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Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

RIVERS POLLUTION COMMISSION (1868).

THIRD REPORT

OF

THE COMMISSIONERS

APPOINTED IN 1868 TO INQUIRE INTO

THE BEST MEANS OF PREVENTING THE POLLUTION OF RIVERS.

POLLUTION ARISING FROM THE WOOLLEN MANUFACTURE, AND PROCESSES CONNECTED THEREWITH.

VOL. II.

EVIDENCE.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
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PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1871.

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PART I.

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EVIDENCE.

PART I.

STATISTICS RELATING TO CITIES, BOROUGHS, TOWNS, LOCAL BOARD OF HEALTH, AND LOCAL GOVERNMENT BOARD DISTRICTS IN ENGLAND AND WALES, SITUATE IN RIVER BASINS ESPECIALLY POLLUTED BY "THE "WOOLLEN MANUFACTURE AND PROCESSES CONNECTED THEREWITH," AND ALSO BY ALKALI AND CHEMICAL WORKS, CALICO AND SILK-PRINT WORKS, CARPET MANUFACTURE, COTTON MANUFACTURES, DYE AND BLEACH WORKS, GAS WORKS, IRON AND COPPER WORKS, MINES, OIL WORKS, PAPER MANUFACTURE, REFUSE FROM MANUFACTURES, SKINNERIES, TOWN SEWAGE, AND TAN YARDS.

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SECTION IV.—Water supply, whence obtained;—situation of works;—volume pumped or abstracted;—area of gathering ground;—situation, area, depth, and capacity of reservoirs;—water filtered, or not;—filtering medium;—pumping power, and cost of pumping;—supply from wells;—area of district, and number of houses and works supplied;—volume and extent of daily supply for domestic, trade, and public purposes;—constant or intermittent service;—cisterns;—supply, adequate or inadequate;—former supply;—means to prevent waste;—rate of charge for water;—cost of works;—analysis of water.—Pages 61–78.

PART I. SECTION I.

QUERIES.—1. Name and area of the city, borough, town, or local board of health or local government board district?—2. Population at last census, and probable yearly increase to the present date?—3. Number of houses, and rate of yearly increase?—4. The rateable value of the city, borough, town, or district?—5. When was the borough incorporated, or the Public Health or Local Government Act adopted?—6. State number of public works that have been executed by the governing body? Waterworks, the cost? Gasworks, the cost? Sewerage works, the cost? Other works, the cost?—7. How were the costs defrayed, by rates, or if by loan, from whom borrowed?—8. Has the Corporation or the Local Board of Health jurisdiction over the river or stream flowing by or through the town?—9. What are the powers and the local Act or Acts of Parliament conferring them?—10. To what extent have those powers been exercised?—11. Describe the past and present condition (within your knowledge) of that part of the river or stream flowing by or through the town, and give the name of the river or stream?—12. Has the bed of the river or stream silted up; if so, to what cause do you attribute it?—13. Is the property situate on either bank of the river or stream affected by floods, and do you attribute them to any obstructions in the river or stream; if so, state the nature thereof?—14. Is the river or stream polluted by town sewage, liquid refuse from manufactures, chemical works, gasworks, dye and bleach works, calico and silk-print works, tanyards, and from mines, and to what extent?—15. Is the river or stream polluted by scoria from ironworks, slags, cinders, small coal, or any other solid refuse?—16. Are encroachments on the river or stream prevented?—17. Is the condition of the river, streams or canals, passing by or through the town, a source of ill-health or discomfort?—18. Are there cellar dwellings in the town; if so, how many?—19. State the rate of mortality per 1,000 in the city, borough, town, or local board district each year from 1859 to 1869?—20. Have the sewerage works or other works of town improvement influenced this rate, and in what manner and degree?—21. Are there any parts of the city, borough, town, or district especially unhealthy; if so, to what cause is this attributed?—22. Are there any parts liable to be flooded occasionally?—23. How is this flooding caused?—24. Have you any suggestions to offer as to the best means of avoiding pollution in future?—25. Have you any suggestions to offer as to the conservancy of rivers and streams?

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2.

Basin of the Wear.

Durham - -

City. Area, 1,260 acres. Population at last census, 14,134; probable yearly increase, 200. Inhabited houses, 2,300; probable yearly increase, 40. Rateable value of city, 34,625*l.* The city was incorporated by Charter granted by Hugh Pudsey, Bishop of Durham, and confirmed by Pope Alexander 3rd, about the year 1130. The Public Health Act was applied to the city by a provisional order dated 19th July 1849, confirmed by 12 and 13 Victoria, chapter 94. The Corporation have not executed any public works, as water or gas works, but they have carried out sewerage works at a cost of 5,853*l.* Of this amount 5,500*l.* were borrowed from private individuals on the security of the rates at 4 per cent., repayable in 30 years; and the balance of 356*l.* for additions recently executed will be paid out of the rates. The Corporation have no jurisdiction over the river *Wear*, which flows through the city, and the present condition of the water is not in a highly polluted state, although the whole of the sewage of the city and towns and district above is discharged into it. To verify this fish may be seen in the river. The bed of the river has silted up caused by solid refuse and rubbish thrown into it from the banks. Property on the banks is affected by floods. The river is polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, tanyards, and by mines; also by slag, cinders, and ashes. Encroachments on the river are not prevented by the Corporation, but the owners of the property on each side of the river are the owners of the bed of the stream to the centre. Opinions differ as to the condition of the river being a source of ill-health, but no doubt its present condition is a source of discomfort. There are three cellar dwellings in the city.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	364	26·1	1865	309	21·1
1860	316	22·5	1866	368	24·8
1861	331	23·4	1867	353	23·5
1862	306	21·5	1868	424	28·0
1863	330	22·9	1869	379	24·9
1864	350	24·1			

Basin of the Wear—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Durham—*cont.*	The sewerage works and other town improvements have beneficially influenced the rate of mortality. There are no parts of the city especially unhealthy, and none liable to be flooded. We suggest as the best means of avoiding pollution in future that the whole of the sewage of cities and towns at present discharged into rivers should be intercepted and conveyed to lands suitable for irrigation purposes. We have no special suggestions to offer as to the conservancy of rivers and streams.

Basin of the Tees.

Darlington -

Borough. Population at last census, 15,799. Present population estimated at 20,000. Inhabited houses, 4,000; 183 houses were built during the last twelve months. Rateable value of borough, 91,395*l.* 15*s.* The Public Health Act, 1848, was adopted in 1850. The borough was incorporated by charter granted in 1867. The Corporation have executed waterworks at a cost of 60,000*l.*; gasworks at a cost of 40,000*l.*; sewerage works at a cost of 17,000*l.*; covered markets at a cost of 16,000*l.* The costs of these works have been defrayed by loans; the gas and water works purchase money secured by mortgage given to the proprietors of the works from whom purchased. In the other cases loans were obtained from private individuals. The Corporation has no jurisdiction over the river *Skerne*, a tributary of the *Tees*, which flows through the borough. It is a very sluggish and polluted stream. The bed of the stream has not silted up. Property on the banks is occasionally flooded. The river is very tortuous, and its course from Darlington to the *Tees* might with great advantage be straightened. The river *Skerne* is polluted by town sewage, liquid refuse from dyeworks and tanyards; it is also polluted by scoria, slag, cinders, and ashes. Encroachments on the river are not prevented by the Corporation. The river is complained of as a source of discomfort, but not of ill-health. There are no cellars occupied as dwellings within the borough.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	295		1865	492	
1860	401	Population of	1866	493	Population of
1861	320	1851, 11,600	1867	498	1851, 11,600
1862	462	1861, 15,799	1868	468	1861, 15,799
1863	487	1870, 23,000	1869	603	1870, 23,000
1864	445				

The town is much healthier; diarrhœa, dysentery, and typhus formerly prevailed to a great extent; these diseases are now rarely met with. There are no districts in the borough especially unhealthy; and no districts liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Stockton - -

Borough. Area, 1,190 acres. Population at last census, 13,357; total increase since last census estimated at 13,090; average yearly increase, 1,305. Inhabited houses, 5,274; average yearly increase for the last 10 years, 261. Rateable value of borough, 69,925*l.* Stockton is an ancient borough; the original charter is supposed to have been granted by King John. The Public Health Act was adopted in 1852, since repealed by the Stockton-on-Tees Extension and Improvement Act, 1869, now the only Local Act in force in the borough. The Corporation have executed gasworks, at a cost of 42,430*l.*; sewerage works, at a cost of 7,200*l.*; cemetery, 7,500*l.*; and public baths and washhouses, at a cost of 3,000*l.* These several costs were defrayed by loans borrowed from the Public Works Loan Commissioners, the Star Life Insurance Office, and private individuals. The Board of Health has, under the Stockton-on-Tees Extension and Improvement Act, jurisdiction over the river *Tees* to mid-stream. These powers are similar to those contained in the 31st section of the Local Government Act. There is not much alteration in the condition of the river; it is fouled by mud and refuse brought down from above. A portion of the low land near the river is flooded during the winter months, this is not attributable to any obstruction in the river. The river is polluted by town sewage, and liquid refuse from manufactories, but not to any pernicious extent. The *Tees* at Stockton is a tidal river; the tide rising 12 feet at Stockton Bridge. The pollution of the river by slag, cinders, and ashes is prevented by the *Tees* Conservancy Commissioners, as are also encroachments on the river. The condition of the river is not a source of ill-health or discomfort. There are no cellars exclusively inhabited as dwellings within the borough.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	303	23·0	1865	522	28·0
1860	272	20·0	1866	555	28·3
1861	374	28·0	1867	555	26·1
1862	334	22·7	1868	498	22·1
1863	456	28·3	1869	655	27·5
1864	436	25·1			

Basin of the Tees—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Stockton—*cont.*	It is very difficult to say whether the sewerage or other works of town improvements have beneficially influenced this rate of mortality, as the population and new buildings have so increased during the last 11 years. No part of the town is especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.
South Stockton -	Local Government Board district. Area, 291 acres. Population at last census 5,067; probable yearly increase, 400. Inhabited houses, 1,154; probable yearly increase, 60. Rateable value of the district 14,790*l.* 16*s.* The Local Board have not executed any public works, as water or gas works; but sewers have been laid in some of the principal streets, and the cost defrayed by contributions from the owners of the adjoining property. The Local Board have jurisdiction, to mid-stream, over the river *Tees*, which flows past South Stockton. The bed of the stream silts up occasionally from soil brought down in time of flood, but the dredging and other operations of the Tees Conservancy Commissioners have lowered the bed. A part of the property situated in South Stockton is subject to floods, but it is not attributable to any obstruction in the river. The river is polluted by the town sewage of South Stockton, Stockton, Darlington, Barnard Castle, Yarm, Middleton, and several other villages on the banks of the river and the tributaries; it is also polluted by liquid refuse from manufactories, and to some extent by "hush" from lead mines. It is not polluted by scoria, slag, cinders, ashes, or small coal from the south side of the river. Encroachments on the river are prevented. The condition of the river is not a source of ill-health or discomfort to the inhabitants. There are no cellar dwellings in the district. The rate of mortality was as follows:—*

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	52	10·0	1865	68	9·1
1860	54	10·0	1866	66	9·0
1861	50	9·0	1867	70	8·7
1862	53	9·0	1868	69	8·5
1863	60	9·5	1869	86	9·5
1864	67	9·0			

	Sewerage and other works of town improvement have not influenced the rate of mortality. There are no parts of the district especially unhealthy; there are parts liable to be flooded by the spring tides. The best means of avoiding the pollution of the river by the sewage of South Stockton would be to intercept the sewage and conduct it, for irrigation, on to the low lands beyond the limits of the town. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.
Middlesbrough	Borough. Area, 2,100 statute acres. Present population about 40,000. Inhabited houses, 7,000; rate of yearly increase about 1,000. Rateable value of borough, 105,000*l.* The borough was incorporated in 1853. The Corporation have executed gasworks at a cost of 41,434*l.* 2*s.* 1*d.*, and sewerage works at a cost of 5,888*l.* 9*s.* 8*d.* These have been defrayed by loans from insurance companies and from private individuals, on the security of the rates. The waterworks were constructed by, and belong to, a private company. The jurisdiction of the river *Tees*, which flows by the town, is vested in the *Tees* Conservancy, four of whom are chosen by the Corporation of Middlesbrough. The powers conferred by the Act relate solely to the navigation of the river. The river *Tees* is a tidal river; Middlesbrough being situated near the estuary thereof. The bed of the river is prevented from silting up by the dredging operations of the Conservancy Board. The river is polluted by town sewage, and liquid refuse from manufactories and chemical works, but on account of the vast volume of water flowing down the river the nuisance has not been complained of. There are large banks formed of slag along the side of the river, which doubtless to a certain extent pollute the water; but the effect is not appreciable, on account of the vastness of the volume of water flowing down. Encroachments are prevented by the Conservancy Board. No complaints have been made of injurious effects upon the health of the inhabitants arising from the condition of the river, but a great amount of discomfort is experienced. There are no cellars used as dwellings within the town. The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	437	17·4	1865	661	18·5
1860	398	14·2	1866	654	18·6
1861	508	16·9	1867	731	20·8
1862	433	14·4	1868	723	20·0
1863	646	20·8	1869	819	21·5
1864	596	17·7			

* See Section III., pp. , Oral Evidence.

Basin of the Tees—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Middlesbrough—*cont.*	Sewerage and other works of town improvement have beneficially influenced the rate of mortality. There are no parts of the borough especially unhealthy. There are some parts of the borough liable to be flooded, caused by a heavy rainfall occurring at high tide when the flap valves to the outfalls of the sewers are closed, the sewage is then consequently dammed back. We suggest as the best means of avoiding pollution in future, that the discharge of sewage into the *Tees* should be prohibited from the towns and villages of Norton, Stockton, Thomaley, Barwick, Yarm, Arsley, Eaglescliff, Worsall, Middleton-on-Row, Dunsdale, Neasham, Thurworth, Dalton Cross, Darlington, Stapleton, Black Well, and Cleasby; also by towns and villages situate near the river *Biss*) all situated at various points above and within a distance of eighteen miles from the Stockton and Middlesbrough water supply); namely, Low Conscliff, High Conscliff, Carlbury, Piercebridge, Gainford, Waiston, Ovington, Whorlton, Greta Bridge, and Barnard Castle; and also all the other towns and villages beyond Barnard Castle. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Basin of the Kent.

Kendal - -	Borough. Area, 2,634 acres. Population at last census, 12,028. Population in 1871 estimated at 12,700. Inhabited houses at last census, 2,850. Average yearly increase, about 15. Rateable value of borough, 38,900*l.* The Public Health Act was adopted in September 1849. The Local Board are now carrying out a system of sewerage works at a cost of 12,000*l.* They have erected public slaughter houses at a cost of 900*l.*; and they have widened and improved streets at a cost of 1,500*l.* Water and gas works were constructed, but they are the property of private companies. The cost of the works executed by the Governing Body was defrayed by loans from private individuals, the repayment extending over a period of 30 years. The Local Board have jurisdiction over the river *Kent*, which flows through the district. The river has latterly been much polluted by sewage, and other refuse from dyeworks, woollen mills, and tanneries in the town; but we anticipate as soon as the sewerage works, now in course of construction, are completed, it will be comparatively pure, as the sewage and other refuse will be intercepted from the river, and conveyed to the land. The bed of the river is not silted up very much. The property situated on either bank of the river is not affected by floods. The river is not polluted by scoria, slag, cinders, small coal, or other solid refuse. Encroachments on the river are prevented. The condition of the river in dry weather, on account of the pollutions turned into it, is a source of discomfort, but not of ill-health. There are no cellar dwellings in the town. The rate of mortality in the borough was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	301	1865	303
1860	232	1866	270
1861	241	1867	322
1862	324	1868	262
1863	260	1869	279
1864	257		

There are no parts of the borough especially unhealthy; nor any liable to be flooded. Have no suggestions to offer as to the best means of preventing pollution in future, or as to the conservancy of rivers and streams.

Basin of the Aire (North Bank).

Skipton - -	Local Board of Health District. Area, 730 statute acres. Population at last census, 5,406; estimated now at upwards of 6,000. Inhabited houses at last census, 1,066; the increase is now much more rapid than in former years. Average yearly increase, 13. Rateable value of district, 12,092*l.* 1*s.* 1*d.* The Public Health Act was adopted in May 1858. The Local Board of Health have carried out sewerage works at a cost of 4,362*l.*, and improvements of streets at a cost of 200*l.* The costs were defrayed by loans borrowed from private individuals on mortgage of the rates. The Local Board has no jurisdiction over the *Ellar Beck*, a tributary of the *Aire*, which flows through the town, and joins that river a mile below the town. This stream has lately been much improved, in many places, by the Airedale Drainage Commissioners, who have straightened and widened the course and deepened the bed. The bed had previously silted up, caused by the sand and loam washed into it from the high lands above. The property situate on the banks of the stream is affected by floods, attributed to the banks not being sufficiently high to prevent the flood waters, which pass down rapidly after a heavy rainfall, from flowing over the lands; the floodwater also backs up the drains. The stream is polluted by town sewage and refuse from manufactories, gasworks, and tanyards. It is not polluted by scoria from ironworks, slag, cinders, or small coal. There are no encroachments on the stream. The condition of the stream is not, to our knowledge, a source of ill-health or discomfort to the inhabitants. There are 40 cellar buildings within the town, but none are used as dwellings. The rate of mortality in Skipton has not been ascertained by the Local Board of Health.

Basin of the Aire (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Skipton—*cont.*	There are not any districts in the town especially unhealthy. In order to avoid pollution in future by town sewage, the Board have before them plans for utilizing the sewage by irrigation; these are now under consideration. The Board have no special suggestions to offer as to the conservancy of rivers and streams.
Silsden - -	Local Board of Health district. Area 6,884 acres. Population at last census, 2,569. Probable yearly increase, 40. Inhabited houses at last census, 500. Probable yearly increase, 4. Rateable value of district, 8,039*l.* The Public Health Act was adopted in 1863. The Governing Body have only constructed small gasworks at a cost of 100*l.*, which was defrayed by loans borrowed from private individuals. The Corporation has no jurisdiction over the *Stort Beck*, a tributary of the *Aire*, which flows through the town. The bed of the stream has not silted up. The property on the banks of the beck is affected by floods, caused by obstructions in the bed of the stream and by refuse thrown in from mills. The stream is polluted by sewage and by manufactories to a limited extent; it is not polluted by slag or cinders. Encroachments on the stream are prevented. The condition of the stream is not a source of ill-health or discomfort. There are no cellar dwellings in the district. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	44	1865	38
1860	38	1866	57
1861	50	1867	50
1862	47	1868	56
1863	45	1869	97
1864	64		

	There are no districts of the town especially unhealthy. We suggest, as the best means of avoiding pollution in future, that town sewage and refuse from manufactories should be purified before being allowed to flow into the stream; that powers should be given to the Local Boards, millowners, and manufacturers to acquire land for the purpose of constructing filters and providing means of purifying the liquid refuse. We have no special suggestions to offer as to the conservancy of rivers and streams.
Bingley - -	Local Government Board district. Area, 10,000 acres. No separate return was made of the population at the last census. The present population is estimated at 12,000. There has not been much increase. Inhabited houses at present are estimated at 2,200. Rateable value of district, 20,000*l.* The Local Government Act was adopted in 1863. The Governing Body have executed in the village of Cullingworth waterworks at a cost of 1,750*l.*, and sewerage works at a cost of 450*l.* These were defrayed by loans from private individuals. The Local Board has not jurisdiction over the streams flowing through the district. The bed of the streams has not silted up. The land adjacent to the river *Aire* is liable to be flooded. The rivers and streams within the district are polluted, but not to any great extent, by town sewage and liquid refuse from manufactories and works. They are also polluted by cinders, slag, and small coal. Encroachments on the streams are not prevented. The condition of the streams is not considered to be a source of ill-health or discomfort to the inhabitants. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859 } 1860 }	We have not returns for these years.	1865	436
		1866	421
1861	356	1867	437
1862	366	1868	689
1863	452	1869	155 first quarter of year.
1864	412		

	There are no districts especially unhealthy. Have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Baildon - -	Local Board of Health district. Area, 1,700 acres. Population at last census, 3,895; present increase not known. Inhabited houses at last census, 950. Probable yearly increase, 16. Rateable value of district, 9,300*l.* The Public Health Act was adopted in the year 1852. The Local Authority have executed waterworks at a cost of 6,700*l.*; defrayed by loan on the security of the rates, borrowed from the Sovereign Life Insurance Company and private individuals. The Local Board of Health have no jurisdiction over a tributary of the *Aire*, flowing through the town. It joins that river at about a mile below the town. The bed of the stream has not silted up. The property on the banks is affected in excessive floods, but not caused by any obstruction in the river. The stream is polluted by sewage, but not by manufacturing refuse, either solid or liquid, within the township of Baildon. Encroachments on the stream are prevented. The condition of the stream is not a source of ill-health or discomfort. There are 10 cellar buildings; but none inhabited as dwellings.

Basin of the Aire (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Baildon—*cont.*	We have applied to the Superintendent Registrar for the rate of mortality, and he declines to give the same; he requires the consent of the Registrar-General. There are no districts especially unhealthy, and none liable to be flooded. No special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Guiseley - -	Local Government Board district. Area, 1,525 statute acres. Population at last census, 2,566; probable yearly increase not known. Inhabited houses at last census, 532; increased to about 700 at the present time. Rateable value of district, 9,548*l.* The Local Government Act was adopted in 1863. The only public work which has been executed by the Governing Body is the making of a new road or street at a cost of nearly 300*l.*, defrayed by loans from private individuals. A *Beck*, a tributary of the *Aire*, flows through the district, and joins that river about 2½ miles from the town. There are no cellar dwellings within the district. We are not able to give the rate of mortality. There are no districts especially unhealthy. Have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

Basin of the Aire (South Bank).

Oxenhope - -	Local Government Board district. Area, 4,260 acres. Population at last census, 2,692; there has been little or no increase. Number of inhabited houses at last census, 651; no increase. Rateable value of district, 5,614*l.* Local Government Act adopted in 1865. The Local Authority has not executed either waterworks, gasworks, sewerage works, or any other public works. The Local Board has no jurisdiction over the river *Worth*, which flows through the town. The bed of the stream has improved within our knowledge; it has not silted up. The property on the banks is not affected by floods. The river is less polluted than formerly by sewage or liquid refuse from manufactories. Encroachments on the river are prevented. There are no cellar dwellings. We have no means of ascertaining the rate of mortality, as two other Local Board of Health districts are included in the registrar's district. People in this district live to a great age. In one house there are four persons of the united ages of 300, and many other persons living in the parish are over 80 years of age. There are no districts especially unhealthy, and none liable to be flooded. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Haworth - -	Local Board of Health district. Area, 360 acres. Population in 1871, 2,884. Inhabited houses, 691. Rateable value of district, 4,920*l.* 19*s.* 1*d.* The Public Health Act, 1848, was applied to the district on 23rd October 1851. The district was altered and amended by a Provisional Order of the General Board of Health dated 1st February 1854, and confirmed by 17 & 18 Victoria, chapter 53. The Local Board have executed waterworks at a cost of 3,050*l.*; but they have not carried out any other public works. The costs were defrayed by loans borrowed from private individuals. The Local Board have no jurisdiction over the river *Worth*, *Sladen Beck*, *Brighouse Beck*, and *Lees Syke*, flowing through the town. The condition of these streams has always within our knowledge been moderately good, although necessarily, from the increase of manufactures, they are polluted. The beds of the streams have silted up, but not to a material extent, caused by ashes, slag, and cinders thrown in. The properties on the banks of the streams are slightly affected by floods. The streams are polluted by town sewage and liquid refuse from gas manufactories, glass works; and to some extent by ashes, slag, and cinders from manufactories. We are not aware that any encroachments are made upon the streams. The rivers and streams passing through the district are not a source of ill-health. There are 13 cellar dwellings in the district of the Local Board. The rate of mortality are as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	211	The total numbers are for the entire township of Haworth, part of which is now in the Oxenhope Local Board district, and part in the Oakworth Local Board district. No separate account for the district of Haworth has been taken or can be arrived at.
1860	108	
1861	103	
1862	133	
1863	140	
1864	147	
1865	132	
1866	141	
1867	121	
1868	87	
1869	104	

	There are no parts of the district especially unhealthy. There are districts liable to be flooded to a slight extent. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
KEIGHLEY - -	Local Board of Health district. Area, 1,800 statute acres. Population at last census, 15,000; probable yearly increase, 700. Inhabited houses in 1869, 3,762. Rateable value of district, 36,000*l.* The Public Health Act was adopted in 1855. Prior to that time the district had been under the control of the Improvement Commissioners under the Keighley Improvement Act, 1824. The Governing Body have executed waterworks at a cost of 20,000*l.*, and are extending them at a cost of 130,000*l*; gasworks, 6,000*l.*, and sewerage works, 4,000*l.* These costs were, and are being, defrayed by loans. The improvements in the gasworks have been paid for out of rates and the revenue arising from gas rents. The Local Board have jurisdiction, under sections 51, 52, and 53 of the Keighley Waterworks and Improvement Act, 1867, over the river *Worth* and the *North Beck*, which flow through the town. These powers have been exercised, but no proceedings have as yet been taken before the justices. Public notice has been given, and the condition of the stream is much improved. The condition of the *North Beck*, particularly some 30 years ago, was very impure, and the bed has risen not less than 4 or 5 feet in vertical height, caused by the amount of solid refuse turned into it. Property situate on the banks is affected by floods caused by the silting up of the bed of the streams. The streams are polluted by town sewage and liquid refuse from manufactories and works; also by slag, cinders, and small coal, but not to such a degree as formerly. There have been no recent encroachments on the river. The condition of the stream passing through the town is a source of discomfort, but not of ill-health. There are a number of cellar dwellings in the town. The rate of mortality was as follows:—

DEATHS registered in the DISTRICT of KEIGHLEY from January 1st, 1861, to March 31st, 1869, inclusive. Total, 8 Years and 3 Months.

Keighley Town within Board of Health District.

—	—	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	Total, 8 years.	1st Quarter 1869.
1,095	Ingraw -	24	32	43	28	33	31	33	62	286	5
3,907	South -	85	97	126	115	114	112	114	186	949	38
2,583	West -	66	74	81	74	78	81	91	124	669	42
1,554	Centre -	45	33	31	48	47	58	35	73	370	15
2,421	North -	59	45	63	57	73	64	68	117	546	21
3,442	Eastern -	77	85	108	90	91	75	96	127	749	34
15,002		356	366	452	412	436	421	437	689	3,569	155

	The chief cause of the increase in the death rate of Keighley is the want of a good water supply, which the Local Board are now carrying out works to obtain. There are no districts especially unhealthy, and none liable to be flooded. We suggest that there should be one general law throughout the country as to the conservancy of rivers and streams—no partial legislation. It is desirable that conservancy boards should be formed, having jurisdiction over river basins.
DENHOLM GATE -	Local Board of Health district. Area, 2,200 acres. Population at last census, 3,000; probable yearly increase, 200. Inhabited houses at last census, 600; probable yearly increase, 5. Rateable value of district under General District Rate, 5,000*l.* Highway rate, 8,000*l.* The Public Health Act was adopted in 1865. The Governing Body have not executed any public works, such as gasworks or waterworks. The Local Board of Health have no jurisdiction over the *Harden Beck*, which flows through the town. There is very little difference in the condition of the river within our knowledge. The bed of the river has not silted up. The property on the banks is not affected by floods. The river is polluted by sewage, but not by liquid or solid refuse from works and manufactories. Encroachments on the stream are not prevented. The condition of the stream is not a source of ill-health or discomfort. There are no cellar dwellings within the town. We are not able to give the separate rate of mortality for this district. There are no districts especially unhealthy, and none liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, as the district of Denholm Gate is situate near to the source of the *Harden Beck*, which is here an unpolluted stream. No special suggestions to offer as to the conservancy of rivers and streams.
ALLERTON - -	Local Board of Health district. Area, 1,789 acres. Population at last census, 2,006; probable yearly increase about 100. Inhabited houses at last census, 550; yearly increase 50 for the last three years, but for seven or eight years previously to that there was no increase. Rateable value of district, 8,000*l.* The Public Health Act was adopted September 9th, 1863. The Local Board have not executed water-

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
ALLERTON—*cont.*	works or gasworks, but in 1869 they executed sewerage works at a cost of 240*l.*, defrayed out of the rates. There are no streams flowing through the district, but a tributary of the *Bradford Beck* flows within half a mile of the district. There are no cellar dwellings within the district. We are not able to give the rate of mortality for this district. There are no parts of the district especially unhealthy; none liable to be flooded. We have no suggestions to offer.
WILSDEN - -	Local Government Board district. Area, 2,607 statute acres. Population at last census, 2,888; probable yearly increase, 50. Inhabited houses at last census, 729; probable yearly increase, 20. Rateable value of district, 7,908*l.* 17*s.* 4*d.* The Local Government Act was adopted in May 1865. The Governing Body have not executed any public works, such as waterworks or sewerage. The gasworks have been executed by a private company. The Local Board has no jurisdiction over the *Wilsden Beck*, which flows into the *Harden Beck*, and thence into the *Aire*. The condition of the stream is much more polluted than formerly, by town sewage and liquid refuse from manufactories; especially in the months of June, July, and August; it is then very offensive. In winter a considerable volume of water flows rapidly down the stream, and to prevent the rapid scour acting on the banks and the bed of the *Beck*, the channel has been pitched, and retaining walls built on the sides. The property on the banks is not affected by floods. The *Beck* is polluted by the whole of the sewage of the town; also by coal mines; very little by refuse from manufactories. Encroachments on the *Beck* are prevented. The stench from the *Beck* in summer time is very disagreeable, and is a source of discomfort. There are no cellar dwellings within the town. The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	81	27	1865	57	19
1860	61	20	1866	73	24
1861	60	20	1867	62	20
1862	79	26	1868	48	16
1863	50	16	1869	74	24
1864	66	22			

	There are no parts of the district especially unhealthy, nor any liable to be flooded. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
THORNTON - -	Local Board of Health district. Area, 3,295 statute acres. Population at last census, 4,811; probable yearly increase, 100. Inhabited houses at last census, 1,353; probable yearly increase, 55. Rateable value of district, 10,577*l.* 7*s.* 1*d.* The Public Health Act was adopted 5th June 1865. The Governing Body have executed waterworks at a cost of 4,710*l.* 1*s.* 4*d.*; but have not executed either gasworks, sewerage or any other public works. The costs were defrayed by loans borrowed from private individuals on the security of the rates. The Local Board of Health has no jurisdiction over the *Beck*, which flows through the district; it is a comparatively pure stream, and very little polluted. The bed of the stream has silted up to a small extent; caused chiefly by débris brought down in time of floods, and partly owing to the tortuous form of the stream. The property on the banks of the stream is slightly affected by floods. The river is polluted to a small extent by town sewage, wool washing, and refuse from chemical works; it is not polluted by slag, cinders, or small coal. Encroachments are prevented. The condition of the stream is not a source of discomfort. There are no cellar dwellings in the town. We are not able to give the rate of mortality. There are no districts in the town especially unhealthy; none liable to be flooded. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
BOLTON - -	Local Government Board district. Area, 105 acres. Population at last census, 937; probable yearly increase, 30. Inhabited houses at last census, 270; probable yearly increase, 6. Rateable value of district, 4,000*l.* The Local Government Act was adopted in 1865. The Governing Body have not executed any public works, as water, gas, sewerage, or other works. The Corporation has no jurisdiction over the *Bradford Beck*, which flows through a portion of the district. This stream has been very much polluted for more than twenty years, principally by sewage and refuse from Bradford, and particularly so since the Bradford canal was closed, three years ago, under an injunction from the Court of Chancery. The bed of the *Beck* has silted up, caused by solid refuse being thrown into it. The property on the banks of the stream is affected by floods, caused by the silting up of the bed. The stream is fearfully polluted by town sewage, and refuse from manufactories and works. It is also polluted by slag, cinders, and small coal. Encroachments on the stream are prevented. The condition of the stream is a source of ill-health; the canal, above referred to, which was fed by the stream, was closed in consequence of its being an intolerable pestilential nuisance. There are no cellar dwellings in the town.

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
BOLTON—*cont.*	We are not able to furnish the rate of mortality. There are no parts of the district especially unhealthy, and none liable to be flooded. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
BRADFORD - -	Borough area, 6,508 statute acres. Population at last census, 106,000; increase very great; now estimated at 140,000. The present number of inhabited houses is estimated at 29,000; annual increase very irregular, but very considerable. Rateable value, 504,192*l.* The borough was incorporated in June 1847. The Corporation have executed waterworks at a cost of 1,100,000*l.*; sewerage works at a cost of 70,000*l.*; street improvements at a cost of 150,000*l.*; cemetery at a cost of 7,000*l.*; and markets at a cost of 30,000*l.* There is also a public park, the gift of a private individual; the costs of the several works were defrayed partly by rates, and partly by loans, all borrowed from private sources. The Corporation have jurisdiction, for only limited purposes, over *Bradford Beck*, which flows through the town; but rights of water have been acquired which are beyond their control. The Acts conferring these powers are the Bradford Improvement Act, 1850; the Public Health and Local Government Acts, and Waterworks Acts of 1854, 1855, 1856, 1857, 1858, and 1859; the Corporation Act of 1866; and the Improvement Act of 1869. The Corporation have exercised the powers conferred by these Acts to the fullest extent. The condition of *Bradford Beck* is now, and long has been, most foul; the bed has silted up from solid refuse formerly thrown into it, but this practice is now discontinued. The property on the banks of the *Beck* is seriously affected by floods, caused by the silting up of the bed and the contracted nature of the channel. The *Beck* is seriously polluted by town sewage, liquid refuse from manufactories, chemical works, gas works, bleach works, calico and silk-print works, tan yards, and by mines. It is slightly polluted by ashes, but the practice of discharging scoria and slag into the *Beck* is discontinued. Encroachments on the *Beck* are prevented. The condition of the *Beck* is a source of discomfort. There are 917 cellars used as dwellings within the borough. The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	2,702	20·8	1865	3,454	28·3
1860	2,360	18·0	1866	3,498	28·2
1861	2,893	27·0	1867	3,306	25·3
1862	2,536	24·0	1868	3,252	24·2
1863	3,040	26·2	1869	3,576	25·8
1864	3,396	28·3			

	The sewerage and other works of town improvement have beneficially influenced the rate of mortality. The districts of the town especially unhealthy are those occupied by the low Irish. The town used to be continually flooded, but the sewers have cured that evil; although at the points where the sewage is discharged into the *Beck*, near the Borough boundary, the stream overflows after a heavy rainfall. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
HEATON - -	Local Government Board district. Area, 1,296 acres. Population at last census, 1,693. Inhabited houses at last census, 406. Rateable value of district, 7,050*l.* 3*s.* 9*d.* The Local Government Act was adopted in 1864. The Governing Body have executed sewerage works at a cost of 244*l.*, defrayed by rates. There is a small stream, an affluent of the *Bradford Beck*, a tributary of the *Aire*, which flows through the township. There are no cellar dwellings in the township. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	20	1865	23
1860	23	1866	26
1861	23	1867	21
1862	25	1868	24
1863	20	1869	19
1864	19		

	There are no districts especially unhealthy, or any liable to be flooded. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
SHIPLEY - -	Local Board of Health district. Area, 1,330 acres. Population at last census, 7,098. Inhabited houses at last census, 1,963; probable yearly increase, 150. Rateable value of district, 32,000*l.* The Public Health Act was adopted in 1853. The Governing Body have executed waterworks at a cost of 29,800*l.*; sewerage works at a cost of 6,000*l.*; other sanitary works at a cost of 2,050*l.* The costs of these works were defrayed by loans from insurance companies and private individuals on the security of the rates. The Local Board have no jurisdiction over the river *Aire* which flows by the town. The condition of the river has not changed within our knowledge. The bed of the river has not silted up. Property on the banks is not affected by floods. The river

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
SHIPLEY—*cont.*	is polluted by town sewage and liquid refuse from manufactories and works, but not by scoria from ironworks, slag, cinders, or small coal. Encroachments on the river are prevented. The condition of the river is not a source of ill-health or discomfort to the inhabitants. There are 30 cellar buildings in the town, used as dwellings. The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	We are unable to give this information.		1865	We are unable to give this information.	
1860			1866		
1861			1867		
1862			1868		
1863			1869		
1864					

	We are not able to say whether the sewerage or other works have had a beneficial influence on the health of the inhabitants. There are no districts in the town especially unhealthy, and none liable to be flooded. Have no special suggestions to offer as to the best mode of avoiding pollution in future, or as to the conservancy of rivers and streams.
WINDHILL - -	Local Board of Health district. Area 240 acres. Population at last census 4,110, probable yearly increase 130. Inhabited houses at last census 1,300, probable yearly increase 30. Rateable value of district 7,500*l.* The Public Health Act was adopted in 1855. The Governing Body have executed waterworks at a cost of 2,200*l.*, but no other public works. The costs were defrayed by loans from private individuals. The Local Board have no jurisdiction over *Bradford Beck* which flows past the western boundary of this district. The stream is in much the same condition as when this Board was established. The bed of the stream has not silted up. Property on the banks is not affected by floods. The stream is polluted before it reaches this district by the town sewage of Bradford, liquid refuse from manufactories and works, and the sewage of this district also flows into it. The stream is not polluted by scoria from ironworks, slag, cinders, or small coal. Encroachments on the stream are prevented. There are about 50 cellar buildings in the district, but not any used as dwellings. We cannot obtain the rate of mortality. It is believed that the condition of the *Bradford Beck* seriously affects the health of the inhabitants of this district. There are no parts of the districts especially unhealthy, or any liable to be flooded. Have no suggestions to offer as to the best mode of avoiding pollution in future, or as to the conservancy of rivers and streams.
ECCLESHILL - -	Local Board of Health district. Area, 1,220 acres. Population at last census, 4,482; probable yearly increase, 200. Inhabited houses at last census, 1,282; probable yearly increase, 24. Rateable value of district, 9,095*l.* The Public Health Act was adopted in 1855. The Governing Body have executed waterworks at a cost of 3,800*l.*, an outfall sewer at a cost of 128*l.*, and an annual rentcharge of 8*l.* The waterworks were paid for by loans from private individuals, and the sewerage works by rates. The Local Board of Health has no jurisdiction over the river *Aire*, which flows by the district. It was formerly a clear stream, it is now black and muddy. The bed of the stream has not silted up. Property on the banks is affected by floods. The river is extremely polluted by town sewage, liquid refuse from manufactories, chemical works, bleach works, calico and silk-print works, tanyards and mines, before it reaches this district, but not by slag, cinders, or small coal. Encroachments on the river are prevented. The condition of the river is a source of ill-health and discomfort. There are no cellar dwellings in the town. We have no means of ascertaining the rate of mortality. There are no parts of the district especially unhealthy. Have no suggestions to offer as to the best means of avoiding pollution, or as to the conservancy of rivers and streams.
CALVERLEY - -	Local Government Board district. Area, 2,300 acres. Population at last census was not taken separately for this district, it was probably 2,000, and the probable yearly increase has been 100. Inhabited houses at last census, 620; probable yearly increase, 32. Rateable value, 12,198*l.* Local Government Act was adopted in November 1866. The Governing Body have not executed any public works, such as water, gas, or sewerage works. The Local Board have no jurisdiction over the river *Aire*, which flows through the district. During the last sixteen years it has been in much the same condition as at present. The water is of a very dark colour, and in summer most offensive. The bed of the river has not silted up. Property on the banks of the river is sometimes affected by floods. The river is seriously polluted by town sewage and liquid refuse from manufactories, but not by slag, cinders, or small coal. There are not many houses in the district near the river, so that its effect upon the health of the inhabitants cannot be ascertained. The stench given off in warm weather is such, as certainly to make living near the river very disagreeable. There are no cellar dwellings in the town. We are unable to procure the returns of the rate of mortality. There are no districts especially unhealthy. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
FARSLEY - -	Local Board of Health district.—Area, 1,000 acres. Population at last census, 3,500; probable yearly increase, 50. Inhabited houses at last census, 760; probable yearly increase, 10. Rateable value of district, 9,582*l.* 2*s.* 5*d.* The Public Health Act was adopted in May 1866. The Local Board of Health have not executed either waterworks, gasworks, or sewerage works, but five acres of land were presented to the township as a recreation ground, and the Board have, at an expense of 170*l.*, erected a wall round the same. The costs were defrayed out of the general district rates. The Local Board have no jurisdiction over an affluent of the *Bagley Beck*, a tributary of the *Aire*, which flows through the district. The bed of the stream has not silted up. The *Beck* is polluted by town sewage, but not by liquid refuse from manufactories, or by slag or cinders. The condition of the *Beck* is not a source of ill-health. There are no cellar dwellings in the town. Cannot give the rate of mortality for the Local Board of Health district, as the parish includes Calverley, Farsley, and Thornbury. There are no districts especially unhealthy, nor any liable to be flooded. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
DRIGHLINGTON -	*In reply to the letter of the Secretary to the Commission, the Clerk to the Local Board of Health transmitted the following communication:—* SIR, Birstal, near Leeds, 9th June 1870. I RECEIVED your letter of the 2nd inst. The Local Board of Health have not executed any public works, as water, gas, or sewerage works. There is no river flowing by or through the township. There is no separate rate of mortality kept, and I could not supply the information required in your letter and queries without incurring expenses to the extent of a large portion of my salary. The Board will not pay me for making the inquiries. They have tried to get the information required themselves, but have failed to do so. Your queries therefore do not seem applicable to small places like this. I am, &c. S. J. Smith, Esq., Secretary, Rivers Pollution Commission, Westminster. (Signed) JOHN SMITH, Clerk to Local Board of Health.
MORLEY - -	Local Board of Health district.—Area, 2,697 acres. Population at last census, 6,835; probable yearly increase, about 200. Inhabited houses at last census, 1,900; probable yearly increase, 50. Rateable value of district, 30,524*l.* 19*s.* 11½*d.* The Public Health Act was adopted in 1862. The Goveraing Body have executed waterworks at a cost of 20,000*l.*, and sewerage works at a cost of 8,000*l.* The costs were defrayed by loans from private individuals. The gasworks have been erected by a private company. The Local Board have no jurisdiction over a tributary of the *Aire* which flows through the district and joins that river about five miles below the town. The bed of the stream has not silted up. Property on the banks is not affected by floods. The stream is polluted by town sewage, but not by manufacturing refuse. The condition of the stream is not a source of ill-health. There are no cellar dwellings. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	159	1865	187
1860	159	1866	276
1861	188	1867	250
1862	165	1868	244
1863	218	1869	208
1864	174		

There are no districts of the town especially unhealthy, and none liable to be flooded. Have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

Basin of the Aire (North and South Banks).

LEEDS - - - Borough. Area, 34 square miles. Population at last census, 207,165. Inhabited houses, June 1870, 59,136; probable yearly increase during the last nine years, 1,390. Rateable value of borough, 722,078*l.* The borough was incorporated in the year 1650. The Corporation have executed waterworks at a cost of 535,620*l.*; gasworks, 800,000*l.*; sewerage works, 222,000*l.*; markets, 109,700*l.*; burial grounds, 26,200*l.*; recreation grounds, 10,200*l.*; purchase of tolls, 67,400*l.*; improvements to the Becks, 11,300*l.*; improvements to streets, 195,000*l.*; town hall and assize courts, 126,900*l.*; borough gaol, 57,000*l.* The cost of these several works was defrayed by loans from private individuals, by rates, and by the sale of water and gas. The Corporation have no jurisdiction over the river *Aire*, which flows through the centre of the borough. About twenty years ago the stream was comparatively clear, since that time it has become and is now a black and greatly polluted stream. There are several weirs across the river in the town, for the purpose of raising the water to give motive power to mills; these dams cause a silting up of the bed, and prevent a free flow of flood water. Property situate on the banks of the river during extraordinary floods is very much affected thereby. The river is polluted above and below the town with sewage from towns, and liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, and tanyards, also by slag, cinders, and small coal. Encroachments on the river have not been prevented. The river and streams flowing through the town are, especially

BASIN OF THE AIRE (NORTH AND SOUTH BANKS)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
LEEDS—*cont.*	in time of drought, very foul, and consequently prejudicial to the health and comfort of the inhabitants. There are 612 cellar dwellings. The rate of mortality was as follows:—

Years.	Rate per 1,000 per Annum.	Years.	Rate per 1,000 per Annum.
1861*	25·9	1866	32·5
1862	29·1	1867	26·0
1863	33·8	1868	27·4
1864	30·4	1869	26·2
1865	30·9		

There are districts in the town, particularly in the eastern portion, which are especially unhealthy. A portion of the town near and below Leeds Bridge is occasionally flooded after heavy and continued rainfall in the upper portion of the valley of the *Aire*. We suggest, as the best means of avoiding pollution in future, that the local authorities and manufacturers should be compelled to utilize the sewage and liquid refuse, or to filter, deodorize, and precipitate it before allowing it to flow into rivers and their tributaries; and that boards should be appointed for the proper conservancy of rivers and streams.

Basin of the Calder (North and South Banks).

TODMORDEN - - Local Board of Health district. Area, statute acres. Population at last census, 11,797; the population varies very much. The total births exceeded the deaths by 2,802 from 1859 to 1869 inclusive. Inhabited houses, 3,010; probable yearly increase, 25. Rateable value of districts, 34,150*l.* The Local Government Act was adopted in 1861. The Governing Body have not executed either water or gas works; but sewerage works at a cost of 7,661*l.* 1*s.* 11*d.*; paving, 4,034*l.*; and lighting, 643*l.* The costs were defrayed by loans from private individuals at 4½ per cent., on the security of the rates. The Governing Body has no special jurisdiction over the river *Calder*, flowing through the town. The bed of the river has silted up very much during the last thirty years, caused by ashes, foundation excavations, refuse and filth from the houses adjacent to the stream, and also by débris washed down from the hills in time of flood. The stream is not so pure as formerly. The property on the banks of the stream is affected by floods, caused by the silting up of the bed, and by weirs formed in the river channel. The river is polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dyeworks, and from mines; and by scoria from iron foundries, slag cinders, and small coal. There have not been any considerable encroachments made on the river, and there have not been any serious complaints made of the condition of the river or its effect on the health of the inhabitants. There are 60 cellar dwellings in the town.
The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	383	22	1865	468	23
1860	438	25	1866	483	24
1861	457	22	1867	400	20
1862	415	20	1868	399	20
1863	366	18	1869	438	22
1864	571	28			

We have no account showing the deaths in the Local Board district separately, but in the Registrar's district of Todmorden, containing *inter alia* the Todmorden Local Board district, the population in 1851 was 17,265, and in 1861, 28,279, and we have given the rate of mortality in the registrar's district. The sewerage works are not completed, and cannot have produced any perceptible effect on the rate of mortality. We are not aware that there are any districts especially unhealthy. We suggest, as the best means of avoiding pollution in future, that the sewage of towns and refuse from manufactories should be prohibited from being turned into the streams. We have no special suggestions to offer as to the conservancy of rivers and streams.

Basin of the Calder (North Bank).

HEBDEN BRIDGE - *In reply to the letter of the Secretary to the Commission, the Clerk to the Local Board of Health transmitted the following communication:—*
SIR, Halifax, 3rd June 1870.
IN order to answer your queries with anything approaching to accuracy, I must spend some time in making inquiries. As the Local Board of Hebden Bridge have no power to pay me out of the rates levied by them, I must decline to answer your queries. The district of Hebden Bridge is a new district, and includes the corners of five townships, and consequently would require an inquiry into the circumstances relating to the whole of the five townships.
I am, &c.
S. J. Smith, Esq., Secretary, Rivers Pollution Commission, Westminster, S.W. (Signed) FRANCIS JUDD.

* First year registration returns made in districts for the Corporation.

Basin of the Calder (North Bank).

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*

Midgley - -

Local Government Board District. Area, 1,268 acres. Population in 1861, 2,933; in 1871, 3,065. Inhabited houses in 1861, 701, averaging for the last 10 years, 10 per annum. Rateable value of the district, 8,713*l.* 12*s.* 6*d.* Local Government Act was adopted 10th April 1863. The Governing Body have not executed any public works, as water, gas, or sewerage works. There are no cellar dwellings in the district. The rate of mortality was as follows:—

Year.	Total Deaths.	Rate per 1,000 per Annum.	Year.	Total Deaths.	Rate per 1,000 per Annum.
1859	55	19·0	1865	70	24·5
1860	81	28·5	1866	46	16·0
1861	64	22·5	1867	68	23·7
1862	59	20·7	1868	48	16·7
1863	51	18·0	1869	58	20·0
1864	58	20·0			

The rest of the queries have not been answered.

Although numerous applications had been made to the Clerk to this Local Board for statistics, they were only furnished September 22nd, 1871, and then, in a most incomplete manner.

Luddenden Foot -

Local Government Board District. Area, 600 statute acres. Population at last census, 3,100. Probable yearly increase about 50. Inhabited houses, . Rateable value of the district, 10,120*l.* 5*s.* 6*d.* The Local Government Act was adopted in February 1868. The local authorities have not executed any public works, as water, gas, or sewerage works. They have no jurisdiction over the river or stream flowing by or through the district, except that conferred by the Local Government Act of 1858, and subsequent Acts incorporated therewith. The river *Calder* flows through the district. The river is polluted by refuse from mills and dyeworks thrown in along the course of the stream. The river becomes worse every year, because of the increase of the mills and population on its banks. The bed of the river is silted up, caused by ashes and solid refuse thrown in. The property on either bank of the river or stream is not to any great extent affected by floods. The river is polluted by sewage, liquid refuse from manufactories, chemical works, gas works, dye and bleach works, tan yards, and from mines. The water is often the colour of ink. The river is also polluted by scoria from iron works, slag, cinders, small coal, and other solid refuse. Encroachments on the river are not prevented. The condition of the river is not a source of ill-health, but of great discomfort in hot and droughty weather. There are no cellar dwellings within the district. We are not able to state the mortality in the district. There are no parts of the district especially unhealthy, and none liable to be flooded. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

Warley - -

Reply received from Clerk to the Local Board of Health of Warley in answer to a third application for answers to queries.

Halifax, 25th May 1871.

Sir,

The Local Board of Warley when asked to furnish the return you require, considered that they had not enough interest in the question to justify them in incurring the expense necessary to do so.

I am, &c.

(Signed) J. B. Holroyde,
Clerk to the said Local Board.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

Sowerby Bridge -

Local Board of Health district. Area, 540 statute acres. Population at last census, 6,500; probable yearly increase, 200. Inhabited houses at last census, 1,500; probable yearly increase, 35. Rateable value of district, 27,000*l.* The Public Health Act was adopted 15th August 1856. The Governing Body have executed the following public works:—Water mains and fittings, cost, 9,000*l.*; gasworks, 43,000*l.*; sewerage works, 6,000*l.*; cemetery, 7,000*l.*; and slaughter-houses, 1,500*l.* The costs were defrayed by loans from private individuals. The Local Board have no jurisdiction over the river *Calder*, which has for a long period been fouled by town sewage and refuse from manufactories, but is not in an offensive condition, nor has the Board jurisdiction over the river *Ryburn* which flows into the *Calder* within the district of the Local Board of Health. The river *Ryburn* is considerably fouled by town sewage and refuse from dyeworks, and in dry seasons is very offensive; the bed has silted up, caused by solid refuse put into it; property on the banks of the river is affected by floods. Neither of the rivers are polluted by scoria from ironworks, slag, cinders, or small coal. Encroachments on the rivers are prevented. The condition of the rivers flowing by or through the town is not a source of ill-health. There are a great many cellar buildings in the town, but we do not know how many are used as dwellings. The Local Board cannot furnish the rate of mortality. There are no districts especially unhealthy; but there are districts liable to be flooded occasionally. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

Basin of the Calder (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*

Queensbury - -

Local Government Board district. Area, 1,500 acres. Population at last census, about 7,000; probable yearly increase, about 500. Inhabited houses at last census, 2,500; probable yearly increase, about 20. Rateable value of district, 12,600*l.* The Local Government Act was adopted in 1864. The Local Board of Health has not executed any public works, as water, gas, or sewerage works. The Local Board of Health has no jurisdiction over the stream which flows by the district. There are no cellar dwellings in the district. There are no parts of the district especially unhealthy. The Local Board district comprises part of two townships. We have no means of ascertaining the rate of mortality. We have no suggestions to offer as to the conservancy of rivers and streams.

Halifax - -

Borough. Area, 3,768 acres or thereabouts. The boundary of the borough was extended in 1865. Present estimated population, 65,000. Number of houses, 10,818. Rateable value of borough, 184,844*l.* 12*s.* 2*d.* The borough was incorporated 2nd March 1848. The Local Government Act was adopted 20th July 1851, and confirmed by Local Government Supplemental Act, 1851 (No. 3.). The Corporation have executed water-works at a cost of 373,432*l.*; gasworks, 190,232*l.*; sewerage works, 77,000*l.*; markets, 12,640*l.*; town hall, 45,000*l.*; bonding warehouse, 3,550*l.*; and baths, 6,000*l.* The public park is a gift of Sir Francis Crossley, Baronet, and is valued at 100,000*l.* The costs of the public works have been defrayed by loan, authorised by local Act, secured on the properties of the Corporation, and the borough fund or debenture bonds, borrowed from private individuals. The Corporation have certain powers to abate nuisance by preventing the outlets of new sewers being made into the river *Hebble*; and for regulating and cleansing the mill-dams on that stream. The *Hebble* flows through the town. It rises in a moorland district about five miles north of Halifax, and enters the borough near Wheatley mills in a comparatively pure state. In its passage through the town it becomes considerably discoloured, and polluted by refuse from mills, dyeworks, and other manufactories; occasionally by ashes thrown into it in times of flood. The sewage of the town has from time immemorial been turned into the river. In 1855-6 the town was systematically drained by the Local Board of Health; the whole of the drainage of the town being intercepted and discharged into the river at the lowest level within the then Local Board of Health district. In July 1869 an injunction was obtained from the Court of Chancery to restrain the Local Board from making any new sewer into existing drains in connexion with the above-named outfall, and from and after the 1st of June 1870 to remove the entire sewage of the town out of the *Hebble*, until or unless the same shall have been sufficiently purified and deodorized. Works have recently been executed whereby the whole of the sewage discharged through the intercepting sewers is now carried to the lowest point of the borough available for treating sewage, in compliance with the terms of the injunction, and there are settling tanks near the point for that purpose. What process will be eventually adopted has not yet been determined, as the Corporation have been waiting for the recommendation of the Rivers Pollution Commissioners to assist them in settling this difficult question. Whatever works may be determined upon can only be experimental; they will involve a considerable outlay of the ratepayers money, estimated at a sum not less than 25,000*l.* The *Calder* is not unfrequently flooded, affecting the property on its banks; but the *Hebble* is kept within its banks by the formation of a reservoir at the head of the *Hebble* valley; there the flood water is impounded, and the flow of the water down the river is so regulated that no injurious effects arise therefrom. Encroachments on the streams are prevented by the riparian owners. The exhalations from polluted rivers are offensive and a source of discomfort; but there is no direct evidence to show that the inhabitants on the banks of these streams suffer exceptionally from those who reside in other parts of the town. It is believed that the chemical refuse from dyeworks neutralizes the ill effects of sewage. Cellar dwellings are strictly prohibited.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859, 1860, 1861	No returns for these years.		1865	1,276	32·71
			1866	1,457	26·01
			1867	1,417	25·07
1862	1,019	27·17	1868	1,502	26·35
1863	973	25·60	1869	1,634	28·66
1864	1,304	34·12			

The sewerage and other works of town improvement have had a beneficial effect on the rate of mortality, and undoubtedly the habits of the people are necessarily improved by the facilities afforded by a system of efficient drainage. The districts especially unhealthy are those which have not yet been reached by the town sewers. There are no districts especially liable to be flooded. The means of avoiding pollution by sewage in future appear to be surrounded with difficulty. In densely populated districts irrigation is difficult, if not entirely impracticable, involving a combination of districts, to execute jointly works best suited to meet the requirements of their districts; but in the West Riding of Yorkshire, where the various manufacturers situated in one large town turn their refuse whether from dyeing, wool washing, or other trades or processes into the public sewers, a combination of causes renders the means of avoiding pollution more

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
HALIFAX—*cont.*	difficult. If manufacturers whose works are situate upon, and directly pollute, the streams are to use means to avoid pollution, then the same law should apply to those works or factories the refuse from which are turned into town sewers. Irrigation has been suggested on the high moorlands, but if such were to be attempted in this locality there would be a riot, as the water supplied to the town is brought from the high lands by gravitation, and it is to be feared that the springs would be injured for manufacturing purposes. We suggest, for the control of rivers and streams, a well considered system of conservancy confined to each river basin and its tributaries, to be managed by a board elected by corporations and local authorities of towns of 20,000 inhabitants and upwards, with a Government officer, to be paid by the local authorities, as inspector; the Board to have power to divide and fix separate rating areas, power of appeal to the Board, or to an officer to be specially appointed by the Government, *i.e.*, the Home Secretary, against the rating orders. The law should attack every source of pollution.
NORTH OWRAM -	Local Government Board district. Area, 1,323 acres. Population at last census, about 4,000; but it is difficult to state it correctly, as a part of the township of North Owram is included in the district of the Queensbury Local Board and the borough of Halifax, and the census was taken in townships. It is doubtful whether there has been any increase or not. Inhabited houses about 700; probable yearly increase about two. Rateable value of district, 8,898*l.* 19*s.* 2*d.* The Local Government Act was adopted in 1858. The Governing Body have not executed any public works, as water, gas, or sewerage works. There is no river flowing by the district. There are no cellar dwellings. We are unable to give the rate of mortality. There are no districts of the town especially unhealthy. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
SOUTH OWRAM -	Local Government Board district. Area, 1,600 acres. Population at last census, about 3,500; there has been very little, if any, increase. Inhabited houses, 600; yearly increase, about 3 per cent. Rateable value of district, 9,400*l.* The Local Government Act was adopted in February 1866. The Governing Body have not executed any public works, as water, gas, or sewerage works. The Local Board have no jurisdiction over the river *Calder*, which flows about a mile or upwards from the populous part of the district, beyond that which is conferred by the Public Health Act. The river was much purer a few years since than it is at present; the bed has not silted up; property on the banks is sometimes affected by floods, but this is not attributable to any obstruction on the river. The river is more or less polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, tanyards, and from mines. It is also polluted by ashes, cinders, and small coals. Encroachments on the river are not generally prevented. The condition of the river is a source of ill-health and discomfort. There are no cellar dwellings. We cannot furnish the rate of mortality, as no record has been kept There are no parts of the district especially unhealthy. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
SHELF - - -	Local Government Board district. Area, 1,302 acres Population at last census, 3,063. There was a decrease of 356 in the population between the census of 1851 and 1861, and it is believed that there is no increase since that date. Inhabited houses, 744; probable yearly increase, 2. Rateable value of district, 7,225*l.* 14*s.* 6*d.* The Local Government Act was adopted in June 1863. The Governing Body have not executed water or gas works, but they have executed sewerage works at a cost of 100*l.*, defrayed out of the rates. The Local Board have no special jurisdiction over the streams flowing through the township. The small streams flowing through the township have been polluted for many years. The names of the streams (all tributaries of the river *Calder*), are *Lumb Brook*, *Woodfall Beck*, and *Sun Wood Beck*; these rise within the district. *Blakeshaw* or *Royd's Hall Beck* rises in an adjoining district near Queensbury, and is in a polluted state on entering Shelf district. The becks are but hill side streams; the beds have not silted up. *Sun Wood Beck* is polluted by dyeworks, *Woodfall Beck* by refuse from manufactories, and *Blakeshaw Beck* by refuse from manufactories and breweries. The condition of the streams is a source of inconvenience to the inhabitants, who would use the water for domestic purposes if unpolluted. There are no cellar dwellings. We are not able to give the rate of mortality. There are no parts of the district especially unhealthy. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled to keep the refuse from their manufactories out of rivers and streams. Have no special suggestions to offer as to the conservancy of rivers and streams.
BRIGHOUSE - -	Local Board of Health district. Area, 403 statute acres. Population at last census. 7,500; probable yearly increase, 200. Inhabited houses, 1,500; probable yearly increase, 40. Rateable value of district, 21,295*l.* The Public Health Act was adopted in 1865. The Governing Body have laid down cast-iron water mains in the streets for the supply of the town, at a cost of 2,380*l.*; gasworks, 11,647*l.*; and sewerage works, 2,318*l.* 6*s.* 3*d.* The costs were defrayed by loans borrowed on the security of the rates. The Local Board of Health have no jurisdiction over the river *Calder*,

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
BRIGHOUSE—*cont.*	which flows by the district. The bed of the river has not silted up. Property on its banks is only affected in very heavy floods. The river is polluted by town sewage, and liquid refuse from manufactories and works; but not by scoria from ironworks, slag, or cinders. Encroachments on the river are prevented. The condition of the river is not a source of ill-health or discomfort. There are no cellar dwellings in the district. We are unable to furnish the rate of mortality from the year 1859 to the year 1869. There are no districts especially unhealthy; the low-lying parts of the district are liable to be flooded occasionally. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
SCHOLES - -	Local Government Board district. Area, 722 statute acres. Population at last census, 1,500; probable rate of yearly increase, 3 per cent. Inhabited houses, 300; probable yearly increase, 2 per cent. Rateable value of district, 2,300*l.* The Local Government Act was adopted in 1862. The Governing Body have not executed any public works; as water, gas, or sewerage works. The Local Board have no jurisdiction over the *Boshaw Brook*, and other tributaries of the *Calder* flowing through the district. The beds of the streams have not silted up. The property on the banks is not affected by floods. The streams are polluted by town sewage, liquid refuse from manufactories, mines, and by ashes, slag, and cinders. There are no encroachments on the streams. The condition of the streams is not a source of ill-health or discomfort. There are no cellar dwellings in the district. The Registrar's district includes the townships of Wooldale, Cartworth, Hepworth, and Fulstone, of which Scholes is only a hamlet; therefore we are not able to give the rate of mortality. There are parts of the district especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
NORTH BIERLEY -	Local Government Board district. Area, 3,090 statute acres. Population at last census, 12,500; probable yearly increase, 150. Cannot state number of inhabited houses at last census. Rateable value of district, 31,099*l.* The Local Government Act of 1858 was adopted on the 14th of November 1865. The Local Board have executed no public works except street improvements at a cost of 1,501*l.* 14*s.* 2*d.*; costs were defrayed out of the rates. Bierley is situated at the head of an affluent of the *Calder*, and the Local Board have no jurisdiction over the stream. The property on its banks is not affected by floods. The river is polluted only to a very small extent by sewage and refuse from manufactories. There are no cellar dwellings. We are not able to state the rate of mortality from 1859 to 1869. There are no parts of the district especially unhealthy. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
CLECKHEATON -	Local Government Board. Area, 1,755 statute acres. Population in 1851, 3,968, and at the last census, 4,942. Inhabited houses, 1,500; probable yearly increase, 60. Rateable value of district, 17,600*l.* The Local Government Act was adopted in January 1863. The Governing Body have executed waterworks at a cost of 12,000*l.*; defrayed by loans from private individuals on security of the rates, but have not executed either gas or sewerage works. The Local Board have no jurisdiction over *Spen Beck*, which flows through the town. The bed of the stream has silted up, caused by ashes, solid and other refuse thrown into it. Property on the banks of the stream is not affected by floods. The stream is polluted by town sewage, liquid refuse from manufactories, chemical works, and gasworks; also by slag, cinders, and small coal. Encroachments on the stream are not prevented. The condition of the stream is a source of very great discomfort, especially in dry weather to those who reside near it. There are 15 cellar dwellings in the district. We have no means of furnishing the rate of mortality. There are no parts of the district especially unhealthy. We suggest, as the best means of avoiding pollution in future, that town sewage and liquid refuse from manufactories should be deodorized and filtered before being allowed to flow into rivers or streams. No special suggestions to offer as to the conservancy of rivers and streams.
HECKMONDWIKE -	Local Board of Health district. Area, 693 statute acres. Population at last census, 6,339; probable yearly increase, 194. Inhabited houses, 1,600; probable yearly increase, 32. Rateable value of district, 20,578*l.* 0*s.* 9*d.* The Public Health Act was adopted in 1853. The Governing Body in 1856 executed waterworks jointly with the townships of Dewsbury and Batley in the following proportions:—Dewsbury three-sixths, Batley two-sixths, and Heckmondwike one-sixth. The share of the cost to Heckmondwike has been 30,494*l.* 1*s.* 9*d.*; and the total expenditure for the three townships, 182,964*l.* 10*s.* 6*d.* The Local Board of Health also, in 1866, executed sewerage works at a cost of 660*l.*; they also, in 1868, built a market-house at a cost of 1,50 *l.*, and, in 1859, laid out a public cemetery, at a cost of 6,000*l.* The several costs were

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
HECKMONDWIKE—*cont.*	defrayed by loans borrowed from an Insurance Company on the security of the rates. The Local Board of Health have no jurisdiction over the river *Spen*, which is one of the boundaries of the township. The stream forty years ago was pure, abounding in fish of various kinds, but has gradually become foul and polluted. The bed of the stream has silted up. Property on the banks of the stream is flooded after a heavy rainfall. The stream is polluted by town sewage, and liquid refuse from fulling mills, chemical works, and gasworks to a very great extent; also by slag, cinders, and small coal. The condition of the stream is a source of much discomfort to persons residing near it. There are no cellar dwellings in the town. We have no means at hand of ascertaining the rate of mortality. The sewerage works have no doubt beneficially influenced the rate of mortality, coupled with the vigilance exercised by the Inspector of Nuisances. There are no parts of the district especially unhealthy. We suggest, as the best means of avoiding pollution in future, that mill-owners should be compelled to filter the waste liquids produced at their works before turning them into the streams, and, it is believed, that this might be accomplished by utilizing the ashes from the steam boilers in forming filter beds for this purpose. We have no special suggestions to offer as to the conservancy of rivers and streams.
RAVENSTHORPE -	Local Government Board district. Area, 360 acres. Population at last census, 1,322; probable yearly increase, 150. Inhabited houses, 530; probable yearly increase, 8 per cent. Rateable value of district, 9,530*l.* The Local Government Act was adopted on the 21st June 1864. The Governing Body have laid down water mains at a cost of 2,387*l.* 10*s.* 3*d.*; defrayed by loans borrowed from private individuals on security of the rates. The Local Board have no jurisdiction over the river *Calder*, which flows through the district. It used to be a clear stream, but now is very much polluted. The bed of the river has not silted up. Property on the banks is affected by floods in time of heavy rains. The river is polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, calico and silk print works, tanyards, and mines; also by slag and cinders. Encroachments on the river are prevented. The condition of the river is not considered a source of ill-health. There are 21 cellar dwellings. We have no means of ascertaining the rate of mortality, as the returns of deaths are made for the whole district of Mirfield, of which this district only forms a part. There are no parts of the district especially unhealthy, but a part near to the *Burgh* beck is liable to be flooded. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled, not only to purify any water abstracted from the river before returning it back again, but also all waste liquid produced at their works. That all local authorities should be compelled to deodorize and utilize the town sewage and prevent it going into the rivers, and that no person should be allowed to deposit any solid matters in the rivers. We suggest that an independent authority should be formed for the conservancy of rivers and streams, having jurisdiction over river basins, with full power to execute all works and to adopt means requisite for the purification of rivers and streams.
BIRKINSHAW -	*In reply to the communication from the Secretary to the Commission, the following letter was received from the Clerk to the Local Board of Health:—* SIR, Birstal, near Leeds, 9th June 1870. I RECEIVED your letter of the 2nd instant. The Local Board of Health have not executed water, gas, or sewerage works. There is no river flowing by or through the township. There is no separate rate of mortality kept, and I could not supply the information required in your letter of queries without incurring expenses to the extent of a large portion of my salary. The Board will not pay me for making the inquiries. They have tried to get the information required themselves, but have failed to do so. Your queries therefore do not seem applicable to small places like this. I am, &c. S. J. Smith, Esq., Secretary, Rivers Pollution Commission, Westminster. (Signed) JOHN SMITH, Clerk to Local Board of Health.
BIRSTAL - -	Local Board of Health district. The district is part of Gomersal township, which contains an area of 3,200 acres. The area of the Birstal district cannot be separately given, as the survey thereof is not completed. Estimated present population of the district, 7,000. Inhabited houses, 1,400; probable yearly increase, 50. Rateable value of district, 15,461*l.* The Public Health Act was adopted in 1864. The Governing Body have laid down iron water mains in the streets, at a cost of 6,600*l.*, and have supplied the town with gas-lamps at a cost of 500*l.* These costs were defrayed by loans from private individuals upon the security of the rates. The Local Board of Health has no jurisdiction over *Birstal Beck*. It is impure and unfit for domestic use, and has been so for a long time past. The bed of the stream has not silted up. The property on the banks is not affected by floods. The *Beck* is polluted by town sewage and liquid refuse from manufactories and dyeworks, but not by slag or cinders. There are no encroachments on the stream. The condition of the stream is not a source of ill-health. There are 30 cellar dwellings in the town. We are unable to furnish the

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
BIRSTAL—*cont.*	rate of mortality, as the Registrar, on being applied to for information, declined to furnish it except on payment of his charges. (See the following letter):— "SIR, Gomersal, near Leeds, 18th June 1870. "I DULY received your letter of the 17th instant, with its enclosure, and beg "to inquire to whom I am to look for payment for my trouble in making out the "return required, as it will take a considerable time in extracting from the register "the deaths in the district of the Local Board for the last 11 years. "I am, &c. "The Clerk to the Local Board "of Health, Birstal. (Signed) SAMUEL PICKERSGILL, Registrar." The district especially unhealthy is that occupied by the poorest houses (overcrowded by an Irish population), and imperfectly drained. We have no suggestions to offer as to the best means of avoiding pollution in future, nor as to the conservancy of rivers and streams.
BATLEY - -	Borough. Area, 2,038 statute acres. Population at last census, 14,173; it is now about 20,000. Inhabited houses at last census, 2,990; at the present time, 4,116. Rateable value of borough, 52,680*l.* The Public Health Act was adopted in 1853, and the borough was incorporated in December 1868. The Corporation have executed waterworks in conjunction with the Corporation of Dewsbury and the Local Board of Health of Heckmondwike, and the share of the cost to Batley was 61,000*l.*, and also sewerage works, but, as no regular system has been carried out, and the works have been done from time to time, we are not able to give the exact amount. The cost of the waterworks has been defrayed by loans borrowed from private individuals on the security of the rates, and the sewerage works out of the rates. The gasworks belong to a private company. The Corporation have no jurisdiction over *Batley Beck*, which flows through the town. The condition of the stream formerly was clear and colourless; it is now very polluted. The bed of the stream has silted up from ashes and solid refuse thrown into it. The property on the banks is occasionally affected by floods; this is not caused by any obstruction in the *Beck*. The stream is polluted by town sewage, and liquid refuse from manufactories, dyeworks, bleachworks, and gasworks to a very considerable extent, and by cinders, slag, and other solid refuse. Encroachments on the *Beck* are not prevented. The condition of the stream is a source of discomfort to the inhabitants, but do not know that ill-health has been attributed to it. There are 187 cellar dwellings in the borough. The average rate of mortality for the past ten years has been 25 per 1,000. There are no districts of the town especially unhealthy. The low parts adjoining the *Beck* are liable to be flooded occasionally. This is caused by heavy rainfall on the higher lands on the course of the *Beck*. We have no suggestions to offer.
DEWSBURY - -	Borough. Area, 1,468 acres. Population at last census, 18,148; probable yearly increase, 600. Inhabited houses, 5,000. We are not able to give the probable yearly increase. Rateable value of borough, 63,473*l.* 8*s.* 8*d.* The Public Health Act was adopted in 1851, and the borough was incorporated April 1862. The Corporation have executed waterworks in conjunction with the Corporation of Batley and the Local Board of Heckmondwike, and the share of the cost to Dewsbury was 97,000*l.*; the cost was defrayed by loans from private individuals on the security of the rates. The gasworks belong to a private joint stock company. The Corporation have not executed any special system of sewerage works; the town is drained into the *Beck*. The Corporation have no jurisdiction over the *Beck* flowing through the town, formerly moderately pure, now very much polluted, nor have they any jurisdiction over the river *Calder*, which flows by the town, which is also very much polluted. The bed of the river has partially silted up, caused by refuse thrown into it, but the bed of the *Beck* has very much silted up, caused by solid refuse thrown into it and by weirs constructed across it. The property on the banks of the river is affected by floods. The river and stream are polluted by town sewage and liquid refuse from manufactories, dyeworks, gasworks, and other works to a very considerable extent; they are also polluted by spent dye-wares, and by slag, cinders, and ashes. Encroachments on the river are not specially prevented. The condition of the river and stream is both a source of ill-health and discomfort. There are 15 cellar dwellings in the town. The Corporation have no record from which to supply the rate of mortality of the borough. The district of the town adjacent to the *Beck* is especially unhealthy. This is also liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
SOOTHILL, UPPER -	Local Government Board district. Area, 1,897 statute acres. Population at last census, 2,210; probable yearly increase, 155. Inhabited houses, 700; rate of yearly increase, 50. Rateable value of district, 13,866*l.* The Local Government Act was adopted in 1863. The Governing Body have not executed either water, gas, or sewerage works. The greater part of the district is agricultural. The Local Board have no jurisdiction over *Batley Beck*, which flows past the district, forming one boundary thereof.

Basin of the Calder (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Soothill, Upper—*cont.*	Formerly it was pure, but now it is very much polluted. The bed of the stream has silted up to some extent, caused by the throwing in of ashes and other solid matters. The property on the banks of the *Beck* is not affected by floods to any great extent. The *Beck* is polluted by town sewage and liquid refuse from woollen mills, dye, and other works to a very great extent; it is also polluted by ashes and cinders. Encroachments on the *Beck* are not prevented. The condition of the *Beck* is a source of discomfort. There are no cellar dwellings. We are not able to give the rate of mortality. There is no part of the district especially unhealthy. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Soothill Nether -	Local Government Board district. Area, 562 statute. Population at last census, 4,028. Number of houses, 1,055; probable yearly increase, 80. Rateable value of district, 9,569*l.* 13*s.* The Local Government Act was adopted 24th of November 1862. The Governing Body have laid down water mains in the streets at a cost of 2,481*l.* 4*s.* 4*d.*; and flagged and channelled the streets at a cost of 500*l.*; they have also erected gas pillars and lamps in the streets at a cost of 138*l.* 12*s.* The cost of the water mains and street improvements was paid for by loans borrowed from an insurance company on the security of the rates. The gas pillars were paid for out of the rates. The Local Board have no jurisdiction over the river *Calder*, which flows past the town, the condition of which for some years has been very bad; the water is of the colour of ink. The bed of the river has silted up, caused partly by the solid refuse thrown into it. The river is polluted by town sewage and liquid refuse from manufactories, chemical and other works, to a very great extent; also by cinders and other solid refuse thrown into it. We are not aware of any encroachments on the river. The condition of the river is a source of ill-health and discomfort to those living near it. There are no cellar dwellings in the district. We are not able to furnish the rate of mortality. There are no parts of the district especially unhealthy; a portion of it near the river is liable to be flooded. We suggest, as the best means of avoiding pollution in future, that a Conservancy Board should be formed having jurisdiction over river basins.
Horbury - -	Local Government Board district. Area, 1,100 acres. Population at last census, 3,246; probable yearly increase, about 30. Inhabited houses, 800; and since 1864 the average yearly increase has been 14. Rateable value of district, 15,098*l.* 8*s.* 10*d.* Local Government Act was adopted in 1863. The Local Authority have not executed any public works, as water, gas, or sewerage works. The Local Board have no jurisdiction over the river *Calder*, which 30 years ago was comparatively clear, but now is little better than a sewer. The bed of the river silts up, especially in summer, caused by solid refuse thrown into it, but by a "fresh" the silt is generally cleared away. During a flood the land on both sides of the river is inundated to a considerable extent. This has, no doubt, in later years been increased by obstructions higher up the river, such as railway and other bridges, and diversions of the stream. The river is seriously polluted by town sewage, liquid refuse from manufactories, gasworks, dyeworks, chemical works, bleach works, tanyards, and by mines. It is not polluted in this district by slag, cinders, ashes, or other solid refuse. There are no encroachments of any importance on the river. The condition of the river is certainly a source of discomfort, as the stench arising therefrom during hot weather is very offensive, and must necessarily be prejudicial to health. There are no cellar dwellings in the town. The rate of mortality was as follows:—

Years.	Total Deaths.		Years.	Total Deaths.	
1859			1865	90	The average rate per 1,000 during these five years was 25.
1860	We have no means		1866	90	
1861	of ascertaining the		1867	70	
1862	rate of mortality		1868	68	
1863	during these years.		1869	98	
1864					

There is no part of the district especially unhealthy. The portion of the district liable to be flooded is at Horbury Bridge, caused by the overflow of the river. We have no suggestions to offer except those laid before Her Majesty's Commissioners during their visit to the adjoining district.

Whitwood - -

The following letter was received by the Secretary to the Commission from the Clerk to the Local Board of Health in reply to communication addressed to him:—

Sir, Board Room, Whitwood, 16th June 1870.

I beg to acknowledge the receipt of your letter of the 2nd inst., and in reply thereto I have laid the queries you have forwarded before the Local Board of Health, and they have directed me not to answer the same.

I am, &c.
(Signed) W. E. Pratt,
Clerk to Local Board of Health.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
	Basin of the Calder (South Bank).
Scammonden -	Local Government Board district. Area, 1,732 statute acres. Population at last census, 1,012; there has been no increase. Inhabited houses, 180; no increase. Rateable value of district, 2,169*l.* The Local Government Act was adopted in 1862. The Local Authority have not executed any public works, as water, gas, or sewerage works. They have no jurisdiction over the river *Blakewater*, which flows through the district. The condition of the stream is comparatively pure; and the bed has not silted up. Property on its banks is not affected by floods. The stream is polluted by sewage, but not by liquid refuse from manufactories or works; nor by ashes or cinders. Encroachments on the stream are prevented. The condition of the river is not a source of ill-health or discomfort. There are no cellar dwellings in the district. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	15	1865	35
1860	20	1866	25
1861	13	1867	21
1862	14	1868	12
1863	13	1869	19
1864	17		

No part of the district is especially unhealthy, and none liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Rishworth - Local Board of Health district. Area of township, 6,190 acres, of which 4,500 acres are moor land and uncultivated. Population at last census, 1,244; yearly decrease about 10. Inhabited houses, 275. Rateable value of district, 3,500*l.* The Public Health Act was adopted in 1863. The Governing Body have not executed any public works, as water, gas, or sewerage works. The Local Board have no jurisdiction over the river *Booth Dean*, which seven years ago was a comparatively pure stream; but since that time it has been seriously polluted. The bed of the river has not silted up. Property on the banks of the river is not affected by floods. The river is polluted by town sewage, liquid refuse from paper and fulling mills, and other works; also by ashes and other solid refuse thrown in. Encroachments on the river are prevented. The condition of the river is not a source of ill-health. There are no cellar dwellings in the district.

We are is not able to give the rate of mortality. There is no part of the district especially unhealthy. No parts of the district are liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Barkisland - Local Government Board district. Area, 2,420 acres. Population at last census, 2,003. Rateable value, 6,398*l.* 2*s.* Amount levied for general district rates on other districts, extending over the whole district, during the year ended 25th March 1868, in each parish or township, 319*l.* 10*s.* *The above return was required by Tom Taylor, Esq., in September* 1868, *and we can give you no more information. No half-dozen of the long list of queries sent are at all applicable to the township of Barkisland.*

Dated 11th April 1870. (Signed) J. N. Crossley,
S. J. Smith, Esq., Secretary, Clerk to Barkisland Local Board.
Rivers Pollution Commission,
Westminster, S.W.

Soyland - - Local Government Board district. Area, 4,960 acres. Population at last census, 3,373; there has been no increase. Inhabited houses, 765. Rateable value of district, 10,772*l.* 19*s.* The Local Government Act was adopted in February 1863. The Governing Body have not executed any public works, as water, gas, or sewerage works. The Local Board have no jurisdiction over the *Rybourne*, which is comparatively a clear stream. The bed of the river has not silted up. Property on the banks is very rarely affected by floods. The river is polluted by town sewage and refuse from paper mills. It is not polluted by slag, cinders, or small coal. Encroachments on the river are prevented. The condition of the river is not a source of discomfort. There are no cellar dwellings.

We are not able to give the rate of mortality. There is no part of the district especially unhealthy, the population is scattered, the greater part of the township is in small farms and moorland, with manufactories in the valleys, and at the village of Ripponden. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Sowerby	*The following letter was received by the Secretary to the Commission, in reply to the communication addressed to the Clerk to the Local Board of Health* :—

Halifax, 3rd November 1870.

Sir,

Your letter of the 31st October (referring to your previous communications), directed to the Clerk of the Local Board of Sowerby, has come to me as such person. It is impossible to answer the questions without considerable time and inquiries being made and expended; and the Local Board do not see that they are bound to incur the expense. We have no waterworks, nor any Engineer or Medical Officer of Health. The district is such that a Surveyor at 50*l.* a year manages all the works relating to roads and sewers, and acts as Nuisance Inspector. A great many questions could not be answered for the township of Sowerby, of which the Sowerby Local Board district is part. This township has been so cut up by the officers under the Local Government Act, that no less than three other Local Boards have a slice of it: viz., Sowerby Bridge Local Board of Health, Luddenden Foot Local Board of Health, and Hebden Bridge Local Board of Health.

I am, &c.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

(Signed) Francis Judd,
Clerk to Local Board of Health.

Greetland — Local Government Board district. Area, 660 statute acres. Population at last census, 2,300. Inhabited houses, 600; probable yearly increase, 20. Rateable value of district, 9,830*l.* 12*s.* 6*d.* The Local Government Act was adopted in 1865. The Local Board have laid down water mains at a cost of 1,440*l.* 8*s.* 4*d.*, defrayed by loans from private individuals on the security of the rates; have carried out street improvements, as flagging and kerbing, at a cost of 158*l.* 16*s.* 8*d.*; and erected gas pillars and lamps at a cost of 150*l.* 14*s.* 11*d.* The cost of these works were defrayed by rates. The Local Board have not jurisdiction either over the river *Calder*, which flows by the district, or the *Black Brook*, a tributary of the *Calder*, which flows through the district. Both of these streams are very seriously polluted. The beds of the streams have not silted up. Property on the banks is occasionally flooded. The streams are polluted by town sewage, liquid refuse from manufactories, and dyeworks, to a considerable extent, but not by scoria, slag, or cinders. We are not aware of any encroachments on the river and stream. The condition of the river and stream is not a source of ill-health. There are five cellar dwellings.

We cannot give the rate of mortality, as the district is only part of a township, and no separate record is kept for the district. There is no part of the district especially unhealthy, nor liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Elland — Local Board of Health district. Area, 3,388 statute acres. The present population is about 7,500; it has increased during the last 9 years about 2,500. Inhabited houses, 1,010. Rateable value, 24,200*l.* The Public Health Act was adopted in 1852. The Local Board have laid water mains in streets at a cost of 5,180*l.*, and executed sewerage works at a cost of 4,215*l.* The cost of these works were defrayed by loans from private individuals on the security of the rates. The gasworks are the property of a private company, and cost 29,000*l.* The Local Board of Health have no jurisdiction over the river *Calder*, which flows through Elland. It is very foul and this has increased two-fold during the last four years. Formerly it was a bright pure stream, and there was abundance of fish in it. The bed of the stream has silted up, caused by solid refuse thrown in. Property on the banks of the river is affected by floods. The river is polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dyeworks, and tanyards to a very considerable extent. It is also very much polluted by solid refuse, slag, cinders, and spent dyestuffs. Encroachments on the river are not prevented. The condition of the river is a source of much discomfort. There are 10 cellar dwellings in the district.

The rate of mortality from 1859 to 1869 was 25 per 1,000. There is no part of the district especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Rastrick — Local Government Board district. Area, 1,290 acres. Population at last census, 4,516; probable yearly increase, 100. Inhabited houses, 1,120; probable yearly increase, 30. Rateable value of district, 15,168*l.* The Local Government Act was adopted in 1863. The Governing Body have not executed any public works, as water, gas, or sewerage works. The Local Board have no jurisdiction over the river *Calder*, which flows through the district; thirty or forty years ago the water was pure and it was well stocked with fish, it is now very impure. The bed of the river has partly silted up, caused by solid refuse thrown into it. The property on the banks is affected by floods, though not to a very great extent. The river is polluted by town sewage, liquid refuse from manufactories, dyeworks, and tanyards to a very considerable extent. It is not polluted by scoria from ironworks, slag, or cinders. Encroachments on the river are prevented. The condition of the river is a source of discomfort and ill-health to the inhabitants. There are no cellar dwellings in the district.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	105	The average rate of mortality for 11 years was 18·5.	1865	121	The average rate of mortality for 11 years was 18·5.
1860	114		1866	124	
1861	101		1867	117	
1862	109		1868	130	
1863	117		1869	122	
1864	105				

There are no parts of the district especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*

Rastrick—*cont.*

river are prevented. The condition of the river is a source of discomfort and ill-health to the inhabitants. There are no cellar dwellings in the district.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	105	The average rate of mortality for 11 years was 18·5.	1865	121	The average rate of mortality for 11 years was 18·5.
1860	114		1866	124	
1861	101		1867	117	
1862	109		1868	130	
1863	117		1869	122	
1864	105				

There are no parts of the district especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Marsden-in-Almondbury. — Local Government Board district. Area, 4,982 statute acres. Population at last census, 2,040; the increase has been very small. Inhabited houses, 408. Rateable value, 6,558*l.* 6*s.* 11*d.* The Local Government Act of 1858 was adopted in 1860. The Local Board have not executed any public works, as water, gas, or sewerage works. They have no jurisdiction over the river *Colne*, which flows past the town, the condition of which has not changed during the last fifty years. The bed of the river has not silted up. Property on the banks is not affected by floods. The river is polluted by town sewage, liquid refuse from manufactories and works, also by scrapings from the roads, and spoil excavated from the foundations of buildings thrown into it. Encroachments on the river are prevented. The condition of the river in a time of drought is rather offensive.

For rate of mortality, see Marsden-in-Huddersfield below.

There is no part of the district especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Marsden-in-Huddersfield. — Local Government Board district. Area, 3,453 statute acres. Population at last census, 663; the increase has been very trifling. Inhabited houses, 158. Rateable value of district, 3,500*l.* 10*s.* The Local Government Act of 1858 was adopted 12th March 1862. The Governing Body have not executed any water, gas, or sewerage works. The Local Board has no jurisdiction over the river *Colne*, which flows through the district. There has been no perceptible difference in the condition of the river during the last fifty years. The bed of the stream has not silted up. Property on the banks of the stream is not affected by floods. The stream is polluted by town sewage, liquid refuse from woollen and other mills; it is also polluted by road scrapings and the spoil excavated from the foundations of buildings thrown into it. Encroachments on the stream are prevented. The condition of the stream is not a source of discomfort, except in time of drought, and then it is offensive. There are no cellar dwellings.

The rate of mortality of the two districts conjointly was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	44	16·3	1865	56	20·7
1860	50	18·5	1866	68	25·2
1861	61	22·6	1867	55	20·3
1862	45	16·6	1868	60	18·7
1863	38	14·0	1869 *	76	23·7
1864	51	18·8			

There is no part of the district especially unhealthy, nor any liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams

Slaithwaite — Local Board of Health district. Area, 2,968 statute acres. Population at last census, 2,932. Inhabited houses, 609. Rateable value, 6,458*l.* 9*s.* The Local Government Act was adopted in 1862. The Local Board have not executed any public works, as water, gas, or sewerage works, and have no jurisdiction over the river *Colne*, which flows through the district, and which is a tolerably clear stream. The bed of the stream has not silted up. Property on the banks of the river is not affected by floods. The river is polluted by town sewage, liquid refuse from woollen, dye, and other works, but not by slag or cinders. Encroachments on the river are prevented. The condition of the stream is not a source of ill-health. There are no cellar dwellings in the town.

The Local Board cannot give the rate of mortality.

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* In consequence of about 500 miners being employed in the railway tunnel in 1868–9, that number has been added to the population in this year.

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
SLAITHWAITE—*cont.*	There are no parts of the district especially unhealthy, nor any liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.
LINTHWAITE - -	Local Board of Health District. Area, 1,287 acres. Population at the last census, 4,300. Probable increase to the present time (1871), 4,700. Inhabited houses, 900. Yearly increase, about 20. Rateable value of the district, 11,978*l.* The Public Health Act adopted November 1861. The Local Board of Health have not executed any public works, as gas or sewerage works, but they have constructed a service reservoir for receiving water from springs at a cost of 280*l.*; they have also erected 13 stone troughs and cisterns, for distributing the water, at a cost of 200*l.* The cost was defrayed by rates. The Local Board have no jurisdiction over the stream which flows through the district, and which forms the boundary between Linthwaite and Golcar. About 20 years ago the water of the river *Colne* was clear; it is now very extensively polluted by refuse from dyeworks, and by excavations from the foundations of buildings. The bed of the stream is silted up, caused by solid and other refuse thrown into it. The property situated on either bank of the stream is not affected by floods. The river is polluted by sewage and liquid refuse from manufactories, chemical works, gasworks, dyeworks, and by ashes and other solid refuse thrown in. Encroachments on the river are prevented. The condition of the river is not a source of ill-health, but of much discomfort, especially in dry seasons. There are no cellar dwellings within the district. We are not able to give the total number of deaths from 1859 to 1869, but the rate of mortality, according to the returns of the Registrar General, is about 23 per 1,000. There are no parts of the district especially unhealthy, and none liable to be flooded. We suggest, as the best means of avoiding pollution in future, that millowners, manufacturers, and others should provide tanks, and should be compelled to filter their refuse before turning it into the stream. Have no suggestions to offer as to the conservancy of rivers and streams.
GOLCAR - -	Local Board of Health district. Area, 1,500 acres. Population at last census, 5,110; at present estimated at 6,000. Inhabited houses, 1,351. Rateable value of district, 14,432*l.* 7*s.* 0*d.* The Public Health Act was adopted in 1861. The Local Board of Health have not executed any public works, as water, gas, or sewerage works, and have no jurisdiction over the river *Colne*, which flows through the town. The condition of the stream has not materially changed during the last twenty years. The bed of the stream has not silted up. The banks of the stream are not affected by floods. The river is polluted by town sewage, liquid refuse from manufactories, woollen, dye, and gas works; also by ashes and cinders thrown in, and other solid refuse. Encroachments on the river are prevented. The condition of the stream is not a source of ill-health. There are three cellar dwellings in the district. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859 }	Cannot give the total deaths for these years.	1865	112
1860 }		1866	125
1861 }		1867	120
1862 }		1868	97
1863 }		1869	144
1864 }			

	The part of the district especially unhealthy is in the neighbourhood of Small Lane Well on account of the impure state of the water used for domestic purposes. There are no districts liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.
LONGWOOD - -	Local Board of Health district. Area, 1,270 acres. Population at last census, 3,401; probable yearly increase, 40. Inhabited houses, 900; probable yearly increase, 20. Rateable value of district, 9,463*l.* The Public Health Act was adopted in 1861. The Local Board have executed sewerage and other works at a cost of 1,300*l.*; this cost was defrayed by loans from private individuals borrowed on the security of the rates. The Local Board have no jurisdiction over the *Longwood Brook*, which flows through the town, which was formerly a clear stream, but now is very much polluted. The bed of the stream has not silted up. Property on the banks is not affected by floods. The stream is polluted by town sewage and liquid refuse from manufactories to a very serious extent; it is also polluted by cinders and ashes. Encroachments on the stream are not prevented. The condition of the stream, in summer-time especially, is a source of ill-health. There are ten cellar dwellings in the town. The Local Board cannot give the rate of mortality. No part of the district is especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
FULSTONE - -	Local Government Board district. Area, 4½ square miles. Population at last census, 2,414. Inhabited houses, 350. Rateable value of district, 5,734*l.* The Local Government Act was adopted in June 1862. The Governing Body have not executed any public works, as water, gas, or sewerage works. They have power, conferred only by the Local Government Act, over the *Beck*, a tributary of the river *Calder*, which flows through the town. The condition of this stream has not changed during the last twelve years. The bed has not silted up. Property on its banks is not affected by floods. The stream is polluted by sewage, liquid refuse from manufactories, and by mines; but not either by slag, cinders, or small coal. Encroachments on the stream are prevented. The condition of the stream is not a source of discomfort. There are no cellar dwellings in the town. The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859 }	Cannot obtain number of deaths for these years.		1865	104	
1860 }			1866	142	
1861	148		1867	128	
1862	146		1868	119	
1863	190		1869	142	
1864	141				

	There is no part of the district especially unhealthy, or liable to be flooded. We suggest, as the best means of avoiding pollution in future, that town sewage and solid and liquid refuse from manufactories and works should not be allowed to be turned into rivers and streams. At present there is no great damage done to the stream in this district; but, if manufactories and works extend, of course the pollution will increase.
HUDDERSFIELD -	Borough. Area, 10,179 statute acres. Population at last census, 60,940; present population (1870), about 75,000. Inhabited houses, 14,000; cannot give the rate of yearly increase. Rateable value of borough, 212,675*l.* 6*s.* 7*d.* The central portion of the borough is under the Huddersfield Improvement Act, 1848, and the other district comprises several Local Boards, now merged in the borough, but which previously to the incorporation had adopted the Local Government Act. The borough was incorporated in 1868. Waterworks were carried out by a private company at a cost of 88,000*l.*, of which about 57,000*l.* remains unpaid, but have been since purchased by the Corporation, who are extending the works at a cost of 300,000*l.* In the district under the Huddersfield Improvement Act extensive sewerage works have been executed at a cost of 11,000*l.*, of which 7,800*l.* are still owing. A model lodging-house has been established at a cost of 5,146*l.*, of which 2,624*l.* 10*s.* 8*d.* is still owing, and a cemetery has been laid out at a cost of 11,240*l.* 6*s.* 8*d.*, of which 6,495*l.* 7*s.* 9*d.* is still owing. Police buildings and numerous street improvements have also been executed. In the Local Board of Health district of Lockwood (now incorporated) sewerage works and street improvements have been carried out, and a board room and offices have been erected. In Mold Green sewerage works and road improvements have been carried out. In Almondbury road improvements have been carried out. The total cost of the works in Lockwood, Mold Green, and Almondbury, has been 12,000*l.*, of which 11,000*l.* is still owing. The portion of the cost defrayed was by a loan borrowed on the security of the rates. The Corporation have no special jurisdiction over the river *Colne*, which flows through the town, which was formerly a pure stream, the water was used for domestic purposes, and fish lived therein; but it is now very seriously polluted. The bed of the river has silted up, caused by solid refuse thrown into it. The property on the banks is affected by floods. The river is polluted to near its several sources, and on all its branches, by town sewage, refuse from chemical works, gasworks, dye and bleach works, calico and print works, tanyards, and by mines. Encroachments on the river are not prevented by the Local Authority. The condition of the river and canals flowing through the town is a source of ill-health and discomfort; the canal especially is made more foul every year, but arrangements are under negotiation for its improvement. There are a number of cellar dwellings in the town, but these kind of dwellings are not permitted in any buildings erected since the borough was incorporated. The annual rate of mortality for three years ending June 20th, 1868, was 23·0 per 1,000. It is fully believed that the sewerage and other works of town improvement have benefited the health of the inhabitants. The district which is most densely populated, and where the lowest class of the population is congregated, is the most unhealthy, but, as compared with other towns, no part is especially unhealthy. There are no districts especially liable to be flooded. In the present condition of uncertainty and experiment it is difficult to offer any suggestion as to the best means of avoiding pollution of streams that has not already been presented to Her Majesty's Commissioners. The pollution by sewage only, is very small in this locality, as compared with that from the various manufacturing processes carried on in the district. The streams are really in a very impure state. It will be a serious thing to check the industry of the district, and any remedy applied or regulations imposed ought to be universal, and not merely of local application, so as to effect no injustice between the manufacturing dis-

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
HUDDERSFIELD—*cont.*	tricts of Yorkshire and those of the West of England or Scotland, they should be also such as not to affect the balance of trade as between England and the Continent. A well-organized system of conservancy of rivers and streams might be productive of good, but although under the control of the local authorities of the centres of industry in the several conservancy areas, yet the measure should be an imperial one, of universal application, and with the security similar to that afforded by the Sanitary Acts, by application to Her Majesty's Principal Secretary of State for the Home Department, who, in sanitary matters, directs local inquiries by Government Inspectors, and on their reports orders works to be carried out.
MELTHAM - -	Local Government Board district. Area, 4,649 statute acres. Population at last census, 4,044; probable yearly increase, 50. Inhabited houses, 850. Rateable value, 11,065*l.* 8*s.* The Local Government Act was adopted May 1860. The Local Authority have executed waterworks at a cost of 2,050*l.*, defrayed by loans borrowed from private individuals on the security of the rates. The Local Authority has no jurisdiction over a tributary of the *Colne*, which flows through the district, and which was formerly a pure stream. The bed of the stream has not silted up. Property on the banks is not affected by floods. The stream is polluted by sewage and by liquid refuse from woollen manufactories, dye and other works. The stream is not polluted by cinders, ashes, or small coal. Encroachments on the stream are not prevented. The condition of the stream is not a source of discomfort. There are no cellar dwellings in the district. The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	75	1865	98
1860	99	1866	116
1861	87	1867	99
1862	95	1868	118
1863	123	1869	138
1864	108		

There are no parts of the district especially unhealthy, and not any liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

HONLEY - - Local Board of Health district. Area, 2,435 acres. Population at last census, 4,626. Inhabited houses, 1,147. Rateable value of district, 13,072*l.* The Public Health Act was adopted in August 1864. The Governing Body have not executed any public works, as water, gas, or sewerage works; and have no jurisdiction over the river *Holme*, which flows through the district; this was formerly a pure stream. The bed of the river has not silted up. The property on the banks is not affected by floods. The stream is polluted by town sewage and liquid refuse from manufactories and dye-works; it is not polluted by either slag, cinders, or coal. The condition of the river is a source of discomfort, but not of ill-health. There are four cellar dwellings in the district.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	98	21·1	1865	129	27·8
1860	112	24·2	1866	138	29·8
1861	107	23·1	1867	104	22·4
1862	172	37·1	1868	106	22·9
1863	152	32·8	1869	105	33·2
1864	142	30·6			

A workhouse was erected in 1862 in this district, and the deaths have considerably increased the rate of mortality.

There is no part of the district especially unhealthy, nor any liable to be flooded. We have no suggestions to offer as to the conservancy of rivers and streams.

AUSTONLEY - - Local Government Board district. Area, 3,208 statute acres. Population at last census, 1,901. Inhabited houses, 369. Rateable value of district, 5,091*l.* 6*s.* The Local Government Act was adopted in 1860. The Local Authority have not executed any public works, as water, gas, or sewerage works, and have no jurisdiction over the river *Holme*, which flows through the town; this was formerly a pure stream. The property on the banks is not affected by floods. The stream is polluted by liquid refuse from manufactories to a small extent, but not by solid refuse. Encroachments on the stream are prevented. The condition of the stream is not a source of ill-health. There are eight cellar dwellings in the district. We are not able to give the rate of mortality. There are no parts of the district especially unhealthy, nor any liable to be flooded. We have no suggestions to offer as to the conservancy of rivers and streams, or as to the best means of avoiding pollution.

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
HOLME - -	Local Government Board district. Area, 1,665 statute acres. Population at last census, 820; and is decreasing. Inhabited houses, about 200; no increase. Rateable value of district, 1,304*l.* Local Government Act adopted in 1861. The Governing Body have not executed any sewerage, gas, water, or any other public works. They have no jurisdiction over the river *Holme*, which flows past the district. There is very little difference in the condition of the stream. The bed of the stream has not silted up. The property on its banks is not affected by floods. The stream is not polluted by sewage, but by manufacturing refuse; it is not polluted by cinders or ashes. Encroachments on the stream are prevented. There are not any cellar dwellings in the township. We are not able to give the rate of mortality. There is no part of the district especially unhealthy, nor any liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
WOOLDALE - -	Local Government Board district. Area, 1,819 acres. Population at last census, 5,322; there has been no increase. Inhabited houses at last census, 1,100; no increase. Rateable value of the district, 7,670*l.* The Local Government Act was adopted in December 1862. The local authorities have not executed any public works, as water, gas, or sewerage works. The Local Board have jurisdiction over the stream which flows through the district for a distance of about three miles. The *Ribbleden*, *Holme*, and *New Mill* streams flow through the district. They were formerly pure, but are now very much polluted. The beds of the streams have silted up, caused by ashes and other solid refuse thrown into them. The property situated on either bank of the streams is not affected by floods. The streams are polluted by sewage, liquid refuse from manufactories, gasworks, dyeworks, and from mines; also by cinders and other solid refuse. Encroachments on the streams are prevented. The condition of the streams is a source of ill-health and discomfort, especially in hot weather. There are no cellar dwellings within the district. We are not able to state the rate of mortality in the district, but have tried to obtain the information; there is no separate return for the district. There are no parts of the district especially unhealthy, and none liable to be flooded, except on very extraordinary occasions, by excessive rainfall. We suggest, as the best means of avoiding pollution in future, that sewage should not be allowed to be turned into streams, nor refuse from dyeworks, mills, or manufactories, unless previously rendered innocuous. Have no suggestions to offer as to the conservancy of rivers and streams.
NETHER THONG -	Local Government Board district. Area, 730 statute acres. Population at last census, 1,097; no increase. Inhabited houses, 251. Rateable value, 3,845*l.* 8*s.* 2*d.* The Local Government Act was adopted in 1862. A new road has been laid out at a cost of 1,100*l.*, defrayed by loans borrowed from private individuals on the security of the rates; no other public works have been executed by the Governing Body. The Local Board have no jurisdiction over the river *Holme*, which flows through the district. The stream was formerly pure and well supplied with fish; it is now so foul that fish cannot live in it. The bed of the river has not silted up. The property on its banks is not affected by floods. The river is seriously polluted by town sewage, liquid refuse from manufactories, woollen, dye, and gas works. Encroachments on the river are prevented. The condition of the river is not a source of ill-health, but of discomfort. There are no cellar dwellings in the district. The Local Board are unable to give the rate of mortality, as the Registrar refuses to supply the information. The sewerage and other works of town improvement have beneficially influenced the rate of mortality. There is no part of the district especially unhealthy, and none liable to be flooded. We suggest, as the best means of avoiding pollution in future, that town sewage and the solid and liquid refuse from manufactories should be kept out of the rivers and streams. We have no special suggestions to offer as to the conservancy of rivers and streams.
UPPER THONG -	Local Government Board district. Area, 3,087 statute acres. Population at last census, 2,690; there is probably a slight increase. Inhabited houses, about 600. Rateable value of district, 7,265*l.* The Local Government Act was adopted 11th June 1861. The Governing Body have not executed sewerage, water, gas, or any other public works. The Local Authority has no special jurisdiction over the river *Holme*, which was formerly a pure stream The bed of the stream has not silted up. The property on its banks is not affected by floods. The stream is polluted by sewage, and fluid and solid refuse from manufactories; it is also polluted by slag and cinders. Encroachments on the river are prevented. The condition of the stream is not a source of ill-health. There are no cellar dwellings in the district. There is no part of the district especially unhealthy, and not any liable to be flooded. We cannot give the rate of mortality. We have no suggestions to offer as to the best means of avoiding pollution in future. This district being an entirely manufacturing one, most of the mills have little or no spare land on which to erect filtering or purifying tanks, and to compel manufacturers to filter or purify the water before they return it again to the stream, would be tantamount to closing the mills. The mill-owners and occupiers might be compelled to keep out solid refuse, such as spent dye stuffs, slag, ashes, and cinders. We have no special suggestions to offer as to the conservancy of rivers and streams.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Thurstonland -	Local Government Board district. Area, 2,040 statute acres. Population at last census, 1,116; there has been a decrease of about 200 during the last 10 years. Inhabited houses, 276. Rateable value of district, 3,482*l.* 9*s.* The Local Government Act was adopted in 1862. The Governing Body have not executed sewerage, water, gas, or any other public works. The Local Board have no jurisdiction over the river *Holme* or over the *Thunder Bridge Dyke*, a tributary of the *Colne*. There has been no perceptible difference in the condition of the streams for several years past. The beds of the streams have not silted up. The property on the banks is not affected by floods. The streams are polluted by town sewage and by liquid refuse from manufactories, dyeworks, and mines, but not by cinders, ashes, or small coal. There have been no encroachments on the river. The condition of the stream is not a source of ill-health. There are two cellar dwellings in the district. The Local Board cannot furnish the rate of mortality. There is no part of the district especially unhealthy, and not any liable to be flooded. We have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Farnley Tyas -	Local Government Board district. Area, 1,784 acres. Population at last census, 702; no increase. Inhabited houses, 170; no increase. Rateable value of district, 2,323*l.* 19*s.* 4*d.* The Local Government Act was adopted 19th March 1862. The Local Board are now carrying out sewerage works, but have not executed either water, gas, or any other public works. The cost of the sewerage works is being defrayed by loan borrowed from the Right Hon. the Earl of Dartmouth, the owner of the whole township, on the security of the rates. The Local Board have no jurisdiction over the *Woodsome-lees Beck*, a tributary of the *Colne*, which was, thirty years ago, quite a pure and clear stream with plenty of trout in it. The bed of the stream has not silted up. The property on the banks of the stream is not affected by floods. The stream is very much polluted by town sewage, liquid refuse from manufactories, woollen, dye, and gas works, and coal mines; but not by slag, cinders, or ashes. Encroachment on the stream is prevented. The condition of the stream is not a source of ill-health, so far as the township is concerned; there are no dwellings within a considerable distance of it. There are no cellar dwellings in the district. We have no means of ascertaining the rate of mortality correctly; the whole district is generally considered very healthy. There is no part of the district liable to be flooded. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.
Shepley - -	Local Government Board district. Area, 1,204 acres. Population at last census, 1,432. Inhabited houses, 340. Rateable value of district, 4,386*l.* 14*s.* 6*d.* The Local Government Act was adopted in June 1860. The Local Authority has not executed water, gas, or sewerage works, and has no jurisdiction over a small stream a tributary of the *Calder*, which flows through the district. The bed of the stream has not silted up. The property on the banks is not affected by floods. The stream is polluted by town sewage, but not by manufacturing refuse. In 1860 an action was brought by E. Hardy, Esq., one of the landowners of Shepley, against Mr. S. Armitage, manufacturer, for polluting the brook with manufacturing refuse; since that date Mr. Armitage has pumped the liquid refuse from his works on to land, and the nuisance has been abated. The condition of the stream is not a source of ill-health. There are no cellar dwellings.
Kirkburton -	We are not able to give the rate of mortality. There are no parts of the district especially unhealthy, and not any liable to be flooded. We have no suggestions to offer for preventing pollution, or as to conservancy of rivers and streams.
	Local Board of Health district. Area, 1,230 acres. Population in 1861, 3,660; average yearly increase, 60. Inhabited houses in 1861, 700. Rateable value of district, 7,260*l.* The Public Health Act was adopted in 1859. The Local Authority have not executed any public works, as water, gas, or sewerage works. The Local Authority have no jurisdiction over the affluents of the river *Colne* flowing through the district, which were formerly comparatively pure, but now are much polluted. The beds of the streams have silted up, caused by solid refuse thrown into them. The property situated on the banks of the streams is not affected by floods. The streams are polluted by town sewage, liquid refuse from manufactories, gasworks, dyeworks, and by mines; but not by scoria from iron works, slag, cinders, or small coal. Encroachments on the streams are prevented. The condition of the streams is not a source of ill-health. There are no cellar dwellings in the district. The Local Board have no means of ascertaining the rate of mortality from 1859 to 1869. There are no parts of the district especially unhealthy. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Kirkheaton -	Local Government Board district. Area, 1,674 statute acres. Population at last census, 3,011; probable yearly increase, 40. Inhabited houses, 654; probable yearly increase, 4. Rateable value of district, 6,856*l.* 9*s.* The Local Government Act was

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*
Kirkheaton—*cont.*	adopted in 1862. The Governing Body have not executed water or gas works, but sewerage works were constructed before the adoption of the Act. The Local Board have no jurisdiction over the river *Colne*, which flows through the district. The rivers *Colne* and *Calder* have for many years been polluted by manufacturing refuse from the towns situate on their banks. The beds of the streams have not silted up within our knowledge. Property situated on the banks of the streams is affected by floods. The condition of the streams within this district is not a source of ill-health. There are about twelve cellar dwellings in the township. The Local Board are unable to furnish the rate of mortality. There are no parts of the district especially unhealthy. The Local Board have no suggestions to offer as to avoiding pollution in future, or as to the conservancy of rivers and streams.
Whitley Upper -	*The following letter was received by the Secretary to the Commission from the Clerk to the Local Board of Health in reply to communication addressed to him:—* Sir, Lillyclough, Hopton Mirfield, 8th June 1870. By order of the Local Board of Whitley, Upper, respecting the pollution of rivers, I beg to inform you that no river or stream flows through this district. It is supplied with water from springs and wells. The Local Board cannot give any further answer to the queries that have been sent to them. I am, &c. S. J. Smith, Esq., Secretary, Rivers Pollution Commission, Westminster, S.W. (Signed) William Turner, Clerk to Local Board of Health.
Thornhill - -	Local Government Board district. Area, 2,565 statute acres. Population at last census, 3,479; it has rapidly increased as a new town has been erected on the south bank of the river *Calder*, known as Savile town. Inhabited houses, 958. Rateable value of district, 17,747*l.* 14*s.* 4*d.* The Local Government Act was adopted 16th February 1863. The Governing Body have laid down water mains at a cost of 1,850*l.*; and have supplied gas pillars and lamps to the streets at a cost of 77*l.* 14*s.*, but have not executed any other public works. The cost of the water mains was defrayed by loan from a private individual on the security of the rates. The gas pillars and lamps were paid for out of the rates. The governing body have no jurisdiction over the river *Calder*, which flows through the district. The condition of the river for some years past has been very bad, the water being the colour of ink. The bed of the river has silted up, caused by solid refuse turned into it. The property on the banks is affected by floods caused by a weir between this township and Dewsbury. The river is very extensively polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, tanyards, and by mines, also by slag, cinders, and ashes, and other solid refuse. We are not aware of any encroachments on the river. The condition of the river is a source of ill-health and discomfort to those living near it. There are only two cellar dwellings in the district. We cannot give the rate of mortality. There is no part of the district especially unhealthy, but the low parts near the river are liable to be flooded. We suggest, as the best means of avoiding pollution in future, that Conservancy Boards should be formed, having control over river basins, with ample powers to prevent pollution of any kind.

Basin of the Calder (North and South Banks).

Wakefield - -	Borough. Area, 1,554 acres. Population at last census, 23,350; probable yearly increase, 431. Inhabited houses, 5,751; probable yearly increase, 74. It is believed that there are fewer empty houses now than in 1861, which accounts for the apparent discrepancy between the probable increase of the population and of dwelling-houses. Rateable value of borough, 81,165*l.* The borough was incorporated in 1848. The Public Health Act was adopted in 1853. The Corporation have executed sewerage works at a cost of 13,500*l.*; the costs were defrayed by loans from private individuals upon the security of the rates. The Corporation have no jurisdiction over the river *Calder*, which in 1849 was a comparatively pure stream, and was very well stocked with fish. By Section 2 of the Aire and Calder Navigation Act persons are liable to a penalty of 5*l.* for throwing refuse, ballast, or other rubbish into the river, but it is enacted that the said river shall not be subject to the control, direction, survey, or order of any commissioners of sewers, or to the law or any statutes relating to sewers. The bed of the river, below Fall Ing, silts up from time to time, but the dredging operations of the Aire and Calder Company removes the silt. Above the weir the river has to some extent silted up. Property on the banks of the river is affected by floods. The river is seriously polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, and dyeworks, and as Wakefield is the last town on the banks of the river, it suffers more from this pollution than the towns higher up the river; the river is also polluted by slag and cinders; also by solid refuse. Encroachments on the river are prevented. The condition of the river is a source of

BASIN OF THE CALDER (NORTH AND SOUTH BANKS)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*

WAKEFIELD—*cont.*

ill-health and discomfort to those living near it. There are six cellar dwellings in the borough.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	410	23·3	1865	501	26·5
1860	399	22·7	1866	545	28·4
1861	381	21·6	1867	461	23·6
1862	357	19·9	1868	494	24·2
1863	447	24·5	1869	489	24·3
1864	520	28·0			

The sewerage works were carried out in 1866, 1867, and 1868. The death-rate has been less since 1866 than it was in the three years previously. The medical officer has at times reported that some of the low-lying districts near to the banks of the river are more unhealthy than others; and also that certain districts were unhealthy from want of proper drainage; this latter defect is being remedied. The low-lying districts near the river are liable to be flooded, caused by the overflowing of the *Calder*, after a heavy rainfall in the higher portions of the basin, and also by the obstruction caused by weirs. We suggest, as the best means of avoiding pollution in future, that town sewage and refuse from manufactories and works should be prevented from being turned into rivers and streams.

Basins of the Aire and Calder.

CASTLEFORD

The following letter was received by the Secretary to the Commission from the Clerk to the Local Board of Health in reply to communication addressed to him.

Castleford, Yorkshire, 3rd June 1870.

SIR,

I DULY laid your communication and queries before the Local Board of this district, and I was directed not to answer them.

I am, &c.
(Signed) GEORGE BRADLEY.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

PONTEFRACT

Borough. Area, 2,058 statute acres. Population at last census, 5,340; yearly increase, about 30. Inhabited houses at last census, 1,225; yearly increase, about 6. Rateable value of borough, 15,557*l.* 5*s.* 7*d.* The borough was incorporated probably before the Conquest, the first charter dates 1194. The Corporation have not carried out any regular system of sewerage works, but the Street Commissioners have constructed waterworks. The cost was defrayed by rates and by loans. Gasworks have been constructed, but they are the property of a private company. The Corporation has jurisdiction over a small stream called the *Dam* or *Beck*, which flows by the town. This stream flows into another called the *Wash*; the *Wash* empties itself into a canal near Knottingley, and the canal joins the river *Aire* at Goole. The *Dam* or *Beck* is a dirty foul stream, polluted by sewage and other refuse, and is occasionally a source of ill-health and discomfort to the inhabitants. There are no cellar dwellings within the borough. We are not able to state the rate of mortality in the borough from the year 1859 to 1869. The registrar informs us that he is unable to furnish this information, but it can be obtained from the Registrar General in London. There are no parts of the borough especially unhealthy, nor any liable to be flooded. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

Basin of the Severn.

NEWTOWN AND LLANLLWCHAIARN.

Local Government Board district. Area, 201 statute acres. Population at last census, 5,100; no increase. Inhabited houses, 1,137; no increase. Rateable value of district, 11,147*l.* 11*s.* 9*d.* The Local Government Act was adopted in May 1866. No public works have been executed by the Governing Body. The Local Board contracts with the Newtown Gas and Coke Company for the requisite supply of gas. The town was partially sewered before the formation of the Local Board of Health, but the Board has extended and improved some of the sewers. The paving in some portions of the district has been also extended and improved. The costs were defrayed out of the rates. The Local Board have no jurisdiction over the *Severn*, which flows through the district. The condition of the stream is not so clear as formerly. The bed has not silted up. The property on the south-eastern side of the river is affected by floods, so that, at that time, many cellars and underground kitchens are under water, especially during floods in winter. The flooding of the property is due chiefly to an obstruction caused by a weir across the river, and partly because the basements, kitchens, and cellars in the low parts of the town are below high-water mark. The whole of the sewage of the town is discharged into the river; the river is also polluted by liquid refuse from manufactories and tanyards, but not by cinders or ashes. Encroachments on the river are prevented. The floods in winter render the dwellings affected thereby damp, the river water is also

BASIN OF THE SEVERN—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*

NEWTOWN AND LLANLLWCHAIARN—*cont.*

diverted above the town by a weir for the use of a factory, and this and the drought in summer so far lessens the volume of water in the stream that in a long reach of the river the water is almost stagnant and very offensive. There are no cellar dwellings in the town.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	—	—	1865	160	26·6
1860	178	29·6	1866	121	20·1
1861	144	24·0	1867	149	24·8
1862	145	24·1	1868	137	22·8
1863	179	29·8	1869	135	22·5
1864	135	22·5			

The portion of the town and district situated on the north-western side of the river is more unhealthy, and the rest has generally been the centre of the outbreak of cholera and other epidemic diseases. The cause of this probably is, that the inhabitants consist in a large degree of the poorest class, the dwellings are overcrowded, and during dry weather the sewers contain fetid accumulations, and are not flushed. The water supply to this part of the district for domestic purposes is insufficient, and it has to be obtained from the river by great labour in carrying. The drinking water is supplied by wells generally situated in close yards near to dwellings, and in close proximity to privies and ashpits. Only one public pump exists in this district, and it is doubted whether this water is wholesome. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

KIDDERMINSTER

Borough. Area, 1,068 statute acres. Population at last census, 15,397; probably at the present time, 20,000. Inhabited houses at last census, 3,873, void 688; now no voids; yearly increase not known, but very considerable. Rateable value of borough, 48,000*l.* The borough was incorporated in 1832. The Local Government Act was adopted in February 1869. The Governing Body have not executed any public works, as water, gas, or sewerage works. The Corporation have powers over the river *Stour*, which flows through the borough. These powers have only been partially exercised. The Local Act (53rd of George III. cap. 83) which confers the powers will shortly be repealed. It is, however, intended by a Provisional Order, confirmed by Act of Parliament, to retain the clauses of the Act which impose penalties on persons encroaching on, or polluting, the river. The bed of the river has in some places silted up, this is partly due to a weir at the upper boundary of the borough, and partly through want of uniformity in the width of the stream. Property on the banks of the river is affected by floods, this is caused by a weir at the lower boundary of the borough, which prevents the water in case of a sudden increase of volume flowing off fast enough. The river is very seriously polluted by town sewage, liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, carpet manufactories, and tanyards; it is also polluted by solid refuse from manufactories, by slag, cinders, and ashes, in fact, it is a common sewer. Encroachments on the river are not prevented. The condition of the river is a source of ill-health and discomfort. There are no cellar dwellings in the town.

The rate of mortality was as follows:—

Years.	Total Deaths.	Years.	Total Deaths.
1859	—	1865	333
1860	—	1866	327
1861	—	1867	340
1862	298	1868	515
1863	342	1869	—
1864	378		

There is no part of the borough especially unhealthy. We suggest, as the best means of avoiding pollution in future, that town sewage and liquid refuse from manufactories be prohibited from being turned into rivers and streams. We have no special suggestions to offer as to the conservancy of rivers and streams.

STROUD

Local Board of Health district. The district comprises an area of so much of the parish as is within a radius mile, the centre being the parish church. The estimated population of the district at last census was 7,500; there has been a slight annual increase. Inhabited houses, 1,540; probable yearly increase, 10. Rateable value of district, 17,600*l.* The Public Health Act was adopted in 1857. The Local Authority have executed waterworks (including the purchase of the works of the former water company) at a cost of 8,828*l.* 2*s.* 1*d.* There is a sum of about 100*l.* still due for land taken to enlarge the reservoir. They have also executed sewerage works at a cost of 7,317*l.* 17*s.* 7*d.*, the costs of which have been defrayed by loans borrowed chiefly from private individuals on the security of the rates. The Local Board has no jurisdiction over the river *Frome*, which forms the boundary of the town and parish on the south-west, and the *Slade* (near

BASIN OF THE SEVERN—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*
STROUD—*cont.*	the town known as the Badbrook), which forms the boundary on the north-west. The *Frome* is now much in the same condition as it has been for many years; its waters have always been to some extent polluted by refuse from manufactories and houses on its banks. The *Slade* formerly received the town sewage and was in a very foul condition, but the Local Board of Health by making new sewers intercepted the sewage and to a great extent purified the stream. It has, however, within the last five or six years again become polluted by refuse from the large woollen manufactories, outside the limits of the Local Board of Health district, and by the drainage of houses erected on the north-west bank, which is in the parish of Paneswick. Upon complaint being made by the Local Board to the Secretary of State, an inquiry has been lately held by the Government Inspector, which has resulted in the formation of a drainage district. It is probable, therefore, that the stream may again become comparatively pure. The silting up of the streams in the Stroud valley has been a work of a very long period. It probably commenced with landslips, which necessarily led to the formation of swamps and drifts. The first alluvial deposit, which is generally found resting upon the liassic bottoms of the valleys, is river gravel, in which are found the remains of red deer, and another species of deer allied to the red deer, boar, and beaver. This is usually succeeded by a deposit of peat derived from the decayed leaves of water plants, small wood, and mud, overlying which is a bed of black earth. The following section was exposed at the Stroud Gasworks, situated a quarter of a mile below the town, and was taken in 1865:—(*a.*) Surface mould passing into buff-coloured clay, or brick earth, varying from 2 feet to 5 feet. (*b.*) Peat formed of leaves, roots, water plants, and river mud, 2 feet. (*c.*) Gravel resting upon lias marl varying from 3 to 6 feet. There has not been any material silting-up of the streams from mill refuse or sewage. Property on the banks is not injuriously affected by floods. The streams are polluted by town sewage, and by refuse from manufactories and dyeworks. The streams are not polluted by cinders or ashes. There are no encroachments on the streams. The condition of the *Frome* is not much complained of, but the *Slade* has been pronounced by medical men to be positively dangerous to health when the water is low in summer. There are no cellar dwellings in the district. No record is kept of the deaths in the Local Board of Health district as distinguished from the parish, and there are no means by which this information can be obtained. The sewerage works are believed to have improved the general health of the town. The upper part of the town, which is occupied by the labouring part of the population, is more unhealthy than the other parts. This is attributed chiefly to the dirty and improvident habits of the people who occupy the worst class of dwellings. The district is specially liable to be flooded. We suggest, as the best means of avoiding pollution in future, that all waste water and refuse from manufactories should be emptied or discharged into a tank of sufficient capacity, and filtered and deodorized. A certain standard of purity should be adopted, and should be applicable to the water discharged from such tanks into the stream. Water discharged from any manufactories or works less pure than the standard should subject the occupiers of the premises to a fine. Town sewage should be similarly treated. Tidal rivers would perhaps be better managed by a Board of Commissioners than by official inspectors. Tributaries might be placed under some conservancy worked by inspectors appointed by the conservators. It is also suggested that inspectors of factories might be inspectors of rivers and streams in their districts with sub-inspectors under them.

Basin of the Thames (Windrush).

WITNEY - -	Local Government Board district. Area, 103 statute acres. Population at last census, 2,989; no increase. Inhabited houses at last census, 620; no increase. Rateable value of borough, 5,229*l.* The Local Government Act was adopted 10th November 1863. The Governing Body have not executed any public works, as water, gas, or sewerage works. The Local Board have jurisdiction over the river *Windrush*, which flows through the district; these powers are only conferred by the Local Government Act. The condition of the river has not much changed for some years. The bed of the river is not silted up. The property on the banks of the river is occasionally flooded. The river is polluted by sewage, liquid refuse from manufactories and dyeworks; but not by cinders or other solid refuse. There have been no encroachments on the river. The condition of the river is not a source of ill-health or discomfort. There are no cellar dwellings in the town. The rate of mortality in the district was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	60	20·00	1865	61	20·33
1860	49	16·33	1866	52	17·33
1861	73	24·33	1867	58	19·33
1862	53	17·33	1868	59	19·33
1863	57	19·00	1869	54	18·00
1864	84	18·09			

There is no part of the district especially unhealthy. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

BASIN OF THE LOWER AVON.

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 25, PAGE 2—*continued.*

Basin of the Lower Avon.

BRISTOL - -	City and county. Area, 4,683 acres. Population in 1861, 154,093. Probable estimate in June 1870, 180,000. Inhabited houses in 1861, 23,596. Rateable value, and for Board of Health rating, 602,110*l.*; for Poor Relief rating, 636,258*l.* The Public Health Act, 1848, was applied to the district of the city and county of Bristol by Provisional Order of the General Board of Health, dated 27th March 1851, confirmed by Act of Parliament, 14 and 15 Victoria, Cap. 98, "Public Health Supplemental Act, 1851, No. 2." The Corporation have executed sewerage works at a cost, to August 1870, of 112,108*l.*, and carried out street improvements at a cost, up to November 1970, of 294,485*l.* The gas and water works have been executed by and belong to private companies. The cost of the several works was partly defrayed by rates, and partly by loans from private individuals. The Corporation have jurisdiction over the rivers *Avon* and *Frome* flowing through the ancient city. The area of the city is not coterminous with the limits under the jurisdiction of the Local Board of Health. The Corporation are also conservators of the river *Avon*, under charters, by the Act 11th and 12th William 3rd, and subsequent Acts. The rivers *Avon* and *Frome*, which were formerly tidal rivers, flow through the town. These have been dammed up, and now form a floating harbour. The Board of Health have diverted the chief part of the sewage from them, and have works in progress for completing such diversion. During the summer of 1870 the water of the rivers was at times very offensive. A new course has been cut for the river *Avon*—this course is tidal—and into that the sewage is discharged. This portion also, during the summer of 1870, was, especially at low water, occasionally very offensive. The beds of the rivers have not silted up to any great extent. The low-lands, in the upper part of the Frome district have always in very wet seasons, been very liable to floods. The rivers are polluted by town sewage, refuse from chemical works, and tanyards; but not by scoria from ironworks, slag, cinders, small coal, or other solid refuse. Encroachments on the river are prevented. The condition of the river, especially in hot and dry weather, is a source of discomfort, but not of ill-health. There are no cellars within the knowledge of the Local Board of Health occupied as dwellings. The rate of mortality is as follows:—

Years.	Rate per 1,000 per Annum.	Years.	Rate per 1,000 per Annum.
1861 }		1866	24·91
1862 } No returns for		1867	23·08
1863 } these years.		1868	22.79
1864 }		1869	24·26
1865	— 23·52		

We are not able to state whether sewerage or other works of town improvement have beneficially influenced the rate of mortality. There are parts of the district especially unhealthy; also parts drained by the river *Frome* are liable to be flooded. The Local Board, in order to avoid pollution in future, have constructed, and are constructing sewers, to carry the sewage into the tidal portions of the river. Have no suggestions to offer as to the conservancy of rivers and streams.

BATH - -	City and borough. Area, 3,745 acres. Population at last census, 52,528. We have reason to believe that the increase has been great. Inhabited houses, 8,603; probable yearly increase, 30. Rateable value of borough, 244,474*l.* 12*s.* The old city was incorporated in 1590, and the boundaries were extended by the Municipal Corporations Act, 1835. The Public Health Act of 1848 was adopted by virtue of the Local Act, 14 and 15 Vict. cap. 104, called the City of Bath Act, 1851, except such parts of the Public Health Act as are excepted by the Local Act. The public works executed by the Governing Body since the Act was obtained have been main sewers in those parts of the district which formerly drained into cesspools or dumb wells. The cost has been about 20,000*l.*, also new sewers constructed and old sewers amended and repaired at a cost of 21,000*l.* Street improvements have also been made at a cost of 15,000*l.* The waterworks have been improved since 1861 at a cost of about 7,000*l.*; police station erected at a cost of 4,000*l.*; new markets built at a cost of 6,000*l.*; new bathing establishment constructed at a cost of 12,000*l.*; free public baths erected at a cost of 500*l.*; and street improvements carried out at a cost of 1,200*l.* The cost of these public works have been defrayed partly by the rates and partly by loans from private individuals on the security of the municipal funds. The gasworks have been constructed and paid for by a private company. The Corporation have no jurisdiction over the river *Avon*, which flows through the city, other than that conferred by the Public Health and General Sanitary Acts. The condition of the river has gradually deteriorated. The bed of the river has silted up, but the Great Western Railway is under an obligation to keep the bed of the river clear for navigation, and this obligation has been enforced, and periodically fulfilled at the instance of parties interested in the navigation. The property on the banks of the stream is seriously flooded, due principally to weirs erected in the river. The river is polluted by town sewage, and liquid

Basin of the Lower Avon—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*

Bath—*cont.*

refuse from manufactories, gasworks, woollen, dye, and bleach works carried on in Bradford, Trowbridge, and Frome. It is not polluted by cinders or ashes within this district. Encroachments on the river are prevented. There is an unpleasant effluvium arising from the river in hot weather when the water is low, but the volume of water at other times is ample, and then the river is not a source of discomfort. There are no cellar dwellings in the city.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	1,289	23·7	1865	1,331	25·3
1860	1,244	22·9	1866	1,230	23·4
1861	1,157	22·0	1867	1,195	22·4
1862	1,159	22·0	1868	1,148	21·5
1863	1,263	23·5	1869	1,135	21·2
1864	1,440	27·4			

Since the appointment of a medical officer of health (in 1866) he has recommended improvements in the drainage and the conversion of a large number of privies into water-closets, besides improving the water supply. The Board of Health in nearly every instance has had the suggestions carried out, and a Bill is now before Parliament for obtaining a better supply of water to the city. The districts especially unhealthy are the small streets and courts in the lower parts of the city, and Lampard's Buildings in the upper parts of the city. The causes are chiefly overcrowding, and the condition of the inhabitants; dirt and a deficient water supply are additional causes. The Dolemeads and the cellars of houses bordering on the river are occasionally flooded. There are many difficulties to be got over before any practical means can be adopted for preventing the pollution of the river *Avon*. The most serious difficulty is that the water is polluted to a great extent before it reaches Bath. If the towns above were prevented from fouling the water it has been suggested that an intercepting sewer might be made to carry the sewage from Bath to an outfall at the lower extremity of the district, where tanks for deodorizing and disinfecting the sewage might be constructed. We suggest that weirs should be removed and a system of hatches substituted, which could be lifted in times of flood, and the river would then have its natural flow and scour.

Trowbridge -

Local Government Board district. Area, about four square miles. Population at last census, 11,671. Inhabited houses at present (1870), 2,690. Rateable value of district, 23,509*l*. The Local Government Act was adopted on June 30th, 1865. The Governing Body have not executed any public works, as water, gas, or sewerage works. They have no jurisdiction over the river *Biss*, a tributary of the *Avon*, which flows through the district. The condition of the river is very bad, and it has been much in the same state for the last twenty years. The bed of the stream has not silted up near the town. Property on the banks of the stream is occasionally affected by floods; this is not due to any obstruction in the river. The river is polluted by town sewage, and liquid refuse from woollen manufactories and dyeworks; it is not polluted by scoria, slag, or cinders. Encroachments on the river are not prevented. The condition of the river is not a source of ill-health. There are no cellar dwellings in the town.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	264	23·7	1865	216	20·6
1860	200	17·9	1866	213	20·3
1861	205	19·5	1867	300	28·6
1862	242	23·0	1868	249	23·7
1863	327	31·1	1869	238	22·7
1864	255	24·3			

There are no parts of the district especially unhealthy. We have no suggestions to offer as to the best means of avoiding pollution in future, or any special suggestions as to the conservancy of rivers and streams.

Frome - -

Local Government Board district. Area, 705 statute acres. Population at last census, 9,522; probable yearly increase, 100. Inhabited houses, 2,000; probable yearly increase, 12. Rateable value of district, 23,000*l*. The Local Government Act was adopted 29th September 1865. The Local Board of Health have repaired and extended sewers that were constructed before the formation of the Board. They have not executed any waterworks; the gasworks belong to a private company. The cost of extending and repairing the sewers has been paid out of the rates of each year in which the work was performed. The lord of the manor claims a right to and jurisdiction over the river *Frome* which flows through the district, and which is very much polluted. The bed of the river has not silted up. Property situate on the banks of the stream has been flooded a few times during the last six or seven years, but this is not due to any obstructions in the river. The river is polluted by town sewage, liquid refuse from dye houses, woollen manufactories, silkworks, and tanyards; it is not

Basin of the Lower Avon—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 25, Page 2—*continued.*

Frome—*cont.*

polluted by cinders or ashes. Encroachments on the river are prevented. The condition of the river is not a source of ill-health. There are no cellar dwellings in the district.

The rate of mortality was as follows:—

Years.	Total Deaths.	Rate per 1,000 per Annum.	Years.	Total Deaths.	Rate per 1,000 per Annum.
1859	327	The Board have not the death-rate for the district, but the figures given are those of the parish of Frome. Population 11,200. The population of the district is 9,522.	1865	289	The Board have not the death-rate for the district, but the figures given are those of the parish of Frome. Population 11,200. The population of the district is 9,522.
1860	242		1866	271	
1861	280		1867	257	
1862	213		1868	245	
1863	254		1869	222	
1864	272				

It is believed that the small amount of attention given to sewerage and sanitary matters has favourably influenced the death-rate. There is no part of the district especially unhealthy. The lower part of the town is flooded perhaps once in three or four years. The Local Board are unable to offer any suggestions as to the best means of avoiding pollution in future other than the general principle applicable to all rivers, that it is very desirable to prevent polluting matters flowing into them. They have no special suggestions to offer as to the conservancy of rivers and streams.

PART I. SECTION II.

QUERIES.—1. Have sewerage works been carried out in the city, borough, town, or district?—2. When were they commenced?—3. When completed?—4. Describe them and state cost?—5. Are the sewers ventilated; if so, describe mode of ventilation?—6. Are the sewers flushed; if so, state how often, and by what mode?—7. Is steam, hot or warm water, conveyed into the sewers; if so, does any nuisance arise therefrom?—8. Were many springs tapped during the execution of the sewerage works; if so, state about the volume of water thus entering the sewers daily?—9. Is the level of the well water in the city, borough, town, or district affected by the sewers, and to what extent is it depressed?—10. How many waterclosets are there in the city, borough, town, or district, and are there any trough or tank closets, or self-acting tumbler tanks; if so, how many?—11. Are they all connected with the sewers?—12. Are the sinks and gullies of houses connected with the sewers?—13. Are there any cesspools; if so, is the overflow from them connected with the sewers?—14. Are there any cesspools, privies, middens, or ashpits within dwelling-houses?—15. What number of privies, middens, or ashpits are there?—16. Are the privies, middens, or ashpits connected with the sewers?—17. Are the privies, middens, or ashpits cleansed systematically and at what intervals?—18. By whom?—19. What is the cost annually?—20. If done by Corporation or Local Authority, what amount is obtained for the refuse?—21. What weight of refuse is removed annually?—22. To what purpose is the refuse devoted?—23. Is there a ready sale for the refuse, and does the amount received for it exceed the cost of cleansing the privies, middens, and ashpits, and removing refuse; or does it only cover the cost, or is there an annual deficiency? State the amount in either case?—24. To what extent is the refuse employed?—25. Is the cleansing of the privies, middens, and ashpits complained of as a nuisance affecting the health and comfort of the inhabitants?—26. Are disinfectants used; if so, state them; and are they efficient in preventing stench?—27. Is sickness attributed to the privies, middens, and ashpits?

Names of Cities, Boroughs, and District.	Answers to Queries 1 to 27, Page 36.
	Basin of the Wear.
Durham - -	Sewerage works have been carried out, commenced in March 1853, and finished in 1854. Nearly the whole of the sewers are earthenware pipes, varying from 6 to 18 inches in diameter; the two main sewers are formed of brickwork, and are 21 and 24 inches in diameter. The total cost was 5,836*l.* The sewers are ventilated by down spouts from buildings and by shafts from the sewers to the surface of the streets, covered with gratings. They are flushed as often as required by water from the Waterworks Company. Steam and hot water are not conveyed into the sewers. We are not able to state what springs were tapped during the execution of the works, and the volume of water thus entering the sewers daily. The level of the well water was not depressed during the execution of the works. There are 739 waterclosets in the borough, and 510 in the county gaol. These and the sinks and gullies of the houses are all connected with the sewers. There are a few cesspools; but none of these are connected with the sewers. There are no cesspools, privies, middens, or ashpits in dwelling-houses. There are 1,467 ashpits and 1,131 privies; none of these are connected with the sewers, but 16 have outlets into the river. They are cleansed at the cost of the occupiers or owners of the premises to which they are attached, but as this is not done by men employed under the Corporation, we are unable to state the cost yearly, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is occasionally complained of as a nuisance affecting the comfort of the inhabitants. Sickness has not been attributed to them. Chloride of lime is used as a disinfectant when required.
	Basin of the Tees.
Darlington - -	An extensive system of sewerage works was commenced soon after the application of the Public Health Act in 1848, and has been carried on ever since. The greater portion of the works were, however, completed in 1860. There are about seventeen miles of sewers averaging in size from 3 feet to 9 inches in diameter; the total cost up the present time has been 17,035*l.* 6*s.* 10*d.* The sewers are ventilated by the rain water-spouts from the eaves of houses, and by connexions made with high chimneys. They are flushed in dry weather about once a month. Steam and hot water are conveyed into the sewers, but no nuisance is caused thereby. There were no springs tapped during the execution of the sewerage works; the level of the well water in some of the districts of the town has been depressed. There are about 900 waterclosets, these and the sinks and gullies of the houses are connected with the sewers. There are no cesspools in the town proper, and some only in connexion with detached houses in streets not sewered; there are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 3,000 privies, middens, and ashpits; these are connected with sewers. They are cleansed when required by men employed by the Local

Basin of the Tees—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Darlington—*cont.*	Board of Health, when requested by the owners or occupiers, and occasionally compulsorily in default of the occupier giving notice, at a cost of 95*l.* a year. The Corporation received 203*l.* 17*s.* 6*d.* last year for 1,100 tons of refuse, including street sweepings, removed. This is sold by auction four times a year and is always readily bought. The whole is used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is sometimes attributed to them. McDougal's disinfecting powder is occasionally used and is efficient in preventing stink.
Stockton - -	Sewerage works have been carried out; the first portion of the works was commenced in 1856; extensions were made in 1859 and 1863; and are now in progress. The sewers are constructed of bricks and stoneware pipes. Those completed have cost 7,200*l.*, and those at present in course of construction are estimated to cost 700*l.* The sewers are only ventilated by the down rain water pipes from the eave spouts of buildings. The sewers are flushed once or twice a year by valves connected with the water mains. The only warm water passing into the sewers is from baths and wash-houses, and no nuisance arises therefrom. There were no springs tapped during the execution of the works; and the level of the well water has not been depressed thereby. The water supply is in the hands of a company, and the Corporation have no means of ascertaining the number or description of waterclosets; these and the sinks and gullies of the houses are connected with sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 4,900 privies, middens, and ashpits; these are not connected with the sewers. They are cleansed, some of them twice a week, by a contractor appointed by the Corporation, the borough is divided into six districts for the purpose. The contractor pays to the Corporation 100*l.* a year for the refuse removed, which he sells to farmers for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
South Stockton -	No system upon a large and comprehensive scale has been carried out; such sewers as have been found absolutely required have been constructed from time to time as the town has grown. The sewers are not ventilated, and are not flushed. Steam and hot water are not conveyed into the sewers. There were no springs tapped during the execution of the sewerage works, and the level of the well water has not been depressed thereby. There are twelve waterclosets, but not any trough or tank closets, or self-acting tumbler tanks, these and some of the sinks and gullies of the houses are connected with the sewers. There is only one cesspool, and this is connected with a sewer. There are about 1,300 privies, middens, and ashpits; these are not connected with the sewers. They are cleansed as often as required by a scavenger, who contracts with the Local Board, and 1,250 tons of refuse are annually removed; this refuse is sold for agricultural purposes, and the amount obtained yearly exceeds the cost of cleansing by 50*l.* The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
Middlesbrough -	Sewerage works have only been partially carried out, they were commenced in 1854, and cost 5,888*l.* 9*s.* 8*d.* The sewers are of brickwork, segment tiles, and sanitary pipes; the branch drains from houses communicate therewith; there are two large outfalls from the north part of the town into the river; the sewers are not, with one exception, ventilated; they are flushed by means of a large portable iron tank supplied with water from the water mains in the various streets. Hot water is conveyed into the sewers from the ironworks, but no nuisance arises therefrom. There were no springs tapped during the execution of the sewerage works. There are 406 waterclosets and two trough or tank closets; these and the sinks and gullies of the houses are connected with the sewers. There are no cesspools. There are 3,250 privies, middens, and ashpits; these are connected with the sewers. They are cleansed on an average every fortnight by scavengers employed by the Local Board expressly for the purpose. The cost for the year ending June 30th, 1870, was 1,816*l.* 4*s.* 10*d.* including all charges; and the amount received for 9,000 tons of refuse removed for the year ending June 1870 was 1,719*l.* 5*s.* 5*d.* There is a good sale for the refuse, and taken on the average of the past 10 years the amount received for the refuse just covers the cost of cleansing and removing. The whole of the refuse is devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. McDougal's and Murdie's disinfectants, and chloride of lime are freely used in cleansing the privies, middens, and ashpits.
	Basin of the Kent.
Kendal - -	Sewerage works are not being carried out by the Governing Body. These were commenced in 1870, and consist of a main intercepting sewer, with the necessary branch mains and connections, and are constructed of brickwork and stoneware pipes. The sewers will be ventilated at the side entrances and at the man holes; also by special shafts at the highest point of each sewer carried to the tops of the highest houses and

BASIN OF THE KENT—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 27, PAGE 36—*continued.*
KENDAL—*cont.*	fitted with an Archimedean screw. Flushing chambers will be constructed, and arrangements made for flushing the sewers with water from the river. There are about 1,000 waterclosets, and the whole of the waterclosets, sinks, and gullies of the houses will be connected with the sewers. At present there are a great many cesspools, but these will all, as soon as the sewerage system is completed, be abolished. There are no cesspools, privies, middens, or ashpits within dwelling-houses; there are about 2,000 privies, middens, and ashpits. The whole of the privies will be connected with the sewers. The privies are cleansed by the occupiers of the houses, but not systematically, and as this is not done by the local authority, we are unable to state the cost, or the weight of refuse removed annually. It is sold to farmers and used for agricultural purposes. There is not a ready sale for the refuse, especially since artificial manures have been introduced. In many cases the refuse is taken as an equivalent for the expense of carting it away; sometimes 1*s.* a load is obtained for it. The want of a sufficiently regular and proper cleansing of the ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used. Sickness is occasionally attributed to the privies, middens, and ashpits.
	Basin of the Aire (North Bank).
SKIPTON - - -	Sewerage works have been carried out; commenced in May 1859 and finished in 1860, except as to new buildings, for which they are still in progress. The main sewers are of brickwork and earthenware pipes, from 1 to 3 feet in diameter. The sewers are ventilated by rain-water spouts to the houses and by gully holes. They are flushed once a week. Steam and hot water are not conveyed into the sewers. Springs were tapped during the progress of the works, but they were unimportant. The level of the well water has not been depressed by the sewerage works. There are 245 waterclosets, but no trough or tank closets, or self-acting tumbler tanks; they are all connected with the sewers, as also are almost all the sinks and gullies of the houses. There are six cesspools in the town; four are connected with the sewers, but two are built water-tight; they are regularly cleaned out. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 224 privies, 156 ashpits, and 22 middens, some of them are connected with sewers; they are cleansed out when required by scavengers and paid for by the owners of the houses to which they are attached; but, as the cleansing is not done by the Local Authority, we are not able to give the cost annually, and the weight of refuse removed. It is sold to farmers, and used partly for manure. The cleansing of the middens, privies, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants; sickness is attributed to those, but cannot state to what extent. No disinfectants are used.
SILSDEN - -	No sewerage works have been carried out by the Local Board of Health. The streets have merely gutters for draining the surface. There are no waterclosets, and no cesspools. There are 245 privies and 218 ashpits; but these are very much too few in number for the population, and the Local Board are compelling the owners of properties to erect additional ones. The cleansing of the privies will be carried out by contractors, under the Local Board of Health, systematically, at proper intervals, as soon as they are constructed and arrangements made. At present the cleansing is performed by men employed by the occupiers of the houses to which the privies are attached; therefore we are not able to state the cost annually, the weight of refuse removed, or to what purpose it is devoted. We are of opinion that the sale of the refuse will not cover the cost of removal. The cleansing of the privies is not complained of as a nuisance affecting the public health. Sickness is not attributed to them. There are no disinfectants used.
BINGLEY - -	Sewerage works have only been carried out in one part of the district, in the village of Cullingworth; they were commenced in 1868, finished in 1869. The sewers are ventilated by man-holes; are only flushed by the springs, tapped during the execution of the sewerage works. No steam or hot-water is passed into the sewers. The level of the well water has not been depressed by the execution of the sewerage works. There are 50 waterclosets; these and the sinks and gullies of the houses are connected with sewers. There are 10 cesspools, but not any privies, middens, and ashpits in dwelling-houses. There are 1,400 privies, and 400 middens and ashpits; these are not connected with sewers; are cleansed when full by the tenants of the houses to which they are attached. As the cleansing is not done by the Local Authority, we cannot give the cost of cleansing, the weight of refuse removed annually, or the purposes to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Not any disinfectants are used.
BAILDON - -	Sewerage works have been carried out in the district; they were commenced in 1854, and improved since at a cost of 300*l.* We are not able to give the original cost of the works. The sewers are not ventilated; they are flushed by springs tapped during the execution of the works. Steam and hot water are not conveyed into the sewers. The level of the well water has not been depressed by the sewerage works. There are only six water and two tank closets; four are connected with the sewers; the sinks and gullies of the houses are connected with the sewers. There are two cesspools, but not

BASIN OF THE AIRE (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 27, PAGE 36—*continued.*
BAILDON—*cont.*	any privies, middens, or ashpits within dwelling-houses. There are 150 privies and 150 ashpits; these are connected with sewers, and are cleansed out, though not systematically, by the farmers in the neighbourhood. As this is not done by the Local Authority we are not able to give the cost annually, or the weight of refuse removed; it is used wholly for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed thereto. Disinfectants are used when necessary.
GUISELEY - -	No sewerage works have been carried out by the Governing Body. There are 9 waterclosets; these and the sinks and gullies of houses are connected with the old drains or sewers which were in existence before the Local Government Act was adopted. There are no cesspools within private houses, but there are some within manufactories, the overflows from which are connected with the old drains or sewers. There are about 350 privies, middens, or ashpits, but not connected with the sewers. They are cleansed out when required by the occupiers of the houses to which they are attached, by a person who takes the refuse as his remuneration for labour of cleansing. As this is not done by the Local Authority we are not able to state the weight of refuse removed annually, or the purpose to which it is devoted; we believe it is all used for manure. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
	Basin of the River Aire (South Bank).
OXENHOPE - -	No sewerage works have been carried out by the Local Authority. There are no waterclosets. There are 264 privies, middens, and ashpits; they are not connected with drains; they are cleansed four times in a year, by owner or occupier of premises. We are not able to state the cost or the weight of refuse removed; it is all used for agricultural purposes. The cleansing is not complained of as a nuisance affecting the health. Disinfectants are not used. If a privy or midden is reported by the Inspector of Nuisances as likely to cause sickness, steps are at once taken to abate the nuisance.
HAWORTH - -	No sewerage works have been carried out by the Governing Body. The drains in the streets are ventilated through gratings at the gullies. The drains are not flushed. There are eight waterclosets; these and the sinks and gullies of the houses are connected with the drains. There are no cesspools. There are 103 privies, middens, and ashpits. These are cleansed when about half filled, by the owners of the premises to which they are attached. This is not done by the Local Authority, and therefore we are not able to state the cost of removal, the weight of refuse removed, or the purpose to which the refuse is devoted. The cleansing of the privies, middens, and ashpits is not complained of by the inhabitants. Disinfectants are not used. Sickness is not attributed to the privies, middens, and ashpits.
KEIGHLEY - -	Sewerage works have been carried out; they were commenced in the year 1860 and completed in 1869. The main sewers are of brickwork, egg-shaped, 3 feet in diameter and 4 feet 6 inches high, and the branch mains of earthenware pipes from 12 inches to 2 feet in diameter. The sewers are ventilated through gulley holes, which are not trapped; they are only flushed by the water flowing into them from springs, tapped during the execution of the works. Steam and hot water are conveyed into the sewers, but we have not observed any nuisance to arise. There were springs tapped during the execution of the works, but we are not able to state the quantity of water daily entering the sewers. The level of the well water has not been depressed by the execution of the sewerage works. There are 97 waterclosets; but not any trough, tank closets, or self-acting tumbler tanks; these and the sinks and gullies of the houses are connected with the sewers. There are cesspools: the overflow from them is connected with the sewers. There are also cesspools, middens, and ashpits within dwelling-houses. There are 1,200 privies, middens, and ashpits; these are not connected with the sewers. They are cleansed when full by men employed by the Local Board, who receive 3*s.* 10*d.* for each privy and ashpit cleansed, in addition to the refuse; 916 tons of refuse are removed annually, which are wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants; sickness is not ascribed to them. Condy's fluid is used as a disinfectant, and is found efficient in preventing stink.
DENHOLM GATE -	No sewerage works have been carried out by the Local Board of Health. We are not able to state the number of waterclosets and cesspools. There are a few cesspools, privies, and middens within dwelling-houses. There are 180 privies, middens, and ashpits; these are cleansed when full by the tenants; as this cleansing is not done by the Local Authorities, we are not able to state the cost annually, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.

Basin of the Aire (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Allerton	A main sewer of brickwork, 18 inches and 15 inches in diameter, has been laid through the principal streets of the village; it is not ventilated nor flushed. There were no springs tapped during the execution of the work, nor was the level of the well water depressed thereby. There are no waterclosets; the sinks and gullies of the houses are connected with the sewer; there are no cesspools. There are about 350 privies and ashpits; these are cleansed when necessary by the occupiers of the houses to which they are attached. As this is not done by the Local Authority, we are not able to state the cost annually, and the weight of refuse removed; but it is devoted to agricultural purposes. The cleansing of the middens, privies, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants, nor is sickness attributed to them. Disinfectants are not used.
Wilsden	No sewerage works have been carried out by the governing body. There are only two waterclosets; these are connected with a private sewer; and these and the sinks and gullies of the houses are connected with private sewers flowing into the *Beck*. These sewers were made previously to the establishment of the Local Board of Health. There are no cesspools. There are about 300 privies, middens, and ashpits; these are not connected with sewers; they are cleansed two or three times a year by farmers of the district; but, as they are not done by the Local Authority, we are not able to state the cost annually, and the weight of refuse removed; but the whole of it is used for agricultural purposes. There is a ready sale for the refuse. The farmers gladly give each cottage occupier 2*s.* 6*d.* for the contents of a privy and ashpit. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants; and only one case of sickness has been attributed to them. No disinfectants are used.
Thornton	Sewerage works have not been carried out by the Governing Body, but additions to the old system have been made as occasion required. The sewers are not ventilated, and are not flushed. Steam and hot water are not conveyed into the sewers. There are six waterclosets, but none of them are connected with the sewers. The sinks and gullies of houses are connected with the sewers. There are cesspools, but they are not connected with the sewers; they are periodically cleaned out, and the refuse is used for manure. There are no cesspools, privies, middens, or ashpits in dwelling-houses. There are 450 privies, and 405 ashpits; these are not connected with the sewers; they are cleansed when necessary by the farmers in the district, and as this is not done by the Local Authority, we are not able to give the annual cost, and the weight of refuse removed; but the refuse is wholly devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
Bolton	No system of sewerage has yet been carried out within the township, in consequence of the houses being so much scattered, which, therefore, would not justify the outlay. The Local Board have taken active measures to abate the nuisance caused by sewage flowing direct into the streams, and require cesspools to be made to all houses to receive the sewage. There are eight waterclosets; these are either connected with cesspools, or the contents flow on to the land. There are a number of cesspools; some have overflows which run on to the land, and others are emptied when full. There are no cesspools within dwelling-houses. There are about 200 privies and ashpits; these are emptied when required, sometimes by order of the Local Board, or nuisance inspector, by the owner, or occupier. As this is not done by the Local Authority, we are not able to give the annual cost, or the weight of refuse removed. In most cases the farmers will cleanse the privies and ashpits for the value of the refuse; in others they require a small sum for doing the work. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used during the cleansing of the privies, middens, and ashpits to prevent stink.
Bradford	Sewerage works are in course of execution; they were commenced in 1862. The main sewers are of brickwork; the largest 8 feet 6 inches in diameter, with branch mains of brickwork, and stoneware pipes. The sewers are ventilated by gullies and down-spouts from buildings. A vertical shaft at the upper end of the town is in course of construction as a trial; if this succeeds others upon the same principle will be constructed. Flushing is not required, as the gradients are sufficient to keep the sewers clean. Steam and hot water are conveyed into the sewers; but we are not aware that any evil result has occurred. Many springs were tapped during the execution of the sewerage works; no record has been kept of the volume thus entering the sewers daily. There has been a slight depression in the level of the well water, caused by the execution of the sewerage works; it is not uniform, as the town lies at very irregular levels. There are about 1,600 waterclosets of various kinds; these as well as the sinks and gullies, where sewers are constructed, are connected with them. In some of the old parts of the town sewers are not yet made; in those places cesspools and other contrivances are resorted to. As soon as a sewer is constructed the house connections are made with it. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 15,209 privies, middens, and ashpits;

Basin of the Aire (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Bradford—*cont.*	these are connected with sewers in districts where they are already constructed. The privies, middens, and ashpits are under the supervision of an inspector of nuisances, who has them emptied when necessary, by a contractor under the Corporation, at an annual cost of 1,250*l.* The refuse in addition becomes the property of the contractor. The dry portion of the ashes is permitted to be tipped to fill up hollow places, and the remaining portion of the refuse is used for agricultural purposes. The loss to the Corporation is the cost paid yearly to the contractor, viz., 1,250*l.* The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are used whenever necessary.
Heaton	Sewerage works were carried out in 1867, and consist of a main sewer, the sides and bottom of brickwork, with flat stone covers. It is only ventilated through the gullies, and is not flushed. Steam and hot water are not conveyed into it. There were no streams tapped during the execution of the sewerage works, and the well water was not depressed thereby. There are no waterclosets. The sinks and gullies of the houses are connected with the sewer. There are no cesspools. There are 67 privies, middens, and ashpits, these are not connected with the sewer; they are cleansed systematically every two months by the occupiers of the houses to which they are attached. As this is not done by the Local Authority, we are not able to state the yearly cost, and the weight of refuse removed, which is used for agricultural purposes. In most cases the tenants pay the farmers for removing the refuse. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
Shipley	Sewerage works have been carried out, commenced in 1854, but are yet incomplete. The main and branch sewers are of brickwork. The sewers are not ventilated, but they are flushed once a month by hose and jet attached to the water mains. Steam and hot water are not conveyed into the sewers. A few streams were tapped during the execution of the sewerage works, but are not able to state the volume of water thus entering the sewers daily. The level of the well water has not been depressed thereby. There are a great many waterclosets, we are unable to give the exact number; these and the sinks and gullies of the houses are connected with the sewers. There are no cesspools. There are about 900 privies, middens, and ashpits, these are all connected with the sewers. They are cleansed regularly by the occupiers and owners of the houses to which they are attached, but, as this is not done by the Local Authority we are not able to state the weight of refuse removed, which is wholly used for agricultural purposes. The farmers in the neighbourhood remove the refuse for the value thereof without any additional charge. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. No disinfectants are used.
Windhill	No sewerage works have been carried out by the Governing Body. There are only a few, if any, waterclosets, these are connected with the old sewers which were constructed previously to the establishment of the Local Board of Health. The sinks and gullies of the houses are connected with the sewers. There are no cesspools within dwelling-houses. There are 400 privies, middens, and ashpits, these are not connected with the sewers. They are cleansed when required by the owners or occupiers of the premises to which they are attached; but, as this cleansing is not done by the Local Authority are not able to state the annual cost, or weight of refuse removed, but the whole of it is devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Chloride of lime is used when necessary as a disinfectant.
Eccleshill	No regular system of sewerage works has been carried out by the Governing Body. The sewers are not ventilated, and are not flushed. There are eight waterclosets; these are not connected with the sewers. The sinks and gullies of the houses are connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 360 privies, middens, and ashpits; these are cleansed when required by the occupiers of the houses to which they are attached. As this cleansing is not done by the Local Authority, we are not able to state the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
Calverley	The Local Board of Health have not carried out any system of sewerage works. Stone drains have been constructed from time to time. The drains are not ventilated and not flushed. There are no waterclosets. The sinks and gullies of the houses are connected with the drains. There are no cesspools. There are 300 privies, and 200 ashpits, these are not connected with the sewers; they are cleansed, but not systematically, by farmers in the neighbourhood for the occupiers of the houses to which they belong;

Basin of the Aire (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Calverley—*cont.*	and the refuse is used for manure. The cleansing is not complained of as a nuisance Disinfectants are not used. Sickness is not attributed to the privies and ashpits.
Farsley	No sewerage works have been carried out by the Local Board of Health, but a main sewer was laid before the Public Health Act was adopted. The sewer is ventilated merely through grids in the streets; it is not flushed. Hot water is not conveyed into the sewer. Springs were tapped during the execution of the work, but we are not able to state the quantity of water thus entering the sewer daily. The level of the well water was not depressed thereby. There are about 20 waterclosets, these and the sinks and gullies of the houses are connected with the sewer. There are no cesspools. There are 250 privies, middens, and ashpits, these are not connected with the sewer. They are cleansed when the refuse is wanted to be put on to land. The refuse is removed by farmers. As this is not done by the Local Authority we are not able to state the weight of refuse removed and the cost yearly. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Chloride of lime is sometimes used as a disinfectant.
Drighlington	See letter from Clerk to Local Board of Health, Section I., page 12.
Morley	Sewerage works have been carried out; commenced in 1863 and completed in 1870. The works comprise a main sewer of brickwork with branch sewers of earthenware pipes. The sewers are ventilated by man-holes, but are not flushed. Steam and hot water are conveyed into the sewers, but we have not observed any nuisance to arise therefrom. There were no springs tapped during the execution of the sewerage works, and the well water has not been depressed. There are 12 waterclosets, and these and the sinks and gullies of the houses are connected with the sewers. There are no cesspools. There are upwards of 400 privies, middens, and ashpits, these are not connected with the sewers; they are cleansed when necessary by the tenants of the houses to which they are attached; but, as this is not done by the Local Authority, we are not able to state the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The cleansing is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to the privies and middens. Disinfectants are not used.
	Basin of the Aire (North and South Bank).
Leeds	A system of sewerage has been carried out; commenced in 1851. Some of the streets were sewered previously to this date, and where the old sewers have been found available they have been connected with the new system. Additional sewers are constructed from time to time as new streets are formed. The sewers are ventilated only to a small extent by connecting them with mill chimneys; also by vertical shafts opening direct into the street surface from the sewers, and the openings covered over with trays filled with charcoal. The sewers are very seldom flushed. Steam and hot water are conveyed into the sewers, but we are not aware of any nuisance arising therefrom. Springs were tapped during the execution of the sewerage works, but we are not able to state the volume of water which thus enters the sewers daily. The well water has not been depressed thereby. There are about 6,000 waterclosets, a few trough closets with self-acting tumbler tanks; these and the sinks and gullies of the houses are connected with the sewers. There are cesspools, but, where the sewer is within 100 feet of the dwelling-house or factory, cesspools are not permitted to remain. There are no cesspools, privies, middens, or ashpits, within dwelling-houses. There are about 10,000 privies, middens, and ashpits; these are connected with the sewers. They are cleansed systematically as required, under cognizance of the Sanitary Committee of the Corporation, at a cost of about 12,000*l.* yearly. The Corporation receive 6,500*l.* a year for 70,000 tons of refuse removed, which is used for agricultural purposes. There is a ready sale for the refuse; but the cost of cleansing exceeds the amount received for the refuse by 5,500*l.* yearly. The cleansing of the privies, middens, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants. The stench in Leeds from 10 o'clock at night till 4 o'clock in the morning, while this operation is going on, is described as something fearful. Sickness is attributed to the privies, middens, and ashpits. Disinfectants are not used.
Todmorden	Sewerage works are being carried out; commenced in 1868, and not yet completed. The main sewers are of brickwork, 4 feet in diameter, with man and gully holes, and the branch mains are of stoneware pipes, 2 feet in diameter. The sewers are ventilated by shafts; they are not flushed. Steam and hot water is conveyed into them, but no nuisance has arisen therefrom. No springs were tapped during the execution of the works, and the well water has not been depressed. There are 50 waterclosets; these have outlets direct into the river. The sinks and gullies of houses are only partially connected with the sewers. There are no cesspools. There are 600 privies, middens, and ashpits; they are not connected with the sewers; they are cleansed when required by the occupiers of the houses to which they belong; the refuse is

Basin of the Aire (North and South Banks)—*continued.*

Names of Cities, Burghs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Todmorden—*cont.*	devoted to agricultural purposes, but we are unable to state the weight of refuse removed annually, or the cost of removal. The cleansing is not complained of as a nuisance. Disinfectants are not used. Sickness is not attributed to the privies and ashpits.
	Basin of the Calder (North Bank).
Hebden Bridge	See letter from Clerk to Local Board of Health, Section I., page 13.
Midgley	See Section I., page 14.
Luddenden Foot	No sewerage works have been carried out by the Local Government Board in the district. There are 35 waterclosets and 60 tank-closets; these and sinks and gullies of houses are connected with the sewers. There are 216 privies, middens, and ashpits within the district. There are no cesspools, privies, middens, or ashpits within dwelling-houses. The privies, middens, and ashpits are not connected with the sewers. They are cleansed, but not systematically, by the owners or occupiers of the houses to which they are attached; but as this is not done by the local authorities, we are not able to state the amount of refuse removed, but it is wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance. If a privy or ashpit becomes a nuisance in consequence of the accumulation of refuse, the Surveyor gives the occupier of the house to which it belongs notice to cleanse it, and it is done forthwith. Disinfectants are not used.
Warley	See letter from Clerk to Local Board of Health, Section I., page 14.
Sowerby Bridge	Sewerage works are being carried out; they were commenced in 1863, and are not yet completed. The main sewers are of brickwork; the branch mains are sanitary pipes, with all necessary man-holes and lamp holes. The sewers are ventilated at the man-holes; they are not flushed. Steam and hot water is conveyed into the sewers, but no nuisance arises therefrom. Springs were tapped during the execution of the works, but a very small volume of water enters the sewers from this cause. There are a great many waterclosets; some of these are connected with old private drains, and these have been complained of as a nuisance to the adjoining houses. The sinks and gullies of houses are connected with the sewers. There are a great many cesspools, and these are not connected with the sewers. There are no cesspools, privies, or ashpits within dwelling-houses, but a great number are too near dwellings. There are 600 privies, middens, and ashpits; these are not connected with the sewers; they are cleansed by the owners or tenants of the houses to which they are attached; but as this is not done by the Local Authority, we are unable to state the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the middens, privies, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
Queensbury	No sewerage works have been carried out by the Governing Body. There are very few waterclosets, and these are connected with private drains belonging to each separate property, and the refuse is utilized by the owner on his own land. There are no cesspools; there are 900 privies, middens, and ashpits. They are cleansed as often as required by the owners of the houses to which they are attached, under the superintendence of an inspector of nuisances; but, as this is not done at the expense of the Local Authority, we are not able to state the cost annually, and the weight of refuse removed, which is wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
Halifax	A system of sewerage works has been carried out in the borough, commenced in 1854, and finished in 1856, but extended from time to time as new streets and buildings have come into existence. The main sewers are of stone and brickwork; the branch mains of earthenware pipes. The principal outlet, previously to June 1869, was at a point in the *Hebble Brook*, above the works of Messrs. Houldsworth; but, since that period the sewage has been diverted and conveyed in iron pipes to a point in the river below the Messrs. Houldsworth's works. The sewers are ventilated at the man-holes, and the sewer gases made to pass through trays filled with charcoal. The sewers are flushed when required with water from the waterworks. Steam and hot water are conveyed into the sewers, and is a very great nuisance. Springs were tapped during the execution of the sewerage works, and 500,000 gallons of water thus enter the sewers daily. The level of the well water has not been depressed by the sewerage works. There are 925 waterclosets, they are not all connected with sewers; some are out of the system, and others are in private grounds and connected with cesspools. The sinks and gullies of the houses, when within 100 feet of the existing sewers, are connected with them. There are only one or two cesspools to new houses in country district, and these have been constructed because of a recent injunction forbidding sewage to be turned into the river before it is purified and deodorized. The storm overflow from the cesspools goes into river or stream. Cesspools, privies, and middens are not allowed within dwelling-houses. There are 8,000 privies, middens, and ashpits; those to the *old* houses are partially connected with the sewers; and those to the new houses are all connected with the sewers. They are cleansed

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 27, PAGE 36—*continued.*
HALIFAX—*cont.*	partly by a town's contractor for scavenging, after notice by the occupier, and partly by farmers. The contractor is paid per ashpit and privy. The occupier is charged for ashpit and privy being cleansed according to the number of loads of refuse removed. The cost of cleansing is greater than the receipts, the loss being equal to about 150*l.* per annum. We are not able to give the weight of refuse removed, but it is wholly used by the farmers for manure. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance if done within proper hours; nor is sickness attributed to them, if they are systematically cleansed. Disinfectants are used.
NORTH OWRAM -	No sewerage works have been carried out. There are no waterclosets, and no cesspools. The Local Board have not taken any steps to ascertain the number of privies, middens, and ashpits. These are cleansed by the occupiers of the houses to which they are attached, but not systematically. As this is not done by the Local Authority, we are not able to state the annual cost, the weight of refuse removed, or the purposes to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance, but if any complaints are made to the Board of an accumulation of refuse, the occupier is compelled to have it removed. There are no disinfectants used.
SOUTH OWRAM -	No sewerage works have been carried out by the governing body. There are about 10 waterclosets and an unknown number of cesspools. The houses generally drain into cesspools or into the fields. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 100 privies and about 100 middens or ashpits. They are cleansed by the owners or occupiers of the houses to which they are attached, but not systematically. As this is not done by the Local Authority, we are unable to state the annual cost, and the weight of refuse removed; but the whole of it is used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health or comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
SHELF - - -	A main sewer was carried out in 1868. It is not ventilated, and is not flushed. No springs were tapped during the execution of the work, and the well water has not been depressed. There are four waterclosets; these are connected with cesspools but not with sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 200 privies and 100 ashpits; some of these are connected with the sewer. They are cleansed as often as is necessary. The inspector of nuisances reports any case of neglect; the occupier is then served with notice, and the cleansing is generally done without any further proceedings being taken. The cleansing is not done by the Local Authority, and we are not able to state the weight of refuse removed; it is wholly used for agricultural purposes. Farmers in the neighbourhood remove the refuse by permission of the tenant, and sometimes pay a small sum for it; but in no case does the removal impose expense upon the tenant. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
BRIGHOUSE - -	Sewerage works have been carried out; commenced in 1846 and completed in 1850. The sewers are not ventilated; they are flushed during the summer season by water from the canal. Steam and hot water are not conveyed into them. No springs were tapped during the execution of the work, and the level of the well water has not been depressed thereby. There are 20 waterclosets, these and the sinks and gullies of the houses are connected with sewers. There are no cesspools. There are 500 privies, middens, and ashpits, these are not connected with the sewers. They are cleansed systematically, some fortnightly and some quarterly, by the occupiers of the houses to which they are attached. The only cost to the Local Board is the salary of a nuisance inspector. As the cleansing is not done by the Local Authority, we are unable to state the weight of refuse removed annually, which is wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Chloride of lime is sometimes used as a disinfectant.
SCHOLES - -	No sewerage works have been carried out. There are no waterclosets and no cesspools. There are about 150 privies, middens, and ashpits, these are cleansed by the occupiers of the houses to which they are attached; but, as this is not done by the Local Authority, we are not able to state the cost or weight of refuse removed annually. The refuse is devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance. Disinfectants are not used.
NORTH BIERLEY -	No sewerage works have been carried out. There are about 40 waterclosets, but no trough or tank closets, or self-acting tumbler tanks. The waterclosets are connected with cesspools, the overflow from which eventually finds its way into the stream. There are no cesspools, privies, middens, or ashpits within dwelling-houses. We do not know the number of privies, middens, and ashpits, as we have no information on the subject; they are cleansed when necessary by the occupiers of the houses to

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 27, PAGE 36—*continued.*
NORTH BIERLEY—*cont.*	which they are attached. This cleansing is not done by the Local Authority, therefore we are not able to state the annual cost, or the weight of refuse removed, which is wholly applied to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
CLECKHEATON - -	No sewerage works have been carried out; but plans have been prepared and are only waiting for the Report of the Rivers Pollution Commission before executing the works. There are 40 waterclosets; these and the sinks and gullies of the houses are connected with sewers. There are about 40 cesspools, and these are connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 350 privies, middens, and ashpits which are not connected with the sewers. They are cleansed by the owners and tenants of the houses to which they are attached, but not systematically. As this is not done by the Local Board, we are unable to state the cost annually or the weight of refuse removed, which is wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health of the inhabitants. Disinfectants are not used. Sickness is not attributed to the privies, middens, and ashpits.
HECKMONDWIKE -	Sewerage works have been carried out; commenced in 1866. The works consist of 1,100 lineal yards in brickwork, main and branch sewers; the continuation of the main sewer is now in course of construction at a cost of 180*l.* The sewers are ventilated by grids in the surface of the street, and they are flushed when necessary. Steam and hot water are not conveyed into the sewers. There were no springs tapped during the execution of the works, and the level of the well water was not depressed thereby. There are 50 waterclosets; these and the sinks and gullies of the houses are connected with the sewers. There are no cesspools. There are 450 privies, middens, and ashpits; these are not connected with the sewers; they are regularly cleansed by the occupiers of the houses to which they are attached. As the cleansing is not done by the Local Authority, we are not able to state the cost annually, and the weight of refuse removed, which is wholly devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants, as this work is done in the night time under the direction of the Inspector of Nuisances, who is very vigilant. There are no disinfectants used.
RAVENSTHORPE -	No sewerage works have been carried out. There is only one watercloset, and it is connected with a cesspool. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 184 privies, and 130 middens and ashpits. These are cleansed when required by the occupiers of the houses to which they are attached. This is not done by the Local Authority, and, therefore, we are not able to state the cost or weight of refuse removed annually. The whole of the refuse is used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
BIRKINSHAW - -	See letter from Mr. John Smith, Clerk to Local Board of Health, Section I., page 18.
BIRSTAL - -	No sewerage works have been carried out. There are twelve waterclosets, but no trough or tank closets or self-acting tumbler tanks, these are connected with cesspools. The sinks and gullies of the houses are connected with private drains. There is one cesspool within a dwelling-house. There are about 500 privies, middens, and ashpits. These are cleansed by the owners, but not systematically, and we are not able to state the annual cost of cleansing, and the weight of refuse removed. It is wholly devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants, to some extent, owing to the removal of the refuse in the day time. Sickness has been attributed to them, in consequence of their not being regularly and properly cleansed. Disinfectants are occasionally, but not systematically, used.
BATLEY - -	No system of sewerage works has been carried out. A few sewers have been laid in the streets, and private drains connected with them from time to time. Steam and hot water are conveyed into the sewers, and nuisance arises therefrom. We are not aware that any springs were tapped during the execution of the works; the level of the well water has not been depressed thereby. There are 100 waterclosets; these and the sinks and gullies of the houses are all connected with the sewers. There are no cesspools. There are about 1,300 privies, middens, and ashpits; these are not connected with the sewers. They are cleansed at intervals only as required, by the occupiers of the houses to which they are attached, as this is not done by men employed by the Corporation, we are not able to state the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants; sickness has not been attributed to them. Carbolic acid, and disinfecting powder are generally used, and are found efficient in preventing stink.

Basin of the Calder (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Dewsbury	No system of sewerage works has been carried out. The sewers are ventilated by the down spouts from the roofs of buildings, and they are occasionally flushed. Steam and hot water are conveyed into the sewers, but we are not aware of any nuisance arising therefrom. We are not aware that any springs were tapped during the execution of the sewerage works, or that the level of the well water has been depressed thereby. There are 300 waterclosets; nearly all these and the sinks and gullies of the houses are connected with the sewers. There are a few cesspools; these are not connected with the sewers. There are not within our knowledge any cesspools, privies, middens, or ashpits within dwelling-houses. There are 1,200 privies, middens, and ashpits, and there are only a few connected with the sewers. They are cleansed by the owners when directed by the Nuisance Inspector; but not systematically. We are not able to give the cost annually, or the weight of refuse removed. There is much difficulty in getting rid of the refuse, but the greater portion of it is used by farmers in the neighbourhood for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is attributed to them, but we have had no special complaint. Carbolic acid is used as a disinfectant, but only occasionally.
Soothill, Upper	No sewerage works have been carried out by the Governing Body. There are 12 waterclosets; these and the sinks and gullies of the houses are connected with private drains, which empty into the beck. There are 12 cesspools; but, the overflow from them is not connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 600 privies, middens, and ashpits; these are not connected with the drains. They are cleansed about twice a year by the occupiers of the houses to which they are attached; but as the cost is defrayed by the owners, we are unable to state the amount or the weight of refuse removed. It is all used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. No disinfectants are used.
Soothill Nether	No sewerage works have been carried out by the governing body. There are five waterclosets; these and the sinks and gullies of the houses are connected with the drains. There are 20 cesspools, but no cesspools, privies, middens, or ashpits within dwelling-houses. There are 202 privies, middens, and ashpits; these are not connected with sewers. They are cleansed when full by the occupiers of the houses to which they are attached. We are not able to state the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
Horbury	No sewerage works have been carried out by the Governing Body. It is impossible to state the number of cesspools, waterclosets, privies, middens, or ashpits without going round to every house. We are not aware of any cesspools, privies, middens, or ashpits within dwelling-houses. The privies, middens, and ashpits are not cleansed by the Board, but by the occupiers; and therefore we are unable to give the cost yearly, the weight of refuse removed, or the purpose to which it is devoted. No complaints of any consequence have been made of the nuisance arising from the cleansing of the privies, middens, and ashpits. Sickness has not been attributed to them.
Whitwood	See letter of Mr. W. E. Pratt, Clerk to the Local Board of Health, Section I., page 29.

Basin of the Calder (South Bank).

Scammonden	No sewage works have been carried out by the Local Board. There are no waterclosets. There are about 40 privies, middens, and ashpits. These are cleansed by the owners of the premises to which they are attached, and the contents are used for agricultural purposes. No disinfectants are used, and sickness is not attributed to the privies and middens.
Rishworth	No sewerage works have been carried out in this district by the Local Board of Health. There are only a few waterclosets; these are connected with cesspools. There are about 80 privies, middens, and ashpits. These are cleansed when full by the owners of the premises to which they are attached. As this is not done by the local authority, we are not able to state the cost or weight of refuse removed, which is only to a small extent devoted to agricultural purposes. The cleansing of the privies is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used. Sickness is not attributed to them.
Barkisland	See letter from Clerk to Local Board of Health, Section I., page 21.
Soyland	No sewerage works have been carried out by the Governing Body. The highways are sewered, and in many instances the drainage from the houses is connected with the sewers, and the outfalls of these are in the river.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Soyland—*cont.*	There are very few waterclosets; these, and sinks and gullies, are connected with the sewers. There are no cesspools; the privies (number of which are not known) are cleansed by farmers in the neighbourhood when required, and the refuse is used for manure. The cleansing is not complained of as a nuisance. Disinfectants are not used.
Sowerby	See letter from Mr. Francis Jubb, Clerk to Local Board of Health, Section I., page 21.
Greetland	No sewerage works have been carried out by the Governing Body. A scheme was prepared (sanctioned by the Local Government Act Office) with an outfall into the river *Calder*, below the junction of the river *Hebble*, which latter river brings down the sewage of Halifax; but, it was thought expedient not to carry the scheme out at present. There are three waterclosets; these are not, but the sinks and gullies of houses are, connected with the sewers. There are two cesspools, and about 180 privies and middens; they are not cleansed systematically, but when required, by farmers, and the contents is used as manure. There is no charge for cleansing, the refuse being considered equivalent to the labour performed. The privies are not complained of as a nuisance. Disinfectants are not used.
Elland	Sewerage works have been carried out in the district; commenced in 1863 and not yet completed. The sides and bottoms of the main drains are of rough stone, with a cover of the same material. They are not ventilated, but are flushed. Steam and hot water are conveyed into the sewers, and a great nuisance arises therefrom. Many springs were tapped during the execution of the sewerage works, but we are not able to give the volume of water thus entering the sewers daily. The level of the well water has not been depressed thereby. There are 12 waterclosets; these and the sinks and gullies of the houses are connected with the sewers. There are no cesspools. There are 140 privies, middens, and ashpits; these are generally connected with the sewers. They are cleansed by order of the Nuisance Inspector by the occupiers of the premises to which they are attached. We are not able to state the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are only occasionally used.
Rastrick	No sewerage works have been carried out by the governing body. There are 15 waterclosets; these are connected with private sewers, as are also the sinks and gullies of the houses. There are a great many cesspools; in only a few cases are these connected with sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 500 privies, middens, and ashpits; these are not connected with the private sewers; they are cleansed, but not systematically, by the farmers of the district. This not being done under the supervision of the Local Authority, we are not able to state the annual cost, or weight of refuse removed, but it is wholly devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
Marsden - in - Almondbury.	See Marsden-in-Huddersfield below.
Marsden - in - Huddersfield.	No sewerage works have been carried out by the Governing Body. There are only four waterclosets: these are not connected with the sewers. The sewage from these and the refuse from the sinks and gullies flow into the *Colne*. There are no cesspools. There are 84 privies, middens, and ashpits. These are cleansed when required by the farmers in the neighbourhood. As this is not done by the Local Authority we are not able to state the annual cost or the weight of refuse removed; but it is all used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Carbolic acid is used as a disinfectant, and is found efficient in preventing stink.
Slaithwaite	No sewerage works have been carried out by the Governing Body. There are two waterclosets; these and the sinks and gullies of the houses are connected with sewers. There are no cesspools. There are about 400 privies, middens, and ashpits; these are not connected with any sewers. They are cleansed when required by farmers; but we are not able to state the annual cost or the weight of refuse removed; the whole of it is used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are only used in summer.
Linthwaite	No sewerage works have been carried out in the district by the Local Board of Health. There are about 20 waterclosets. These, and the sinks and gullies of houses, in many cases are connected with the old drains. There are no cesspools. There are about 300 privies, and about 90 middens and ashpits; these are not connected with the drains. They are cleansed by the owners of the premises to which they are attached, but not systematically; and, as this is not done by the Local Authority, we are not able to state the weight of refuse removed, or the cost of cleansing. The refuse is devoted to agricultural purposes. The cleansing of the privies and ashpits is not

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 27, PAGE 36—*continued.*
LINTHWAITE—*cont.*	complained of as a nuisance, affecting the health of the inhabitants. Disinfectants are not used. Sickness is not attributed to privies, middens, and ashpits.
GOLCAR	No sewerage works have been carried out by the Local Board. There are no water-closets. The sinks and gullies of the houses are not connected with any drains. There are no cesspools. *We do not know the number of privies, and have no means of ascertaining, except counting them, which we do not feel inclined to do.* The privies are cleansed when required by the occupiers of the houses to which they are attached. We cannot state the annual cost or weight of refuse removed; but it is all used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. No disinfectants are used.
LONGWOOD	Sewerage works have been carried out; commenced in 1866, and finished in 1869. The main sewers of the houses are of rough stone. The sewers are ventilated by grids upon the surface of the street, and are only flushed by the rainfall. Steam and hot water are not conveyed into the sewers. No springs were tapped during the execution of the work, and the level of the well water has not been depressed thereby. There are a few waterclosets, none of which are connected with the sewers; the sinks and gullies of the houses are connected with the sewers. There are no cesspools. There are about 500 privies, middens, and ashpits; these are not connected with the sewers. They are cleansed when required; but as this is not done by the Local Authority, we are not able to state the annual cost, the weight of refuse removed, and the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
FULSTONE	No sewerage works have been carried out. There are only a few waterclosets and cesspools. There are no cesspools, privies, or ashpits within dwelling-houses. There are 350 privies, middens, and ashpits; these are cleansed by the tenants when full, but as the Local Authority do not undertake the scavenging we are not able to give the annual cost, the weight of refuse removed, or the purpose to which it is devoted. The privies are not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
HUDDERSFIELD	Sewerage works have been carried out; commenced soon after the passing of the Improvement Act in 1848, and extended as new streets were laid out; they are still in progress, but incomplete, as an extensive system of sewerage works is about to be commenced. In addition to the existing lines of sewerage it is intended to supply the following districts with earthenware pipes, varying from 12 to 36 inches in diameter:—Lockwood, at a cost of 1,449*l.*; Fartown, 4,772*l.*; Marsh, 2,658*l.*, and Linley, at a cost of 2,147*l.* The sewers are ventilated by Brooks' patent charcoal ventilator. The sewers are only occasionally flushed, by means of water supplied from the waterworks, as, from their steep gradient, and the heavy rain which occasionally falls in this district, they do not often require it. Steam and hot water are conveyed into the sewers, and cause a great nuisance. Springs were tapped during the execution of the sewerage works, but we are not able to give the volume of water thus entering the sewers daily. The level of the well water has not been depressed thereby. There are 1,050 water-closets in the area supplied by the waterworks; the number supplied independently is not known. There are only a few trough or tank closets, these and the waterclosets are connected with the sewers, as are also the sinks and gullies of the houses, when they are situated within 100 feet of the sewers. There are no cesspools. There are 2,000 privies, middens, and ashpits; these are to a great extent connected with the sewers; they are cleansed systematically, at proper intervals, within the area of the "Huddersfield Improvement Act, 1848," by men employed by the Corporation, and 1,200 tons of refuse removed (two-thirds of this only is used for agricultural purposes, and the remaining one-third is carted away as rubbish), for which, during the last eighteen months, there has been a ready sale. The cleansing of the ashpits, after deducting allowance for sales of manure and establishment charges, costs 1,529*l.* yearly. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. In some cases sickness is attributed to them. Disinfectants are freely used.
MELTHAM	The Governing Body have not executed sewerage works. There are six waterclosets; these are connected with cesspools, but not with sewers. There are no trough or tank closets or self-acting tumbler tanks. The sinks and gullies of the houses are connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 404 privies and 279 ashpits; these are not connected with sewers. They are cleansed when required by the tenants. As this is not done under the control of the Local Board of Health we are not able to state the annual cost or the weight of refuse removed, but it is entirely used for agricultural purposes. The cleansing of the privies, middens, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is attributed to them. Disinfectants are not used.

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 27, PAGE 36—*continued.*
HONLEY	Sewerage works have been carried out; commenced in 1842, and finished in 1843. They consist of sewers built with rough stone sides, bottoms, and covers; they are not ventilated, nor are they flushed. Steam and hot water are conveyed into the sewers, but no nuisance arises therefrom. Springs were tapped during the execution of the works, but we are not able to state the volume of water thus entering the sewers daily. The level of the well water has not been depressed thereby. There are 12 waterclosets: these and the sinks and gullies of the houses are generally connected with sewers. There are no cesspools. There are 300 privies, middens, and ashpits; these are not connected with sewers, and are not systematicaly cleansed; but when required, the work is done by farmers, and the refuse taken in exchange for the labour. The refuse is used as manure. The cleansing has not been complained of as a nuisance affecting the health of the inhabitants. Chloride of lime is used as a disinfectant, and is efficient in preventing stink.
AUSTONLEY	No sewerage works have been carried out. There are no waterclosets, and no cesspools. We are not able to state the number of privies and middens; they are cleansed systematically by the owners of the houses to which they belong, and refuse used as manure. The privies and middens are not a nuisance. Disinfectants are not used.
HOLME	Sewerage works to a very limited extent were carried out in 1840, and consist of a main drain of earthenware pipes about 100 yards in length. There are not any water-closets. The water from the sinks and gullies of the houses is not conveyed into the sewers. There are no cesspools. There are about 100 privies, middens, and ashpits; these are not connected with the sewer. They are cleansed two or three times in the year by the tenants. We are not able to state the cost and weight of refuse removed, which is wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used.
WOOLDALE	No sewerage works have been carried out by the Governing Body. The drains are not ventilated—they are only flushed by rainfall. Steam and hot water are not conveyed into the drains. There are only very few waterclosets, these and the sinks and gullies of houses are not connected with the drains. There are no cesspools. There are about 700 privies, middens, and ashpits, these are not connected with the drains. They are cleansed systematically weekly by the occupiers of the houses with which they are connected; but as this is not done by the Local Authorities we are unable to state the cost annually, or the weight of refuse removed. It is wholly devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is rarely complained of as a nuisance affecting the health of the inhabitants. Disinfectants are used, but not generally. Sickness is not attributed to the privies, middens, and ashpits.
NETHER THONG	No sewerage works have been carried out by the Governing Body. There are no waterclosets. The sinks and gullies of the houses are connected with old drains. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 30 privies, middens, and ashpits; they are not connected with the drains. They are cleansed twice a year by the tenants of the houses to which they are attached. We are not able to give the cost of the cleansing or the amount received for about forty tons of refuse removed, which is wholly used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to the privies. Disinfectants are not used.
UPPER THONG	Sewerage works have been partially carried out. There are 50 waterclosets; these are connected with the sewers, and the outlets are in the river. The sinks and gullies of the houses are connected with the sewers. There are 50 cesspools; and where these are not connected with the sewers the owners are compelled to empty them when full, and remove the refuse on to land to be used for manure. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 100 privies; these are not connected with the sewers. They are cleansed when full, and, if not done, they are reported as nuisances. The cleansing is done by the farmers, therefore we are not able to state the yearly cost, nor the weight of refuse removed; but it is wholly devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance. Disinfectants are used when necessary.
THURSTONLAND	A main sewer has been constructed through the township, which delivers the sewage on to agricultural land. It is not ventilated nor flushed. Steam and hot water are not conveyed into it. No springs were tapped during the execution of the sewerage works, nor has the level of the well water been depressed thereby. There are no waterclosets. The sinks and gullies of the houses are connected with the sewer. There are no cesspools. There are 150 privies; these are not connected with the sewers. They are cleansed by the tenants; but not systematically. We are not able to give the yearly cost and the weight of refuse removed; but the whole of it is used for manure. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness has not been attributed to them. Disinfectants are sometimes used.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Farnley Tyas -	Sewerage works are now being carried out; they were commenced in November 1869, and consist of a main sewer of earthenware pipes, 18 inches in diameter, with branch mains 12 inches in diameter. The only ventilation provided is by iron grids to the gullies. Springs were not tapped during the execution of the works, and the level of the well water has not been depressed at present. There are only four waterclosets, and it is intended to connect these and the sinks and gullies of the houses with the sewers. There are a number of cesspools, and these will be connected with the sewers when completed. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 100 privies, and these are generally cleansed when full by farmers in the neighbourhood; this is done without any cost to the Local Authorities, and we are unable to state the expense or the amount of refuse removed, which is wholly devoted to agricultural purposes. The cleansing is not complained of. Disinfectants are not used during the removal of the refuse from the privies, middens, and ashpits.
Shepley - -	No system of sewerage works has been carried out. Sewers have been laid in the principal roads. There are about 250 privies; these are not connected with the drains. The sinks and gullies of the houses are connected with the drains. There are no cesspools in the district. The privies are cleansed by the proprietors or tenants of the houses to which they belong, but not systematically. As this is not done by the Local Authority we are not able to state the cost, or the weight of refuse removed. It is all used as manure for the land. The cleansing of the privies is not complained of as a nuisance. Disinfectants are not used. Sickness has not been attributed to the privies, middens, and ashpits.
Kirkburton - -	No general system of sewerage works has been carried out by the Governing Body. Steam and hot water are not conveyed into the drains. There are no waterclosets. The sinks and gullies of the houses are connected with the drains. There are no cesspools. There are about 200 privies, middens, and ashpits; these are not connected with the drains; they are cleansed when required by the owners or occupiers of the the houses to which they belong. The cleansing is not done by the Local Board, and therefore we are not able to state the cost annually, or the weight of refuse removed; it is used for agricultural purposes. The privies are sometimes complained of as a nuisance, especially when too full, and then notice is given to the occupier by the Nuisance Inspector to have them cleansed. Disinfectants are used, but not always. Sickness is sometimes attributed to the middens, privies, and ashpits.
Kirkheaton - -	Sewerage works were carried out before the adoption of the Act in 1862. There are two waterclosets; these are connected with cesspools. The sinks and gullies of the houses are not connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 269 privies, 45 middens, and 4 ashpits; these are not connected with the sewers. The privies are cleansed three or four times yearly, ashes or earth being generally thrown upon the excrement. The cleansing is done by the occupiers, who sell it to the farmers in the neighbourhood; but, as this is not done by the Local Authority, we are unable to state the cost of removal and the weight of refuse removed; it is used for agricultural purposes.
Whitley Upper -	See letter of Mr. W. Turner, Clerk to the Local Board of Health, Section I., page 28.
Thornhill - -	No sewerage works have been carried out by the Governing Body. We are not able to state the number of waterclosets. The sinks and gullies of the houses are connected with the sewers. There are 20 cesspools; these are not connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 246 privies, middens, and ashpits; these are not connected with the sewers. They are cleansed when full by the occupiers; but we are not able to state the cost annually, the weight of refuse removed, or the purpose to which it is devoted. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance. Sickness has not been attributed to them. Disinfectants are not used.
	Basin of the Calder (North and South Banks).
Wakefield - -	A system of sewerage works has been carried out; commenced in 1865, and the greater portion completed in 1869. Some small additions thereto are now being carried out. The sewers are of brickwork, main sewers chiefly of egg-shaped form, with branch sewers of earthenware pipes 18 inches in diameter. The sewers are partially ventilated by down spouts and by ventilating shafts, carried up from the sewers to the surface of the streets; and arrangements are made for the gases to pass through trays filled with charcoal. Flushing chambers constructed to hold two tons of water are connected with the branch sewers for the purpose of flushing the same. No provisions are made for flushing the main sewers. Steam and hot water are conveyed into the sewers from the mills, but we believe that no nuisance arises therefrom. Several springs were tapped during the execution of the works, and about 20,000 gallons thus enter the sewers daily. There are very few wells now in use in Wakefield. It has not been ascertained that the level of the well water has been depressed by the sewerage works. There are 646 waterclosets; nearly all are connected with the sewers; as are also the sinks and gullies of the houses. There are very few cesspools, the overflow from which is connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 2,122 privies and 1,800 ashpits; these are mostly connected

Basin of the Calder (North and South Banks)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Wakefield—*cont.*	with the sewers. They are not cleansed systematically or at any stated intervals. The The Inspector of Nuisances causes them to be emptied when full by the tenants of the houses to which they are attached. As this is not done by men employed by the Corporation, we are not able to state the yearly cost of the cleansing, and the weight of refuse removed. There is generally a ready sale for it with the exception of seed time and harvest. The whole of the refuse is devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is complained of as a nuisance affecting the health and comfort of the inhabitants, especially at the times when there is no demand for the refuse. The medical officer does not attribute any special sickness to the privies and middens, but considers that they are always liable to lower the general tone of health, and so predispose to the spread of disease. Bishop's disinfecting powder is used to a very small extent, and is partially effective in preventing stink.
	Basin of the Aire and Calder.
Castleford - -	See letter of Mr. Geo. Bradley, Clerk to the Local Board of Health, Section I., page 30.
Pontefract - -	No proper system of sewerage works has been carried out by the Corporation. The sewers are not ventilated nor flushed. There are 190 waterclosets; 155 are, and 20 are not, connected with the sewers; 311 sinks and gullies of houses are connected with sewers. There are 28 cesspools; these are not connected with sewers. There are six or seven privies and middens in dwelling-houses. There are 750 privies and 735 middens and ashpits; these are not connected with sewers. They are cleansed when required by the owners or occupiers of the premises to which they belong; but as this is not done by the Corporation we are not able to give the cost annually, or the weight of refuse removed, but it is wholly devoted to agricultural purposes. The cleansing of the privies is not complained of as a nuisance affecting the health and comfort of the inhabitants. Chloride of lime is occasionally used as a disinfectant, and has proved satisfactory. Sickness is not attributed to the privies, middens, and ashpits.
	Basin of the Severn.
Newtown and Llanllwchaiarn.	No system of sewers has been carried out by the Local Board; but sewers were constructed before the adoption of the Act. They are not ventilated and not flushed. Steam and hot water are not conveyed into them. There are about 25 waterclosets, but no self-acting tumbler tanks. Most of them are connected with the sewers, as also are the sinks and gullies of the houses. There are cesspools; these are not connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 671 privies and 400 ashpits; these are not connected with the sewers. They are emptied when full by the occupiers of the houses to which they are attached. The cleansing is not done by the Local Authority, and therefore we cannot state the annual cost and the weight of the refuse removed; there is a ready sale for it, and the whole is devoted to agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants, but, undoubtedly, sickness is produced by the accumulations in the privies, middens, and ashpits, more especially in hot and dry weather. The "Eureka" disinfecting powder is sometimes used, and has proved effective in preventing stink.
Kidderminster -	No system of sewerage works has been at present carried out, but plans have been devised for the proper sewerage of the borough; these have been approved by the Corporation and will be shortly carried out. Sewers have been constructed from time to time having their outlets in the river. The sewers are not ventilated, and are not flushed. Steam and hot water are conveyed into the sewers. No complaints have been made of any nuisance arising therefrom. There are 30 waterclosets; these are not connected with the sewers. The sinks and gullies of the houses are connected with the sewers. There are a great many cesspools, but very few are connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are about 1,200 privies and ashpits, and about 50 middens; these are not connected with the sewers. The privies are cleansed by the owners or occupiers of the houses to which they are attached, but not systematically, except on notice by the Inspector of Nuisances when the contents become foul. As the cleansing is not done by the Local Authority we are not able to state the cost annually, or the weight of refuse removed. There is a ready sale for the street sweepings, which are sold to farmers and used for manure. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health of the inhabitants. Chloride of lime is used as a disinfectant in very bad cases. Sickness is attributed to the middens and ashpits.
Stroud - -	Sewerage works have been carried out; commenced in 1859 and completed in 1861: small extensions have been made from time to time, and are still in progress; but the hamlets of Pakenhill, Down Field, and Bow Bridge within the district are not sewered. The works consist of a main trunk sewer with several branches. The main trunk sewer discharges the sewage into deodorizing tanks, from which there is an outfall into

Basin of the Severn—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Stroud—*cont.*	the *Frome*. There are a few pipes specially fixed against the houses for ventilating the sewers; but in general the ventilation is by means of down spouts from the roofs. The sewers are only flushed by storm water. Steam and hot water are not conveyed into the sewers. Some springs were tapped during the execution of the works; but none of any consequence. We are unable to state the volume of water which thus enters the sewers daily. The level of the well water has not been depressed by the sewerage works. There are 216 waterclosets; but no trough or tank closets, or self-acting tumbler tanks; these and the sinks and gullies of the houses are all connected with the sewers. There are five cesspools; they are with one exception connected with the sewers. There are no cesspools, privies, middens, or ashpits within dwelling-houses. There are 513 privies, and a few middens and ashpits. All the privies in the town, with one or two exceptions, are connected with the sewers; but not the middens or ashpits. The house refuse is in most cases put out in boxes and removed by the town scavengers. The privies are only cleansed when complained of, or during garden operations in the spring, sometimes by the owners, but generally by the occupiers of the premises to which they are attached. The annual cost of scavenging the town and district is 143*l.*, and the Local Authority do not receive anything for the 2,000 tons of refuse which are removed. There is no sale for it; the annual cost is therefore a deficiency. Occasionally a few loads are disposed of by the scavengers as manure; but generally it is not employed in any way. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Bishop's powder and chloride of lime are used as disinfectants, and are efficient in preventing stink.
	Basin of the Thames (Windrush).
Witney - - -	No sewerage works have been carried out by the Local Government Board. There are about 20 waterclosets; these are not connected with the sewers. There are cesspools, but these are not connected with sewers. There are no cesspools, privies, or middens, within dwelling houses. There are about 300 privies, middens, and ashpits; these are not connected with sewers. The privies, middens, and ashpits are cleansed by the owners of the houses to which they belong, but not systematically. As this work is not done by the Local Authority we are unable to state the cost or the weight of refuse removed annually; it is used for agricultural purposes. The cleansing of the privies and ashpits is not complained of as a nuisance affecting health. Disinfectants are used, and they are effective in preventing stink.
	Basin of the Lower Avon.
Bristol - - -	Sewerage works have been carried out; commenced in 1853, and in five districts are quite, or nearly quite completed. The works in the sixth remaining district are now in hand. The sewers are formed of brickwork. The sewers are not ventilated, and are only flushed by the rainfall and storm water. Steam and hot water are conveyed into the sewers, and in some instances nuisance arises therefrom, especially when the refuse from paraffine works mixes with the warm water. Several springs were tapped during the execution of the sewerage works, but these have been prevented from entering the sewers. The level of the well water has been depressed by the sewage works, but we are not able to state to what extent. All new houses, and nearly all the old houses, have separate waterclosets; but in some cases the tenants of two houses are allowed to use one closet in common. There are about 23,596 houses in the district. No cesspools are allowed. There are but very few privies; these are connected with the sewers. The waterclosets, sinks, and gullies of the houses are connected with the sewers. The privies and ashpits are cleansed by contractors employed under the Corporation, and by the terms of the contract the contents are to be removed twice a week. The contractors take the refuse, but we are unable to state the weight annually removed; and as the contract includes the street cleansing, the separate cost of removing the refuse from privies and ashpits is not known. The cleansing of the privies and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are not used. Sickness is not attributed to the privies, middens, and ashpits.
Bath - - -	Sewerage works have been carried out and the old sewers reconstructed; commenced in 1851, and extensions made from time to time, stoneware pipes being substituted for the stone flat-bottomed sewers. The main sewers are ventilated at the upper parts of the city by shafts carried up from the sewers to the surface of the street, and the sewer gases made to pass through trays filled with charcoal. The sewers are not flushed artificially, but, as they are at a very steep gradient, flushing is scarcely required. Hot mineral water is discharged at a low level into three of the sewers, but no nuisance arises therefrom. There were no springs tapped during the execution of the sewerage works. There are upwards of 10,000 waterclosets, but no tank closets or tumbler tanks; these and the sinks and gullies of the houses are

Basin of the Lower Avon—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 27, Page 36—*continued.*
Bath—*cont.*	connected with the sewers. There are no cesspools. There are 3,000 privies, middens, and ashpits, the privies are being converted into waterclosets; nearly all the privies, but none of the middens or ashpits, are connected with the sewers. The privies are only cleansed by the occupiers of the houses when required, but the middens and ashpits are periodically cleansed by the scavengers under the direction of the Inspector of Nuisances. As the cleansing is done partly by the occupiers and partly by a contractor under the Board of Health, we are unable to state the yearly cost, or the weight of refuse removed. The contractor takes all the refuse, and all that is available is used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Sickness is not attributed to them. Disinfectants are not used.
Trowbridge - -	No sewerage works have been carried out by the Governing Body, but plans have been sent to the Secretary of State for his approval. It is impossible for the Local Board to give the number of waterclosets, privies, middens, or ashpits, as they have no means of obtaining this information. The waterclosets are not connected with the sewers. The sinks and gullies of the houses are connected with the sewers. There are no cesspools. Some of the privies, middens, and ashpits are connected with the sewers. The privies, middens, and ashpits are cleansed by the occupiers of the houses to which they are attached, but not systematically. As this is not done by the Local Board of Health, we are unable to state the cost, or the weight of refuse removed. It is used for agricultural purposes. The cleansing of the privies, middens, and ashpits, is not complained of as affecting the health of the inhabitants. Disinfectants are not used. Sickness is not attributed to the privies, middens, and ashpits.
Frome - - -	Sewerage works were carried out before the adoption of the Local Government Act. The sewers are not ventilated and are not flushed. Steam and hot water from breweries are conveyed into the sewers, but no nuisance arises therefrom. There were no springs tapped during the execution of the sewerage works, and the level of the well water has not been depressed thereby. The Board have no means of ascertaining the number of waterclosets, cesspools, privies, middens, and ashpits; some are, and some are not, connected with sewers. They are not cleansed systematically, but the Board have fixed the hours between which the cleansing is to be done by the owners or occupiers of the premises to which they are attached, and we are therefore unable, as this work is not done by the Local Authority, to give the annual cost and the weight of refuse removed. The street sweepings, road dirt, and the ashes from dwelling-houses are sold, but the sum received does not cover the cost, and there is a deficiency of 30*l.* annually. The whole of the refuse is sold to farmers, and is used for agricultural purposes. The cleansing of the privies, middens, and ashpits is not complained of as a nuisance affecting the health and comfort of the inhabitants. Disinfectants are only occasionally used.

PART I. SECTION III.

QUERIES.—1. Describe the sewage works, state where they are situate, and how far distant from the city, borough, town, or district?—2. How is the sewage treated, by lime, per-chloride of iron, or by any other disinfectant; if so, in what proportion?—3. Is the sewage filtered; if so, describe process, and the state of the effluent water?—4. Where is the effluent water discharged?—5. Is there land available for irrigation over which the sewage of the city, borough, town, or district might be passed?—6. Has irrigation of land with sewage of the city, borough, town, or district been contemplated by the governing body or by any other persons?—7. Are there any difficulties in the way of irrigation; if so, state them?—8. If irrigation works are established, describe them, and state the cost?—9. State the area of land to which sewage is applied?—10. The volume of sewage used every twenty-four hours?—11. What is the condition of the effluent water, and where is it discharged?—12. State the extent and kind of crops (grass, grain crops, and green crops) which have been sewaged and the amount of produce in the several cases?—13. The total working expenses per annum?—14. The profit or loss per annum?

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54.
	Basin of the Wear.
Durham - -	No sewage works have been carried out. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered; but flows direct into the river. There is land available for irrigation over which the sewage might be passed, but not within the boundary of the borough; an irrigation scheme was contemplated at the time the sewage works were carried out, but it was deemed too expensive to be adopted.
	Basin of the Tees.
Darlington - -	No sewage works have been carried out by the Corporation. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; it is not filtered, and flows direct by several outlets into the river. The Corporation received an order from Her Majesty's Principal Secretary of State, Home Department, under the Sanitary Act 1866, directing a sewage irrigation farm to be obtained. (*The order was subsequently quashed*). There are no difficulties in the way.
Stockton - -	No sewage works have been carried out. The sewage is not treated by any chemical agent, and it is not filtered; it flows by several outlets direct into the river. There is land available over which the sewage might be passed, but pumping would have to be resorted to. Irrigation of land with the sewage has not been contemplated by the Corporation. There are no difficulties in the way.
South Stockton -	No sewage works have been carried out by the Local Board of Health. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant, and is not filtered, but is discharged direct into the river. There is land over which the sewage of the district might be passed, but irrigation has not been contemplated by the governing body. There are no difficulties in the way of irrigation.
Middlesbrough -	No sewage works have been constructed by the Local Board. The sewage of some of the outlying districts within the borough is treated with lime, previously to being discharged into open watercourses, which communicate with the river, but the main volume of the sewage is not treated by any chemical agent, and is not filtered, but is discharged direct into the river. There is no land available within the borough over which the sewage might be passed. No special consideration has been given by the Local Board of Health to the subject of irrigation by sewage. The difficulties in the way of irrigation are, *first*, that there are a great number of privies and ashpits, and only a small portion of the fœcal matter from the houses finds its away into the sewers; *second*, if irrigation were determined upon the principal portion of the main drainage of the town would have to be reconstructed so as to be able to remove the excrementitious matter, the present sewers being only adapted to act as surface water drains; *third*, the configuration of the town is such that the whole of the sewage would have to be pumped to a considerable elevation, as a large portion of the houses are built on a level with high-water mark; *fourth*, there is no land within the borough available for the purpose; *fifth*, the sewage would have to be conveyed to a considerable distance in order to be pumped and distributed over land suitable for the purpose, and *sixth*, in the case of Middlesbrough, the probability is that irrigation would entail a serious loss upon the town as land is excessively high in price in the district.

Basin of the Kent.

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54—*continued*.
	Basin of the Kent.
Kendal - -	Sewage works are now being carried out. Land has been purchased for the purpose of utilizing the sewage by irrigation.
	Basin of the Aire (North Bank).
Skipton - - -	No sewage works have been carried out. The sewage has not been treated by lime, per-chloride of iron, or by any other disinfectant, is not filtered, and the entire volume flows into the *Eller Beck*, and thence into the *Aire*. There is land available over which the sewage of the town might be passed. Irrigation of land with the sewage is contemplated by the governing body, and a survey has been made, and plans prepared. There are no difficulties in the way of irrigation, and the necessary works will soon be carried out.
Silsden - - -	No sewage works have been carried out in the district.
Bingley - -	No sewage works have been carried out by the Local Authority. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, and flows direct into the stream. There is land available over which the sewage might be passed. There are no difficulties in the way of irrigation.
Baildon - -	No sewage works have been carried out by the Local Board of Health. The sewage is not treated by lime, per-chloride of iron, or by any other disinfectant; is not filtered; it flows direct into the stream. There is land available for irrigation, but this mode of treating the sewage has not been contemplated by the Governing Body. The only difficulty in the way would be obtaining possession of land for the purpose.
Guiseley - -	No sewage works have been carried out by the Governing Body. The sewage is not treated by lime, per-chloride of iron, or by any other disinfectant; is not filtered; flows into the *Beck*, and thence into the *Aire*.
	Basin of the Aire (South Bank).
Oxenhope - -	No sewage works have been carried out by the Governing Body.
Haworth - -	No sewage works have been carried out. The sewage is not treated by any chemical agent, and is not filtered, but flows direct by several outlets into the stream. There is land available over which the sewage of the district might be passed; but irrigation by sewage has not been contemplated by the public body.
Keighley - -	No sewage works have been carried out by the Local Board of Health. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant. It is not filtered but flows direct into the river. There is land available, over which the sewage might be passed at a very convenient distance from the town, and it is now under the consideration of the Local Board to apply the sewage to irrigation. The only difficulty in the way is acquiring land for that purpose.
Denholm Gate -	No sewage works have been carried out by the Governing Body. The sewage is not treated by any chemical agent; is not filtered; flows into the stream. There is land available for irrigation.
Allerton - -	No sewage works have been carried out by the Local Authority. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; it is not filtered, and is conveyed into a stream, a tributary of the *Bradford Beck*. There is land available over which the sewage might be passed, but irrigation by sewage has not been contemplated by the governing authority. There are no difficulties in the way of irrigation, except obtaining land for the purpose.
Wilsden - -	No sewage works have been executed by the Local Board of Health. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; it is not filtered, but flows direct into the Beck. There is land available over which the sewage of the town might be passed. Sewage irrigation has been contemplated by the Governing Body. There are no difficulties in the way of irrigation. A tenant of Mr. William Ferrand, of St. Ives, near Bingley, occupies a farm at the extremity of the town contiguous to the *Beck*. The *Beck* flows on the side of meadow land, and with the aid of a penstock a certain volume of the stream is diverted and allowed to flow over an area of from 10 to 12 acres; and the effect has been very apparent on the land within reach of its fertilizing properties.
Thornton - -	No sewage works have been carried out by the Governing Body. The sewage is not treated by chemical agents, is not filtered, but flows direct into the *Beck*. There is land available, over which the sewage of the town might be passed. Irrigation has not been contemplated by the Governing Body.
Bolton - - -	Sewage works have not been carried out by the Governing Body. There is land over which the sewage of the district might be passed. There are no difficulties in the way of sewage irrigation.

Basin of the Aire (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54—*continued.*
Bradford	Sewage works have not been carried out by the Corporation. The sewage is occasionally treated with lime and chloride of lime; it is not filtered, but flows direct into the *Bradford Beck*. The Corporation are afraid to adopt any specific plan for dealing with the sewage of the town until the Rivers Pollution Commissioners have presented their report. There is no land available over which the sewage of the town might be passed. Irrigation has been carefully considered, and is found here to be utterly impracticable. The surrounding land is hilly and is used for building purposes, and any irrigation scheme would not only be ruinous, but lead to endless litigation, and the inhabitants would not endure the nuisance arising therefrom. The difficulties, therefore, in the way of irrigation are insurmountable.
Heaton	No sewage works have been carried out. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant, is not filtered, but a portion of it flows on to meadow land in the district. There is land available, over which the whole of the sewage of the district might be passed. There are no difficulties in the way of irrigation.
Shipley	Sewage works have not been carried out by the Governing Body. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant, is not filtered, but flows direct into the river *Aire*. There is land available, over which the sewage of the town might be passed. Irrigation has not been contemplated by the Governing Body, but there are no difficulties in the way of it being carried out.
Windhill	No sewage works have been carried out by the Local Board of Health. The sewage is not treated by any chemical agent, is not filtered, and flows direct into *Bradford Beck*. There is no land available within the district over which the sewage of the town might be passed. Sewage irrigation has not been contemplated by the Governing Body. There are difficulties in the way of sewage irrigation amounting to impossibilities; first, the contracted state of the valley below, and, secondly, the limited area of the district.
Eccleshill	No sewage works have been carried out by the Governing Body. There is land suitable for the purpose of irrigation, but there would be difficulty in securing it. That is the only difficulty in the way of irrigation.
Calverley	No sewage works have been carried out by the Governing Body. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; and is not filtered, but is turned on to fields by the various farmers through whose lands the sewage flows, or can be conveyed by gravitation, and the effluent water flows off in a comparatively clear state.
Farsley	No sewage works have been carried out by the Local Board of Health. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, but is discharged into the *Beck* and thence into the river. There is land available over which the sewage of the town might be passed, but irrigation has not been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Deighlington	See Letter from Clerk to Local Board of Health, Section I., page 12.
Morley	No sewage works have been carried out. The sewage is not treated by any chemical agent; is not filtered, but flows direct into the *Beck*, and thence into the *Aire*. There is land available over which the sewage of the town might be passed; but irrigation by sewage has not been contemplated by the Governing Body.
Basin of the Aire (North and South Bank).	
Leeds	No sewage works have been executed by the Corporation. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; it is not filtered, but is discharged into the river *Aire*, about a mile and a quarter below the town. There is land available, over which the sewage of the town might be passed. The treatment of the sewage, either by irrigation or filtration, has been for some time under the consideration of the Corporation. The only difficulties in the way of irrigation are, the large area of land required, the land available being some distance from the town, and the large volume of sewage to be dealt with.
Basin of the Calder.	
Todmorden	No sewage works have been carried out. The sewage is not treated by any chemical agent, and is not filtered, but flows direct into the river. There is no land available for irrigation in the district, as the sides of the valley are steep. Irrigation has not been contemplated by the Governing Body.
Basin of the Calder (North Bank).	
Hebden Bridge	See Letter from Clerk to Local Board of Health, Section I., page 13.
Midgley	See Section I., page 14.

Basin of the Calder (North Bank)—*continued.*

Names of Cities Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54—*continued.*
Luddenden Foot	No sewage works have been carried out within the district. The sewage is not treated with lime, per chloride of iron, or by any other disinfectant; is not filtered, and is discharged direct into the river. There is land available over which the sewage might be passed; but irrigation has not been contemplated by the Local Authority.
Warley	See Letter from Clerk to Local Board of Health, Section I., page 14.
Sowerby Bridge	No sewage works have been carried out; the sewage is not treated by chemical agents and is not filtered, but flows direct into the rivers *Calder* and *Ryburn*. There is land available for irrigation over which the sewage might be passed, and the expense is the only difficulty in the way. Irrigation has not been contemplated by the Governing Body.
Queensbury	No sewage works have been carried out; the sewage is not chemically treated, and is not filtered. There are no public sewers; the sewage from private drains and from houses flows on to the adjoining land, where it is utilized by the farmers.
Halifax	The whole of the sewers are being intercepted, and the sewage will be carried to one point where settling and defœcating tanks are constructed, and the solid matter will there be taken out. The effluent water will then flow into the *Hebble* brook, which is at the present time a discoloured stream, caused by refuse from dyeworks and other manufactories on the banks. The sewage at the present time is not treated by lime, per-chloride of iron, or by any other disinfectant, is not filtered, and flows direct into the *Hebble*. There are difficulties in the way of obtaining land for utilising sewage in irrigation by gravitation works in a densely populated district.
North Owram	No sewage works have been carried out.
South Owram	No sewage works have been carried out by the Local Board; and the sewage is not chemically treated. The district is a rural one and too thinly populated to render sewage works at all necessary. There is land available over which the sewage of the district might be passed, if irrigation were necessary; but it has not been contemplated to utilize the sewage by irrigation. There are no difficulties in the way of sewage irrigation.
Shelf	No sewage works have been executed by the Governing Body. The sewage is not treated chemically. There is land in some parts of the district suitable, over which the sewage might be passed; but, it is very doubtful whether it could be obtained for that purpose. The question of the utilization of the sewage has been discussed by the Governing Body, but no decision has at present been arrived at. The difficulty in the way of sewage irrigation is the expense of sewerage and sewage works, and obtaining land for irrigation purposes.
Brighouse	No sewage works have been carried out. The sewage is not treated by any chemical agent; is not filtered, but is discharged direct into the river. There is no land available over which the sewage of the town might be passed, and irrigation has not been contemplated by the Governing Body. The difficulties in the way are the steep gradients of the hills adjacent to the town.
Scholes	No sewage works have been carried out.
North Bierley	There are no sewage works. There is land available over which the sewage of the district might be passed, but irrigation has not been contemplated by the Governing Body. The Local Board are of opinion that irrigation increases rather than diminishes the trouble and difficulty of dealing with sewage.
Cleckheaton	No sewage works have been carried out. There is no land available in the district over which the sewage could be passed; the sewage would also have to be pumped.
Heckmondwicke	No sewage works have been carried out.
Ravensthorpe	No sewage works have been carried out. There is no land available over which the sewage could be passed. The irrigation of land with sewage has not been contemplated by the Governing Body. The difficulty in the way of irrigation is that the district is small, and the land immediately adjoining is valuable.
Birkinshaw	See Letter from Mr. John Smith, Clerk to Local Board of Health, Section I., page 18.
Birstal	No sewage works have been carried out. There is no land available over which the sewage might be passed, and the irrigation of land, with the sewage of the town, has not been contemplated by the Governing Body.
Batley	No sewage works have been carried out in this borough. The sewage is not treated at all, except that disinfectants are frequently put down the sewer grates. The sewage is not filtered, but flows direct into the *Batley Beck*, which at present appears to be the natural outlet for the sewage. There is no land available for irrigation over which the sewage of the borough could be passed, and irrigation by the sewage of the borough has not been contemplated. To render the sewage available for irrigation, it would have to be pumped at great cost to the higher lands on each side of the valley, principally in another township and parish.

Basin of the Calder (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54—*continued.*
Dewsbury	No sewage works have yet been carried out in the borough. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; it is not filtered, and the whole of the sewage flows direct into the *Beck*. There is no land over which the sewage of the town might be passed, and irrigation with sewage has not been contemplated by the Governing Body. The only difficulty in the way of irrigation is the acquisition of land for the purpose.
Soothill, Upper	No sewage works have been carried out by the Governing Body. There is land available over which the sewage might be passed; but, irrigation with sewage has not been contemplated by the Governing Body.
Soothill Nether	No sewage works have been carried out.
Horbury	There are no sewage works. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered; it flows into the river. There is land available over which the sewage of the town might be passed, but irrigation has not been contemplated by the Governing Body.
Whitwood	See Letter of Mr. W. E. Pratt, Clerk to the Local Board of Health, Section I., page 29.
Basin of the Calder (South Bank).	
Scammonden	No sewage works have been carried out. This is quite an agricultural district.
Rishworth	No sewage works have been carried out. The sewage is not treated, but flows unfiltered into the *Booth Dean*. There is land over which the sewage might be passed, but irrigation has not been contemplated by the Governing Body.
Barkisland	See Letter from Clerk to the Local Board, Section I., page 21.
Soyland	No sewage works have been carried out. The sewage is not treated by chemical agents or filtered; it flows direct into the stream. There is land available over which the sewage might be passed, and no difficulties in the way of irrigation.
Sowerby	See Letter from Mr. Francis Jubb, Clerk to Local Board of Health, Section I., page 21.
Greetland	No sewage works have been carried out.
Elland	No sewage works have been carried out in the district. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant. It is not filtered, but is discharged direct into the river. There is land over which the sewage of the district might be passed. Irrigation by sewage has been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Rastrick	No sewage works have been carried out.
Marsden-in-Almondbury.	See Marsden-in-Huddersfield, below.
Marsden-in-Huddersfield.	No sewage works have been carried out. The sewage is not treated by any chemical agent and is not filtered; it flows direct into the *Colne*. There is no land available over which the sewage of the town might be passed. Irrigation has not been contemplated by the Governing Body. The difficulty in the way of irrigation is, that the gradient of the adjacent land is too steep for the purpose.
Slaithwaite	No sewage works have been carried out. The sewage flows unfiltered into the Colne.
Linthwaite	No sewage works have been carried out. There is no land available for irrigation over which the sewage of a district might be passed.
Golcar	There are no sewage works.
Longwood	The Local Board have not carried out sewage works.
Fulstone	The Local Board of Health have not carried out any sewage works.
Huddersfield	No sewage works have been established. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant, and is not filtered, but flows direct into the river. There are about 190 acres of land available within the borough over which the sewage of the town might be passed by gravitation, but there are elevated districts, outside the borough, to which the sewage might be pumped. Irrigation by sewage has not yet been contemplated by the Governing Body.
Meltham	No sewage or irrigation works have been carried out.
Honley	Sewage works have not been carried out. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, but flows direct into the stream. There is no land available over which the sewage of the town might be passed.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54—*continued.*
Honley—*cont.*	Irrigation by sewage has not been contemplated by the Governing Body. There are no special difficulties in the way of irrigation.
Austonley	No sewage works have been carried out; irrigation has not been contemplated by the Governing Body.
Holme	No sewage works have been carried out. The sewage of each house is utilized by the occupier on his own land.
Wooldale	No sewage works have been carried out. Sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, and flows direct into the streams. There is no land available within the district over which the sewage of the town might be passed. Irrigation has not been contemplated by the Governing Body. The only difficulty in the way of irrigation is the formation and division of the districts.
Nether Thong	Sewage works have not been carried out by the Local Authority. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant, and is not filtered. One half of the volume of sewage flows into the river, and the other half flows on to land and is used in irrigation. There is land available over which the whole of the sewage might be passed, but irrigation by sewage has not been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Upper Thong	Sewage works have not been carried out. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, and the effluent water is discharged into the river *Holme*. There is land available over which the sewage might be passed, but not in the township. Irrigation of land by sewage has not been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Thurstonland	No sewage works have been carried out by the Local Authority. The sewage is not treated by any chemical agent; is not filtered, and flows on to land where it is utilized in irrigation.
Farnley Tyas	No sewage works have been carried out. The sewage is not treated chemically, but flows on to meadow and pasture land. The volume of sewage is at present very small, and 10 or 12 acres of land is sufficient to utilise the same. There are no difficulties in the way of irrigation; there is a marked improvement in the condition of the fields over which the sewage is passed.
Shepley	No sewage works have been carried out. The sewage is not chemically treated, is not filtered, and flows from the houses into the stream. There is land available for irrigation, over which the sewage of the district might be passed, and the fluid refuse from two woollen mills and a brewery is pumped on to the land for irrigation. There is no difficulty in the way of irrigation. The area of the land irrigated by the woollen mills is about 25 acres, and of that irrigated by the brewery 10 acres. The effluent water flows into the stream.
Kirkburton	No sewage works have been carried out by the Local Board of Health. The sewage is not treated chemically, or disinfected, or filtered, but flows into the stream by several outlets. There is land available, but not to a very large extent, over which the sewage might be passed. Irrigation has not been contemplated by the Governing Body.
Kirkheaton	No sewage works have been carried out.
Whitley, Upper	See Letter of Mr. W. Turner, Clerk to the Local Board of Health, Section I., page 28.
Thornhill	No sewage works have been carried out.
Basin of the Calder (North and South Banks).	
Wakefield	No sewage works have been carried out by the Corporation. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, and flows direct into the river *Calder*. There is land available for irrigation, over which the sewage of the town might be passed; irrigation has not been contemplated by the Governing Body. There are no special difficulties in the way of irrigation.
Basins of the Aire and Calder.	
Castleford	See Letter of Mr. Geo. Bradley, Clerk to the Local Board of Health, Section I., page 30.
Pontefract	No sewage works have been carried out by the Governing Body. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, but flows direct into the streams. There is land available for irrigation over which the sewage of the borough might be passed, but irrigation has not been contemplated by the Corporation. We are not aware of any difficulties in the way of irrigation.

Basin of the Severn.

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 14, Page 54—*continued.*
	Basin of the Severn.
Newtown and Llanllwchaiarn.	No sewage works have been carried out. The sewage is not treated by any chemical agent and is not filtered; it flows direct into the river. There is land over which the sewage of the town might be passed; irrigation has not been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Kidderminster -	No sewage works have been carried out. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; is not filtered, but flows direct by several outlets into the river *Stour*. There is land available for irrigation, over which the sewage of the borough might be passed; and irrigation by sewage has been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Stroud - - -	Sewage works have been carried out in the district and consist of two tanks situate nearly half a mile from the town. The sewage is treated by Bird's disinfecting process, which is a registered invention. The sewage as it falls into the tank is mixed with the prepared powder, and the solid parts are dredged, taken out, and spread to dry, having been first covered with the powder; when dry it is used to mix with other manures. The effluent water is comparatively pure, certainly not offensive, and is discharged into the river *Frome*. There is very little land available within two miles of the town, but at a distance of three miles from the town sufficient land might be found over which the sewage of the town might be passed, but it would have to be pumped. Sewage irrigation has not been contemplated by the Governing Body. The difficulties in the way are, first, that the surrounding country is rather thickly populated; secondly, as there is a long valley with a slope of upwards of a mile on either side, and as the lower portions of the slopes are those in which the population chiefly lies, the sewage would have to be lifted to a considerable elevation before the open country could be reached; thirdly, the bottoms of the valleys are on the clays of middle and lower lias and would absorb little sewage.
	Basin of the Thames (Windrush).
Witney - - -	No sewage works have been carried out by the Local Authority. The sewage is not chemically treated, and is not filtered, but flows by several outlets into the river. There is land available for irrigation over which the sewage might be passed, Irrigation was contemplated by the Governing Body in 1866, but the project has been abandoned.
	Basin of the Lower Avon.
Bristol - - -	No sewage works have been carried out in the city or district. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant, but is principally discharged into the tidal parts of the rivers. The sewage is not filtered. There is land available for irrigation over which the sewage of the city and district might be passed, but it would have to be pumped. The question as to utilising the sewage of the city and district, if it could be done profitably, and without nuisance, has been discussed, but no plan which appeared feasible has been discovered. The only difficulty in the way of irrigation is that the sewage would have to be pumped and carried some distance from the city.
Bath - - -	No sewage works have been carried out. The sewage is not treated by lime, per-chloride of iron, or any other disinfectant; it is not filtered, and the whole of the sewage flows direct through several outlets into the river. There is land available over which the sewage might be passed, but irrigation of land with the sewage of the city has not been contemplated by the Governing Body. The only difficulty in the way is obtaining land, and the sewage would have to be pumped.
Trowbridge - -	No sewage works have been carried out. The sewage is not treated by lime, per-chloride of iron, or any other chemical agent, and is not filtered, but flows direct into stream. There is land available on which the sewage of the town might be passed, and irrigation has been contemplated by the Governing Body. There are no difficulties in the way of irrigation.
Frome - - -	No sewage works have been carried out. There is land available for irrigation over which the sewage might be passed.

PART I. SECTION IV.

QUERIES.—1. How is the city, borough, town, or district supplied with water for domestic purposes?—2. From what source is the water at present obtained, from wells, river or stream, or both?—3. When were the waterworks first established?—4. To whom do they belong?—5. Where are the reservoirs or pumping stations situate?—6. If impounding reservoirs; what is the area of gathering ground?—7. If pumped or abstracted from river, give the daily volume pumped or abstracted?—8. What is the area of reservoir; if more than one, give area of each separate?—9. What the maximum depth?—10. How many gallons of water will each contain?—11. Is the water polluted before entering the reservoirs; if so, state the nature of pollution?—12. Is the water filtered?—13. Describe the filtering medium?—14. Is the water pumped to a high service reservoir or reservoirs; if so, describe the pumping machinery?—15. What is the situation and area of the high service reservoir?—16. What the maximum depth?—17. How many gallons of water will it contain?—18. Is the high service reservoir built entirely above the surrounding ground, or only partially so, and is it a covered one?—19. State the total annual cost of pumping, including labour, fuel, and materials?—20. If supply is obtained from wells; describe geological character of the water bearing stratum into which the well is sunk?—21. What is the diameter and depth of well?—22. The diameter and depth of bore-hole?—23. What volume of water pumped each hour, and for how many hours daily?—24. What is the situation, area, and maximum depth of service reservoir?—25. How many gallons of water will it contain?—26. Is the service reservoir built entirely above the surrounding ground, or only partially so, and is it a covered one?—27. Describe pumping machinery?—28. State annual working cost, including labour, fuel, and materials?—29. What is the area of the district supplied?—30. How many houses are supplied, and for what purpose?—31. How many works or manufactories are supplied?—32. Is the supply constant or intermittent; if the latter, how many hours daily are the service mains kept charged?—33. What volume of water in gallons is supplied to the district daily, for trade and for domestic purposes?—34. What volume of water in gallons is supplied daily for watering of streets and flushing of sewers, and during what months?—35. Are the houses furnished with cisterns, or is the water supplied direct from the mains; if the former, is the overflow pipe from cisterns connected with the soil pipe from watercloset or with the sewer?—36. Is the present supply adequate to the requirements of the town or district?—37. What is the rate of charge for water?—38. What steps are taken to prevent waste?—39. What have the waterworks cost?—40. From what source was the town or district supplied previous to the establishment of the waterworks?—41. What effect has the improved water supply had upon the health of the inhabitants?—42. Has the water been analysed; if so, state by whom, and furnish copy of analysis?

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61.
	Basin of the Wear.
Durham - -	The city is supplied with water for domestic purposes from the river *Wear* and from private wells. The waterworks were established in 1847, and belong to the Durham Waterworks Company. The reservoir is situated near the village of Shincliffe, on the river *Wear*, about one and a half miles from the city; and 350,000 gallons of water are pumped from the river daily. Area of reservoir, 2,147 superficial yards; maximum depth, 10 feet; and contents, 800,000 gallons; there are three filter beds with an average superficial area of 4,104 feet, and 7 feet deep. The water is polluted before entering the reservoir by "hush" from lead works, by sewage from Bishop Auckland, and other small towns higher up the stream; also by collieries and other works situate on the banks of the river; it is filtered through 7 feet of sand and gravel. The water is pumped to the high service reservoir by two Cornish engines of 40 nominal horse-power each. The high service reservoir is built above the surrounding round, and is not covered. The annual cost of pumping, including labour, fuel, and materials is 364*l*. The area of the district supplied is 2,260 acres. Houses, 3,600 for domestic purposes. Works and factories, 80 for trade purposes. The supply is constant and direct from the mains; and 350,000 gallons is delivered to the district daily for trade and domestic purposes, and 1,133,400 gallons is used yearly for watering streets and flushing sewers, chiefly in the summer months. The supply is adequate for the requirements of the town. The rate of charge for water for domestic purposes is at a rate of from 3 to 5½ per cent. on the annual rental, and for trade purposes at from 5½*d*. to 1*s*. 2*d*. per 1,000 gallons. In order to prevent waste, periodical inspection is made of fittings and taps. The waterworks have cost 24,872*l*. 13*s*. 3*d*. Previous to the establishment of the waterworks the city obtained supply of water from the river *Wear* and from springs. The improved supply has had a beneficial effect upon the health of the inhabitants. The corporation have not had the water analysed.

Basin of the Tees.

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Darlington -	**Basin of the Tees.** The borough is supplied with water from the river *Tees*. Waterworks were established in 1849, purchased by the Local Board of Health in 1854 or 1855. The pumping stations and filter beds are at Tees Cottage, distant two miles from the town. The reservoirs are at Bushell Hill, distant a mile from the town. A volume of about 1,500,000 gallons is pumped from the river daily. The water is polluted before entering the reservoirs by the sewers of Barnard Castle, twenty miles higher up on the river, and by the villages and houses on the banks between Darlington and Barnard Castle. The water is filtered through a filtering medium composed of pebbles, gravel, and sand 5 feet 10 inches in thickness. After filtration it is pumped to a high service reservoir. The area of the high service reservoir is 20,359 feet; maximum depth, 10 feet; and contains 1,000,000 gallons. It is partially built under the surrounding ground, and is not covered. The cost of pumping for the half-year ending June 30th, 1870, was:—Fuel, 194*l.* 4*s.* 1*d.*; labour and materials, 186*l.* 7*s.* 1*d.*; total, 380*l.* 11*s.* 2*d.* The area of district supplied is 3,350 acres; houses, 4,000 for domestic purposes; manufactories, 75 for trade purposes. The supply is constant, and 1,000,000 gallons for domestic use and 500,000 for trade purposes are delivered to the district daily. For watering the streets during the months of April, May, June, July, August, and September 11,000 gallons of water are daily used. The supply is direct from the mains, and the present supply is adequate for the requirements of the town and district. The rate of charge for water for domestic purposes varies from 1*s.* per quarter on houses of a yearly rent not exceeding 3*l.* up to 10*s.* per quarter for houses not exceeding a yearly rent of 52*l.* a year. For manufacturing purposes the supply is by meter, and no consumer is charged less than 15*s.* per half-year; the charge varies from 1*s.* per 1,000 gallons for a quarterly consumption not exceeding 30,000 gallons to 3*d.* per 1,000 gallons for a consumption exceeding 3,200,000. In order to prevent waste an inspector is appointed who periodically inspects the water taps and fittings. The waterworks have cost 60,822*l.* 16*s.* 3*d.* Previously to the establishment of the waterworks the town was supplied with water from wells. An inexhaustible supply of excellent water has been introduced into our streets, yards, and houses, which has not only changed the aspect of the town, but has necessarily proved a source of inestimable benefit to the health and comfort of the inhabitants. The water has been analysed at the Rivers Pollution Laboratory and by Dr. Henry Letheby, Professor of Chemistry. Rivers Commission Laboratory, 30th June 1870. Results of Analysis expressed in parts per 100,000. See table below.

Total Solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrites and Nitrates.	Total combined Nitrogen.	Previous Sewage Contamination.	Chlorine.	Hardness. Temporary.	Hardness. Permanent.	Hardness. Total.	Remarks.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	A few suspended particles.
16·26	·244	·025	·000	·000	·025	0	1·15	2·60	7·88	10·48	

College Laboratory, London Hospital, 19th April 1869.

Water supplied to Darlington from the River Tees, 2 Miles west of the Town.	At Works before Filtration. As it enters the Works, 4 Feb. 1869.	At Works before Filtration. As it enters the Works, 25 March 1869.	At Works after Filtration, and at Stockton and Middlesbrough. From the Supply Well at Works, 4 Feb. 1869.	From the Supply Well at Works, 25 March 1869.	From Tap at Railway Station, Stockton, 4 Feb. 1869.	From Tap at Railway Station, Middlesbrough, 4 Feb. 1869.
	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.
Total solid matter, per gallon -	7·73	8·69	7·43	8·05	8 02	8·06
Chloride of sodium, per gallon -	0·82	0·71	0·81	0·69	0·82	0·82
Earthy sulphates, per gallon - -	2·55	4·10	2·50	4·07	2·57	2·60
Degrees of hardness - - -	3·4	3·9	3·3	3·8	3·2	3·2
Do. after boiling - - - -	3·3	3·7	3·2	3·6	3·2	3·2
Oxygen required by organic and other oxydisable matter.	0·470	0·246·	0·265	0·154	0·265	0·260
Ammonia, per gallon - - -	0·008	0·002	0·008	0·001	0·008	0·008
Nitrogen as nitrates, &c. - -	0·015	0·015	0·053	0·021	.0·037	0·048

The samples of the 4th February were obtained by myself, and those of the 25th March were sent to me by the manager, Mr. Hall; and the results show that the water is of excellent quality, containing only from 7·43 to 8·06 grains of solid matter per gallon as it is delivered to the consumers; and the hardness is only from 3·2 to 3·8 degrees. The solid matter is less than half as much as is contained in the water

Basin of the Tees—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Darlington—*cont.*	supplied to this metropolis, and the hardness is about one-fourth. The water is of exactly the same quality as that contained in the Slapestone Beck, the Oak Dale Beck, and the Cod Beck at Osmotherley; and it is excellently well suited for a town supply, especially where there are large manufacturing works which require a soft water. (Signed) Henry Letheby, M.B., M.A., Ph.D., &c., Professor of Chemistry in the College of the London Hospital, and Medical Officer of Health for the City of London.
Stockton-on-Tees	The town is supplied with water by the Stockton and Middlesboro' Waterworks Company; this is a private company, over which the Corporation has no control. The water is obtained from the river *Tees* above Darlington. The works were established in 1851. About 5,000,000 gallons of water daily is pumped from the river. There are two reservoirs, each containing 3,500,000 gallons. The water is polluted before entering the reservoirs by the sewage of Barnard Castle (containing about 4,000 inhabitants), by Staindrop, Gainford, and several other villages on its banks; also by lead washings and refuse from dyeworks and fellmongers' premises. The water is filtered; and the filtering medium is composed of gravel and sand six feet in thickness. After filtration it is pumped. The area of the district supplied is 2,695 statute acres; houses, 5,600 for domestic purposes; manufactories and works, 50 for trade purposes. The supply is constant, and direct from the mains; and 1,000,000 gallons is delivered for trade, and 1,000,000 gallons for domestic purposes is delivered in the district daily. For watering streets during the months from May to September, 1,076,000 gallons of water is used. For pumping the water, four steam engines, two of 40, and two of 80 nominal horse-power are used, and the cost of pumping, including labour, fuel, and materials, is 2,000*l.* a year. The rate of charge for water for houses not exceeding 4*l.* per year to houses not exceeding 100*l.* a year varies from 1*s.* 6*d.* to 15*s.* a quarter; for trade purposes, for any supply not exceeding 5 000 gallons per quarter, 7*s.* 6*d.* per quarter; and for the next 5,000 gallons up to 640.000 gallons, the price varies from 1*s.* to 5*d.* per 1,000 gallons. Special rates are made for day and night supplies to iron works and other manufactories. In order to prevent waste constant inspection is made of the taps and fittings. Previously to the establishment of the waterworks the town was supplied with water from public wells. As Stockton and Middlesbrough are both supplied from the same works we cannot give the cost separately. The total cost of the works was 295,000*l.* Previous to the establishment of the waterworks the inhabitants were supplied from public and private wells. The new supply is only an improvement as regards quantity and not quality.
South Stockton -	The district is supplied with water by a private company called the Stockton and Middlesboro' Waterworks Company. The water is obtained from the river *Tees* at Tees Cottage, about three miles west of Darlington. The works were established in 1858. The pumping stations are at Tees Cottage near Darlington. There is a reservoir near the "Fighting Cocks," about midway between Darlington and Stockton. The area of district of South Stockton supplied is 325 acres; houses, 1,300 for domestic purposes; manufactories, 10 for trade purposes. The supply is constant and direct from the mains, and 290,000 gallons for trade and 168,000 gallons for domestic purposes are supplied to the district daily; 2,600 gallons of water are used for watering streets from April to September yearly. The supply is adequate for the requirements of the town. The rate of charge for water for trade purposes is 3*d.* per 1,000 gallons to large consumers, and up to 1*s.* per 1,000 gallons to small consumers; and for domestic purposes, 5*l.* to 6*l.* per cent. on the rental. To prevent waste an inspector is constantly employed examining the fittings. Previous to the establishment of the waterworks the supply was obtained from wells, which are now abolished.
Middlesbrough -	The town is supplied with water for domestic purposes by the Stockton and Middlesboro' Waterworks Company. The water is abstracted from the *Tees* above Darlington. The waterworks were established in 1851. The area of district supplied is 2,100 acres. Houses, 7,000 for trade purposes. Works and manufactories, 80 for trade purposes. The supply is constant, and 2,000,000 gallons are delivered to the district daily for domestic and trade purposes. 50,000 gallons of water are used daily from May to August for watering the streets. The supply is direct from the mains, and is at present adequate for the requirements of the town and district. The rate of charge for water is rather more than 5 per cent. per annum on the rental. In order to prevent waste very vigorous steps are taken by the Inspectors of the Company, who make constant inspection of the taps and fittings. Previously to the establishment of the waterworks the town obtained its supply of water from private wells.

Basin of the Kent.

Kendal - -	The borough is supplied with water for domestic purposes from waterworks established in 1846, which belong to the Kendal Waterworks Company. The water is obtained from gathering grounds, from springs, and from streams. The reservoirs are situated about one mile from the town. The area of the gathering ground is 170 acres.

Basin of the Kent—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Kendal—*cont.*	The area of the lower reservoir is five acres; that of the higher one three acres. The maximum depth of the lower one is 28 feet, that of the higher 36 feet. The lower reservoir contains 13,500,000 gallons, and the higher one 5,000,000 gallons. The water is not polluted before entering the reservoirs; it filters through the river bank, a natural bed of gravel and sand, into filtering wells, a short distance from the river channel. The water is pumped by two steam engines of 20 nominal horse-power each, and the yearly cost of pumping is 182*l.* per annum. The area of the district supplied is 230 acres; houses, 2,500 for domestic purposes; manufactories, five for trade purposes. The supply is constant, and 200,000 gallons of water are supplied to the district daily for trade and domestic purposes. No water is used for watering streets or flushing sewers. The houses are not furnished with cisterns, but are supplied direct from the mains. The present supply is adequate for the requirements of the town. The rate of charge for water is 1*s.* 3*d.* in the pound on the rateable value. In order to prevent waste, a general supervision is made of the taps and fittings. The waterworks have cost about 16,000*l.* Previously to the town being supplied from the present source water was obtained from wells. Before the establishment of the present waterworks the inhabitants suffered severely from gravel on account of the hardness of the water; but the improved supply has had a beneficial effect upon their health, the disease having nearly disappeared. The water has been analysed, and a copy of the analysis is sent herewith.
	Basin of the Aire (North Bank).
Skipton - -	The town is supplied with water for domestic purposes from gathering grounds. The waterworks were established in 1824, and belong to the Skipton Waterworks Company. The area of the gathering ground is about 230 statute acres. There are three reservoirs situate near the town of Skipton. No. 1 has an area of two roods and twenty-four perches; No. 2, two roods; and No. 3, one statute acre; total, two acres and twenty-four perches. The maximum depth is 25 feet; the contents of No. 1, 400,000 gallons; No. 2, 350.000; and No. 3, 1,875,192; total, 2,625,192 gallons. The water is not polluted before entering the reservoirs; it is filtered through sand and gravel; it is not pumped to a high service reservoir. The area of district supplied is 730 acres, and houses, 1,160 for domestic purposes; no manufactories. The supply is intermittent in dry seasons, from 8 to 12 hours daily; ordinarily from 100,000 to 200,000 gallons are delivered in the district daily, but a smaller quantity in time of drought. No water is supplied for watering streets; about 6,000 gallons are supplied every week for flushing sewers, except in the dry weather, and then the sewers are only occasionally flushed. The water is supplied direct from the mains; only a few houses have cisterns, the overflow pipes from which are connected with the soil pipes, and thence with the sewers. The present supply is very inadequate for the requirements of the town. The rate of charge is 5 per cent. on the rental. This charge is about to be increased, owing to recent expenditure of the Company in Parliamentary proceedings. The Company have at present no sufficient power of preventing waste; they hope to obtain an Act this session that will give them additional powers. The waterworks have cost 6,274*l.* Previously to the establishment of the waterworks the town was supplied with water from wells. Are not in a position to state what effect the improved water supply has had on the health of the inhabitants. The water has been analysed by Mr. F. A. Manning, and in the Laboratory of the Rivers Pollution Commission.
Silsden - -	The district is supplied with water from private shallow wells and small streams. These wells are sunk in gravel, and are only about two feet deep. The water has not been analysed.
Bingley - -	The village of Cullingworth, within the district, is supplied with water from springs. The waterworks were established abount five years ago, and belong to the Local Board of Health. The reservoir is situated within a very short distance of the village; has an area of about half an acre; maximum depth, 18 feet; and contains 750,000 gallons. The water is not polluted before entering the reservoir; is not filtered, and is not pumped. The area of district supplied is about 200 acres; houses, 250, and one manufactory. The supply is constant for nine months of the year, but intermittent during the remaining three, and 10,000 gallons of water is delivered to the district daily. No water is used either for watering the streets or flushing sewers. The supply is direct from the mains, and is not adequate for the requirements of the district. The rate of charge for the water is 1*s.* in the pound on the rental. There have been no cases of waste brought to our knowledge. The waterworks have cost 750*l.* The village was supplied with water previously to the establishment of the waterworks from private wells, and the improved water supply has had a beneficial effect upon the health of the inhabitants. The water is from the millstone grit formation, and is of good quality. It has not been analysed.
Baildon - -	The town is supplied with water from gathering ground. The waterworks were commenced in 1852, and finished in 1857; belong to Local Board of Health. Area of gathering ground, 350 statute acres. There are two reservoirs situated just above

Basin of the Aire (North Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Baildon—*cont.*	the town; and contain 3,600,000 gallons. The water is not polluted before entering the reservoirs; is not filtered: and is not pumped. The area of district supplied is 450 acres, and 780 houses, for domestic purposes. The supply is constant, and 7,800 gallons are delivered to the district daily. None is used for flushing sewers or watering streets. The supply is direct from the mains, and is adequate for the requirements of the town and district. The rate of charge is 1*s.*, 2*s.*, 2*s.* 6*d.*, and 3*s.* in the pound on the rental. In order to prevent waste, proper supervision is made of the taps and apparatus, to see that they are kept in proper repair. The works have cost 6,700*l.* Previously to the establishment of the waterworks the town was supplied with water from private wells. The improved water supply has had a beneficial effect upon the health of the inhabitants. The water has been analysed by Mr. Thomas Leigh, but a copy of the analysis has been either lost or displaced.
Guiseley - -	This town is supplied with water from well sunk into the red sandstone. The works were established in 1861, and belong to a private company. The reservoir is situated at a considerable elevation above the town. Since the works were established it has been found necessary to sink another well at a lower elevation than the reservoir: from this, water is pumped into the reservoir. The reservoir is 45 feet in diameter, 13 feet deep, and contains 130,000 gallons. The water is not polluted, and is not filtered; it is pumped from the old red sandstone, from a well sunk, 8 feet in diameter, and 18 feet deep. The bore-hole is 3 inches in diameter; the depth is not known. In summer the water is pumped from the lower well for one hour each day; in winter no pumping is necessary. We are not able to give the volume of water pumped. The service reservoir is built below the level of the surrounding ground, and is covered. A steam engine, two nominal horse-power, is used for pumping; and the cost of working, including labour, fuel, and materials, is from 150*l.* to 160*l.* a year. The area of district is 1,525 acres, but not more than one-third of it is supplied; 460 houses are supplied for domestic purposes, but no manufactories. The supply is intermittent; the mains are only charged two hours daily in summer. It is not known what quantity of water is supplied to the district for trade and domestic purposes. None is used for watering streets or flushing sewers. The water is supplied direct from the mains. The present supply is inadequate to the requirements of the town or district. The rate of charge is 2½*d.* per week for rentals under 8*l.*, and 3*d.* per week for rentals above 8*l.* No steps have been taken to prevent waste. We are not able to give the cost of the waterworks. Previously to the establishment of the waterworks the town was supplied by private wells. The water has been analysed, but we are not able to forward a copy of analysis.
	Basin of the Aire (South Bank).
Oxenhope - -	The district is abundantly supplied with water from river and streams flowing through it. There are no waterworks. The district is a wide one, with a scattered population. The water has not been analysed.
Haworth - -	The district is supplied with water by the waterworks of the Local Board of Health, and the water is obtained chiefly from springs, but to a small extent from gathering grounds. The reservoir is situated near the village of Haworth, has an area of 248 yards, is 13 feet 6 inches deep, and contains 194,600 gallons of water. The water is not polluted before entering the reservoir, is not filtered, and is not pumped. The area of the district supplied is 360 acres, houses 491 for domestic purposes, and no manufactories. The supply is almost constant and direct from the mains, but it is scarcely adequate to the requirements of the town and district. The rate of charge for water is 3*d.* in the pound on the assessment. The waterworks were constructed in 1854, and cost 3,050*l.* Before the waterworks were established the district was supplied with water from private shallow wells and streams. The improved water supply has had a beneficial effect upon the health of the inhabitants. The water has not been analysed.
Keighley - -	The town is at present supplied with water chiefly from springs, and also from gathering ground. The works were first established in 1816, and an extension authorised in 1869; they belong to the Local Board of Health. The original works were purchased from the company in 1865. The area of the gathering ground appropriated by a recent Act of Parliament (1869) to supply the Keighley district is 2,320 acres. There are two small service reservoirs situate in the high part of the town in which the water from the springs is collected. The reservoirs in course of construction are the Chedoles, area 40 acres, maximum depth 76 feet, and will contain 156,250,000 gallons; Bullytree, area 23 acres, maximum depth 86 feet, and will contain 100,000,000 gallons. The water is not polluted before entering the reservoirs; is not filtered, and is not pumped. The high service reservoir is situated at Black Hill; has an area of three-quarters of an acre; maximum depth, 15 feet, and contains 2,000,000 gallons. The high service reservoir is built partially under the surrounding ground, and is not covered. The area of the district at present supplied is about 1,300 acres; but the present system is merely provisional until the new works are completed, when a much larger district will be supplied; about 3,000 houses, for domestic purposes; no manufactories for trade purposes, owing to the insufficient supply for domestic use. The present supply is very intermittent, and is regulated in accordance with the

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
KEIGHLEY—*cont.*	quantity stored. About 100,000 gallons are delivered into the district daily for trade and domestic purposes. None is supplied for flushing the drains or watering the streets. The supply is direct from the mains, and is utterly inadequate for the requirements of the town and district; but when the new works are completed it is contemplated that the supply will be adequate. The rate of charge extends from 4*s.* per annum for houses rated under 21*l.* to 24*s.* for houses rated at 22*l.* 10*s.* and upwards. In order to prevent waste strict watch is kept, and offenders are summoned or the supply is cut off. The works, when completed, will cost 150,000*l.* Before the waterworks were established the town was supplied with water from springs and a stream flowing down the main street, which is now covered over. The water at present supplied to the town is very hard, but the new supply will be a very soft water, and almost equal to that supplied to Glasgow from Loch Katrine.
DENHOLM GATE -	The district is supplied with water from springs collected in reservoirs near the town; this supply is wholly insufficient, and works are now in course of construction, at a very considerable cost (under the Keighley Waterworks Extension and Improvement Act, 1869), by means of which an ample supply of water, derived from the sources of the river *Worth*, about seven miles from Keighley, will be furnished to the town, as a part of the district to be supplied under that Act. The waterworks were established in 1816, and belong to the Local Board of Health. The area of the present gathering ground is so very small and undefined that it cannot be correctly stated. The area of the gathering of new works is 2,320 acres. When the works are completed a volume of about 2,750,000 gallons will be abstracted from the river, and delivered to the town daily. The area and capacity of the existing reservoir is very small. The service reservoirs now being constructed will contain about 2,750,000 gallons, and the compensation reservoirs will contain about 300,000,000 gallons. The water is not polluted before entering the reservoirs, and is not filtered. The existing reservoir is built above ground; the new reservoirs will be constructed in the bottom of a valley. The works when completed will cost about 150,000*l.*
ALLERTON - -	The district is supplied with water from springs and from shallow private wells.
WILSDEN - -	The town is supplied with water for domestic purposes from three springs, the flow from which is constant; these are the property of the Local Board of Health. There are also small springs from which the public are supplied at a small annual charge, a few shillings to each family; and there are also private wells. The supply of water to the houses in the higher parts of the town during dry weather is very inadequate.
THORNTON - -	The town is supplied with water for domestic purposes by the Bradford Corporation Waterworks. It was first supplied in 1869. Area of district supplied, 100 acres. Houses, 347 for domestic purposes; 5 manufactories for trade purposes. The supply is constant, and about 15,000 gallons are delivered daily to the district. No water is used either for flushing sewers or watering streets. The supply is direct from the mains, and is at present adequate for the requirements of the town and district. The rate of charge for water is, for cottages 2*d.* a week; a higher rate for a better class of houses; and 8*d.* per 1,000 gallons for mill purposes. In order to prevent waste the taps and fittings are constantly inspected. The waterworks have cost 4,710*l.* 1*s.* 4*d.* Previously to the town being supplied by the Bradford Corporation the inhabitants obtained water from wells. The improved supply has had a most beneficial effect upon the health of the inhabitants. The water has been analysed for the Bradford Corporation, and reference is to be made to them for a copy of the analysis.
BOLTON - -	The district is supplied with water from shallow private wells and surface springs. The present supply is considered adequate for the requirements of the district. The water has not been analysed.
BRADFORD - -	The borough is supplied with water for domestic purposes by water impounded from gathering grounds. The waterworks were established in 1842, and belong to the Corporation. There are no pumping stations, as the whole are gravitation works. The reservoirs are (*a*) Grimwith,* Bardon, Chelker; (*a*) Silsden, Chellow, (*a*) Doe-park, Stubden, (*a*) Hewenden, Heaton, and Globe, or Whitley Hill. The area of the gathering ground for town supply is 11,000 acres. The areas of the reservoirs are,—Bardon, 66 acres; Chelker, 56 acres; Heaton, 8¼ acres; Chellow, Upper, 8 acres; Chellow, Lower, 5½ acres; Globe or Whitley Hill, 1¼th of an acre; and Stubden, 11 acres. Maximum depth:—Bardon, 60 feet; Chelker, 36; Heaton, 33; Chellow, Upper, 44; Chellow, Lower, 37; Globe or Whitley Hill, 12; and Stubden, 55 feet. The contents in gallons are:—Bardon, 440,000,000; Chelker, 250,000,000; Heaton, 30,000,000; Chellow, Upper, 50,000,000; Chellow, Lower, 28,000,000; Globe or Whitley Hill, 2,650,000; and Stubden, 85,000,000. The water is not polluted before entering the reservoirs; is not filtered, and is not pumped. The area of the district supplied is, Borough of Bradford, 6,508 acres; Bolton, 712; Thornton, 4,785; Clayton, 1,743; North Bierley, 3,341; Pudsey, 1,903; Eccles Hill, 1,219; Calverley, 3,180; Idle, 2,461; Tong, 2,657; Gomersal, 3,253; Hunsworth, 1,379; and Cleckheaton, 1,755. There are in Bradford 28,000 houses supplied for domestic purposes; we cannot give the number of houses in the other districts, but water is supplied to

* Those marked (*a*) are for compensation water only; they are not used for town supply.

BASIN OF THE AIRE (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
BRADFORD—*cont.*	them in bulk by meter. There are 800 works in the borough supplied by meters, and many others at a fixed rate for trade purposes; we are not able to give the number of works and manufactories in the other districts. The supply is constant, and 6,500,000 gallons are delivered daily in the borough and district. Cannot state the volume of water used for watering streets or flushing sewers. The supply is direct from the mains. Large houses only, where waterclosets are in use, have cisterns. The overflow pipes from these cisterns are connected with the soil pipe or sewer, whichever is most convenient. The present supply is adequate for the requirements of the town and district. The domestic rate of charge for water varies from 5 to 7½ per cent. upon the rental, and the rate of charge for supply by meter for manufacturing purposes is from 2*d.* to 1*s.* per 1,000 gallons. In order to prevent waste an officer is specially appointed who periodically inspects the water apparatus and fittings. The waterworks have cost 1,100,000*l.* Previously to the establishment of the waterworks the borough was supplied with water from wells and springs in the locality. We are not able to say what effect the improved water supply has had upon the health of the inhabitants. The water has been analysed by the Rivers Pollution Commissioners (1865), and the following is a copy of the analysis:—

Stream or Reservoir from which the sample of Water was taken.	Solid Residue, Grains per Gal.			Hardness. (Degrees of Clark.)		
	Mineral.	Organic.	Total.	Permanent.	Temporary.	Total.
Stubden Reservoir:						
1st Sample - -	4·93	0·77	5·70	3·25	—	3·25
2nd Sample - -	3·86	1·18	5·04	2·59	—	2·59
Manywells Springs -	5·40	0·12	5·52	2·24	—	2·24
Chellow Reservoirs -	6·80	0·89	7·70	3·57	0·07	3·64
Joy Beck, Burnsall -	4·00	0·76	4·76	2·94	0·98	3·92
Barden Beck - -	3·09	1·03	4·12	1·89	0·07	1·96
Howgill (Chelker) -	7·85	1·32	9·17	4·62	0·21	4·83
Howden Beck - -	9·04	0·54	9·58	5·04	—	5·04
Heaton Reservoir -	8·09	8·82	8·91	4·90	1·54	6·44

HEATON - -	The district is supplied with water from 40 private shallow wells situated in various parts of the township. The water has not been analysed.
SHIPLEY - -	The town is supplied with water from springs. The waterworks were established in 1855, and belong to the Local Board of Health. The reservoirs are situated at Eldwick, near Bingley, and at Baildon Bank, Baildon. The area of gathering ground is 1,300 acres. No. 1 reservoir contains 25,000,000, No. 2, 3,500,000, and No. 3, 7,500,000 gallons. The water is not polluted before entering the reservoirs, is not filtered, and is not pumped. The high service reservoir is built level with the surrounding ground, and is not covered. Area of district supplied, 1,330 acres; houses, 1,963 for domestic purposes; works and manufactories, 45 for trade purposes. The supply is constant and direct from the mains, and 300,000 gallons are delivered to the town daily for trade and domestic purposes. We are not able to state the volume of water used for watering streets and flushing sewers. There are no cisterns. The present supply is adequate for the supply of the town and district. The rate of charge for water is for houses of the rental of 5*l.* 10*s.* per annum, 8*s.* 8*d.*; 8*l.* 10*s.*, 10*s.*; 10*l.*, 12*s.*; 12*l.*, 14*s.*; 15*l.*, 16*s.*; 20*l.*, 18*s.*; 25*l.*, 1*l.*; 30*l.*, 22*s.*; 40*l.*, 26*s.*; 50*l.*, 30*s.*; 60*l.*, 34*s.*; 70*l.*, 42*s.*; 80*l.*, 46*s.* The steps taken to prevent waste are periodical inspection of the fittings and taps. The waterworks have cost 29,800*l.* Previously to the establishment of the waterworks the town was supplied with water from wells. We are not able to state what effect the improved water supply has had upon the health of the inhabitants. The water was analysed by the Rivers Pollution Commissioners (1865), and a copy of the analysis is transmitted herewith.
WINDHILL - -	The district is supplied with water by the Shipley Local Board of Health. These works were established in 1859. Area of district supplied, 240 acres. Houses, 1,000 for domestic purposes; and 10 works or manufactories for trade purposes. The supply is constant, and 25,000 gallons of water are delivered daily to the district. We are not able to state the quantity of water used for flushing sewers or watering streets. The supply is direct from the mains, and the present supply is adequate for the requirements of the town and district. The rate of charge for water is the same as that at Shipley (*see above*). Previously to obtaining the present source of supply, the town obtained water from wells and springs. The improved water supply has had a beneficial effect upon the health of the inhabitants, to what extent we are not able to say. The water has been analysed by the Rivers Pollution Commissioners (1865), and a copy of the analysis is transmitted herewith.
ECCLESHILL -	The district is supplied with water for domestic purposes by the Bradford Corporation waterworks. They were first established in 1863. The area of the district supplied is 900 acres. Houses, 840 for domestic purposes; five manufactories for trade purposes. The supply is constant, except during the prevalence of a long drought in summer,

Basin of the Aire (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Eccleshill—*cont.*	and 5,100 gallons of water is delivered daily to the district for domestic and trade purposes. No water is used for flushing sewers or watering streets. The supply is direct from the mains, and is adequate at present for the requirements of the town and district. The rate of charge for domestic purposes is 2*s.* 2*d.* per quarter and upwards according to the annual value of the houses, and for trade purposes from 7*d.* to 1*s.* 6*d.* per 1,000 gallons according to the quantity of water consumed. The steps taken to prevent waste are frequent inspections of the taps and fittings. The waterworks cost 3,800*l.* Previously to obtaining water from the present source the town was supplied from public and private wells. The improved supply has had a beneficial effect upon the health of the inhabitants. The water has been analysed by the Rivers Pollution Commissioners, 1865, and a copy of the analysis is sent herewith.
Calverley - -	The district is supplied with water from springs and wells. Waterworks to supply only a portion of the township were established in 1856, and belong to W. C. C. Thornhill, Esq., and for the other part of the district in 1866, and belong to the Calverley District Waterworks Company. This latter Company purchases the water it supplies from the Bradford Corporation Waterworks. There is no water used for watering streets. The present supply is inadequate in summer, but when the whole of the Bradford Corporation Waterworks are completed it is expected it will be sufficient, if the inhabitants choose to avail themselves of it. The rate of charge varies from 6*s.* to 24*s.* per year on houses of the annual rent of 12*l.* and upwards. The water has not been analysed by direction of this Board. Before the establishment of waterworks the district was supplied from wells and springs.
Farsley - -	The district is supplied with water by the Calverley District Waterworks Company, who purchase the water they supply from the Bradford Waterworks Company. The works were established in 1864. The supply is constant, and direct from the mains; from 400 to 500 houses and three mills are supplied. The supply is adequate. The rate of charge for water for domestic purposes is in proportion to the rent of the house, and for trade purposes 1*s.* 6*d.* per 1,000 gallons. To prevent waste, inspectors are appointed to examine fittings, taps, and meters. Previous to the establishment of the waterworks the district obtained a very scarce supply from springs. The improved supply has been beneficial to the health of the inhabitants.
Drighlington -	See letter from Clerk to Local Board of Health, Section I., page 12.
Morley - -	The town is supplied with water for domestic purposes from the Leeds Corporation Waterworks. The town was first supplied in 1869. The reservoir is situated at Churwell. Area, 2,500 superficial feet; maximum depth, 10 feet; and contents, 1,500,000 gallons. The water is not polluted before entering the reservoir; the water is filtered at Leeds, and is pumped to a reservoir, which is not covered. The cost of pumping, including labour and materials, is about 120*l.* yearly. The area of district supplied is about 1,400 acres. Houses, 1,200 for domestic purposes, and 15 manufactories for trade purposes. The supply is constant, and 100,000 gallons are delivered daily to the district. No water is used either for watering the streets or flushing the sewers. The supply is direct from the mains; and the present supply is adequate for the requirements of the town. The rate of charge for water for domestic purposes varies from 8*s.* 8*d.* a year for houses not exceeding 3*l.* yearly value, up to 2*l.* a year for houses from 50*l.* to 60*l.* yearly value. For trade purposes the charge is by meter, and varies from 1*s.* 3*d.* per 1,000 gallons for the quarterly consumption of 5,000 gallons, down to 9*d.* for the quarterly consumption of 500,000 gallons. No steps are taken to prevent waste. The waterworks have cost 20,000*l.* Previously to the establishment of the waterworks the town was supplied with water from wells. For copy of analysis, see Leeds, page 69.
	Basin of the Aire (North and South Bank).
Leeds - -	The town is supplied with water from gathering grounds at Eccup; from the river *Wharfe* at Arthington; and from the river *Washburn* at Leathley. The waterworks now in use for the supply of the town were established by Act of Parliament passed in 1837; they were first brought into actual operation in the year 1841, and belong to the Corporation of the borough. The reservoirs and pumping stations for the major part of the town are a store reservoir at Eccup; reservoir and filter beds at Westwood; service reservoir at Woodhouse; and pumping stations at Arthington. The high level reservoirs are the summit at Bramley and pumping works at Headingley. The gathering ground of the Eccup reservoir is about 1,200 acres. There is Parliamentary power to pump 6,000,000 gallons daily from the *Wharfe* and *Washburn*, but this volume has not yet been attained on the average of the year. The area of the Eccup reservoir is 40 acres; maximum depth, 43 feet; and contents, 257,000,000 gallons. The area of Westwood reservoir and filter beds is 11 acres; maximum depth, 22 feet; and contents, 22,000,000 gallons. The area of Woodhouse reservoir is $2\frac{1}{2}$ acres; maximum depth, 13 feet; and contents, 6,000,000 gallons. The water from the Eccup gathering ground and river *Washburn* is free from pollution, while that from the river *Wharfe* receives some of the sewage of Otley, Burley, Ilkley, and Addingham before the water is abstracted. The water is filtered through sand 18 inches deep. The water is pumped by two steam engines of 15 and 30 nominal horse-power. The

Basin of the Aire (North and South Banks)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Leeds—*cont.*	high service reservoir is built partially above the surrounding ground, but not covered. The yearly cost of pumping, including labour, fuel, and materials, is 4,091*l.* 6*s.* 10*d.* The area of the district supplied is 21,572 acres; 56,908 houses for domestic purposes, and 2,500 works and manufactories for trade purposes. The supply is constant, and 6,000,000 gallons of water is delivered to the district daily for trade and domestic purposes. From April to October 17,862,000 gallons are used for watering streets. The sewers are not flushed. The supply of water is direct from the mains, except to large houses, these have cisterns; the waste pipes from cisterns are not connected with soil pipes, but either have an outlet on to the sinkstones or into the pan of the waterclosets. The present supply is adequate for the requirements of the town and district. The rate of charge for houses for domestic purposes is 1*s.* in the pound on the rental; that to manufactories for trade purposes is 6*d.* per 1,000 gallons. In order to prevent waste an assistant inspector is occupied constantly in inspecting taps and fittings. The waterworks have cost 535,620*l.* Previously to the establishment of the waterworks the borough was supplied with water from the river *Aire* at Pitfall Mills, near Leeds Bridge, and by wells. We are not able to say what effect the improved supply of water has had upon the health of the inhabitants. The water has been analysed by Mr. Reynolds, F.C.S., and a copy of the analysis is transmitted herewith.
	Basin of the Calder (North and South Banks).
Todmorden -	The town is principally supplied with water from shallow wells and springs, but impounding reservoirs have been constructed by millowners for manufacturing purposes, and a supply is obtained from these sources by the tenants or workpeople of the manufacturers to whom the reservoirs belong. The present supply is not adequate to the requirements of the district. The water has not been analysed.
	Basin of the Calder (North Bank).
Hebden Bridge -	See letter from Clerk to Local Board of Health, Section I., page 13.
Midgley - -	See Section I., page 14.
Luddenden Foot -	The district is supplied with water from shallow wells sunk only two feet into the ground in different parts of the district. The people carry the water from the wells nearest to their dwellings. The supply is adequate for the requirements of the inhabitants; the water has not been filtered.
Warley - -	See letter from Clerk to Local Board of Health, Section I., page 14.
Sowerby Bridge -	The district is supplied with water from the Halifax Corporation Waterworks; houses, 1,000, for domestic purposes; manufactories, 100, for trade purposes. The supply is constant, direct from the mains, and 100,000 gallons are delivered to the district daily; the present supply is adequate, the rate of charge is 1*s.* per 1,000 gallons. The water mains and fittings cost 9,000*l.* No steps are taken to prevent waste.
Queensbury -	The district is supplied with water for domestic purposes from shallow private wells, and from a public fountain erected at the sole expense of Messrs. John Foster and Sons. The water has not been analysed.
Halifax - -	The borough is supplied with water from extensive waterworks, and from gathering grounds situate on the range of hills between Yorkshire and Lancashire. The works were established in 1853, and belong to the Corporation. The reservoirs are situate at Ogden and Mixenden, in Ovenden, four miles from the town in the Luddenden valley, six miles from Halifax. The area of the gathering ground is 8,000 acres. Contents of storage reservoirs. Ogden, 221,806,174 gallons; Mixenden, 112,500,000; Warley Moor, 193,250,587; Upper Dean Head, 59,142,694; (Lower Dean Head not yet finished), and Rawsden Wood, 11,699,750 gallons. Service reservoirs, Albert, 28,303,798 gallons; Victoria, 12,731,643; Hanson Lane, No. 1, 3,290,454, and No. 2, 2,445,062. All the high service reservoirs are built partly above ground. The limits of water supply under the Act will include nearly the whole of the parish of Halifax, about 30,000 acres. The area actually supplied consists of parts of Local Board districts of Sowerby Bridge, Elland, Greetland, Brighouse, and Hipperholme, in which the water is delivered by meter and sold in bulk. In the borough there are 13,000 houses supplied for domestic purposes, and 240 manufactories and works for trade purposes. The supply is constant and direct from the mains; cisterns only are provided for supply of waterclosets. About 3,600,000 gallons are delivered to the district daily. The waterworks being in the hands of the Corporation, no exact account is kept of the volume used for watering streets or flushing sewers; when the water carts are in requisition about 12,000 gallons are used daily. The supply is adequate to the requirements of the town; but the Corporation are constructing extensive works equal to double the present supply. The rate of charge for water varies from 6*s.* 6*d.* to houses under 5*l.* annual rackrent; up to 4*l.* to house of 100*l.* a year; and 4 per cent. is charged on all houses above 100*l.* a year. Waterclosets and baths in houses are charged at from 5*s.* to 7*s.* 6*d.* each a year. Works and manufactories are supplied for trade purposes by meter according to consumption, varying from 6*d.* to 10*d.* per 1,000 gallons. In order to prevent waste a general inspection from house to house

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
HALIFAX—*cont.*	is made of fittings and taps. The present waterworks, including mains, have cost 384,942*l.*, and the works in course of construction will cost 180,000*l.* Previous to the establishment of the waterworks the town was supplied from Well Head and Birks Well springs (one in, and the other about a mile from, the town). The increased supply has been beneficial to the general health of the inhabitants. The water has been analysed; and a copy of the analysis is sent herewith.
NORTH OWRAM -	The district is supplied from shallow private wells and springs. The supply is inadequate to the requirements of the district. The water has not been analysed.
SOUTH OWRAM -	The district is supplied with water for domestic purposes from shallow private wells and springs, and the supply is not adequate to the requirements of the district. The water has not been analysed.
SHELF - -	This district is supplied with water from private wells, which are very shallow. The district is included in the water supply area of Bradford, under an Act passed last session, and it is expected that the district will be supplied from that source in about two years. The present supply is inadequate to the requirements of the district. The water has not been analysed.
BRIGHOUSE - -	The town is supplied with water from waterworks belonging to the Corporation of Halifax. The town was first supplied from this source in 1869. We have no reservoirs, only cast-iron distributing mains from a station meter at Slead Syke, which belong to the Local Board of Health. The area of district supplied is 403 acres; 700 houses for domestic purposes, and 12 manufactories and works for trade purposes. The supply is constant, and 38,000 gallons of water a day are delivered for domestic purposes, and 7,800 for manufacturing purposes. There are also 15,000 gallons of water used per week for watering streets from the month of May to September inclusive. The supply is direct from the mains, and is at present adequate for the requirements of the town and district. The rate of charge is 1*s.* per 1,000 gallons for trade purposes, and for domestic purposes the rate varies from 7*s.* 6*d.* per annum for houses of from 5*l.* to 7*l.*, to 3*l.* 10*s.* for houses of from 91*l.* to 100*l.* gross annual value. No special steps are taken to prevent waste. The water mains and laying the same have cost 2,300*l.* Previously to the town being supplied from the present source the water was obtained from private wells. The water has been analysed.
SCHOLES - -	The district is supplied with water for domestic purposes from private shallow wells.
NORTH BIERLEY -	The town is supplied with water partly from wells, and partly by the Waterworks Company, incorporated under the Company's Act of 1862, who obtained their supply of water from the Bradford Corporation Waterworks. The district was first supplied from this source in 1864. The reservoirs belong to the Bradford Corporation Waterworks, and the water mains belong to the North Bierley Waterworks Company, Limited.
CLECKHEATON -	The district is supplied with water from the Bradford Corporation Waterworks. The supply was commenced from this source in 1865. The water mains belong to the Local Board of Health. The area of district supplied is 1,755 statute acres; houses, 1,000, for domestic purposes; manufactories and works, 120, for trade purposes. The supply is constant, and 60,000 gallons are delivered daily to the district for trade and domestic purposes. No water is used for watering the streets. The supply is direct from the mains, and is adequate for the requirements of the district. The average rate of charge is 10*d.* and five-eighths per 1,000 gallons. In order to prevent waste a very vigilant inspection is made of the taps and fittings; and persons detected wilfully wasting water are summoned, and on conviction a fine of 5*l.* is inflicted. The waterworks cost 12,000*l.* Previously to the town obtaining water from the present source the supply was derived from wells. The water has been analysed.
HECKMONDWIKE -	The district is supplied with water from gathering grounds. The waterworks were established in 1860, and belong to the Local Boards of Dewsbury, Batley, and Heckmondwike. The reservoirs are situated at Dunford Bridge; one on the *Don* containing 231,250,000 gallons, and one on the *Windleden* containing 75,000,000 gallons. These are partially storage and compensation reservoirs, as the millowners are entitled to 2,000,000 gallons per day out of them before the townships are supplied. The area of the gathering ground is 2,002 statute acres. The whole of the volume of the stream is abstracted, impounded, and stored, with the exception of the 2,000,000 gallons which is daily passed down the streams as compensation to the millowners; Dewsbury is entitled to use 750,000 gallons; Batley, 500,000; and Heckmondwike, 250,000 gallons a day. For three or four months in the summer the supply is very limited indeed. The area of the Broadstones reservoir is 18¼ acres; maximum depth, 37 feet; and capacity, 72,681,000 gallons. The service reservoir for the town of Heckmondwike is situated at Stancliffe, just out of the township, and it contains 1,000,000 gallons; it is partially built above the surrounding ground and covered. The water is collected from the moorlands at or near Woodhead, part in the counties of Lancashire and Yorkshire, far away from any source of pollution. The water is not filtered, but flows by gravitation to a high service reservoir, and thence into the township.

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
HECKMONDWIKE—*cont.*	The area of district supplied includes the whole township of Heckmondwike (693 statute acres), and parts of the adjoining hamlets of Flush and Mildridge. Houses supplied for domestic purposes, 1,550, and 60 manufactories for trade purposes. The supply is constant, except in time of drought. We have no means of ascertaining the volume of water supplied to Heckmondwike daily. Last year a sum of 1,712*l.* was received from the sale of water for domestic and manufacturing purposes. We are not able to give the quantity of water used for flushing the sewers. In summer water is obtained from mills having deep wells for the purpose of watering the streets. The supply is direct from the mains, and is very deficient for three or four months in the year. The rate of charge for water varies from 8*s.* per year on houses of the value of 5*l.* 10*s.*, to 2*l.* 6*s.* a year on houses of the value of from 70*l.* to 80*l.*; and for trade purposes for 15,000 gallons per quarter 1*s.* per 1,000 gallons, and for 60,000 to 100,000 gallons per quarter 6*d.* per 1,000 gallons. The steps taken to prevent waste are constant supervision, by an inspector, of the fittings and taps; and parties detected in wasting the water are summoned, and on conviction are fined. The waterworks have cost Heckmondwike 30,494*l.* 1*s.* 9*d.* Previously to the establishment of the waterworks the town was supplied with water from private wells. The improved water supply has had a decidedly beneficial effect upon the health of the inhabitants. The water has not been analysed.
RAVENSTHORPE -	The town is supplied with water for domestic purposes by the Dewsbury, Batley, and Heckmondwike Waterworks Company. The district was first supplied in 1868. There are no reservoirs, but the Local Board has laid down iron mains for conveying the water from the Dewsbury works into the district. The area of district supplied is 360 acres. Houses, 440 for domestic purposes; and 8 manufactories for trade purposes. The supply is constant, except in very dry weather, and 8,890 gallons for trade and 12,800 gallons for domestic purposes are delivered to the district daily. No water is used for watering the streets. The supply is direct from the mains, and is at present adequate for the requirements of the district. The scale of charges for domestic purposes varies from 17*s.* 4*d.* for houses of the annual value of 5*l.* 10*s.*, to 3*l.* for houses of the annual value of 50*l.* The rate for warehouses, shops, and offices of the value of 5*l.* varies from 8*s.* per annum to 1*l.* 10*s.* for warehouses, shops, and houses of the annual value of 100*l.* No special steps are taken to prevent waste. The laying of the water mains has cost 2,387*l.* 10*s.* 3*d.* Previously to the town being furnished with water from the present source it obtained its supply from wells and the river *Calder*. The improved water supply has had a beneficial effect upon the health of the inhabitants. The water has not been analysed.
BIRKINSHAW -	See letter from Mr. John Smith, Clerk to Local Board of Health, Section I., page 18.
BIRSTAL - -	The town is supplied with water for domestic purposes from the Bradford Corporation waterworks. This was commenced in 1865. The area of district supplied is 1,300 statute acres. Houses, 700 for domestic purposes; and works and 16 manufactories for trade purposes. The supply is constant, and 70,000 gallons are delivered daily to the district when the supply is equal to the demand. There is no water used for watering the streets. The supply is direct from the mains, but is quite inadequate for the requirements of the town. The rate of charge varies for the domestic supply from 8*s.* 8*d.* yearly for houses of the yearly value of 3*l.*, to 2*l.* for houses of the yearly value of from 50*l.* to 60*l.* For trade purposes the supply is by meter, varying from 1*s.* 3*d.* per 1,000 gallons for the quarterly consumption of 5,000 gallons, to 9*d.* per 1,000 gallons for the quarterly consumption of 500,000 gallons. *It must be distinctly understood that no water can be sold for trade purposes if the supply for domestic purposes be insufficient to meet the demand.* No steps are taken to prevent waste. The cost of the water mains and apparatus was 6,600*l.* Previously to receiving water from the present source the town obtained a supply from private wells. The improved water supply has had a decidedly beneficial effect upon the health of the inhabitants. The water has not been analysed on behalf of the Board.
BATLEY - -	The town is supplied with water impounded for domestic purposes from gathering grounds. The waterworks were established in 1853, and belong to the Corporations of Dewsbury, Batley, and the Local Board of Heckmondwike. The reservoirs are at Dunford Bridge, Broadstone, Dewsbury Moor, and Stancliffe. The reservoir at Dunford Bridge is for compensation, the others are for storage and the supply to the district. The area of the gathering ground is about 2,000 acres. The area of Dunford Bridge reservoir is about 33 acres; maximum depth, 84 feet; and contents, 231,250,000 gallons. Area of Broadstone reservoir, 18 acres; maximum depth, 37 feet; and contents, 72,681,000 gallons. Area of Dewsbury Moor and Stancliffe service reservoirs, 3,814 square yards; maximum depth, 15 feet 6 inches; and contents, 3,000,000 gallons. The high service reservoir is built partially above the surrounding ground, and is covered. The water is not polluted before entering the reservoirs, and is not filtered. The water is not pumped to the high service reservoir, but flows by gravitation into it, and thence into the town. The area of district supplied is 2,038 statute acres; houses upwards of 3,000 for domestic purposes; works and manufactories, 100 for trade purposes. The supply is constant except in time of drought, when it is only supplied for a certain time in the day; and 400,000 gallons are delivered daily to the district for trade and domestic purposes

BASIN OF THE CALDER (NORTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
BATLEY—*cont.*	Very little water is used for watering streets. The supply is direct from the main, and is not adequate to the requirements of the town and district. The rate of charge for the water is on a graduated scale according to the rental, varying from 8*s.* 8*d.* per annum for houses rented at 5*l.* 10*s.* and upwards. No steps have been taken to prevent waste. The waterworks have cost Batley 61,000*l.* Previously to the establishment of the waterworks, the town was supplied with water from private wells and rainfall. The improved water supply has had a beneficial effect upon the health of the inhabitants. The water has not been analysed.
DEWSBURY - -	The town is supplied with water for domestic purposes from water impounded from gathering grounds. The works were established in 1853, and belong to the Corporations of Dewsbury and Batley, and the Local Board of Health of Heckmondwike. The reservoirs are situated at Dunford Bridge, the storage reservoirs are at Broadstone in the parish of Kirkbolton. The particulars of these are given (*see Batley above*). The area of district supplied is 1,468 statute acres. Houses, about 4,000 for domestic purposes. Works and manufactories, 130 for trade purposes. The supply is constant for domestic purposes, and about 750,000 gallons are delivered daily to the district for trade and domestic purposes. We are not able to give the volume of water used for watering the streets. The supply is direct from the mains, but is at present quite inadequate for the requirements of the town and district. (*For rate of charges for water see Batley above.*) No steps are taken to prevent waste. The waterworks have cost Dewsbury 97,529*l.* Previously to the establishment of the waterworks the town was supplied from the river, wells, and rainfall. The improved water supply has had a beneficial effect upon the health of the inhabitants. The water has not been analysed.
SOOTHILL, UPPER -	The district is supplied with water for domestic purposes from shallow private wells, but is about to obtain a supply from the Halifax Corporation Waterworks.
SOOTHILL NETHER -	The district is supplied with water from the Dewsbury Corporation Waterworks at 1*s.* 6*d.* per 1,000 gallons; the supply was commenced in 1869. The area of district supplied is 563 statute acres. Houses supplied, 600 for domestic purposes; manufactories, 2 for trade purposes. The supply is intermittent, and the mains are only charged from two to three hours per day; 328 gallons for trade purposes, and 8,852 gallons for domestic purposes are delivered daily to the district. No water is used for watering the streets. The water is supplied direct from the mains. The present supply is inadequate for the requirements of the district. (*For rate of charge see Batley above.*) No steps are taken to prevent waste. The works (water mains) have cost 2,481*l.* 4*s.* 4*d.* Previously to being supplied with water by the Corporation of Dewsbury, the district obtained its supply from private wells, and from the river. The water has not been analysed.
HORBURY - -	The town is supplied with water for domestic purposes by wells, partly public and partly private; but the supply is very insufficient. The water has not been analysed.
WHITWOOD - -	See letter of Mr. W. E. Pratt, Clerk to the Local Board of Health, Section I., page 29.

Basin of the Calder (South Bank).

SCAMMONDEN -	The district is supplied with water for domestic purposes from springs. The water has not been analysed.
RISHWORTH -	The district is supplied with water from shallow private wells. The supply of water is adequate for the supply of the district. The water has not been analysed.
BARKISLAND -	See letter from Clerk to Local Board, Section I., page 21.
SOYLAND - -	The district is supplied with water for domestic purposes from shallow private wells; the supply is adequate; the water has not been analysed.
SOWERBY - -	See letter from Mr. Francis Jubb, Clerk to Local Board of Health, Section I., page 21.
GREETLAND -	The district is supplied with water chiefly by the Halifax Corporation, and partly by springs and wells. The town was first supplied with water from the Halifax Corporation Waterworks in 1867–8. There are 408 houses supplied for domestic purposes, and 9 manufactories for trade purposes. The supply is constant, and 12,000 gallons of water for domestic, and 15,750 gallons for trade purposes are delivered daily to the district. No water is used for watering streets. The supply is direct from the mains, and is adequate for the requirements of the town and district. The rate of charge for the water is, for 347 houses, under 7*l.* 10*s.* at 2*d.* per week; 40 houses under 12*l.* at 3*d.*, and 15 houses above 12*l.* at 4*d.* per week; 5 beershops at 1*l.* [illegible] and 1 public-house at 2*l.* per annum. In order to prevent waste the w[illegible] con-

BASIN OF THE CALDER (SOUTH BANK)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
GREETLAND—*cont.*	stantly examines the fittings and taps. The water mains have cost 1,440*l.* 8*s.* 4*d.* Previously to being supplied with water from the Waterworks Company the inhabitants obtained water from springs and wells. The spring water was very good, and the increased supply has been more a convenience than anything else; it has not affected the health of the inhabitants. We do not know whether the water has been analysed.
ELLAND - -	The district is supplied with water for domestic purposes from the Halifax Corporation Waterworks; it was first supplied in 1865. There are 900 houses supplied for domestic purposes, and 42 manufactories for trade purposes. The supply is constant, and 60,000 gallons of water is delivered daily to the district for trade and domestic purposes. No water is used for watering the streets. The supply is direct from the mains, and is adequate for the requirements of the district. The rate charged for water delivered from the Halifax Corporation Waterworks is 6*d.* per 1,000 gallons. In order to prevent waste an inspector is engaged to examine the fittings and taps constantly. The water mains, have cost 5,180*l.* Previously to being supplied with water by the Corporation waterworks, the district obtained water from wells. The water has been analysed.
RASTRICK - -	The town is supplied with water for domestic purposes by shallow private wells. The supply is inadequate to the requirements of the town; but a supply will be obtained from the Halifax Corporation Waterworks, the necessary works for which are now in progress. The present supply of water from wells has not been analysed.
MARSDEN - IN - ALMONDBURY.	See Marsden-in-Huddersfield below.
MARSDEN - IN - HUDDERSFIELD.	The town is supplied with water for domestic purposes from the river and from springs, and is adequate to the requirements of the district. The water has not been analysed.
SLAITHWAITE -	The district is supplied with water from springs. The supply is inadequate. The water has not been analysed.
LINTHWAITE -	The district is supplied with water for domestic purposes, from about 240 private shallow wells; and the Board have constructed a series of reservoirs for receiving water from springs; they have also erected in different parts of the district, 13 stone troughs and public tanks for distributing water to the inhabitants. The works belong to the Local Board of Health. The reservoir is situate at Milnsbridge, it has an area of about 6,000 feet, is 12 feet deep, and contains about 450,000 gallons. The water is not polluted before entering the reservoir, is not filtered, and is not pumped. We are not able to state the volume of water supplied to the district daily. None is used for watering the streets, or for flushing sewers. The supply is adequate for the requirements of the district. The inhabitants are not charged for the water. The waterworks have cost 480*l.* The water has not been analysed.
GOLCAR - -	The district is supplied with water chiefly from springs, which flow into stone troughs, and the inhabitants have to go a considerable distance to obtain water from these troughs. In the summer season they have to rise very early in order to obtain a supply for their daily wants, which they have to store up in their houses for domestic purposes. On Saturdays this is of course a double hardship. A few years ago the Steward of Lord Scarboro' kindly offered a site for a reservoir, and a supply of water for the same, if the Local Board would be at the expense of constructing the works, but this they declined to do. Subsequently a Mr. Taylor constructed a reservoir on his own property, at his own expense, for the good of the townspeople; and he now gratuitously supplies a great number of people with water. The Local Board have received the following memorial from the ratepayers:—

"To the Local Board of Health for the township of Golcar.

"The memorial of the inhabitants of the township of Golcar, being owners and "ratepayers, showeth that, on the 25th day of August 1864, a request, in writing, "signed by 90 ratepayers was presented to your Board praying that measures "might be taken to ensure a continuous supply of pure water to the inhabitants, "and the memorialists further showeth that many of the inhabitants have suffered "from the want of water for the last two years, especially during the summer "months, so much so as to necessitate their going considerable distances, as well "as during the night time, to obtain a sufficient supply; also that during the last "year zymotic diseases have extensively prevailed in this township, *i.e.*, diseases "which are usually regarded as of a preventible character, and are mainly attribu- "table to a deficient and impure supply of water, so much so that for the year "ending February 1st, 1870, out of a total number of deaths registered for the "township of Golcar, viz., 136, one-fourth of the deaths resulted from the several "fevers partaking of the typhoid, the gastric, and scarlatina forms, and one-sixth "of the whole number from scarlatina, in addition to 10 deaths from diarrhœa. "Your memorialists therefore submit that the foregoing state of things ought no "longer to be allowed to exist, but that the Local Board of Health should take

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Golcar—*cont.*	"the matter into their most serious consideration, inasmuch as the law gives them "the power not only to obtain a pure and sufficient supply of water, but to execute "works for the proper drainage of the township, measures calculated to secure, in "the opinion of your memorialists, beyond everything else, the health and the "lives of the inhabitants."
Longwood - -	The district is supplied with water from springs and shallow private wells, and the supply is inadequate. The water has not been analysed.
Fulstone - -	The district is supplied with water for domestic purposes from springs adjacent to the village. The supply is not adequate. The water has not been analysed.
Huddersfield -	The borough is supplied with water for domestic purposes by waterworks established under Acts of Parliament passed in 1828 and 1845. The supply powers extend however only to the central portions of the borough, and the sources of supply are from springs at Longwood. Further extensive works are authorised by the Huddersfield Water Act, 1869, and are now in progress. The source of supply of the new works is from springs and gathering ground at Meltham and Marsden, about eight miles south of the borough. The original works were established in 1828, although there existed previously some small works established by the Ramsden family, who are the principal proprietors of the district. The waterworks now belong to the Corporation. The reservoirs of the existing works are situated at Longwood, and the area of the gathering ground of the existing works and those now in progress, is 2,000 statute acres. The area of Longwood store reservoir is 3 acres, 1 rood, and 34 perches; maximum depth, 22 feet; and contents, 63,000,000 gallons. Area of Blackmoor Foot reservoir, 8 acres; maximum depth, 30 feet; and contents, 700,000,000 gallons. Area of Deerhill reservoir, 8 acres, 2 roods, and 38 perches; maximum depth, 38 feet; and contents, 140,000,000 gallons. The water is not polluted before entering the reservoirs, and is not filtered. The area of the high service reservoir (Spring Street) is 80 superficial feet; maximum depth, 12 feet 9 inches, and contents, 392,713 gallons. It is built entirely above the surrounding ground, and is not covered. The area of district supplied is 2,000 acres; houses, 7,500 for domestic purposes; works and manufactories, 600 for trade purposes. The supply is constant during the winter months, and intermittent during the summer months (the mains then being charged on an average 8 hours per diem). The average volume of water delivered in the district daily is 400,000 gallons. We are not able to give the volume of water used for watering the streets or flushing the sewers. The supply to cottages under 10*l.* is direct from the mains. Houses of the higher class are furnished with cisterns, the overflow pipes of which are generally connected with the soil pipes; but, under the new Act of 1869, the overflow pipes are not to be connected with the soil pipes, but project through the walls outside the buildings. The present supply is inadequate for the town and district. The rate of charge for water varies from 4*s.* for houses under 2*l.* rateable value, up to 45*s.* for houses of the rateable value of 50*l.*; there is a special arrangement for warehouses, shops, and public-houses. The supply to works and manufactories is measured by meter, and the rate varies from 1*s.* 6*d.* per 1,000 gallons for 15,000 gallons per quarter, to 1*s.* per 1,000 for from 60,000 to 100,000 gallons per quarter. In order to prevent waste a periodical inspection is made of the taps and fittings. The water has been analysed by Dr. Henry Letheby, and the following is a copy of the analysis:—

	Grains.
Carbonate of lime and magnesia	0·19
Sulphate of lime	4·01
Chloride of sodium	1·12
Silica, alumina, and oxide of iron	0·06
Organic matter	0·69
Total solid matter per gallon	6·07
Degrees of hardness	3·1
Degrees of hardness after boiling	2·7

Meltham - -	The town is supplied with water from springs. The waterworks were first established in 1862, and belong to the Local Board of Health. The reservoir is situated at Town Slack. Area of gathering ground, 300 acres. Area of reservoir, 1,210 yards; maximum depth, 9 feet; and contents, 612,562 gallons. The water is not polluted before entering the reservoir, and is not filtered. The area of district supplied is 1,000 statute acres; houses, 250 for domestic purposes; no manufactories or works. The supply is constant. There is no water used for watering streets. The supply is direct from the mains, and is adequate for the supply of the town and district. The rate of charge for water up to the present time has been about 3*d.* in the pound on the rateable value. In order to prevent waste the Waterworks Inspector makes constant inspection of the taps and fittings. The waterworks have cost 2,500*l.* Previously to the establishment of the waterworks the district obtained water from private wells. The improved water supply has had a beneficial effect upon the health of the inhabitants. The water has not been analysed.

Basin of the Calder (South Bank)—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Honley - -	The district is supplied with water for domestic purposes from eighteen public wells and surface springs; the supply is adequate, but not well distributed; the water has not been analysed.
Austonley - -	The district is supplied with water from shallow private wells; the water has not been analysed.
Holme - -	The district is supplied with water from the stream and springs; and the supply is adequate for the requirements of the district. The water has not been analysed.
Wooldale - -	The district is supplied with water for domestic purposes by private shallow wells and springs; and the supply is inadequate for the requirements of the district. The water has not been analysed, but it is said to be of very good quality.
Nether Thong	The district is supplied with water for domestic purposes from the river and from springs. The supply is not adequate in droughty seasons. The water has not been analysed.
Upper Thong -	The district is supplied with water for domestic purposes by private wells. The supply is not adequate to the requirements of the district. The water has not been analysed.
Thurstonland -	The district is supplied with water from springs and wells.
Farnley Tyas -	The district is supplied with water from private wells. The supply is adequate. The water has not been analysed.
Shepley - -	The district is supplied with water from the stream and from private wells.
Kirkburton -	The district is supplied with water from springs and wells. The present supply is not adequate to the requirements of the district. The water has not been analysed.
Kirkheaton -	The district is supplied with water from shallow wells and springs. The present supply is not adequate. The water has not been filtered.
Whitley, Upper -	See letter of Mr. W. Turner, Clerk to the Local Board of Health, Section I., page 28.
Thornhill - -	The district is supplied with water for domestic purposes from the waterworks belonging to the Corporation of Dewsbury at the rate of 1*s.* 6*d.* per 1,000 gallons. This district was first supplied from this source in 1869. The area of district supplied is 2,565 acres; houses, 387 for domestic purposes; manufactories, 6 for trade purposes. The supply is intermittent, and the mains are only charged from two to three hours a day, and 525 gallons of water for trade purposes, and 8,247 for domestic purposes, are delivered to the district daily. None is used for watering the streets. The water is supplied direct from the mains, and the present supply is not adequate for the requirements of the town and district. No steps are taken to prevent waste. The water mains have cost 1,850*l.* Before the town received water from the present source, a supply was obtained from wells, the river, and the canal. We are not able to state the effect upon health of the improved water supply to the inhabitants. The water has not been analysed.

Basin of the Calder (North and South Banks).

Wakefield - -	The borough is supplied with water for domestic purposes, one-fourth from springs, and three-fourths abstracted from the river *Calder*. The waterworks were established in 1837, and belong to a joint stock company called the Wakefield Waterworks Company. The reservoirs are situated at Stanley Ferry, two miles from Wakefield, and a volume of 1,000,000 gallons is daily pumped from the river. The area of the store reservoir is about four acres; average depth, 14 feet; and contents, 30,000,000 gallons. The area of the service reservoir is three-quarters of an acre; maximum depth, 11 feet; and contains 3,000,000 gallons. The water is polluted before entering the reservoirs by town sewage and liquid refuse from manufactories, chemical works, gasworks, dye and bleach works, tanyards, and also by mines; not only from the towns and district situate in the basin higher up; but from the borough of Wakefield itself, as the water is abstracted from the river about a mile below the main sewer outlet. The water is filtered by a patent process, through sand 18 inches deep, gravel 3 inches, and carbide of iron 9 inches deep; and is pumped to a high service reservoir 200 feet. The high service reservoir is built partially above the surrounding ground, and is not covered. We are not able to give the cost of pumping, including labour, fuel, and materials. The area of the borough supplied is 1,553 acres 2 roods and 30 perches. The company supply other townships, of which the area is not known. Houses in the borough, 5,650 for domestic purposes; manufactories, 42; and malt kilns, 60 for trade purposes. The supply is constant, and 700,000 gallons of water for domestic purposes, and 300,000 for trade purposes, are delivered within the area of the borough daily. 12,000,000 gallons of water are used yearly for watering the streets, from April to September. The supply is direct from the mains. The present supply *in quantity* is adequate for the present requirements of the borough. The rate of charge for water

BASIN OF THE CALDER (NORTH AND SOUTH BANKS)—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
WAKEFIELD—*cont.*	to dwelling houses and houses with shops not being hotels, spirit vaults, public houses, or butchers' shops, the rent of which exceeds 6*l.* per annum, 1*s.* in the pound upon the annual rackrent. Dwelling houses at the yearly rent of 6*l.* and under, 6*s.* per annum. Hotels, spirit vaults, public houses where there is no brewing, 2*s.* in the pound; and where occupiers brew, 2*s.* 6*d.* in the pound. Temperance hotels, eating houses, and lodging houses, 2*s.* in the pound. Butchers' shops not having slaughter houses, 1*s.* 3*d.* in the pound; butchers' shops with slaughter houses, 1*s.* 6*d.* in the pound. Waterclosets, 6*s.* each. Cottage waterclosets, 3*s.* each. No steps are taken to prevent waste. The waterworks have cost 66,729*l.* 8*s.* 2*d.* Previously to the establishment of the waterworks the borough was supplied with water from wells and from the river. We are not able to state the effect the improved water supply has had upon the health of the inhabitants. The water has been analysed, but we have not procured a copy of the analysis.
	Basins of the Aire and Calder.
CASTLEFORD -	See letter of Mr. Geo. Bradley, Clerk to the Local Board of Health, Section I., page 30.
PONTEFRACT -	The borough is supplied with water for domestic purposes by waterworks and wells, at private houses. The waterworks were established in 1851, and are the property of the Street Commissioners. The reservoir is situated at Tanshelf, the well of the Waterworks Company is 7 feet in diameter, and sunk into the limestone a depth of 40 feet; 7,000 gallons of water are pumped each hour, and for 10 hours each day. The service reservoir is 18 feet by 16 feet, and 10 feet deep, and contains 18,000 gallons. It is built partially above ground, and is not covered. The annual cost of pumping, including labour, fuel, and materials, is 159*l.* 13*s.* 8*d.* The area of the district supplied is 2,050 statute acres. Houses, 211 for domestic purposes, 10 works, and 21 malt kilns for trade purposes. The supply is intermittent, and the mains are only kept charged for 16 hours a day. 75,000 gallons of water are supplied to the district daily for domestic and trade purposes. The supply is direct from the mains. The present supply is inadequate, and a well is at present being sunk to obtain a larger supply. The rate of charge for water for houses rated at 20*l.* and upwards is twenty shillings a year; above 10*l.* and under 20*l.*, fifteen shillings; below 10*l.*, ten shillings a year. Malt kilns, 1*s.* 6*d.* per quarter of barley malted per year. Steam boilers, ten shillings a year. Persons detected in wasting water are summoned before the magistrates. The waterworks have cost 2,000*l.* Previously to the establishment of the waterworks the town was supplied with water from a spring running 5,000 gallons a day, and from private wells. The water has not been analysed.
	Basin of the Severn.
NEWTOWN AND LLANLLWCHAIARN.	The town is supplied with water for culinary purposes from shallow wells, and for other domestic purposes from the river.
KIDDERMINSTER -	The town is supplied with water for domestic purposes from shallow private wells. This source has been greatly affected by the sinking of artesian wells at the various carpet manufactories to obtain water for trade purposes. The supply is inadequate for the requirements of the town. The water has not been analysed.
STROUD - -	The town is supplied with water to a small extent from wells, but chiefly from waterworks belonging to the Board of Health, called the Upper and Lower Works. The hamlets of Pakenhill, Downfield, and Bow Bridge, in the district, are not supplied from the works. The waterworks were established in 1768. The reservoirs are situated, one on Stroud Hill, above the town, and the other near the Cross in the middle of the town. The upper works are only supplied from gathering grounds Pipes are carried along the sides of the hills in the Fuller's earth clays to an extent of 2,000 yards; the width is about 100 yards. The area of the upper reservoir is 280,000 feet; maximum depth, 17 feet; and contents, 1,680,000 gallons. The area of the lower reservoir is 6,100 feet; maximum depth, 6 feet; and contents, 37,000 gallons. The water is not polluted before entering the reservoirs. Only the water of the upper reservoir is filtered, and that through a rough gravel filter in the bottom. The water is not pumped. The only supply of water obtained from wells is from those owned by private persons, except in the instance of a well sunk by the Local Board to obtain water for watering the streets. All the wells are sunk in inferior oolite to the level of the water-bearing clays of the upper lias, or the lower part of the supra-liassic sands. The area of district supplied is about 110 acres; houses, 900 for domestic purposes; works and manufactories, 9 for trade purposes. The supply is intermittent. The hours of supply vary in summer and winter from one hour to two or three hours; and about 50,000 gallons of water on the average is delivered to the district daily. The streets are watered usually from April to September, inclusive. Very little of the water so used is taken from the waterworks; it is procured partly from the rivers *Frome* and *Slade*, and partly from a well belonging to the Local Board of Health. Houses of the better class are furnished with cisterns, but the cottages are generally without cisterns. In the former cases the waste pipe is usually connected with a sewer. The present

BASIN OF THE SEVERN—*continued.*

Names of Cities, Boroughs, and Districts.	ANSWERS TO QUERIES 1 TO 42, PAGE 61—*continued.*
STROUD—*cont.*	supply is scarcely adequate for the requirements of the town. Additional storage was obtained last year, and it is hoped that the supply will be in future sufficient. Hitherto the upper portion of the town has not had more than half the proper supply during the summer months. The rate of charge varies according to the rental of the houses from 4*s.* per year to 30*s.*; an additional charge for stables of 5*s.* and coach-houses, 5*s.*; and a rate of charge for certain trades according to special agreement. In order to prevent waste the Inspector repeatedly inspects the fittings. Previously to the establishment of the waterworks a supply was obtained from wells and a local spring. The waterworks, although on a limited scale, have been so long established, that no comparison can be made as to the improvement upon the health of the inhabitants. The water has been analysed by Professor Voelcker, F.R.S.; No. 1, upper works, newly collected springs; No. 2, upper works, old springs; No. 3, lower works.

An Imperial gallon of each sample contained	1.	2.	3.
Solid matter, dried at 300° F.	27·60	29·44	20·81
Organic matter	·96	·48	·80
Carbonate of lime	22·91	23·12	12·44
Sulphate of lime	1·81	2·56	2·31
Magnesia	·62	·62	·66
Oxides and traces of phosphates	·76	·32	·72
Alkaline salts	·54	2 34	3·88
Degrees of hardness according to Clarke's scale before boiling	24°	27°	14°·5
After boiling	4°·7	5°	5°·5

	Basin of the Thames (Windrush).
WITNEY - -	The district is supplied with water for domestic purposes from private shallow wells, also from the river. The water has not been analysed.
	Basin of the Lower Avon.
BRISTOL - -	The high level district of the borough is supplied with water for domestic purposes by pumping, and the low level district by gravitation. The water is obtained from springs at Mendip, Barrow, Chelvey, and Ashley Down. The waterworks were established in 1846, and belong to the Bristol Waterworks Company. The store reservoirs are situated at Barrow; the compensation at Litton, Harptree, Chew Magna, and Barrow; the service reservoirs at Knowle, Bedminster, Leigh, and Clifton, and the pumping stations at Chelvey, Bedminster, Ashley Down, and Clifton. The water is not abstracted from any river or stream. The area of the store reservoir at Barrow No. 1 is 26¾ acres, and of No. 2, 39½ acres. The maximum depth of No. 1 is 26 feet, and of No. 2, 29 feet; and contains, No. 1, 143,951,050 gallons, and No. 2, 188,631,000 gallons. The compensation reservoirs at Litton, Harptree, and Chew Magna together contain 24,000,000 cubic feet, and the compensation reservoir at Barrow contains 6,313,647 cubic feet. The water is not polluted before entering the reservoirs, and is not filtered. There are two pumping engines at Clifton, cylinders 39 inches in diameter, pumps 23 inches in diameter, plungers 18 inches in diameter, stroke 6 feet, single action. There is one pumping engine at Bedminster Down. The high service reservoir is of an oval shape, 150 feet by 50 feet, and 12 feet deep, and contains about 1,000,000 gallons; it is built entirely above the surrounding ground, and is covered. We are not able to state the cost of pumping, as a separate account is not kept. The springs at Mendip and Barrow issue from the conglomerate lying over the limestone of the great Mendip strata. The springs at Chelvey are from the New Red Sandstone. The well at Chelvey now in course of sinking is 7 feet in diameter, and is intended to be 140 feet in depth; two bore holes, one 4 inches in diameter and 140 feet deep; and the other 2½ inches in diameter and 140 feet deep. The springs at Chelvey yield 1,600,000 gallons per diem. The service reservoir at Oakfield Road, Clifton, is one acre in area and 14 feet deep, and contains about 4,000,000 gallons. It is partially built above the surrounding ground, and is not covered. We are not able to give the area of the district, the number of houses, or works supplied. The supply is constant, and some few houses are furnished with cisterns in the basement floor, but the water in all other cases is supplied direct from the main. About 3,000,000 gallons of water is delivered to the district daily for trade and domestic purposes; and for watering the streets from 1st April to 30th of September from 3,000,000 to 4,000,000 gallons of water per month is used. The present supply is adequate for the requirements of the town and district. The rate for water for domestic supply is charged for in accordance with the provisions of the Bristol Waterworks Act, 1862, and the Bristol Waterworks Amendment Act, 1865; and for trade purposes it varies, under 25,000 gallons for quarterly consumption, from 1*s.* 6*d.* per 1,000 gallons to 6*d.* for 4,000,000 gallons and upwards. In order to prevent waste, rigid inspection is made of the taps and fittings, and proceedings are taken against offenders when discovered. The waterworks have cost to December 31st, 1870, 385,752*l.* 12*s.* 8*d.* Before the waterworks were con-

Basin of the Lower Avon—*continued.*

Names of Cities, Boroughs, and Districts.	Answers to Queries 1 to 42, Page 61—*continued.*
Bristol.—*cont.*	structed there was no general supply of water to the borough, but about 500 houses in Clifton were supplied by three private waterworks companies. The improved water supply has had a highly beneficial effect upon the health of the inhabitants. The water has been analysed by Mr. W. W. Stoddard, F.C.S., F.G.S., Bristol, and a copy of the analysis is sent herewith.
Bath - -	The city is supplied with water from springs principally from the upper lias, and the principal of the waterworks were established in 1846. The works belong to the Corporation and 18 other companies. The Corporation works supply 30,000 of the inhabitants, and the other companies about 13,000. There are three reservoirs, and they are situated about four miles from Bath; two of them have an area of three acres; maximum depth, 20 feet, and contain about 9,000,000 gallons. The third has an area of one-sixth of an acre; maximum depth, 9 feet; and contains 115,000 gallons. The water is not polluted before entering the reservoirs; it is not filtered, but is passed through fine wire strainers. There are a few private wells, and these are sunk below the inferior oolite. The area of district supplied is 560 acres; houses, 4,650 for domestic purposes; and 71 breweries and sodawater works, for manufacturing purposes. The supply is intermittent, and the mains are only charged two hours daily. A volume of about 402,000 gallons is delivered to the district daily for domestic purposes, and 30,000 for trade purposes. The streets are watered with mineral and filtered river water. The houses are furnished with cisterns, the overflow pipes from which are not connected with the soil pipe, but lead on to the sinks, and thence into the sewers. The present supply is inadequate for the requirements of the city and district. The rate of charge for water is from 2 to 5 per cent. on the rackrent of the houses supplied. Breweries and manufactories are charged by meter. The only steps taken to prevent waste are constant inspection of the taps and fittings. The Corporation has already expended more than 35,000*l.* on waterworks, and further works are in progress. Previously to the establishment of the waterworks the city was supplied with water from wells and small springs. The improved supply has had a beneficial effect on the health of the inhabitants. The water has not been analysed.
Trowbridge -	The town is very inadequately supplied with water for domestic purposes from private wells. The water is of a very indifferent quality. Waterworks have been in course of construction for some time. They are yet incomplete, and there is very little prospect of their being completed. The waterworks belong to a joint stock company.
Frome - -	The town is supplied with water for domestic purposes from wells and springs. The supply is inadequate to the requirements of the town and district, and a Water Works Company has been established, and have commenced sinking a well.

PART II.

STATISTICS (SERIES A., B., C., AND D.,) RELATING TO THE TRADES AND MANUFACTURES (CARRIED ON IN THE BASINS OF THE RIVERS WEAR, TEES, URE, NIDD, WHARFE KENT, AIRE, CALDER, DEARNE, DON, LUNE, TAME, SEVERN, WINDRUSH, LOWER AVON, AXE, PARROT, AVON (SOMERSET) AND THEIR TRIBUTARIES) WHICH USE AND POLLUTE THE WATER.

Copies of the following Queries were sent to every Manufacturer and Trader, to whom they apply, located in the above River Basins. Out of a number of Answers have been furnished only by , and these after many applications. The Answers will be found on pages 80 to 240.

Series A.—Cotton and Woollen Manufacturers, Calico and Silk Printers, Dyers, and Bleachers.—Queries.—1. Name of your Firm and situation of works?——2. Trade or manufacture carried on by you? Number of Hands employed? and rateable annual value of works?——3. Name of River or Stream on which your works are situated?——4. Has the bed of the River or Stream silted up? If so, to what cause do you attribute it?——5. Are your works affected by floods owing to the silting up of the bed of the River or Stream?——6. Describe the past and present condition (within your knowledge) of that part of the River or Stream opposite your works?——7. Is the River or Stream polluted by works situated above yours? If so, to what extent?——8. Is the River or Stream polluted by refuse from Mines?——9. From whence do you obtain Water; from the River or Stream; from Wells or Boreholes; from Waterworks; from what other source? What is the annual consumption at your works in gallons?——10. If the River or Stream from which you might derive your supply of Water were rendered clear and colourless, what would be the direct money value to you?——11. What is the approximate weight and value per annum of the goods manufactured, bleached, printed, and dyed at your works?——12. What quantity of liquid refuse from washing, bleaching, printing, dyeing, and soap-suds, do you produce at your works annually?——13. Have you depositing tanks, and do you filter the waste liquid?——14. Does this waste liquid flow into Sewers or direct into the River or Stream?——15. What description of dye wares do you use, the quantity in lbs. per annum, and what is done with the spent dye stuffs?——16. What description of bleaching materials do you use, and the quantity in lbs. solid and liquid per annum?——17. What description of oil do you use in working the wool, the quantity, and value per annum?——18. What weight of waste wool do you produce in carding, and what is done with it?——19. What quantity of soap, soda, ammonia, and urine do you use per annum? Are the soap-suds treated for the recovery of grease? What amount do you gain by the extraction per annum?——20. If you use Steam or Water Power at your works, state the nominal horse-power?——21. What quantity of coal do you use per annum?——22. What quantity of ashes do you make, and what is done with them?——23. How are the excrements of your workpeople removed or got rid of?——24. Have you any suggestions to offer as to the best means of avoiding pollution in future?——25. Have you any suggestions to offer as to Conservancy of Rivers and Streams?

Series B.—Alkali and Chemical Works.—(Queries 1 to 10 and 20 to 25 of Series A. repeated.) Queries.—11. What are the number and dimensions of Condensing Towers at your works?——12. What quantity of materials do you use and produce at your works annually: Common Salt, Sulphur, Sulphuric Acid, Pyrites, Limestone, Chalk, Lime, Oxide of Manganese, Bleaching Powder, Bicarbonate of Soda, Alkali or Black-ash?——What volume and strength of Acid do you condense for use? What volume and strength of Acid do you condense and run to waste?——13. What are the names and quantities of any other materials used or produced at your works annually?——14. What quantity of liquid refuse do you produce at your works annually?——15. Have you depositing tanks, and do you filter the waste liquid?——16. Does this waste liquid flow into Sewers, or direct into the River or Stream?——17. Do you recover Sulphur from Alkali waste produced at your works; if so, state the quantity of waste operated upon yearly, the cost of working the process, and quantity, quality, and value per ton of the Sulphur recovered?——18. Do you recover Manganese from the waste chloride of Manganese produced at your works?

Series C.—Paper Manufacturers.—(Queries 1 to 10 and 20 to 25 of Series A. repeated.)—Queries.——11. What quantity of the following materials do you use at your works annually; Rags, Esparto, Soda-ash, Caustic Soda, Crystals of Soda, Sulphate of Soda, Bleaching Powder, Bleaching Salt, Alum, Lime, Antichlor, Vitriol, Sulphate of Alumina, Pearl-ash, Salt, Manganese, and Soap?——12. What quantity of liquid refuse do you produce at your works annually?——13. Have you depositing tanks, and do you filter the waste liquid?——14. Does this waste liquid flow into Sewers or direct into the River or Stream?——15. Do you recover the soda from waste Esparto liquor?——16. What description of Paper and quantity of each kind do you produce at your works annually?—17. What quantity of Rag-dust or Waste do you produce annually, and what is done with it?

Series D.—Tanners.—(Queries 1 to 10 and 20 to 25 of Series A. repeated.)—Queries.—10. What quantity of the following materials do you use and produce at your tanyard annually; Hides, description and weight, Leather, Lime, Bark, Valonia, Sumach, Gambir, or Terra Japonica, Gall Nuts?——11. Do you use pigeons', fowls' or dogs' dung, bullocks' blood, or human excrement; if so, give the quantities you use of each annually?——12. What are the names and quantities of any other materials used at your tanyard?——13. What quantity of Hair do you obtain in the process of "depilation," and what is done with it?——14. What quantity of fatty Matter do you obtain in the process of "fleshing," and what is done with it?——15. What are the number and dimensions of Tan Pits at your tanyard?——16. Do you dye; if so, what description of Dye Works do you use, the quantity in lbs. per annum, and what is done with the spent dye stuffs?——17. What quantity of liquid refuse do you produce at your tanyard annually; and does this waste liquid flow into Sewers, or direct into the River or Stream?——18. Have you depositing Tanks, and do you filter the waste liquid?

STATISTICS (SERIES A., B., C., AND D.) RECEIVED FROM TRADERS, MANUFACTURERS, AND OTHERS, IN THE CITIES, TOWNS, AND DISTRICTS OF DURHAM, BISHOP WEARMOUTH, SUNDERLAND, MONK WEARMOUTH, DARLINGTON, RIPON, PATELEY BRIDGE, RIPLEY, ADDINGHAM, BURLEY-IN-WHARFEDALE, OTLEY, KENDAL, SELBY, SKIPTON, BRADLEY, SILSDEN, BINGLEY, ELDWICK, SALTAIRE, BAILDON, GUISELEY, YEADON, RAWDON, HORSFORTH, HEADINGLY, LEEDS, CARLETON, CONONLEY, COWLING, CROSS HILLS, SUTTON, OXENHOPE, HAWORTH, KEIGHLEY, CULWORTH, WILSDEN, HARDEN, ALLERTON, THORNTON, BRADFORD, MANNINGHAM, SHIPLEY, WINDHILL, IDLE, ECCLESHILL, CALVERLEY, STANNINGLEY, FARSLEY, RODLEY, NEWLAY, FULNECK, PUDSEY, GIRDLESOME, FARNLEY, MORLEY, CHURWELL, BRAMLEY, ARMLEY, HOLBECK, WORTLEY, BEESTON ROYDS, TODMORDEN, HEPTONSTALL, MYTHOMROYD, HEBDEN BRIDGE, MIDGLEY, LUDDENDEN FOOT, SOWERBY BRIDGE, QUEENSBURY, FARTOWN, WHEATLEY, HALIFAX, HIPPERHOLM, SOUTH OWRAM, SHELF, BRIGHOUSE, WIBSEY, LOW MOOR, NORTH BIERLEY, CLECKHEATON, SCHOLES, LIVERSEDGE, HECKMONDWIKE, MIRFIELD, RAVENSTHORPE, BIRKENSHAW, GOMERSAL, BIRSTAL, BATLEY, BATLEY CARR, DEWSBURY, SOOTHILL, EARLS HEATON, EAST ARDSLEY, OSSETT, HORBURY, SOYLAND, GREETLAND, BRADLEY, STAINLAND, ELLAND, RASTRICK, MARSDEN, ALMONDBURY, SLAITHWAITE, GOLCAR, LINTHWAITE, LONGWOOD, HUDDERSFIELD, HOLMFIRTH, MELTHAM, NETHERTON, HONLEY, KIRKBURTON, WHITLEY, WAKEFIELD, DENBY DALE, SKELMANTHORPE, SWITHIN HAIG, ARDSLEY, CAWTHORNE, BARNSLEY, PENISTONE, OWLERTON, LOCKSLEY, SHEFFIELD, BALBY, LANCASTER, DELPH, DOBCROSS, SADDLEWORTH, GREENFIELD, NEWTOWN, KIDDERMINSTER, STONEHOUSE, STROUD, BRIMSCOMBE, WOODCHESTER, NAILSWORTH, MITCHIN HAMPTON, WITNEY, BRISTOL, BEDMINSTER, KEYNSHAM, TWIVERTON, BATH, BRADFORD-ON-AVON, BECKINGTON, FROME, MARSTON BIGGOTT, WESTBURY, TROWBRIDGE, MELTHAM, LAYCOCK, WELLS, CHEDDER, CASTLE CARY, HUISH, LANGPORT, ILMINSTER, HEYTESBURY.

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
		Basin of the Wear.
Henderson & Company, Carpet Manufacturers.	Black Lane, Durham.	Our works are situated on the river *Wear*. Employ 500 hands. Rateable value of works, 729*l*. The bed of the river has silted up very much in the districts above Bishop Auckland and Walsingham owing to refuse poured in from works and lead mines. Thirty years ago the river opposite our works was pure; now it is very filthy, especially in droughty weather. It is polluted by lead mines, town sewage, refuse from collieries, paper mills, and other works to a serious extent. Obtain supply of water jointly from river, and from waterworks; and consume yearly about 4,000,000 gallons. If the river from which we might derive our supply of water, were rendered clear and colourless, it would be of considerable value to us; without stating precisely we should say at least from 300*l*. to 400*l*. yearly. We manufacture yearly 500 tons of goods, of the value of 100,000*l*. Produce yearly liquid refuse 2,745,000 gallons from dyeing, and 255,000 gallons as soapsuds. This refuse flows into depositing tanks, recently erected by us at a cost of 200*l*., and from thence into the river. We use yearly 210,000 lbs. of dye wares, chiefly vegetable and a little mineral, also cochineal. The spent dye stuffs are carted away to a rubbish heap. Use yearly as bleaching materials 30 cwt. of sulphur in a solid state. This is evaporated. Use yearly 4,500 gallons of olive and whale oil, of the value of 950*l*. to 1,000*l*. Produce yearly 16 tons of waste wool in carding, which is sold to farmers for manure. Use yearly, soap 22 tons; alkali 25 tons; also urine from our workpeople, and a further unknown quantity from the town. The soapsuds are not treated for the recovery of grease. Use steam and water as power; steam 170, and water 40, nominal horse-power. Consume yearly 3,500 tons of coal. Make 675 tons of ashes, which are carted away for the repair of neighbouring roads and to ash heaps. The excrements of our workpeople are discharged into the river through sewers. We suggest, as the best means of avoiding pollution in future, that all manufacturers and owners of mines (perhaps except lead mines which require further consideration) be compelled to filter all impure water issuing from their premises, and that the sewage be not allowed to enter the stream. For the proper conservancy of rivers and streams, we suggest that a public prosecutor be appointed.
Thomas Summers, Tanner.	Giles Gate, Durham.	My tanyard is situated on the river *Wear*. Employ 10 hands. Rateable value of tanyard 45*l*. The bed of the river has partly silted up, caused by solid refuse of all kinds tipped in from the banks. The

Series A, B, C, D, Trades and Manufactures—(Basin of the Wear)—*continued*.

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thomas Summers, Tanner—*cont.*	Giles Gate, Durham—*cont.*	tanyard is not affected by floods. The condition of the stream has not changed within my knowledge. It is polluted by works above, and by mines. Obtain supply of water from a spring, and from waterworks. Consume yearly about 330,000 gallons. If the river were rendered clear and colourless, I could use the water entirely from that, and the direct money value to me would be worth 26*l*. a year. I tan yearly 100 tons of hides; and make 50 tons of leather. Use yearly, lime 15 tons, bark 250 tons, valonia 20 tons, sumach 2 tons, gambia 1 ton, pigeons' dung 100 bushels, and oil and tallow 5 tons. Obtain yearly 5 tons of hair in the process of depilation, which are sold to plasterers. Obtain yearly 1 ton of fleshings, which is sold to glue makers. I have 110 tan pits, varying from 4 feet to 7 feet in length and width, and 4 feet in depth. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard flows into sewers, and thence into the river. Use steam, 8 nominal horse-power. Consume yearly 50 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are mixed with horse dung and used for manure. I suggest for the conservancy of rivers and streams that proper inspectors should be appointed.
M. Hatton & Company, late H. W. Richardson & Company, Paper Manufacturers.	Deptford, Bishop Wearmouth.	Our mills are situated on the river *Wear*. Employ 46 hands. Rateable value of mills, 178*l*. There has been no change in the bed of the river within our knowledge. Our mills are not affected by floods. The river is polluted by works and sewage at Durham; and by towns, works, and mines, above the city. Obtain supply of water from the river, and use from that source 2,750,000 gallons yearly; from wells and boreholes, 54,000,000 gallons yearly; and from the Sunderland Waterworks Company, 5,000,000 gallons yearly. The river here is tidal, and therefore cannot be rendered colourless; and if it were, it would be of no more value to us than at present. Use yearly, old ropes and sacking, 750 tons, soda ash 4 tons, lime 50 tons, and sulphate of alumina 35 tons. The whole of the liquid refuse produced at our mills flows direct into the sewers, and thence into the river. Manufacture yearly 670 tons of best rope brown paper. Produce yearly 10 tons of dust or waste, which is carted away to land for manure. Use steam, 70 nominal horse-power, of which 50 horse-power is condensing. Consume yearly 2,500 tons of coal, and make about 180 tons of ashes, which are turned into the river. The excrements of our workpeople are conveyed by waterclosets into the river. Have no suggestions to offer as to the best means of avoiding pollution in future, as our works are only one and a half miles from the city, and within full flow of the tide. Therefore we are not affected by the pollution flowing down the river.
R. H. Pomfret, Dyer.	Villiers Street, Bishop Wearmouth.	My works are situated on the river *Wear*. Employ 38 hands. Rateable value of works, 65*l*. My works are not affected by floods. Obtain supply of water from the Sunderland and South Shields Waterworks Company; and consume yearly 1,000,000 gallons. I am not able to state the value of the goods dyed at my works yearly. The whole of the liquid refuse produced at my works flows into sewers, and thence into the river. Use yearly 10 tons of dye wares, chiefly logwood, cochineal, and aniline dyes. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly, soap 3 tons, soda 10 tons, no urine. The soapsuds are not treated for the recovery of grease. Consume yearly 80 tons of coal and 80 tons of coke, the ashes from which are carted away from the premises. The excrements of my workpeople are passed by waterclosets into sewers, and thence into the river. Have no suggetions to offer.
Ford Works Company, Limited, Paper Manufacturers.	Near Sunderland.	Our mills are situated on the river *Wear*. Employ from 200 to 300 hands. The bed of the stream has silted up to some extent. Our mills are slightly affected by floods. The condition of the river has not changed within our knowledge. The river is polluted by town sewage, by coal washing, refuse from works above, and by mines. Obtain supply of water chiefly from wells and boreholes; sometimes from river; and consume yearly about 60,000,000 gallons. If the river were rendered clear and colourless, it would be no direct money value to us, as we obtain our supply chiefly from wells. Use yearly esparto about 5,000 tons; caustic soda, 500 tons; bleaching powder, 600 tons; also small quantities of alum, lime, antichlor, vitriol, sulphate of alumina, pearl ash, salt, manganese, and soap. We have depositing tanks, and recover the soda from the waste esparto liquor; the supernatant liquid subsequently flows from the tanks into the river. We manufacture yearly about 1,300 tons of printing paper, and about

Series A, B, C, D, Trades and Manufactures—(Basin of the Wear)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Ford Works Company, Limited, Paper Manufacturers—*cont.*	Near Sunderland—*cont.*	2,600 tons of half stuff and paper stock. We do not produce any waste, as the esparto roots are burned. Use steam, about 400 nominal horse-power. Consume yearly about 10,000 tons of coal, the ashes from which are deposited on ground near the mill. The excrements of our workpeople are mixed with ashes, and used as manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Learmouth, Dyer.	Harmers Hill, Monkwearmouth.	My works are situated on the river *Wear*. Employ eight hands. Rateable value of works, 30*l*. My works are not affected by floods. The river is polluted by works above, and by mines. Obtain supply of water from the Sunderland and South Shields Waterworks Company, and consume yearly 400,000 gallons. Produce yearly 400,000 gallons of liquid refuse, which flows into sewers, and thence into the river. Use six tons of dye wares, principally logwood and fustic, also cochineal, coal tar, 400 lbs. The spent dye stuffs are burned. Use yearly as bleaching materials 100 lbs. of chloride of lime. Use yearly about 1 ton of soap, and 1 ton of soda. Consume yearly 80 tons of coal, the ashes from which are carted to brickfields. The excrements of my workpeople are removed by farmers, and used as manure. Have no suggestions to offer.
Moses Frater, Grease and Oil Manufacturer.	Wilson Street, Monkwearmouth.	My works are situated on the river *Wear*. Employ three hands. Rateable value of works, 20*l*. The bed of the river has not silted up within my knowledge. My works are not affected by floods. The river is polluted by works above, and by mines. Obtain a supply of water from the Sunderland Waterworks Company, and consume 5,000 gallons annually. Use yearly, lime, 40 tons; resin, 100 tons; and produce yearly 80 tons of pine oil. The whole of the liquid refuse produced at my works flows into sewers, and thence into the river. Use yearly 20 tons of coal, the ashes from which are mixed with the excrements of our workpeople, and are carted away. I suggest, as the best means of avoiding pollution in future, that the fluid refuse from manufacturing works should be filtered before being passed into the stream, and the solid refuse should be prevented from being turned into rivers and streams.
Joseph Forster & Sons, Dyers.	Nile Street, Sunderland.	Our works are situated near to the river *Wear*. Employ 11 hands. Rateable value of works, 28*l*. The works are not affected by floods. Obtain supply of water from the Sunderland and South Shields Waterworks Company. The whole of the waste liquid produced at our work flows into sewers, and thence into the river. Use yearly as dye wares chiefly dye woods. The spent dye stuffs are turned into the sewers, and thence into the river. Use yearly, soap 4 tons, alkali 5 tons. The soapsuds are not treated for the recovery of grease. Consume yearly 100 tons of coal, the ashes from which are mixed with the excrements of our workpeople and carted away. Have no suggestions to offer.
		Basin of the Tees.
Henry Pease & Company, Worsted Spinners and Manufacturers.	Railway Mill, Priestgate Mill, and Low Mill, Darlington.	Our mills are situated on the river *Skerne*, a tributary of the *Tees*. Employ 550 hands. Rateable value of works, 1,330*l*. The bed of the river has not silted up. Our works are not affected by floods. There is no noticeable change in the condition of the river opposite Railway mill, where it enters the town. The water is reasonably clean; it is not so good as Priestgate Mill, and worse at Low Mill, where it leaves the town. The river is polluted by Dye Works above, but not by mines. We obtain a supply of water partly from the river, the remainder from the waterworks belonging to the Corporation; and consume about 9,000,000 gallons yearly. If the *Skerne* water were as pure as the water supplied by the Corporation, it would save the sum we now pay for the latter, 50*l*. a year; but no amount of cleansing would effect this, as the water naturally contains much earthy matter. We produce about 400,000 lbs. of worsted yarn and about 110,000 lbs. of woven fabrics yearly, of the value of 85,000*l*. Produce liquid refuse in washing, about 1,000,000 gallons yearly. We have no depositing tanks, and this refuse flows direct into the river. We do not use any dye wares or bleaching materials. Use 3,000 gallons of Gallipoli oil yearly, of the value of 800*l*. Produce, yearly, 20,800 lbs. of waste wool in carding, which is sold to the Bradford woollen merchants. Use yearly about 300 packs of soft soap and 33 tons of soda. We extract the grease from

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Henry Pease & Company, Worsted Spinners and Manufacturers—*cont.*	Railway Mill, Priestgate, Mill, and Low Mill, Darlington—*cont.*	the soapsuds, but we do not think there is much profit upon it. Use steam, 110 nominal horse-power. Consume, yearly, 3,000 tons of coal, the ashes from which are taken away and used for repairing roads. The excrements of our workpeople at Railway Mill are removed weekly; and a portion at Priestgate Mill is removed weekly in a portable tank; the other portion, from Priestgate and from Low Mill, is discharged into sewers, and thence into the river. We have no suggestions to offer as to the best means of avoiding pollution, or as to the conservancy of rivers and streams.
		Basin of the Ure.
William Yorke, Tanner.	High Street, Agnesgate, Ripon.	My tanyard is situated on the *Skell*, a tributary of the *Ure*. Employ 7 hands. Rateable value of tanyard, 50*l*. The bed of the stream has not silted up. My works are not affected by floods. There has been no change in the condition of the stream since I have known it. The river is slightly polluted by works above, but not by mines. Obtain my supply of water from the stream, but do not know the annual consumption at my tanyard. The water is always clear, except in case of floods, when it is discoloured by peat from the moors. I tan yearly 50 tons of English hides, and produce 25 tons of leather. Use lime, 5 tons; bark, 140 tons; and pigeons' dung, 18 bushels. Obtain 4 tons of hair in the process of depilation, which is sold to bricklayers and manufacturers of rugs; also 6 cwt. of fatter matter in the process of fleshing, which is sold to tallow chandlers. There are 65 tanpits in my yard; the sizes varying from 5 feet 6 by 3 feet 6 by 4 feet 6 to 8 feet 6 by 8 feet by 5 feet 3. Do not use any dyeing materials. The whole of the liquid refuse produced flows unfiltered into the river. Use steam, 5 nominal horse-power. Consume, yearly, 100 tons of coal, the ashes from which are mixed with the excrements of the workpeople and used for manure. No suggestions to offer.
		Basin of the Nidd.
John & George Metcalfe, Flax Spinners.	Glass Houses, Pateley Bridge.	Our mills are situated on the *Nidd*. Employ 400 hands. Rateable value of mills, 385*l*. The bed of the stream has not silted up. Our mills are not affected by floods. The river is polluted by works above and by lead mines. Obtain supply of water jointly from the river and waterworks constructed by ourselves, but cannot give the annual consumption at our works, as we have no means of measuring the volume. We spin yearly 300 tons of yarn, of the value of 37,000*l*. The liquid refuse produced at our works flows into the river. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam and water as power, steam 40, and water 80 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are ground up, and mixed with lime for mortar. A portion of the excrements of our workpeople is conveyed into the river, and the remainder is used for agricultural purposes. No suggestions to offer.
H. Kirkby & Sons, Flax Spinners and Bobbin Manufacturers.	Pateley Bridge	Our works are situated on the *Fell Beck*, a tributary of the *Nidd*, and also on the *Nidd*. Employ 40 hands. Rateable value of works, *l*. The bed of the stream has not silted up. Our works are not affected by floods. The *Nidd* is polluted by lead mines. Obtain supply of water from the stream, but do not know the annual consumption at our works. Manufacture yearly 50 tons of flax, of the value of 2,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use water, 20 nominal horse-power. The excrements of our workpeople are used for manure. No suggestions to offer.
Bentley, Eskholme, & Shann, Flax and Hemp Spinners.	Pateley Bridge	Our works are situated on the *Forster Beck*, a tributary of the *Nidd*. Employ 18 hands. Rateable value of works, 37*l*. The bed of the stream has not silted up. Our works are not affected by floods. The river is polluted by works above and by mines. Obtain supply of water from the stream, but do not know the annual consumption at our works. Manufacture yearly 75 tons of yarn, of the value of 3,300*l*. The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use water, 15 nominal horse-power. The excrements of our workpeople are used for manure Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Francis Thorpe & Company, Bleachers, Dyers, Yarn Spinners, and Linen Thread Manufacturers.	Ripley, Yorkshire.	Our works are situated on the river *Nidd*. Employ 200 hands. Rateable value of works, 362*l*. The bed of the stream has not silted up. Our works are not affected by floods. There has been no appreciable difference in the condition of the stream during the last forty years. The stream is not polluted by works above, but it is occasionally polluted by mines, not so much as formerly. Obtain our supply of water from the river, and, except during floods, the entire volume of the stream passes over our water-wheel. The river water is clear, except during floods, when it is discoloured by peat from the moors. We manufacture 430,000 lbs.; bleach, 160,000 lbs., and dye, 100,000 lbs. yearly. We are not able to give the volume of liquid refuse produced, which flows unfiltered into the sewers, and thence into the river. Use 42,000 lbs. of dye wares yearly, principally shumac, peachwood, and fustic. The spent dye stuffs are mixed with the excrements of our workpeople and used for manure. Use as bleaching materials, yearly, chloride of lime, 20,000 lbs.; soda ash, 29,000 lbs.; manganese, 28,000 lbs.; vitriol, 49,000 lbs.; salt, 45,000 lbs.; and soap, 6,300 lbs. The soapsuds are not treated for the recovery of grease. Use steam, 130 nominal horse-power. Consume 1,200 tons of coal, the ashes from which are used to repair roads. We remove the excrements of our workpeople twice a week, to be used as manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Bell & Grange, Flax Spinners.	Thornthwaite Mill, Ripley.	Our mill is situated on the *Thornthwaite Beck*, a tributary of the *Nidd*. Employ 35 hands. Rateable value of mill, 60*l*. The bed of the stream has not silted up. Our works are not affected by floods. There has been no alteration in the condition of the stream within our knowledge. The stream is not polluted by works above, nor by mines. Obtain a supply of water from the stream, but we are not able to state the annual consumption at our works. We manufacture yearly 75 tons of goods, of the value of 4,500*l*. The whole of the liquid refuse produced flows into the stream. We do not use either dye wares or bleaching materials. Use water as power, 25 nominal horse-power. The excrements of our workpeople are removed and used as manure. We have no suggestions to offer.
Grange & Bell, Flax Spinners.	Dacre Banks, near Ripley.	Our works are situated on the *Nidd*. Employ 30 hands. Rateable value of works, 60*l*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the river has not changed since our occupation of the works. The river is not polluted by manufactories above, but it is polluted by the washings from lead ore. Obtain our supply of water from the river, but are not able to give the annual consumption at our works. The whole of the waste liquid produced flows direct into the river. We do not use any dye wares or bleaching materials. Use water as power, 25 nominal horse-power. The excrements of our workpeople are removed and used as manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
		Basin of the Wharfe.
S. C. Lister & Company, Silk Spinners and Manufacturers.	Addingham -	Our works are situated on the *Wharfe*. Employ 300 hands. Rateable value of works, 350*l*. The bed of the river has silted up, but not to any appreciable extent. Our works are not affected by floods. The river is not polluted by works above, but it is occasionally by mines. Obtain our supply of water from the river, but are not able to state the annual consumption at our works. If the river were rendered quite clear and colourless, it would not be of much value to us, as it is now comparatively clean. We manufacture 150,000 lbs. of goods annually, of the value of 50,000*l*. The whole of the liquid refuse produced at our works flows into the river. We have one depositing tank. Formerly, when we combed the wool, we used to filter the soap suds from the wool washing before allowing it to flow into the river. We do not use any dye wares, bleaching materials, soap, alkali, or urine. Use both steam and water as power; 50 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are used to repair roads. The whole of the excrements of our workpeople are collected in a tank, mixed with dry earth, and used for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled to filter the waste liquid produced at their works before allowing it to flow into rivers.

Series A, B, C, D, Trades and Manufactures—(Basin of the Wharfe)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Fison & Company, Worsted Spinners and Stuff Manufacturers.	Green Holm Mills, Burley, in Wharfedale.	Our works are situated on the *Wharfe*. Employ 800 hands. Rateable value of works, 1,100*l* The bed of the river has not silted up. Our works are not affected by floods. The condition of the stream remains as it was upwards of tweny years ago. There is no appreciable pollution in the river. The water is always clear, except in time of flood. The Addingham mills (Lister & Company), are six miles above us. The river is not polluted by mines. We obtain our supply of water jointly from the river and from the waterworks, but are unable to give the annual consumption at our works. For many weeks in the year the entire volume of the stream passes over our water-wheel, which we estimate to take 125,000,000 gallons weekly. We manufacture yearly goods of the value of 300,000*l*., and dye goods of the value of 20,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. We use as dye wares 90,000 lbs. of logwood, fustic, and bi-chromate of potash. The spent dye stuffs are consumed under our boilers. We do not use any bleaching materials. Use of best Gallipoli oil about 20 tons yearly, of the value of 1,000*l*.; also 153,000 lbs. of the best Gallipoli soft soap. The grease is extracted from the soapsuds at an annual gain to us of 100*l*. We do not use either alkali or urine. Use water and steam as power; water 200, and steam 20, nominal horse-power. Consume yearly 2,500 tons of coal; the ashes from which are partly thrown into the river, and partly used for repairing roads. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Ackroyd & Company, Worsted Spinners.	West Gate, Otley.	Our works are situated on the *Wharfe*. Employ 650 hands. Rateable value of the works, 757*l*. The bed of the stream has not silted up. Our works are not affected by floods. There are dye and bleach works on the tributary streams which pollute the river. Obtain supply of water from the river, but do not know the volume consumed yearly. Manufacture yearly 2,452,274 lbs. of goods, of the value of 145,000*l*. The whole of the liquid refuse, except soapsuds, produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 22 tons of olive oil, of the value of 1,100*l*. Do not card wool. Use yearly about 207,000 lbs. of soap. Produce, yearly, 21,895,000 gallons of soapsuds. These are treated for the recovery of the grease, but we are not able to state what we gain by the extraction. Use both steam and water as power; steam 115 and water 78 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are carted away to repair roads and footpaths. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Duncan Barriclough and Company, Stuff Manufacturers.	West Gate, Otley.	Our works are situated on the *Wharfe*. Employ 120 hands. We are not able to give the rateable value of our works. The bed of the river has not silted up. Our works are not affected by floods. The river is not polluted by works above, nor by mines. Obtain a supply of water from the *Wharfe*; but are not able to give the annual consumption at our works. If the river were rendered clear and colourless it would be of no direct money value to us. We manufacture yearly from 75 to 80 tons of goods, of the value of from 30,000*l*. to 40,000*l*. The whole of the waste liquid produced at our works flows direct into the river. We do not use either dye wares, bleaching materials, soap, alkali, or urine. Use steam as power, 15 nominal horse-power. As we rent power from William Ackroyd & Co., we are not able to give the quantity of coal used, or to state what is done with the ashes. The excrements of the workpeople are collected in tanks and used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Barker, Tanner.	Otley - -	My tanyard is situated on a small stream, a tributary of the *Wharfe*. Employ 10 hands. Rateable value of tanyard, 66*l*. 12*s*. The bed of the stream has not silted up. My tanyard is not affected by floods. There is no perceptible difference in the condition of the stream within my knowledge. It is not polluted by works above, nor by mines. Obtain a supply of water from the stream, but do not know the annual consumption at my tanyard. I tan yearly 223 tons of English hides, and produce 98 tons of leather. Use yearly of lime 26 tons, bark 22 tons, valonia 11 tons, gambir 100 tons; and pigeons' and fowls' dung 200 bushels. Do not use any other materials. Obtain yearly 500 bushels of hair in the process of depilation, sold to plasterers, and 560 bushels of fatty matter in the

Series A, B, C, D, Trades and Manufactures—(Basin of the Wharfe)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Barker, Tanner—*cont.*	Otley—*cont.*	process of fleshing, sold to glue makers. There are about 80 tanpits in my tanyard. Do not use any dye wares. The whole of the waste liquid produced in the tanyards flows direct into the sewers, and thence into the stream. Have no depositing tanks, and do not filter the waste liquid. Use steam, 4 nominal horse-power. Consume yearly 100 tons of coal, the ashes from which are used to repair roads. The exercements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that all polluted liquid should be kept out of rivers and streams. I have no suggestions to offer as to the conservancy of rivers and streams.
William Lawson & Sons, Tanners.	Otley - -	Our tanyard is situated on a small stream, a tributary of the *Wharfe*. Employ 30 hands. Rateable value of tanyard, 128*l*. The bed of the stream has not silted up. Our tanyard is not affected by floods. The stream is not polluted by works above, nor by mines. Obtain a supply of water from a small stream, and in summer from a well in addition thereto, but are not able to state the annual consumption in our tanyard. We tan market hides, but are not able to state the number of hides tanned yearly, or the quantity of leather produced. Use yearly, lime 50 tons, bark 60 tons, valonia 50 tons, gambir 80 tons, and also fowls' and dogs' dung. Obtain 15 tons of hair in the process of depilation, which is sold to plasterers; the fatty matter obtained in the process of fleshing is sold to size makers. There are 120 tanpits of various sizes in our tanyard. We do not use any dye wares. The whole of the waste liquid from our tanyard flows into the sewers, and thence into the river. Use steam, 4 nominal horse-power. Consume yearly 150 tons of coal, the ashes from which are used to repair roads. The exercements of our workpeople are used for manure. We have no suggestions to offer.
		Basin of the Kent.
W. Robinson & Company, Woollen Yarn Spinners and Weavers.	Sprint Mill, near Kendal.	Our works are situated on the *Sprint*, a tributary of the *Kent*. Employ 10 hands. Do not know the rateable value of works. The bed of the stream has not silted up. Our works are not affected by floods. The stream is clean, and the water comparatively pure. It is not polluted by works above, nor by mines. Obtain supply of water from the stream. We do not finish our own goods, and therefore cannot state the weight and value of the goods manufactured or operated upon by us. We do not produce any liquid refuse in our manufactory. Do not use any dye wares or bleaching materials; use yearly four tons of Gallipoli oil. The waste wool produced in carding is used for manure. Use water only as power, eight nominal horse power. The exercements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future that all filth and polluting material should be kept out of rivers, but this is easier said than done.
Braithwaite & Company, Woollen Manufacturers.	Meal Bank Mill, near Kendal.	Our works are situated on the *Mint*, a tributary of the river *Kent*. Employ 245 hands. Rateable value of works, 560*l*. The bed of the stream has not silted up. Our works are not affected by floods. The floods and also the small volume of water flowing down the stream are caused by the increased agricultural drainage of the upper portion of the watershed. The river is not polluted by works above, nor by mines. Obtain supply of water from the river, which is quite sufficiently pure for our purposes, but do not know the annual consumption at our works. Manufacture yearly 400,000 lbs. of goods, of the value of 50,000*l*. Produce yearly liquid refuse from washing 3,000,000 gallons, and from soapsuds 2,000,000 gallons. The whole of the waste liquid produced, except soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 30 tons of Price's and olive oil, of the value of 1,200*l*. Do not produce any waste wool in the process of carding. Use yearly soap 8 tons, alkali 1 ton, and urine 40,000 gallons. The soapsuds are treated for the recovery of grease, but as the process has only been in operation at the works for a short time, we are unable to state the amount gained by it. Use both steam and water as power steam, 30, and water 80 nominal horse-power. Consume, yearly, coal 1,100 tons; make about 90 tons of ashes, which are used for filling up hollow places, and repairing the roads. The exercements of our workpeople are regularly removed away from the premises by farmers, and used for manure. We would suggest as the

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Braithwaite & Company, Woollen Manufacturers—*cont.*	Beck Mill, Kendal—*cont.*	best means of avoiding pollution in future, to provide for a constant flow of water down the river channel; that a reservoir or reservoirs should be formed at the head of each main stream to impound the flood water. The cost of the land and works and the expense of maintenance should be defrayed by a rate on all landed property within the watershed, and also on all mill and other property on the banks of the streams. Riparian owners have benefited by their land being drained, and this is carried out to a very great extent in this neighbourhood, so much so that the present volume of the water in the river has greatly decreased, and in summer time there is scarcely any water in the stream. The millowners and manufacturers would also be greatly benefited by the construction of such reservoirs, as they would have an ample and constant supply of water furnished to their works.
Ireland & Edmondson, Woollen Manufacturers.	Kendal and Staveley Mills, near Kendal.	Our works are situated on the *Kent*. Employ 85 hands. Rateable value of works, 300*l*. The bed of the stream has not silted up. Our works are not affected by floods. The river is not polluted by works above, nor by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. We spin, card, and dye 6,240 stones of woollen yarn yearly. The whole of the waste liquid produced at our works flows direct into the stream. We use as dye wares dye-woods, indigo, spent grain, and aniline dyes. Do not use any bleaching materials. Use yearly five tons of cloth oil, of the value of 160*l*. The waste wool produced in carding is used for manure. Do not use soap or alkali, but an unknown quantity of urine. Use steam and water as power; steam 16 and water 16 nominal horse-power. Use yearly 450 tons of coal, the ashes from which are used to repair roads. The exercements of our workpeople are conveyed into the river. Have no suggestions to offer.
Whitwell, Busher, & Company, Worsted Spinners.	Beck Mill, Kendal.	Our works are situated on the *Mint*, a tributary of the *Kent*. Employ 9 hands. Rateable value of works, 50*l*. Our works are not affected by floods. The river is broad and the fall good opposite our mill, and any temporary silting up of the bed is immediately washed away in flood time. The stream is only slightly polluted by the works of Messrs. Braithwaite situated above ours, and is not polluted by mines. Obtain our supply of water from the stream, and consume yearly about 25,000 gallons for heating the steam boiler, and for scouring the worsted. Manufacture yearly 20,000 lbs. of goods, of the value of 3,500*l*. The whole of the liquid refuse produced at our works flows direct into the mill race, and thence into the river. Do not use any dye wares or bleaching materials. Use yearly Gallipoli oil 10 gallons, and soap 3 cwt. Use water as power, 15 nominal horse power. Use yearly about 9 tons of coal, the ashes from which are mixed with the exercements of our workpeople, which are carted away for manure. Have no suggestions to offer as to the conservancy of rivers and streams, but we believe that the subject is a very important one and deserves the best attention of all practically acquainted with it.
Whitwell & Company, Carpet Manufacturers.	Lockray Hall Mills, Kendal.	Our works are situated on the river *Kent*. Employ 237 hands. Rateable value of works, 412*l*. The bed of the stream has silted up slightly, caused by weirs erected across the stream to supply water to the dye houses. Our works are affected to a small extent by floods. The river is generally clear opposite our works; and probably more so since the river wall was built, which increases the velocity of the current. The river is slightly polluted by a paper mill and a woollen mill above, but before the water reaches our works it is comparatively clear, except in flood time; it is then turbid. The river is not polluted by mines. Obtain supply of water principally from river, and a small quantity from the waterworks: and consume yearly in dyeing and for steam-engine purposes 1,588,000 gallons. We are unable to state the volume we use for washing. The water of the river is sufficiently clear for our business purposes. As the goods are woven at other works, not near the river, we only give the weight and approximate value of the yarn dyed annually, which are as follows: linen 650 lbs., value 27*l*.; woollen 246,200 lbs., value 13,335*l*., and worsted yarn 78,120 lbs., value 7,165*l*. We produce yearly liquid refuse from dyeing 560,000 gallons, and from soapsuds 72,500 gallons. We have sometimes used depositing tanks, but not always. We do not filter the waste liquid, but it flows direct into the river. We use yearly as dye wares logwood, cochineal, and fustic. The spent dye stuffs are used for filling up hollow places on our land. We do not use any bleaching materials. Use yearly 16 tons of Price's and olive oils, of the value of 600*l*. We produce yearly about 30 tons of waste wool

Series A, B, C, D, Trades and Manufactures—(Basin of the Kent)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Whitwell & Company, Carpet Manufacturers—*cont.*	Dockray Hall Mills, Kendal —*cont.*	in the process of carding, which are sold to manure manufacturers. Use yearly, soap 8,178 lbs., and alkali 34.164 lbs. The soapsuds are not treated for the recovery of grease. Use both steam and water as power, steam 25, and water 40 nominal horse-power. Consume yearly 470 tons of coal; the ashes from which are used to repair roads and for filling up hollow places. The excrements of our workpeople are partially used for manure, and are partially thrown into the river. With the exception of the excrements of our workpeople we do not think that the refuse from our works pollutes the river. As manufacturing works do in the aggregate pollute rivers, we suppose that the best means of avoiding pollution in future would be that all solid matters should be kept out and that the liquid refuse should be filtered before being passed in. Where there is a local board of health, we think that the entire conservancy of rivers and streams should be in their hands for all purposes; where no local board of health exists, the guardians of the unions (who have already the charge and management of streets and dwelling houses) should in our opinion constitute the conservancy board.
John, J. & William Wilson, Woollen Manufacturers.	Castle Mills, Kendal.	Our works are situated on the river *Kent*. Employ 360 hands. Rateable value of works, 679*l*. The bed of the stream has silted up in certain places, caused by débris brought down by floods. Our works are not affected by floods, as we yearly remove the silt and obstructions formed at the head of our mill race. There has been little change, if any, in the condition of the river within our knowledge. The river is polluted by works above, but not to a very considerable extent; it is not polluted by mines. Obtain supply of water chiefly from the river, and partially from the waterworks, but are not able to state the annual consumption at our works. The river is sufficiently clear for our purposes, and we do not think it could be much improved. Manufacture yearly 450,000 lbs. of goods, of the value of 55,000*l*. Produce yearly liquid refuse from washing 12,000,000 gallons, dyeing 500,000 gallons, and from soapsuds 80,000 gallons. We have depositing tanks for the soapsuds. The other waste liquid flows direct into the river, but sewers are now in course of construction, and the liquid refuse from our works will be then intercepted and carried with the whole of the sewage of the town on to land below the town to be there utilized. Use yearly as dye wares, cochineal, logwood, chromate of potash, indigo, and aniline colours. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 30 tons of Price's, cloth and Gallipoli oil. Produce yearly 41 tons of waste wool in the process of carding, which are sold for manure. Use yearly, soap 5 tons, soda 13 tons, ammonia 1½ tons, and urine 40,000 gallons. Use both steam and water as power, steam 30 and water 30 nominal horse power. Consume yearly about 1,000 tons of coal, the ashes from which are carted away by the authorities of the town to be used in repairing roads. The excrements of our work people are partly used for manure, and partly turned into the river. We are of opinion that when the sewers, now in course of construction, are completed, and the sewage thereby intercepted, the river will be practically clear. We are of opinion that all persons should be prevented from polluting streams, but at the same time we believe that any attempt to maintain a high state of purity in a manufacturing county will entirely fail, and destroy an immense source of wealth, the result of manufacturing industry.
Braithwaite & Company, Dyers.	Highgate, Kendal.	Our works are situated on the *Kent*. Employ 17 men. Rateable value of works, 68*l*. 15*s*. The bed of the stream has not silted up. Our works are not affected by floods. The bed of the stream has been much improved of late, the course having been made three feet wider, and the bed lowered at least six inches. The river is polluted by works above, and especially by the sewage of the town; but works are now in progress for intercepting the whole of the liquid refuse, and conveying the sewage on to land below the town. The bed of the river is not polluted by mines. Obtain supply of water principally from the river, and only occasionally from the waterworks; consume yearly at our works, 10,000,000 gallons. When there is an ample volume of water in the river, the water is sufficiently pure for all our purposes. We dye yearly 300,000 lbs. of goods, of the value of 30,000*l*. Produce yearly, liquid refuse from washing 9,500,000 gallons, from dyeing 400,000, and from soapsuds 100,000 gallons. The whole of the liquid refuse, except soapsuds, flows direct into the stream. Use yearly as dye wares dyewoods 179,200 lbs., indigo and cochineal 2,400 lbs., mordants, as chrome and copperas, 6,720 lbs. The spent dye stuffs are burned. Do not use any bleaching materials or oil. Use yearly, soap 5,236 lbs., alkali

Series A, B, C, D, Trades and Manufactures—(Basin of the Kent)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Braithwaite & Company, Dyers —*cont.*	Highgate, Kendal—*cont.*	40,320 lbs., and urine 15,000 gallons. The soapsuds are treated for the recovery of grease, but as the works for carrying out this process have been so recently erected, we are not able to state the amount we gain by the extraction of the grease. Use steam, 6 nominal horse-power. Consume yearly 530 tons of coal; make 30 tons of ashes, and we pay for their being carted away from our premises. The excrements of our workpeople are carted away for manure. The main sewer for the town now in course of construction passes our works, and will convey the whole of the waste liquids therefrom. The irregular volume of water flowing down the stream in summer is the greatest evil we have to contend with. A constant daily supply of water would be the best means of preserving the purity of the stream. For the remainder of the suggestions upon this point we refer to our evidence (page 86) relating to our mills at Meal Bank, near Kendal.
James Cropper & Company, Paper Manufacturers.	Burnside and Cowen Head Mills, near Kendal.	Our mills are situated on the river *Kent*. Employ at both mills 190 hands. Rateable value of Cowen Head Mill, 272*l*. 10*s*., and of Boarside Mill, 273*l*. 10*s*. The bed of the stream has not silted up within our knowledge. Our mills are not affected by floods. The condition of the stream has not changed, as far as we have known, for the past twenty years. It is not polluted by works above, nor by mines. Obtain supply of water from the river, but we can hardly estimate the annual consumption at our mills. The river water is pure, except in time of heavy rain and flood. Use, yearly, rags and old papers 1,600 tons, soda ash 22 tons, bleaching powder 160 tons, alum 155 tons, and lime 170 tons. The whole of the liquid refuse from washing, boiling of rags, and other processes of the manufacture flows direct into the stream. Manufacture yearly 1,336 tons of printing and wrapping paper. The whole of the rag dust produced is carted away for manure. Use both steam and water as power; water 140, and steam 50 nominal horse-power. Consume yearly 4,000 tons of coal, the ashes from which are carted to the railway to be used for ballast. The excrements of our workpeople are carted on to land to be used for manure. Have no suggestions to offer.
Anthony Gaenett, Dyer.	Kendal -	My works are situated on the river *Kent*. Employ 4 hands. Rateable value of works, 17*l*. The bed of the stream has not silted up within my knowledge. My works are not affected by floods. The condition of the stream is much the same as formerly; it is polluted, but when the main intercepting sewer is completed the polluting liquids from manufactories and sewers will be diverted from the river. Obtain supply of water from the waterworks; and consume yearly, 241,600 gallons. Dye yearly, 83,200 lbs. of goods. The whole of the waste liquid produced at my works flows now into the river, but as before stated, it will be conveyed into the intercepting sewer when it is completed. Use yearly as dyewares logwood 3 tons, redwood 2 tons, cochineal 5,160 lbs., lac-dye 4,300 lbs., cudbear 672 lbs., indigo 850 lbs., woad 4,480 lbs.; besides small quantities of spirits of salts, oil of vitriol, prussiate of potash, bi-chromate of potash, cream of tartar, and nitrate of tin. The whole of the spent dye-stuffs are turned into the river. Do not use any bleaching materials, or oil. Consume yearly 60 tons of coal; the ashes from which are used to repair the roads. The excrements of my workpeople are removed to be used as manure on land. At the head of the river *Kent* a reservoir is formed for impounding the flood water, and an equable volume is allowed to flow down the river channel daily, which is a great benefit in drought. If similar reservoirs were formed at the heads of the *Mint*, and *Sprint*, tributaries of the *Kent*, the river would be kept comparatively pure.
Joshua Wilkinson, Tanner.	Kendal -	My tanyard is situated on the river *Kent*. Employ 17 hands. Rateable value of tanyard, *l*. The bed of the stream has not silted up My tanyard is not affected by floods. The river is polluted by works above, and to such an extent that in the summer months it is a nuisance. The river is not polluted by mines. Obtain supply of water from waterworks, but cannot tell the volume used in my tanyard yearly. I produce yearly, leather 20 tons; and use bark, 40 tons, sumach and gambier 10 tons, also bran and fowls' dung. I produce about a ton of fatty matter in the process of fleshing, which is sold to size makers. Have about 100 tan-pits of various sizes. All the liquid refuse produced in my tanyard flows direct into the stream. Consume yearly, coal, 20 tons, the ashes from which are mixed with the excrements of my work people and used for manure. Have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Ouse).

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
		Basin of the Ouse.
Richard Galsworthy, Tanner.	Galthorp, Selby	My tanyard is situated on the *Selby Dam*, near the *Ouse*. Employ six hands. Rateable value of tanyards, 30*l*. The bed of the river has not silted up opposite my tanyard. My tanyard is not affected by floods. The condition of the water has always being clear; it is not polluted by works above, nor by mines. Obtain supply of water from the stream, but do not know the annual consumption at my tanyard. Tan yearly 104 tons of hides, and produce yearly 47 tons of leather. Use yearly, lime 19 tons, bark 39, valonia 13, shumac 3, gambir or terra japonica 26 tons, and pigeons' dung 100 bushels. Obtain 24 tons of hair in the process of depilation, which are sold to plasterers. The whole of the fatty matter produced in fleshing is sold to glue and size makers. Have number of tanpits. Do not use any dyewares. The whole of the waste liquid produced at my tanyards flows direct into the stream, which at Selby is a tidal one. Use steam 6 nominal horse-power. Consume yearly 150 tons of coal; the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
		Basin of the Aire (North Bank).
C. A. Rickards, Silk Spinner.	Bell Busk Mill, near Skipton.	My mill is situated on the river *Aire*. Employ 70 hands. Rateable value of works, 148*l*. 3*s*. The bed of the stream has not silted up. My mill is not affected by floods. The source of the river is only five miles above my works; and it is here a perfectly pure stream. Obtain a supply of water from the river; but do not know the annual consumption at my works. Manufacture yearly 20,000 lbs. of goods, of the value of 14,000*l*. The whole of the waste liquids produced at my works flow into depositing tanks, and thence into the river; the solid refuse is taken out of the depositing tanks and used for manure. We do not use any dye wares or bleaching materials. Use yearly 4 tons of soap; but do not treat the suds for the recovery of grease. Use both steam and water as power; steam 25, and water 18, nominal horse-power. Consume 300 tons of coal yearly, the ashes from which are partly thrown into the river and partly used to repair roads. The excrements of my workpeople are mixed with earth and lime and used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Dewhurst & Sons, Cotton and Worsted Spinners and Weavers.	Skipton -	Our works are situated on the *Ellar Beck*, a tributary of the *Aire*. Employ 600 hands. Rateable value of works, 574*l*. The bed of the stream has silted up below our works caused by the throwing in of rubbish. Our works are not affected by floods. The condition of the stream is now better than formerly as we have erected retaining walls on each side, to prevent the washing away by floods of the banks of the stream. The river is polluted by works above, not appreciably, but is not polluted by mines. Obtain a supply of water from the stream; and consume yearly about 50,000,000 gallons. We manufacture yearly 695,000 lbs. of goods, of the value of 72,000*l*.; bleach 18,000 lbs., and dye 210,600 lbs. of the value of 28,500*l*. Cannot estimate the volume of liquid refuse produced at our works; but the whole of it flows through a filter formed of engine ashes into the stream. Use yearly as dye wares dyewoods 59,000 lbs.; gambir, shumac, myrobalans 48,000 lbs.; bi-chromate and prussiate of potash, 2,800 lbs.; sulphates of copper and iron, 17,000 lbs.; muriatic, nitric, and sulphuric acids, 15,000 lbs.; soda ash, 1,500 lbs.; alum, 800 lbs.; sugar of lead, 2,300 lbs.; and methylated finish 100 gallons. Use yearly, as bleaching materials, chloride of lime, 4,700 lbs. Use steam, 150 nominal horse-power. Consume yearly 5,000 tons of coal, and make 500 tons of ashes; these are carted away for filling up hollow places and repairing roads. About one third of the excrements of our workpeople is used for manure; the remainder flows into the stream. We suggest, as the best means of avoiding pollution in future, that the whole of the refuse produced at manufactories and works should be filtered, and that the whole of the sewage of towns should be utilized by irrigating land; and we further suggest that local conservancy boards should be formed for limited areas, controlled by a general board over the whole river basin.
J. B. Sidgwick & Company, Cotton Spinners and Weavers.	Skipton -	Our works are situated on the banks of the canal. Employ at High Mill 153, and at Low Mill 67 hands. Rateable value of High Mill, 208*l*. 10*s*., and Low Mill, 184*l*. Obtain our supply of water from the canal. Manufacture yearly 85,000 lbs. of goods of the value of 6,500*l*.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
J. B. Sidgwick & Company, Cotton Spinners and Weavers—*cont.*	Skipton—*cont.*	The whole of the liquid refuse produced flows into the canal. Use steam, 40 nominal horse-power. Consume yearly from 1,300 to 1,400 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are collected in a tank, and carted from thence on to land to be used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Roberts, Pasteboard Manufacturer.	Mill Bridge, Skipton.	My mill is situated on the *Ellar Beck*, a tributary of the *Aire*. Employ 12 hands. Rateable value of mill, 54*l*. The bed of the river has silted up. My mill is occasionally affected by floods. The condition of the stream has very little changed during the last 14 years. I am not aware that the stream is polluted by works above or by mines. Obtain a supply of water from the stream, but am not able to give the annual consumption at my mill. The whole of the liquid refuse produced at my mill flows into the stream. I produce yearly 52 tons of pasteboard. Use water as power, 15 nominal horse-power. Consume yearly about 80 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. I have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Brown, Wade, and Brown, Worsted Manufacturers.	Bradley - -	Our works are situated on the *Middle Beck*, a tributary of the *Aire*. Employ 76 hands. Rateable value of works, 58*l*. 15*s*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is not polluted by works above nor by mines. Obtain a supply of water from the stream, but cannot give the number of gallons we consume yearly. We manufacture yearly 70 tons of goods of the value of 26,000*l*. The whole of the waste liquid produced flows into the *Beck*. We have no depositing tanks or filters. Do not use any dye wares or bleaching materials, soap, or alkali. Use steam, 8 nominal horse-power. Consume yearly about 280 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We have no suggestions to offer.
Fletcher and Mitchell, Worsted Weavers.	Beck's Mill, Silsden.	Our works are situated on the *Silsden Beck*, a tributary of the *Aire*. Employ 100 hands. Rateable value of works, 364*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above nor by mines. Obtain our supply of water from the Beck, but do not know the annual consuption at our works. We work on commission and are unable to give the amount or value of goods produced yearly. The whole of the liquid refuse produced at our works flows direct into the *Beck*. We use steam, 30 nominal horse-power. Consume yearly about 800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with sawdust and used as manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
James Stock, Worsted Weaver.	Beck's Mill, Silsden.	Our works are situated on the *Silsden Beck*, a tributary of the *Aire*. Employ 50 hands. The bed of the stream has not silted up. Our works are not affected by floods. Obtain a supply of water from the *Beck*, but are unable to give the annual consumption at our works. The whole of the waste liquid produced at our works flows unfiltered into the stream. We do not use dye wares, bleaching materials, soap, or alkali. Use steam, 30 nominal horse-power. Consume yearly about 800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. I have no suggestions to offer.
William Thornber, Tanner.	Silsden - -	My tanyard is situated on the *Silsden Beck*. Employ three hands. Rateable value of tanyard, 34*l*. The bed of the stream has not silted up. My tanyard is not affected by floods. The stream is not polluted by works above, nor by mines. Obtain a supply of water from the stream, but cannot tell the yearly consumption at my tanyard. I tan 28 tons of hides yearly, and produce about 10 tons of leather Use yearly, lime, 2 tons, bark, 30 tons, and fowls' dung, 1 ton. Obtain about a ton of hair in the process of depilation, which is yearly sold to plasterers; and about a ton of fatty matter in the process of fleshing, which is sold to size makers. There are 28 tanpits of various sizes. Do not use any dyeing materials. The whole of the waste liquid produced is used for irrigation. Use steam, 8 nominal horse-power. Consume about 10 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. I have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Jonas Foster & Company, Worsted Spinners and Manufacturers.	Castlefield Mills, Bingley.	Our works are situated on the river *Aire*. Employ 300 hands. Rateable value of works, 475*l*. The bed of the stream has not silted up. Our works are affected by floods, owing in a great measure to the straightening of the river's course above Keighley, which causes the waters to flow off much more rapidly than formerly, and so flood the lower lands. The condition of the water in the river has not changed within our knowledge. The river is polluted by town sewage and works above; but not by mines. We obtain our supply of water jointly from the river and from wells, but are not able to give the yearly consumption at our works. If the river were rendered clear and colourless it would be of no direct money value to us. We manufacture yearly 500,000 lbs. of goods, of the value of from 80,000*l*. to 100,000*l*. The whole of the refuse produced at our works flows into the stream. Do not use dye wares, bleaching materials, soap, alkali, or urine. Use both steam and water as power; steam 40, and water 50, nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are mixed with earth and used for manure.
Thomas Baines, Stuff Manufacturer.	Cottingley Mill, Bingley.	My works are situated on the river *Aire*. Employ 300 hands. Rateable value of works, 327*l*. The bed of the river has not silted up. My works are not affected by floods. The river is polluted by the sewage of towns and refuse from works above, also by mines. Obtain supply of water from springs; but am unable to give the volume used yearly at my works. Manufacture yearly 360,000 lbs. of goods of the value of 72,000*l*. Produce liquid refuse from washing 90,000 and soapsuds 90,000 gallons yearly. The whole of the liquid refuse flows into depositing tanks, and thence into the river. Do not use dye wares or bleaching materials. Use Gallipoli oil of the value of 300*l*. yearly. The inferior wool produced in carding (about 3 tons yearly) is used for manure, and the better portion is sold to shoddy merchants. Use yearly 120 packs of soap, and alkali 4 tons. The soapsuds are treated for the recovery of grease, and I gain 24*l*. a year by the extraction. Use steam, 100 nominal horse-power. Consume yearly 2,330 tons of coal, the ashes from which are used to repair roads and footpaths. The excrements of my workpeople are taken away weekly and used for manure. I suggest that the best means of avoiding pollution in future would be to destroy all waterclosets, utilize human excrements, and require all sewage to be used for irrigation.
H. & J. W. Wright, Paper Manufacturers.	Morton, near Bingley.	Our mills are situated on the *Morton Beck*, a tributary of the river *Aire*. Employ 39 hands. Rateable value of mills, 162*l*. 15*s*. 10*d*. The bed of the river has not silted up. Our mills are not affected by floods. The present condition of the stream is better than it has been during many years past. It is polluted by works above, but only to a limited extent; not by mines. Obtain our supply of water partly from the stream and partly from a spring, but cannot give the volume consumed at our mills yearly. We are unable to state the direct money value to us if the river were rendered clear and colourless; but do not think it would be worth very much. Use yearly, rags, 240 tons; bleaching powder, 3 tons; lime, 14 tons; and soap, 5 cwt. The whole of the liquid refuse produced at our works flows into the stream. Produce yearly 160 tons of press paper and 18 tons of loom card. Produce yearly 10 tons of rag dust, which is sold for manure. Use both steam and water as power; steam 70 and water 30 nominal horse-power, when the water is plentiful. Consume yearly about 1,200 tons of coal, the ashes from which are carted away. The excrements of our work-people are removed by farmers. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Hastings, Paper Manufacturer.	Sunnydale near Bingley.	My mill is situated on *Morton Beck*, a tributary of the *Aire*. Employ 20 hands. Rateable value of mill, 174*l*. The bed of the stream has not silted up. My mill is not affected by floods. The river is not polluted by works above, nor by mines. Obtain a supply of water from the stream, but am not able to state the annual consumption at my mill. Use yearly, rags 260 tons, bleaching powder 16 tons, and lime 40 tons. The whole of the waste water from the paper machine is filtered through two conical filters, covered with fine copper wire, 60 wires to the square inch, and flows thence into the stream. The other liquid refuse is not filtered, and flows direct into the stream. I produce yearly 234 tons of thin cap half-bleached paper. The whole of the rag dust produced is made into manure. Use steam, 50 nominal horse-power

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Hastings, Paper Manufacturer—*cont.*	Sunnydale near Bingley—*cont.*	Consume yearly 2,000 tons of coal, the ashes from which are collected and used for repairing roads. The excrements of my workpeople are used for manure. I have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Gilbert Keighley, Worsted Spinner and Manufacturer.	Morton, near Bingley.	My works are situated on the *Morton Beck*, a tributary of the *Aire*. Employ 127 hands. Rateable value of works, 111*l*. The bed of the stream has not silted up. My works are not affected by floods. The river is polluted by paper mills, and refuse from woollen manufactories higher up the stream; not by mines. Obtain a supply of water from springs; but as I only use it for condensing and then turn it into the *Beck*, I am not able to give the annual consumption at my works. I do not at present comb the wool I use, but send it out for that purpose. I am making preparations to do so, and clean water for washing will be then a necessity. I intend to extract the grease from the soapsuds, discharge the effluent water into a pit two yards deep, and filter it before it passes into the *Beck*. The works are situated high up the stream on a gravelly sub-soil, and the water will have to filter through 30 yards of gravel before it can reach the *Beck*. I do not use any dye wares, bleaching materials, soap, or alkali. Use steam, 12 nominal horse-power; consume yearly 470 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are mixed with earth and used for manure. I have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Thomas Horne, Worsted and Stuff Manufacturer.	Holroyd Mill, Bingley.	My works are situated on the *Morton Beck*, a tributary of the *Aire*. Employ 50 hands. Rateable value of works, 80*l*. The bed of the river has silted up. My works are not affected by floods. Very little alteration has taken place in the condition of the stream within my knowledge. The river is polluted by works and mills above; not by mines. Obtain a supply of water from the *Morton Beck*, but am not able to give the yearly consumption at my works. I manufacture yearly 80 tons of goods, of the value of 13,000*l*. I have not any depositing tanks or filters. The whole of the liquid refuse produced at my works flows into the stream. Do not use any dye wares on bleaching materials. Use steam, 10 nominal horse-power. Consume yearly about 70 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that all liquid refuse from manufactories and the sewage of towns should be kept out of rivers and streams.
A. & H. Butler & Company, Worsted Spinners and Manufacturers.	Victoria Mill, Dubb, Bingley.	Our works are situated on the *Leeds and Liverpool Canal*. Employ 650 hands. Rateable value of works, 495*l*. Obtain a supply of water from the canal, but are not able to give the annual consumption at our works. We manufacture yearly goods of the value of 100,000*l*. The whole of the liquid refuse produced at our works flows into the canal. We do not use either dye wares or bleaching materials. Use yearly 10 tons of Gallipoli oil, of the value of 550*l*., and 320 packs of soap. The soapsuds are treated for the recovery of the grease, by which we gain 100*l*. a year. Use steam, 95 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are used to fill up hollow places and for repairing roads. The excrements of our workpeople are used for agricultural purposes. We have no suggestions to offer.
A. H. Ramsden, Worsted Spinner.	Stanley Works, Bingley.	My works are situated on the *Leeds and Liverpool Canal*. Employ 170 hands. The works are newly built, and have not yet been assessed. Obtain a supply of water from the canal, but cannot give the yearly consumption at my works. Manufacture yearly 130 tons of goods of the value of 30,000*l*. The whole of the liquid refuse produced flows into the canal. Do not use dye wares, bleaching materials, soap, or alkali. Use steam, 20 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for agricultural purposes. I have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
M. Platt & Company, Worsted Manufacturers.	Peel Mill, Bingley.	Our works are situated on the *Leeds and Liverpool Canal*. Employ 190 hands. Rateable value of works, 216*l*. Obtain our supply of water from the canal. Do not know the annual consumption at our works. We use 150,000 lbs. of cotton, and 290,000 lbs. of worsted yarns of the value of about 60,000*l*. We use water for condensing only, and it then flows back into the canal. Do not use any dye wares or bleaching

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
M. Platt & Company. Worsted Manufacturers—*cont.*	Peel Mill, Bingley—*cont.*	materials. Do not use oil as we buy the yarns spun. Do not use either soap, alkali, or urine. Use steam 24 nominal horse-power. Consume yearly about 400 tons of coal; the ashes from which are partly ground up to be used for mortar, and partly used in repairing roads. The excrements of our workpeople are carted away. Have no suggestions to offer.
Stephen Wildman, Worsted Manufacturer.	Peel Mill, Bingley.	My works are situated on the *Leeds and Liverpool Canal.* Employ 390 hands. Rateable value of works, 155*l.* My works are not affected by floods. Obtain supply of water from the canal. Cannot give the annual consumption at my works. Manufacture yearly about 200,000 lbs. of goods of the value of 40,000*l.* Do not use any dye wares or bleaching materials. The whole of the liquid refuse produced at my works flows direct into sewers, and thence into the canal. Do not use soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly about 600 tons of coal; the ashes from which are used for building purposes. The excrements of my workpeople are removed by farmers and used as manure. Have no suggestions to offer.
J. F. Field, Worsted Weaver.	Bingley	My works are situated on the *Leeds and Liverpool Canal.* Employ 250 hands. I hire room and power. The water in the canal is much clearer than formerly, but the river *Aire* has gradually got worse during the last 20 years owing to the pollution liquids turned into it. Obtain a supply of water from the canal, but do not know the quantity consumed at my works yearly. I manufacture yearly 372,000 lbs. of goods, of the value of 80,000*l.* The whole of the liquid refuse produced at my works flows directly into the canal. I do not use dye wares, bleaching materials, soap, alkali, or urine. Use steam, 40 nominal horse-power, but as I hire the power do not know the yearly consumption of coal; the ashes are carted away to fill up hollows and to repair roads. The excrements of my workpeople are removed and used for manure. I suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to keep polluting liquids out of rivers and streams.
J. Ambler, Worsted Manufacturer.	Eldwick, near Bingley.	My works are situated on the *Eldwick Beck*, a tributary of the *Aire.* Employ 60 hands. Rateable value of works, 100*l.* The bed of the stream has not silted up. My works are not affected by floods. The stream is clear and colourless. It is not polluted by works above, nor by mines. Obtain a supply of water jointly from the stream, and from the Shipley waterworks compensation reservoir, but have never gauged the volume used yearly at my works. Manufacture 72,000 lbs. of goods yearly. The whole of the waste liquid produced flows direct into the stream. Do not use either dye wares or bleaching materials. Use yearly 120 gallons of sperm and olive oil. Use steam, 30 nominal horse-power. Consume yearly 550 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are mixed with ashes and used for manure. I have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Sir Titus Salt, Bart., Sons, & Company, Worsted Spinners and Manufacturers.	Saltaire, near Bradford.	Our mills are situated on the river *Aire.* Employ 3,500 hands. Rateable value of mills, 5,180*l.* The bed of the river has silted up. Our works are affected by floods, but not to any serious extent. There has been very little change in the condition of the river during the last 20 years. Fish live in the river above and below our works. The river is polluted by works above, but not by mines. Obtain water for condensing purposes from the river; it is afterwards returned to the river; obtain water for use in dyeing, from springs, and Shipley Waterworks, but have no means of calculating the total volume consumed yearly at our works. If the river were rendered clear and colourless, it would be of so little value to us that it is difficult to estimate it, although it would be an advantage to have it always clear. The only time that we are unable to get it clear is during a "fresh." We manufacture yearly 5,500,000 lbs. of goods of the value of 700,000*l.* The whole of the waste liquid produced at our works flows direct into the river. Use yearly as dye wares 320,000 lbs. of logwood and similar dye wares; the refuse is thrown into the adjoining stone quarries. Use yearly 15,000 lbs. of bleaching materials, chloride of lime, ammonia, liquid oil, and vitriol. Use yearly Gallipoli oil from 40 to 50 tons, of the value of 2,300*l.* The material we use is chiefly combed, not carded; what little waste is produced is sold, and removed from the premises immediately. We use yearly, soap 700,000 lbs., and alkali 40,000 lbs. The soapsuds are treated for the recovery of grease, by which we gain 900*l.* a year.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Sir Titus Salt, Bart., Sons, & Company, Worsted Spinners and Manufacturers—*cont.*	Saltaire, near Bradford—*cont.*	Use steam, 2,000 indicated horse-power. Consume yearly 14,000 tons of coal, the ashes from which are partly sold to the railway company for ballast, and partly mixed with the excrements of our workpeople, these latter are removed nightly, and sold to farmers for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Cyrus Brocx & Company, Manufacturers of Worsted and Cotton Warps and Cloths.	Baildon Green Mills, Baildon.	Our works are situated on the *Baildon Beck*, a small tributary of the *Aire*, about half a mile from its junction with the river. Employ 82 hands. The condition of the river *Aire* has not changed during the last 40 years within our knowledge. The river is polluted by works above, not by mines. We are tenants of rooms and mill power from Brearley Brothers, who obtain a supply of water from a well. We weave yearly goods on commission, of the value of 26,000*l.* The whole of the waste liquid we produce flows directly into the river. We do not use either dye wares or bleaching materials. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Thomas & William W. Holmes, Worsted Spinners and Manufacturers.	Providence Mills, Baildon.	Our works are situated upon a tributary of the river *Aire*, within a short distance from the river. Employ 480 hands. Rateable value of works, 360*l.* The works are affected by floods. Obtain a supply of water from springs; but we are not able to give the annual consumption at our works. We manufacture yearly 600,000 lbs. of worsted yarn, of the value of 100,000*l.* Do not comb the wool, but this is done for us by commission at Bradford. The whole of the waste liquid produced at our works flows direct into the river. Do not use dye wares, bleaching materials, soap, alkali, or urine. Use steam, 48 nominal horse-power. Consume 2,800 tons of coal yearly, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with ashes and used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
C. & F. Taylor & Company, Stuff Manufacturers.	Lower Holme, Baildon.	Our works are situated on the river *Aire.* Employ from 500 to 600 hands. Rateable value of works, 400*l.* The bed of the stream has not silted up. Our works are occasionally affected by floods. The river is very seriously polluted, more especially by the *Bradford Beck*, which joins the river just above our works. Obtain supply of water from the river; but as we use it chiefly for condensing purposes, are not able to state the annual consumption at our works. If the river were rendered clear and colourless, it would be of considerable money value to us, but we are not able to state the amount. We manufacture yearly 600,000 lbs. of goods, of the value of 100,000*l.* The whole of the liquid refuse flows direct into the river. We do not use dye wares, bleaching materials, soap, alkali, or urine. Use steam, 60 nominal horse-power. Consume about 2,000 tons of coal yearly, the ashes from which are used chiefly for building purposes, but also for the repairing of roads. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Thomas Constable, Solicitor, of Otley.	Solicitor for Mr. Compton Stansfield, of Esholt Hall.	Have been solicitor for Mr. Crompton Stansfield (whose estate is situate on the river *Aire*, below the junction of the *Bradford Beck*), for a great many years. Was examined, along with other witnesses, before the Rivers Pollution Commission (1865) as to the injury to the Esholt Hall estate by the state of the waters of the river *Aire* and of the *Guiseley* and *Yeadon Becks*, which flow through the estate, and near the Hall, into the said river. The state of the waters has not improved since then. About two years ago the very low rent then taken for the Hall, consequent on the state of the waters, was further considerably lowered to induce the occupier to stay. He has within the present month given notice to quit at the expiration of the current year; and he states that he does so with reluctance, as the place suits him otherwise, and that he leaves entirely on account of the excessive offensiveness of the waters, which he has occasion to believe is injurious to health. The fine residential mansion of Esholt Hall is therefore likely to become deserted and valueless if the state of the waters cannot be improved; and the depreciation of the Esholt Hall estate generally from the same cause is very considerable. As regards the river *Aire*, Mr. Stansfield has been comparatively powerless to prevent the mischief in consequence of its very gradual growth and the multitude of contributors to it. As the

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thomas Constable, Solicitor, of Otley —*cont.*	Solicitor to Mr. Compton Stansfield, of Esholt Hall —*cont.*	manufacturing districts increase in works and population, so does the pollution of rivers and waters flowing through these districts increase. As regards *Guiseley* and *Yeadon Becks*, Mr. Stansfield has not been so powerless at law; but, practically, he could not have enforced his rights, by injunction or otherwise, to have the waters of the becks flowing down from those villages pure, without stopping the trade and manufactures by which the population live and the country flourishes. On the *Guiseley Beck* considerable efforts have been made by the principal manufacturers to purify the discharges from their mills, but with very partial effect for the improvement of the water; and as regards the dye water, with no effect at all. The present state of the law leaves the alternative to Mr. Stansfield of ruin to his manufacturing neighbours if he enforces the law, or ruin to his residential estate if he takes no steps to enforce it. Moreover, there are such multitudinous small contributions to the nuisances, as well on the becks as on the river, that it may well be doubted whether any legal steps that might be taken could effectually cure the evil. It therefore comes to this, that in such a case as Mr. Stansfield's, and as to property generally on the rivers and streams in the manufacturing districts, the law, that persons higher up a stream may not foul it to the prejudice of those lower down, is virtually and practically abrogated; for a law that cannot be enforced is no law, but a mere delusion. As therefore there is no available law for the protection of rivers and streams in these manufacturing and populous districts, legislation is urgently needed for them. The principle or foundation of such legislation ought to be that all who enjoy the privilege of discharging their sewage into property that is not their own should pay for the privilege, and pay for it more or less in proportion to the extent and degree to which they avail themselves of it. A sewage board should therefore be constituted for each sufficiently extensive manufacturing and populous district in which the common law is at fault, and has become practically worthless. Such board should have power to impose a sewage tax, from such they should be exempted who could show that they disposed of their sewage on their own land exclusively, and which should be mitigated against others in the proportion that they ameliorated the character of their sewage discharges. Without such tax, serious in the case of greatly polluted discharges, but proportionally mitigated in case of their amelioration, there will be no inducement to manufacturers and others to avail themselves of the purifying processes that science may point out. Inasmuch as sanitary legislation has hitherto stopped short, by ordering drains to be made, but never providing outfalls for such drainage, and consequently after much cost in a drainage system an injunction is frequently obtained to prevent the outfall into the proposed stream, the board should have power to order the construction of proper outfalls in every case where required. They should also have power to require the adoption in all cases of the remedies for the purification of the water that can reasonably be required. They should also have power compulsorily to purchase land necessary for outfalls, filtering ponds, and other necessary works, and that in a speedier and less expensive way than the Lands Clauses Act provides, and by means of official valuers. Lastly, to the extent that the nuisance to streams and rivers cannot be cured, but must be allowed to exist for the benefit of the general population, power should vest in the board to make compensation to the owners of property injured, as in the case of Esholt Hall, by the effects of a nuisance that must be borne for the convenience of the general public.
Ing's Mill Company, Scribblers, Spinners, and Fullers.	Guiseley, near Leeds.	Our works are situated near a small stream, a tributary of the *Aire*. Employ 70 hands. Rateable value of works, 331*l*. Obtain our supply of water from wells and boreholes, but are not able to give the volume we consume yearly at our works. We cribble, spin, and full 600 packs and dye 400 packs of wool, and manufacture 4,648 ends of cloth. We have eight depositing tanks and three filters. The waste liquid produced at our works is filtered over and over again, and used for condensing purposes. Use yearly 19,000 lbs. of dye wares, chiefly logwood, barwood, camwood, fustic, and bi-chromate of potash. Do not use any bleaching materials. Use yearly Gallipoli oil, but do not know the quantity or value. The waste wool produced in carding is returned to the owners of the goods sent to us to manufacture. Use yearly, soap 10 tons, alkali 10 tons, and an unknown quantity of urine. We do not extract the grease from the soapsuds. Use steam, 25 nominal horse-power. Consume yearly 1,400 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with "willey" and

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Ing's Mill Company, Scribblers, Spinners, and Fullers—*cont.*	Guiseley, near Leeds—*cont.*	flue dust, and are carted away for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to filter their liquid refuse before allowing it to flow into rivers and streams. We have no suggestions to offer as to the conservancy of rivers and streams.
Pawson, Hudson, & Company, Scribblers and Fullers.	Guiseley -	Our works are situated on the *Guiseley Beck*, a tributary of the *Aire*. Employ 61 hands. Rateable value of works, 281*l*. 5*s*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not so clear as formerly, owing to the increase in the population of the district; it is slightly polluted by town sewage and by works above, but not by mines. Obtain a supply of water from wells, and consume 44,576,000 gallons yearly. We scribble and full 133,560 lbs. of goods yearly. Produce yearly liquid refuse from washing or scouring of wool 35,460,000 gallons, dyeing 1,678,000, and soapsuds, 2,034,500 gallons. The whole of this waste liquid flows direct into the stream. Use yearly as dye wares 53,120 lbs. of camwood, fustic, barwood, logwood, bi-chromate of potash, cudbear, alum, and copperas. The spent dye stuffs are partly burnt, and partly removed with the ashes Do not use any bleaching materials. Use yearly 7,400 gallons of olive and Gallipoli oil. The whole of the waste wool produced in carding is returned with the manufactured goods to the owners. Use yearly, soap 12 tons, alkali 16 tons, and urine 57,400 gallons. The soapsuds are not treated for the recovery of grease. We use steam, 35 nominal horse-power. Consume yearly 1,166 tons of coal, the ashes from which are used for repairing roads and footpaths. The excrements of our workpeople are used for manure. We have no suggestions to offer.
Abraham Moon & Sons, Woollen Manufacturers.	Nether Field Mill, Guiseley.	Our works are situated near a tributary of the *Aire*. Employ 50 hands. Rateable value of works, 250*l*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain a supply of water from a well, but we are not able to give the annual consumption at our works. We manufacture yearly 100,000 lbs. of goods of the value of 11,000*l*. The whole of the waste liquid produced at our works will flow into the sewers, and thence into the stream. We use 42,000 lbs. of dye wares, principally logwood, but do not use any bleaching materials. Use yearly 9 tons of olive oil of the value of 490*l*. The waste wool produced in carding is sold. Use yearly, soap 5 tons, alkali 9 tons, and urine 20,000 gallons. The soapsuds are not treated for the recovery of grease, but are used to irrigate land. Use steam, 20 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We have no suggestions to offer.
Robinson-Smiths', Reilly, & Company, Woollen Manufacturers.	Guiseley -	Our mill is situated at the junction of a small stream with the *Guiseley Beck*, a tributary of the *Aire*. Employ 60 hands. Rateable value of mill, 290*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the small stream is clear, but *Guiseley Beck* is very much polluted by town sewage and works above, but not by mines. Obtain a supply of water from the stream, and consume yearly 9,000,000 gallons. As one of the streams is clear and colourless, it would not be of much money value to us if the water of *Guiseley Beck* were rendered equally clear. We manufacture yearly 492,000 lbs. of goods, of the value of 60,000*l*. We produce yearly liquid refuse from washing (soapsuds), 3,000,000 gallons, and from dyeing, 40,000 gallons. This flows direct into the stream. Use yearly as dye wares 112,000 lbs., chiefly logwood. The spent dye stuffs are burned. We do not use any bleaching materials. We use yearly 4,800 gallons of olive oil, of the value of 1,200*l*. Produce five tons of waste wool in the process of carding, which is sold to waste wool dealers. Use yearly, soap 29,120 lbs.; alkali 22,400 lbs.; and urine 36,000 gallons. The soapsuds are not treated for the recovery of grease. Use steam, 30 nominal horse-power. Consume yearly 1,400 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future or as to the conservancy of rivers and streams.
Smiths', Riley, & Company, Woollen Manufacturers.	Low Mill, Guiseley.	Our works are situated on the *Guiseley Beck*, a tributary of the *Aire*. Employ 34 hands. Rateable value of works, 200*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is seriously polluted by town sewage and by works above, not by mines. Obtain a supply of water jointly from the stream and from a well, but are not able to give the annual consumption at

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Smiths', Riley, & Company, Woollen Manufacturers—*cont.*	Low Mill, Guiseley—*cont.*	our works. If the stream, from which we might derive our supply of water, were rendered clear and colourless, it would be of great money value to us. We manufacture yearly 52,000 lbs., and dye 10,000 lbs. of goods, of the value of 3,000*l.* The liquid refuse produced at our works, except that from dyeing, flows direct into the stream. We produce 200,000 gallons of liquid refuse from dyeing, which flows into a tank, and is there used to supply our engine boiler, and the condensed water, after use in boiler, flows into the stream comparatively clean. Use yearly as dye wares, 30,000 lbs., chiefly logwood. The spent dye stuffs are burned. We do not use any bleaching materials. Use yearly 6½ tons of olive oil, of the value of 370*l.* The whole of the waste wool produced in carding is sold to waste wool dealers. Use yearly, soda 2 tons, and urine 5,000 gallons. Use steam, 15 nominal horse-power. Consume 210 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. The only suggestion we have to offer is that all manufacturers should be put on the same footing, and be compelled to keep their refuse out of the streams.
Pullan, Gill, & Pinder, Woollen Manufacturers.	Guiseley -	Our works are situated on the *Guiseley Beck*, a tributary of the *Aire*. Employ 28 hands. Rateable value of works, 95*l.* The bed of the stream has silted up. Our works are not affected by floods. The condition of the stream is getting worse and worse every year. It is slightly polluted by town sewage and works above, but not by mines. Obtain our supply of water from the Beck, and consume about 5,000,000 gallons yearly. If the river were rendered clear and colourless, it would be of considerable money value to us. We manufacture yearly 80,000 lbs., and dye 60,480 lbs. of goods. The whole of the liquid refuse produced at our works flows direct into the stream. We use yearly 42,000 lbs. of dye wares, chiefly logwood, camwood, barwood, fustic, bi-chromate of potash, and copperas. The spent dye stuffs are burned; we do not use any bleaching materials. Use yearly 6 tons of Galipoli and olive oil, of the value of 336*l.* The whole of the waste wool produced in carding is sold. Use yearly, soda 2 tons, but do not use either soap or urine. Use steam and water as power; steam 15, and water 6, nominal horse-power. Consume 500 tons of coal yearly, the ashes from which are removed from our premises and used to repair roads and footpaths. The excrements of our workpeople are used for manure. We have no suggestions to offer.
The Yeadon Old Mill Company, Scribblers, Carders, Spinners, and Fullers.	Yeadon - -	Our works are situated on an affluent of the river *Aire*. Employ 50 hands. Rateable value of works, 368*l.* The bed of the stream has not within our knowledge silted up. Our works are not affected by floods. Obtain supply of water from wells, but do not know the quantity consumed yearly. We are not able to give the quantity or value of the goods manufactured by us yearly. The whole of the waste liquid, except soapsuds, flows direct into the river. Use yearly 7 tons of dye wares, chiefly logwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 7 tons of olive oil, of the value of 250*l.* The whole of the waste wool produced in carding is sold to waste dealers. Use yearly, soap 6 tons, alkali 6 tons, and urine 5,000 gallons. The soapsuds are treated for the recovery of grease, by which we gain 12*l.* per annum. Use steam, 30 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are all dissolved, and used for scouring purposes. No suggestions to offer.
Baldwin, Brown, & Company, Woollen Manufacturers.	Union and Albert Mills, Yeadon Moor.	Our works are situated on an affluent of the *Aire*. Employ 160 hands. Rateable value of mills, 573*l.* 4*s.* 0*d.* The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from *Yeadon Moor Tarn*, but am not able to give the annual consumption at our works. Are not able to state the weight or value of goods we manufactured yearly. The whole of the waste liquid, except soapsuds, flows direct into the sewers, and thence into the stream. Use yearly 90,000 lbs. of dye wares, principally logwood. The spent dye stuffs are used for manure. Do not use any bleaching materials. Use yearly 27 tons of Gallipoli oil, of the value of 1,224*l.*; also, soap, 10 tons, and alkali, 15 tons. The soapsuds are treated for the recovery of grease, by which we gain 25*l.* a year. Use steam, 80 nominal horse-power. Consume yearly 3,380 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Edward Burton & Company, Woollen Cloth Manufacturers.	Manor Mills, Yeadon.	Our works are situated on a tributary of the *Aire*. Employ 150 hands. Rateable value of works, 312*l.* The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from wells, but do not know the annual consumption at our works. Manufacture yearly goods of the value of 15,000*l.* The liquid soapsuds flow into depositing tanks; the whole of the other waste liquid produced flows direct into the sewers, and thence into the stream. Use yearly 26 tons of dye wares, principally logwood. The spent dye stuffs are part burned and the remainder used to repair roads. Do not use any bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,000*l.* The whole of the waste wool produced in carding is sold to waste dealers, who extract the oil out of it, and then sell the refuse to hop growers for manure. Use yearly, soap of the value of 546*l.* The soapsuds are treated for the recovery of grease, by which we gain 30*l.* a year. Use steam, 30 nominal horse-power. Consume yearly 1,560 tons of coal; make about 300 tons of ashes, which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
Brown, Brothers, & Brayshaw, Woollen Cloth Manufacturers.	Kirk Lane, Yeadon.	Our works are situated on an affluent of the river *Aire*. Employ 120 hands. Rateable value of works, 261*l.* 19*s.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The stream is much more polluted than formerly. It is polluted by works above, but not, within our knowledge, by mines. Obtain supply of water from wells and boreholes; and consume yearly about 6,000,000 gallons. Manufacture yearly 240,000 lbs. of goods, and dye 120,000 lbs., of the value of 44,000*l.* Produce liquid refuse from washing 3,500,000; dyeing, 250,000, and soapsuds, 250,000 gallons. The whole of the waste liquid, except the soapsuds, flows direct into the sewers, and thence into the stream. Use yearly 40,000 lbs. of dye wares, chiefly logwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 45,000 lbs. of Gallipoli and olive oil of the value of 1,000*l.* Produce 8 tons of waste wool in carding; the greater portion of this is re-carded, and the refuse is sold to waste dealers. Use yearly, soap 6 tons, alkali 8 tons, and urine 20,000 gallons. The soapsuds are treated for the recovery of grease, by which we gain 25*l.* a year. Use steam, 40 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Jonathan Cooper, Woollen Manufacturer.	Henshaw Mill, Yeadon.	My works are situated on the river *Aire*. Employ 26 hands. Rateable value of works, 225*l.* 8*s.* 0*d.* The bed of the stream has not silted up within my knowledge. My works are not affected by floods. The stream is polluted by works above; but not by mines. Obtain supply of water from wells and from springs, but do not know the quantity consumed at my works yearly. The whole of the waste liquid produced at my works flows direct into the sewers, and thence into the stream. Use yearly 10,000 lbs. of dye wares, chiefly logwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 4 tons of olive oil. The waste wool produced in carding is sold to waste dealers. Use yearly, soap about 2 tons, alkali 2 tons, and urine 5,200 gallons. The soapsuds are not treated for the recovery of grease. Use steam, 22 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Stenson & Robinson, Woollen Manufacturers.	Henshaw, Yeadon.	Our works are situated on the *Henshaw Beck*, a tributary of the *Aire*. Employ 40 hands. Rateable value of works 210*l.* 14*s.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The stream is a small one, and in winter there is a large volume of water flowing down; in summer the bed is nearly dry. The stream is not polluted by works above, nor by mines. Obtain supply of water partly from the stream and partly from wells. Not able to state the annual consumption at our works. The water of the stream at present is clear enough for our use. We are not able to state the weight or the value of the goods manufactured or operated upon at our works. Produce liquid refuse annually from washing 20,000 gallons, and soapsuds 6,000 gallons. We have no depositing tanks, and the waste liquid flows into sewers, and thence into the stream. Use yearly as dye wares chiefly logwood, bi-chromate of potash, and

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Stenson & Robinson, Woollen Manufacturers—*cont.*	Henshaw, Yeadon—*cont.*	copperas 50,000 lbs. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,000*l.* The waste wool produced in carding is mixed with the excrements of our workpeople, and is used as manure on the land. Use yearly, soap about 10 tons. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly 600 tons of coal; make about 200 tons of ashes, which are used for repairing roads. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Wood, Bleacher.	Rawdon, near Leeds.	My works are situated on a tributary of the *Aire*, about one mile from that river. Employ 32 hands. Rateable value of works, 200*l.* The bed of the stream has not silted up within my knowledge. My works are not affected by floods. The river has been discoloured for a number of years. It is polluted by works above to a considerable extent, and by mines. Obtain supply of water jointly from springs, surface water, and from waterworks, and consume yearly 4,000,000 gallons. Bleach yearly 500 tons of goods. Produce 3,000,000 gallons of waste liquid from bleaching; this and the other waste liquid flows direct into the stream, and thence into the river. Do not use any dye wares. Use yearly, bleaching materials, 150 tons of bleaching powder, soda ash, and sulphuric acid. Do not use any oil. Use yearly 25 cwt. of soap, but no urine. Use steam, 24 nominal horse-power. Consume yearly about 1,000 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for agricultural purposes. No suggestions to offer.
William Thompson, Woollen Manufacturer.	Lark Field Mill, Rawdon.	My mill is situated on an affluent of the *Aire*. Employ 60 hands. Rateable value of mill, 300*l.* The bed of the stream has not silted up. My works are not affected by floods. Obtain supply of water from gathering grounds by gravitation. Manufacture yearly 149,760 lbs. of goods, of the value of 24,960*l.* I have depositing tanks, and pump the water after the wool scouring on the land, and the effluent water flows back into a reservoir for re-use. The other waste liquid flows into sewers, and is then conveyed on to land by farmers below for irrigation. Use yearly 70,000 lbs. of dye wares, chiefly dyewoods. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 4,800 gallons of olive oil, of the value of 1,080*l.* The waste wool produced in carding is sold to waste dealers. Use yearly, soap 4 tons, alkali 30 tons, and urine 15,000 gallons. Use steam, 30 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that the whole of the waste liquid from manufactories should be pumped on to land, where possible, to be used in irrigation.
Edwin Ingham, Bleacher.	Cookridge, Horsforth.	My works are situated on the *Troy Beck*, a tributary of the *Aire*. Employ four hands. Rateable value of works, 10*l.* The bed of the stream has not silted up. My works are not affected by floods. The stream is polluted by works above, but not by mines. Obtain supply of water from springs, but am not able to give the annual consumption at my works. If the river were rendered clear and colourless, it would be worth a direct money value to me of 10*l.* a year. Bleach yearly about 40 tons of goods. The liquid refuse produced at my works flows into the stream. Do not use any dye wares. Use as bleaching materials 10 tons of chloride of lime, soda ash, and vitriol. Do not use oil, soap, alkali, or urine. Consume yearly about 30 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Conyers, Tanner.	Horsforth	My tanyard is situated on the *Troy Beck*, a tributary of the *Aire*. Employ six hands. Rateable value of tanyard, 35*l.* The bed of the stream has not silted up. My tanyard is not affected by floods. There has been very little difference in the condition of the stream within my knowledge. Obtain supply of water from surface drainage, but do not know the annual consumption at my tanyard. Tan yearly 50 tons of kips, and produce 40 tons of leather. Use yearly, lime 10 tons, valonia 15 tons, gambir or terra japonica 20 tons, shumac 5 tons, and fowls' dung, 2 tons. Do not use blood or human excrement. The hair obtained in depilation is thrown on to a manure heap. Obtain yearly 20 tons of

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Conyers, Tanner—*cont.*	Horsforth—*cont.*	fatty matter in the process of fleshing, which is made into size. Have 60 tanpits, 5 feet square, and 4 feet deep. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard flows direct into the stream. Use steam, 4 nominal horse-power. Consume yearly 80 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. No suggestions to offer.
The Woodside Mill Company. Scribblers, Fullers, and Spinners.	Woodside, Horsforth.	Our works are situated on the *Horsford Beck*, a tributary of the *Aire*. Employ 40 hands. Rateable value of works, 230*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has been little changed during the last 30 years; it is polluted to a small extent by works above, not by mines. Obtain supply of water for general purposes from the stream, but for finishing purposes from wells, and consume yearly 27,900,000 gallons. If the river were rendered clear and colourless, the acids from the bleach works would still render it unfit for finishing purposes. We manufacture yearly 310 tons, and dye 150 tons, of goods. The whole of the waste liquid produced at our works flows into filtering ponds, and thence into the river. Use yearly 12 tons of dye wares, chiefly logwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 4,510 gallons of Gallipoli oil, of the value of 800*l.* The waste wool produced in carding is sold to waste dealers. Use yearly, soap 5 tons, urine 208 tons. The soapsuds are not treated for the recovery of grease. Use steam, 20 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
C. G. & W. Cheetham, Woollen Cloth Manufacturers.	Wood Bottom, Horsforth.	Our works are situated on a *Beck*, a tributary of the *Aire*. Employ 45 hands. Rateable value of works, 250*l.* The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water jointly from the stream and from springs, and consume yearly 930,000 gallons. Manufacture yearly 160,000 lbs. of goods, of the value of 24,000*l.* Produce yearly, liquid refuse from soapsuds 310,000 gallons, and 465,000 gallons from dyeing. We have no depositing tanks, but the whole of the waste liquid produced at our works, except that from dyeing, is used on our farm in irrigation. Use yearly 100,000 lbs. of dye wares, principally dye woods. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 20 tons of olive and rape oils, of the value of 1,000*l.* Produce yearly 25 tons of waste wool in the process of carding, of which we re-use a portion, and sell the remainder for manure. Use yearly, soap 7 tons, and urine 200 tons. The soapsuds are not treated for the recovery of grease. Use steam, 30 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are all used for repairing roads and footpaths. The excrements of our workpeople are mixed with the waste wool and used for manure. No suggestions to offer.
Joseph Gill & Sons, Bleachers.	Headingly, near Leeds.	Our works are situated on a tributary of the river *Aire*. Employ from 60 to 70 hands. Rateable value of works, 348*l.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. Obtain supply of water jointly from wells and surface drainage, but do not know the annual consumption at our works. We bleach yearly from 800 to 1,000 tons of goods. The whole of the waste liquid produced at our works flows unfiltered into the *Beck*. Do not use any dye wares. Use yearly as bleaching materials, bleaching powder 90 tons, soda-ash 80 tons, vitriol 20 tons; do not use oil or urine. Use yearly, soap 3 tons. The soapsuds are not treated for the recovery of grease. Use steam, 20 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
		Basin of the Aire (North and South Banks).
Kinnear, Holland, & Company, Cloth Manufacturers.	Bean Ings Mills, Wellington Street, Leeds.	Our works are situated on the river *Aire*. Employ 500 hands. Rateable value of works, 1,917*l.* 5*s.* 0*d.* Our works are occasionally flooded, but we are not aware that it is owing to the silting up of the bed of the river. The river is very seriously polluted by works and refuse from towns and villages above, but do not know whether it is polluted by mines. Use water from river for condensing, and for manufacturing purposes, from wells, boreholes, and waterworks. Consume about 2,500,000 gallons from waterworks, but are not able to

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North and South Banks)—*cont.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Kinnear, Holland, & Company, Cloth Manufacturers—*cont.*	Bean Ings Mills, Wellington Street, Leeds—*cont.*	tell the consumption from the other sources of supply. If the river were rendered clear and colourless it would be a direct money value to us of from 60*l.* to 70*l.* a year. Cannot give the weight or value of the goods manufactured or dyed yearly. The whole of the waste liquid produced at our works flows direct into the river. Cannot give the weight or description of dye wares used yearly. The spent dye stuffs are burned. Do not use any bleaching materials, oil, soap, alkali, or urine. Use steam, 160 nominal horse-power. Consume yearly upwards of 3,000 tons of coal; make 750 tons of ashes, which are carted away for ballast to railways. The excrements of our workpeople are conveyed by the town sewers into the river. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to keep the whole of the solid and liquid refuse produced at their works out of rivers and streams. No suggestions to offer as to the conservancy of rivers and streams.
Ladley & Dixon, Cloth Manufacturers.	Leander Mills, Leeds.	Our works are situated on the river *Aire*. Employ 80 hands. Rateable value of works, 230*l.* Our works are affected by floods. The river is polluted to a very serious extent by works, and other refuse turned into it above. Obtain supply of water from the river for condensing purposes, from waterworks for other purposes, and consume yearly from the latter source 78,000 gallons. If the river were rendered clear and colourless it would not be of any direct money value to us. Manufacture yearly 260,000 lbs. of goods, of the value of 15,000*l.* The whole of the waste liquid produced at our works flows into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 6 tons of olive oil, of the value of 300*l.* Produce yearly 40 tons of waste wool in the process of carding, which is used for manure. Use yearly, soap 5 tons, alkali 2 tons. The soapsuds are not treated for the recovery of grease. Use steam, 35 nominal horse-power. Consume yearly about 1,000 tons of coal, the ashes from which are used to level up hollow spaces. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the river. Have no suggestions to offer.
William Holroyd, Cloth Manufacturer.	Park Lane, Leeds.	My works are situated on the river *Aire*. Employ 40 hands. Rateable value of works, 100*l.* My works are not affected by floods. The river is seriously polluted. Obtain supply of water from wells and boreholes, but do not know the annual consumption at my works. Manufacture yearly 60 tons of goods, of the value of 8,000*l.* The whole of the waste liquid produced at my works flows into sewers, and thence into the stream. Do not use either dye wares or bleaching materials. Use yearly olive oil of the value of 300*l.* The best part of the waste wool produced in carding is used again, and the remainder is partly sold to oil extractors, and partly used for manure. Use yearly 6,000 gallons of urine, but neither soap nor alkali. Use steam, 12 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are carted away by contractors under the Corporation. I suggest that the best means of avoiding pollution in future is to do away with waterclosets.
Booth Brothers, Cotton Warp and Woollen Weft Manufacturers.	Low Fold Mill, Leeds.	Our works are situated on the river *Aire*. Employ 35 hands. We are unable to give rateable value of works. Our works are not affected by floods. Obtain supply of water from the river, but as we only rent room and power we are not able to give the annual consumption at our works. Manufacture yearly 156,240 lbs. of goods, of the value of 6,840*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the river. Use yearly 4 tons of Gallipoli oil, of the value of 224*l.* The refuse from the willey and machines is sold for manure. Use steam; but, as we are only tenants of the mill, are unable to give the nominal horse-power, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Simpson, Hopps, & Company, Union Cloth Manufacturer.	Whitehall Works, Whitehall Road, Leeds.	Our works are situated on the river *Aire*. Employ 24 hands. Rateable value of works, 100*l.* Our works are not affected by floods. The condition of the river is very black in colour, owing to the great amount of pollution poured in from dye works and other manufactories above, also from towns and villages situated on its banks. Obtain supply of water from the river, but cannot possibly state the volume consumed at our works yearly. Manufacture yearly goods of the value of 7,000*l.* The whole of the liquid refuse produced at our works

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Simpson, Hobbs, & Company, Union Cloth Manufacturer—*cont.*	Whitehall Works, Whitehall Road, Leeds—*cont.*	flows directly into the river. Do not use any dye wares or bleaching materials. Use yearly 4 tons of Galipoli oil. Produce 12 tons of waste wool in carding, which is sold to waste dealers. Do not use either soap, alkali, or urine. Use steam, 10 nominal horse-power; but, as we rent power, we are not able to give the weight of coal consumed, or what is done with the ashes. The excrements of our workpeople are conveyed by waterclosets into the river. Have no suggestions to offer.
John Botterill, Dyer and Stover.	Kirkstall Road, Leeds.	My works are situated on the river *Aire*. Employ 350 hands. Rateable value of works, 426*l.* The bed of the river has not silted up opposite my works. My works are affected by floods, but not more than they were 30 years ago. The river is very much polluted year by year by manufactories and works above, as also by town sewage. Obtain supply of water jointly from the river, boreholes, and waterworks; and consume yearly from the river 100,000,000 gallons; boreholes 17,000,000 gallons; and waterworks 18,000,000 gallons. The river water is suitable for dyeing most colours, except in flood time, when the water is very dirty. I dye yearly 300,000 pieces, and stove with sulphur and brimstone 40,000 pieces. Produce yearly 135,000,000 gallons of liquid refuse; this flows direct into the river. Use yearly, as dyewares, aquafortis, 37,090 lbs.; double aquafortis, 25,524 lbs.; alum, 95,086 lbs.; ammonia, 181,498 lbs.; argol, 80,309 lbs.; white argol, 2,912 lbs.; red argol, 17,966 lbs.; prepared argol, 5,040 lbs.; bi-chrome, 23,737 lbs.; cochineal, 7,241 lbs.; cudbear, 13,519 lbs.; copperas, 85,120 lbs.; catechu, 5,540 lbs.; divi divi, 77,750 lbs.; d. o. vitriol, 125,177 lbs.; fustic, 38,374 lbs.; flavine, 841 lbs.; extract, 1,994 lbs.; indigo, 400 lbs.; refined indigo, 1,091 lbs.; logwood, 678,280 lbs.; limawood, 62,272 lbs.; prussiate, 7,118 lbs.; soda-ash, 21,444 lbs.; spirits of salts, 67,905 lbs.; salt cake, 159,936 lbs.; turmeric, 64,148 lbs.; madder, 13,608 lbs.; myrobalans, 117,448 lbs.; soap, 92,392 lbs.; soap bark, 3,186 lbs.; safflower, 11 bottles; grain tin, 12,320 lbs.; galls, 2,780 lbs.; methylated spirit, 745 gallons; camwood, 1,680 lbs.; barwood, 12,992 lbs.; picric acid, 532 lbs.; wood, 5,376 lbs.; shumac, 35,168 lbs.; sugar of lead, 1,272 lbs.; oxalic acid, 262 lbs.; nitrate of soda, 13,776 lbs.; violet imperial, blue imperial, green paste, magenta crystal, and brown crystal, 6,286 lbs. The spent dye woods are either carted away with the ashes, or thrown amongst the coals and burned under the boilers; the spent liquids are run into the river. Do not use any bleaching materials or oil. Use yearly, soap 24 tons, soda ash 10 tons, ammonia 7 tons, and oil of vitriol 56 tons. Do not use any urine. The soapsuds are not treated for the recovery of grease. Use steam, 60 nominal horse-power, and 400 horse-power in boilers. Consume yearly about 13,000 tons of coal, the ashes from which are carted away and used for filling up inequalities of building ground, for making foundations, and new streets. The excrements of my workpeople are conveyed by waterclosets into sewers, and thence into the river. Have no suggestions to offer.
W. Walker & Company, Wool and Cloth Dyers.	Kirkstall Road, Leeds.	Our works are situated on the river *Aire*. Employ from 40 to 50 hands. Rateable value of works, 200*l.* The bed of the stream has silted up; caused principally by spent dye stuffs, dye wares, and other solid refuse thrown into it. Our works are only affected in very heavy floods. The condition of the stream is gradually getting worse year by year. It is seriously polluted by refuse from towns and works above. Obtain supply of water jointly from the river and boreholes, and consume yearly 61,320,000 gallons. If the river were rendered clear and colourless it would be of considerable money value to us, but cannot give the amount. We produce 43,000,000 gallons of liquid refuse yearly, which flows into sewers, and thence into the river. Use yearly, as dye wares, indigo 70,000 lbs., logwood 224,000 lbs., fustic 40,000 lbs., camwood 4,500 lbs., barwood 44,800 lbs., and Sander's wood 20,000 lbs. Do not use any bleaching materials or oil. Use yearly, soap 18,000 lbs., and urine 15,000 gallons. Use steam, 10 nominal horse-power, and boilers 52 horse-power. Consume yearly 1,800 tons of coal. Make 300 tons of ashes, which are used for ballast on railways and deposited on rubbish heaps. The excrements of our workpeople are conveyed by waterclosets into the river. No suggestions to offer.
George Hirst & Sons, Dyers.	Wellington Mills, Leeds.	Our works are situated on the *Aire*. Employ 34 hands. Rateable value of works, 125*l.* Our works are not affected by floods. The river *Aire* is much more foul than formerly, and is seriously polluted. Obtain supply of water jointly from the river and waterworks, and consume yearly 52,000,000 gallons. If the stream, from which we might

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George Hirst & Sons, Dyers—*cont.*	Wellington Mills, Leeds —*cont.*	derive a supply of water were rendered clear and colourless, it would be of considerable money value to us, but we cannot state the amount. We dye yearly 6,500 stones of wool, and 300,000 yards of woollen cloth. The whole of the waste liquid produced at our works flows direct into the river. Use yearly, as dye wares indigo 21,200 lbs. The spent dye liquor is turned into the river. Do not use any bleaching materials or oil. Use yearly, alkali six tons, and very little soap. The soapsuds are not treated for the recovery of the grease. Use steam, 10 nominal horse-power; but as we hire power, we are not able to give the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are carted away for manure. No suggestions to offer.
J. C. Waddington, Cloth Dyer.	East Street, Leeds.	My works are situated on the river *Aire*. Employ 22 hands. Rateable value of works, 182*l*. The bed of the river has silted up, caused by solid refuse thrown into it. My works are affected by floods. The river is in much the same condition as it has been for the last 20 years. It is seriously polluted by every kind of manufacturing refuse, and by town sewage. Obtain supply of water from the river, and consume yearly 20,000,000 gallons; also from waterworks, and consume 2,500,000 gallons from that source. If the river, from which we might derive a supply of water were rendered clear and colourless, it would be a direct money value to me of 100*l*. a year. I dye yearly 200,000 lbs. of goods, of the value of 60,000*l*. The whole of the waste liquid produced at my works flows direct into the river. Use yearly 20 tons of dye wares, principally indigo, cochineal, and lac dye. The spent dye stuffs are burned. Do not use any bleaching materials, oil, soap, or alkali. Use yearly, urine 4,000 gallons. Use steam, 16 nominal horse-power. Consume yearly 1,400 tons of coal; make 300 tons of ashes, which are carted away and deposited to fill up old excavations. The excrements of my workpeople are removed by a contractor under the Corporation. I suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to filter their waste liquid before allowing it to flow back into the streams. I have no practical suggestions to offer as to the conservancy of rivers and streams.
John Bucktrout, Dyewood Cutter.	Goodman Street, Hunslet Road, Leeds.	My works are situated on the river *Aire*. Employ 16 hands. Rateable value of works, 100*l*. My works are not affected by floods. The river is of the colour of ink, and has been so ever since I have known it. It is very seriously polluted by every kind of refuse, solid and liquid. Obtain supply of water from the river for condensing purposes. Prepare yearly 800 tons of dye woods of the value of 4,750*l*. The whole of the waste liquid produced at my works flows into the river. Use steam, 30 nominal horse-power. Consume yearly 300 tons of coal, the ashes from which are used to level up low lands, and for repairing roads. The excrements of my workpeople are turned into the river. No suggestions to offer.
Ives & Tennant, Flax Spinners.	East Street, Leeds.	Our works are situated on the river *Aire*. Employ 1,242 hands. Rateable value of works, 1,932*l*. 10*s*. The bed of the river has not silted up. Our works are not affected by floods. The river is in a much more filthy condition than it was 20 years ago, and the evil goes on increasing year by year. It is greatly polluted by every kind of manufacturing refuse, sewage, and by mines. Obtain supply of water from the river and from waterworks; and consume yearly 180,000,000 gallons. If the river were rendered clear and colourless it would be a direct money value to us of 25*l*. a year which we pay to the Waterworks Company, and be indirectly of great value. Manufacture yearly 2,400 tons of flax, of the value of 200,000*l*. The whole of the waste liquid produced at our works flows direct into the river. Do not use any bleaching materials. Use steam, 285 nominal horse-power. Consume yearly from 10,000 to 11,000 tons of coal; make 1,250 tons of ashes, which are carted away for filling up hollow places and repairing streets. The whole of the excrements of our workpeople are conveyed into sewers and thence into the river, but we are taking steps to deodorize them, and keep them out. We suggest, as the best means of avoiding pollution in future, that all manufacturing refuse and sewage of towns should be deodorized and utilized in irrigation, and we suggest for the conservancy of rivers and streams, that some independent board or authority should be constituted with compulsory powers, having jurisdiction over the whole drainage area of each particular district.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
A. Paterson & Son, Hemp and Tow Spinners.	Trafalgar Mill, Meadow Lane, Leeds.	Our works are situated on the river *Aire*. Employ 126 hands. Rateable value of works, 200*l*. Our works are not affected by floods. The condition of the river is black and filthy, and has been so ever since we have known it. It is seriously polluted by every kind of manufacturing refuse, solid and liquid, and by town sewage. Obtain supply of water jointly from the river, and from Waterworks Company; but do not know the annual consumption at our works. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be a direct money value to us of 20*l*. a year. Manufacture yearly 600 tons of goods, of the value of 25,000*l*. The whole of the waste liquid produced at our works flows direct into the river. Use steam, 50 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are carried away and used for repairing roads. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the river. We suggest, as the best means of avoiding pollution in future, that manufacturers should be prevented from turning their solid and liquid refuse into rivers and streams, and that town sewage should be kept out of them. We have no special suggestions to offer as to the conservancy of rivers and streams.
John Neill & Company, Paper Manufacturers.	Duke Street, Leeds.	Our mills are situated on the river *Aire*. Employ 28 hands. Rateable value of works, 240*l*. The river is navigable to Leeds, and the bed is kept from silting up by dredging. Our mills are sometimes, but not often, affected by floods. The river is polluted to a very serious extent by solid and liquid refuse, and by town sewage. Obtain supply of water from the river, and consume yearly 15,600,000 gallons. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be a direct money value to us of 75*l*. per annum. Use yearly, rags, 600 tons; soda ash, 5 tons; bleaching powder, 24 tons; alum, 30 tons; lime, 20 tons; and antichlor, half a ton. The whole of the liquid refuse produced at our mills flows unfiltered direct into the river. Make yearly, brown paper 200 tons, and grocer's paper 200 tons. Produce yearly about 30 tons of rag dust, which is carted away from our premises. Use steam, 80 nominal horse-power. Consume yearly 2,500 tons of coal; make 600 tons of ashes, which are used by the railway company for ballast. The excrements of our workpeople are conveyed into the river. No suggestions to offer.
James Houldsworth & Sons, Silk Spinners.	Banklow Mills, Leeds.	Our works are situated on the river *Aire*. Employ 300 hands. Rateable value of works, 1,000*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is very seriously polluted by works above, by town sewage, and by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. If the river were rendered clear and colourless it would be a direct money value to us of 200*l*. a year. Manufacture yearly goods of the value of 50,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. Do not use dye wares, bleaching materials, oil, soap, or alkali. Use steam, 90 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are carted away from the premises. The excrements of our workpeople are removed and used for manure. Have no suggestions to offer.
Joseph Conyers & Sons, Tanners.	Kirstall, Leeds	Our works are situated on the river *Aire*. Employ 75 hands. Rateable value of works, 416*l*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the river becomes year by year more foul. It is considerably polluted by works above, and by town sewage. Obtain supply of water from wells; and as we have a good supply, if the condition of the river were made clear and colourless, it would be of no direct money value to us. We tan yearly 150 tons of light hides, 234 tons of heavy, salted and dry hides; and produce 300 tons of leather. Use yearly, lime 50 tons, bark 150 tons, valonia 250 tons, shumac 20 tons, gambir or terra japonica 250 tons, myrobalans 50 tons, and pigeons' dung 500 bushels. Do not use either bullock's blood or human excrement. Obtain 600 bushels of hair in the process of depilation, which is sold to felt and rug makers. Obtain 150 tons of fleshings, which are sold to size and glue manufacturers. We have 380 tanpits, 6 feet long, 5 feet wide, and 6 feet deep. Do not use any dye wares. The whole of the liquid refuse produced at our works flows direct into sewers. Use steam, 35 nominal horse-power. Consume yearly 550 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. No suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North and South Banks)—*cont.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Richard Nickols & Sons, Tanners.	Joppa Leeds -	Our tanyards are situated on the river *Aire*. Employ 280 hands. Rateable value of tanyards, 879*l*. The condition of the river is very much worse than formerly. It is considerably polluted by every kind of manufacturing refuse, and by town sewage. Obtain supply of water jointly from the river, wells, boreholes, and from waterworks, and consume yearly from 7,000,000 to 8,000,000 gallons. With our present resources, if the river were rendered clear and colourless, it would be of little or no value to us. We tan yearly 70 tons of hides, and make 25½ tons of leather. Use yearly, lime 9½ tons, bark, valonia, shumac, gambir, terra japonica, and gall nuts, 20 tons. Use pigeons' and dogs' dung, but do not know the quantity; also bran, oatmeal, and salt, but do not know the quantity of each. Obtain 14,000 to 15,000 bushels of hair in the process of depilation, the greater part is sold for manufacturing yarns for carpets, and the remainder is used on our farm for manure. Obtain yearly 15 tons of fleshings, which are converted into glue. We have 359 tanpits, 7 feet 6 by 6 feet by 5 feet. Do not use any dye wares. The whole of the waste liquid produced at our works flows direct into the river. Use steam, 60 nominal horse-power. Consume yearly 2,600 tons of coal, the ashes from which are carted away for levelling up hollow spaces in land. The excrements of our workpeople are used for manuring our own land. No suggestions to offer.
Boocock & Company, Tanners.	Woodhouse Street, Leeds.	Our tanyards are situated on the river *Aire*. Employ 23 hands. Rateable value of tanyards, 82*l*. 10*s*. Our tanyards are not affected by floods. Obtain supply of water from waterworks; and consume yearly 514,000 gallons. Tan yearly, East India kips 105 tons; make 88 tons of leather. Use yearly, lime 12 tons, valonia 37 tons, shumac 11 tons, gambir 47 tons, and pigeons' and fowls' dung 3 tons. The hair obtained in depilation is used for manure. Obtain 66 tons of fleshings, which are sold to glue makers. We have 44 tanpits, 5 feet by 5 feet, by 5 feet. Do not use any dye wares. The whole of the liquid refuse produced flows direct into sewers, and thence into the river. Use steam, 10 nominal horse-power. Consume yearly 468 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed by a contractor under the Corporation. No suggestions to offer.
Alfred Brigg, Woollen Manufacturer.	Caledonian Cross Mill, Woodhouse Lane, Leeds.	My works are situated on the river *Aire*. Employ 130 hands. Rateable value of works, 488*l*. My works are not affected by floods. Obtain supply of water principally from the Waterworks Company, but do not know the annual consumption at my works. Manufacture yearly 60,000 lbs. of goods, of the value of 8,000*l*., and finish 600,000 lbs., of the value of 60,000*l*. The whole of the liquid refuse produced at my works flows direct into sewers, and thence into the river. Do not use any dye wares. Use yearly 600 gallons of Gallipoli oil, of the value of 140*l*. Produce yearly from 5,000 to 8,000 lbs. of waste wool in carding, which is all re-sold. Use yearly, soap 2,016 lbs., alkali 1,344 lbs., and urine 12,000 gallons. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly 1,200 tons of coal; make 400 tons of ashes, which are used for repairing roads and streets. The excrements of my workpeople are carted away by a contractor under the Corporation. Have no suggestions to offer.
Joseph Gilpin, Woollen Manufacturer.	Cromwell Street, Leeds.	My works are situated near the river *Aire*. Employ 80 hands. Rateable value of works, 180*l*. My works are not affected by floods. Obtain supply of water from the Waterworks Company, and consume yearly 150,000 gallons. Manufacture yearly from 30,000 to 40,000 lbs. of goods, of the value of from 20,000*l*. to 25,000*l*. The whole of the waste liquid produced at my works flows direct into the sewers, and thence into the river. Use yearly as dye wares a very small quantity of logwood, camwood, and copperas. Do not use any bleaching materials. Use yearly olive oil, of the value of 250*l*. The waste wool produced in carding is used over again, and the remainder sold for manure. Have not milled cloth for two years, so do not use soap, alkali, or urine. Use steam, 40 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are removed by farmers, and used for agricultural purposes. Do not feel competent to offer any suggestions as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, North and South Banks)—*cont.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Robinson, Stuff and Woollen Printer.	Isle of Cinder, Leeds.	My works are situated on the river *Aire*. Employ 25 hands. Rateable value of works, 96*l*. The bed of the river has silted up, caused by solid refuse thrown into it. My works are not affected by floods. When I was a boy I have caught fish in the river, but it is so fouled by all kinds of impurities, that no fish can now live in it. It is polluted also by mines near Skipton. Obtain supply of water jointly for engine and boiler purposes from the river, and for the washing and printing of goods jointly from the Waterworks Company and from a well. Consume yearly from waterworks alone 1,330,000 gallons. If the river were rendered clear and colourless it would be of a direct money value to me of 34*l*. 10*s*. yearly. I am not able to give an estimate of the value of the goods operated upon at my works, as I only print, and do not manufacture the goods. The whole of the waste liquid produced at my works is conveyed into the river. Use yearly 15 tons of dye wares, chiefly logwood and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Do not use either soap, alkali, or urine. Use steam, 5 nominal horse-power. Consume yearly 330 tons of coal, the ashes from which are carted away on to railways for ballast. The excrements of my workpeople are turned into the river. I suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled to burn the spent dye stuffs instead of turning them into rivers and streams, and that the liquid refuse should be filtered and precipitated. But there is by far too much business done on the banks of the river and its tributaries for the water to be ever rendered as clear as it was when I first knew it.
Watson, Walker, & Quickfall, Manufacturing Chemists.	Skinner Lane and Sheeps Carr Street, Leeds.	Our works are situate on *Sheeps Carr Beck*, a tributary of the river *Aire*. Employ 23 hands. Rateable value of works, 320*l*. The beck has silted up considerably, partly from manufacturing refuse, and partly from town sewage. Our works are occasionally flooded, caused by the silting up of the bed of the stream. The *Sheeps Carr Beck* was 40 or 50 years ago pure and clear, and dyers, whose works were situated on its banks, washed their scarlet, crimson, and other bright-coloured cloths, by throwing them into the stream; they were noted for producing colours of superior brilliancy. Small fish abounded in the stream at that time; but since then it has gradually become more and more polluted, and is now so filthy and black as to be almost unfit for any purpose whatever. Some portion, however, of the *Beck* has lately been very much improved by confining the stream in a narrow channel; and the bed has been paved, which has to some extent cured the evil of silting up. Solid matters thrown into it are more rapidly carried away by a flood. The Town Council have lately obtained parliamentary powers to carry out and further extend the improvement in the bed of the beck for a length of two miles. We obtain supply of water from the stream, from wells, and from waterworks; but are not able to give the annual consumption at our works. If the river, from which we might derive our supply of water, were rendered clear and colourless, it would make very little difference to us, as we obtain the chief part of our supply from wells. We use and produce yearly, common salt 100 tons, indigo 20 tons, oil of vitriol 30 tons, copperas 30 tons, ammonia 40 tons, and lime 60 tons. Produce refined indigo 10,000 lbs., extract of indigo 150 tons, cudbear 120 tons, orchill liquor 100 tons, and soap, 100 tons. The whole of the waste liquid produced at our works flows direct into the stream. Use steam, 46 nominal horse-power. Consume yearly about 3,000 tons of coal, the ashes from which are carted away. The excrements of our workpeople are used for manure. We suggest that the beds of rivers flowing through towns should be paved, in a manner similar to the works now being carried on in the *Sheeps Carr Beck*. If refuse from manufactories and sewage of towns must necessarily be thrown into rivers and streams, the plan now being carried out in *Sheeps Carr Beck* of paving the bed and forming an invert in the channel, is perhaps the best plan of mitigating the worst evils, which generally result from the practice of throwing polluted materials into streams; as by this means all the solid refuse matters are carried away by the stream with much more rapidity than formerly, and before they have time to enter into putrefaction or decay.
Jonathan Crawford & Sons, Cloth Manufacturers.	East Street, Leeds.	Our works are situated on the *Sheeps Carr Beck*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 500*l*. Our works are not affected by floods. The condition of the *Beck* is no worse to our knowledge than it was 10 years ago, when we first came to the works. It is seriously polluted by every kind of manufacturing refuse, and by town sewage. Obtain supply of water from the *Beck* for

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Jonathan Crawford & Sons, Cloth Manufacturers—*cont.*	East Street, Leeds—*cont.*	condensing purposes, and from waterworks for scouring purposes, and consume yearly 3,200,000 gallons for the latter purpose. If the stream were rendered clear and colourless it would be of a direct money value to us of 40*l.* a year. Manufacture yearly 125 tons of goods, of the value of from 20,000*l.* to 30,000*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly 10 tons of olive oil, of the value of 550*l.* Produce yearly 26 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap 6 tons, and alkali 6 tons, but no urine. The soapsuds are not treated for the recovery of grease. Use steam, 30 nominal horse-power. Consume yearly 2,500 tons of coal, the ashes from which are used to repair roads. The excrements of our work-people are carted away for agricultural purposes. No suggestions to offer.
Holroyd & Company, Stuff and Woollen Dyers and Finishers.	Sheep's Carr, Leeds.	Our works are situated at the junction of the *Gipson* and *Sheeps Carr Becks*, tributaries of the *Aire*. Employ 130 hands. Rateable value of works, 250*l.* The bed of the streams has not silted up. Our works are not affected by floods. Thirty years ago we could use the water from *Sheeps Carr Beck* for dyeing and washing, but now we cannot use it at all. The *Becks* are polluted by works above, and by town sewage, but not by mines. Obtain our supply of water from the *Gipson Beck*, and consume yearly 60,000,000 gallons. We dye and finish yearly, goods of the value of 550,000*l.* The whole of the waste liquid produced at our works flows unfiltered into *Sheeps Carr Beck*. We use yearly, as dyewares, logwood, 156,800 lbs.; fustic, 67,200 lbs.; alum, 156,800 lbs.; argol, 20,160 lbs.; tartar, 33,600 lbs.; cudbear, 7,250 lbs.; cochineal, 20,000 lbs.; aquafortis, 42,700 lbs.; ammonia, 46,000 lbs.; bichrome, 13,600 lbs.; oil of vitriol, 51,400 lbs.; extract of indigo, 33,900 lbs.; extract of fustic, 13,550 lbs.; indigo, 200 lbs.; annatto, 400 lbs.; iron liquor, 13,000 lbs.; lac, 16,800 lbs.; madder, 3,360 lbs.; nicaragua wood, 11,200 lbs.; pearl ash, 3,360 lbs.; prussiate of potash, 5,800 lbs.; refined indigo, 100 lbs.; shumac, 2,240 lbs.; tin, 4,928 lbs.; turmeric, 11,200 lbs.; Zante fustic, 5,040 lbs.; blue spirits, 12,700 lbs.; and various spirits, 35,800 lbs., and also a large quantity of aniline colours. Use yearly, as bleaching materials, chloride of lime 50 tons. Do not use any oil; use yearly soap 2 tons, soda 2 tons. We use the whole of the urine produced at the works, and also that collected from a public urinal. The soapsuds are not treated for the recovery of the grease. Use steam, 30 nominal horse-power. Consume yearly 6,000 tons of coal, the ashes from which are taken away to repair roads and footpaths. The excrements of our workpeople are mixed with fine ashes and used for manure. We know of no way to extract the colour from the water after we have used it. We think it quite impracticable.
T. & S. Milner, Woollen Manufacturer.	Beeston Mill, Leeds.	Our works are situated on a *Beck*, a tributary of the *Aire*. Employ 6 hands. Rateable value of works, 36*l.* Our works are not affected by floods. Obtain supply of water from the Corporation Waterworks, and consume yearly 320,000 gallons. Manufacture yearly 22 tons of goods, of the value of 1,400*l.* The whole of the waste liquid produced at our works flows into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 100 gallons of olive oil, of the value of 26*l.* The waste wool produced in carding is sold to hop growers for manure. Do not use either soap, alkali, or urine. Use steam, 10 nominal horse-power. Consume 400 tons of coal; make 130 tons of ashes, which are used for repairing roads. The excrements of our workpeople are sold for manure. No suggestions to offer.
Daniel Jackson, Woollen Manufacturer.	Lowelose Mill, Stamford Street, Leeds.	My works are situated on the *Sheeps Carr Beck*, a tributary of the *Aire*. Employ 39 hands. Rateable value of works, 135*l.* My works have only been flooded once. The *Beck* is polluted by works above; not by mines. As I rent power I am unable to state the quantity of water consumed at my works yearly. Cannot state the weight or value of goods I manufacture yearly. The whole of the waste liquid produced at my works flows into sewers, and thence into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly Gallipoli oil, of the value of 300*l.* Produce yearly 16 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Do not use soap, alkali, or urine. Use steam, but am not able to state the nominal horse-power I rent and the quantity of coal used, or what is done with the ashes. The excrements of my workpeople are deposited in the stream by a closet built over it, which is a very bad and unwholesome principle.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thos. Smith & Sons, Union Cloth Manufacturers.	Mill Garth Mills, Leeds.	Our works are situated on the *Lady Beck*, a tributary of the *Aire*. Employ 55 hands. Rateable value of works, 150*l.* The bed of the *Beck* is paved, and an invert formed, which has very much improved the condition of it. Our works are affected by floods, but only at the time of heavy floods. The *Beck* is polluted by refuse from works and ashes thrown into it from above, and is very foul indeed. Obtain supply of water jointly from the stream and from waterworks, but are not able to give the annual consumption at our works. If the stream, from which we might derive a supply of water, were rendered clear and colourless, it would be a direct money value to us of from 15*l.* to 20*l.* a year. Manufacture yearly 20,800 lbs. of goods, of the value of from 7,000*l.* to 8,000*l.* The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly 10 tons of Gallipoli oil, of the value of 560*l.* Produce yearly from 12 to 14 tons of waste wool in the process of carding, a portion of which is sold to oil and grease extractors, and the remainder of this refuse is sold for manure. Use yearly, soap 4 tons, and alkali 4 tons. The soapsuds are not treated for the recovery of grease. Use steam, 16 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are conveyed by water-closets into the sewers. We suggest, as the best means of avoiding pollation in future, that all polluting materials should be kept out of rivers and streams.
Samuel D. Dixon & Sons, Dyers of Woollen Cloths.	Ferns Island, East Street, Leeds.	Our works are situated on *Lady Beck*, a tributary of the *Aire*. Employ 14 hands. Rateable value of works, 66*l.* 10s. Our works are affected in heavy floods. The stream is very seriously polluted, and has been so for a number of years past. Obtain supply of water for condensing purposes from the *Beck*, but for dyeing purposes from the river *Aire*, which is situated about 200 yards from our works, and consume yearly 25,000,000 gallons. If the river were rendered clear and colourless it would be of great benefit to us, but we are not able to fix the money value. We dye yearly 3,000 tons of goods, of the value of 80,000*l.* We produce yearly 25,000,000 gallons of liquid refuse, which flows direct into the *Beck*. Use yearly 300,000 lbs. of dye wares, as bichromate of potash, sulphate of iron, sulphate of copper, argols, nitrate of iron, pyroligneous acid, myrobalans, sulphuric acid, and logwood. The spent dye liquor is turned into the *Beck*, and the spent solid stuffs are burnt. Use yearly, as bleaching materials, 1,200 lbs. of chloride of lime. Use steam, 8 nominal horse-power. Consume yearly 500 tons of coal; make about 200 tons of ashes, which are carted away on to railways to be used as ballast. The excrements of our workpeople are conveyed by waterclosets into the *Beck*. Have no suggestions to offer.
A. Robinson, Woollen Manufacturer.	Mill Garth Mills, Dyer Street, Leeds.	My works are situated on the *Mab Gate Beck*, a tributary of the *Aire*. Employ 42 hands. Rateable value of works, 600*l.* The bed of the *Beck* has been paved, and an invert formed, which has greatly improved the condition of the beck. My works were formerly affected by floods, but they are not at this present time. The bed of the beck is polluted by liquid refuse from manufactories and works above, and by town sewage. Obtain supply of water partly from the beck and partly from wells and boreholes, and consume yearly 112,800 gallons. When the water of the *Beck* is free from solid matter it is suited for my trade purposes. I scribble and spin yearly 20,000 lbs. to 30,000 lbs. of goods. The whole of the waste liquid produced at my works flows into the beck. My dye-house is let to J. Musgrove. Cannot tell the quantity of dye wares he uses. The spent liquid dye stuffs are carried into the *Beck*, the solid portion is burnt. Do not use any bleaching materials. Use yearly 300 gallons of Gallipoli oil. The better portion of the waste wool produced in carding is used again, the remainder is sold to mungo dealers. Do not use soap or alkali; use yearly, urine 3,100 gallons. The soapsuds are not treated for the recovery of grease. Use yearly, steam 58 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are carted away to form new streets. The excrements of my workpeople are conveyed into cesspools and carted away by a contractor under the Corporation. I suggest, as the best means of avoiding pollution in future, that all manufacturers should be compelled to keep their solid and liquid refuse out of the streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Wilkinson & Sons, Carpet Manufacturers, Manufacturers of Felted Cloth, and Patent Brussels Carpet Manufacturers.	St. Helen's Mill and Airedale Mills, Hunslet, Leeds.	Our works are situated on the river *Aire*. Employ 300 hands. Rateable value of works, 984*l*. The bed of the river has silted up. Our works are not affected by floods. The condition of the river has not altered within our knowledge. It is very much polluted by works above, and by mines. Obtain supply of water jointly from the river and from wells, boreholes, and waterworks; and consume 26,000,000 gallons yearly. Manufacture, print, and dye yearly 1,200 tons of goods, of the value of 150,000*l*. Nearly the whole of the liquid refuse produced at our works flows direct into the river. Use yearly, soap 50 tons, but no urine. The soapsuds are not treated for the recovery of grease. Use steam, 160 nominal horse-power. Consume yearly 4,000 tons of coal, the ashes from which are used to fill up hollows in brickfields. The excrements of our workpeople are conveyed into the river. No suggestions to offer.
Samuel Warburton & Sons, Manufacturing Chemists.	Hunslet Carr, Hunslet, Leeds.	Our works are situated on the *Hunslet Carr Beck*, a tributary of the *Aire*. Employ 16 hands. Rateable value of works, 94*l*. The bed of the stream has silted up. Our works are affected by floods. The river is polluted by works above, but not by mines. Obtain supply of water from the stream, but are not able to give the annual consumption at our works. We produce yearly pyroligneous acid and charcoal. The whole of the liquid refuse produced at our works flows direct into the river. Use steam, 12 nominal horse-power. Consume yearly about 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are conveyed by watercloset into the sewers. Have no suggestions to offer.
Benjamin Mellor, Paper Manufacturer.	Hunslet, Leeds	My mills are situated on the river *Aire*. Employ 20 hands. Rateable value of works, 550*l*. The bed of the river has silted up. My mills are only affected by heavy floods. The condition of the stream 30 years ago was tolerably clear; it is now fearfully polluted. Obtain supply of water jointly from the river and from wells, but am not able to give the annual consumption at my works. If the river were rendered clear and colourless it would be of great money value to me, but am not able to give the amount. I use yearly, rags, 1,300 tons; esparto, 20 tons; soda ash, 25 tons; bleaching powder, 50 tons; alum, 80 tons; lime, 120 tons; and vitriol, 50 tons. The whole of the waste liquid produced at my mills flows direct into the river. I do not recover the soda from the waste esparto liquor. I manufacture yearly 950 tons of packing and wrapping paper. The whole of the rag dust produced at my mills is used for manure. Use steam, 120 nominal horse-power. Consume yearly 7,000 tons of coal, the ashes from which are partly used to fill up hollows in brickfields, and as ballast for railways. The excrements of my workpeople are carted away, and used for agricultural purposes. No suggestions to offer.
T. W. Appleyard, Tanner.	Hunslet - -	My tanyards are situated near an affluent of the *Aire*. Employ 110 hands. Rateable value of tanyards, 349*l*. 12*s*. 6*d*. My tanyards are not affected by floods. The stream is polluted by works above; not by mines. Obtain supply of water from a gathering ground collected in a reservoir, and from a well; but do not know the annual consumption at my tanyards. I tan yearly, foreign dry hides 400 tons, and produce leather 350 tons. Use yearly, lime 78 tons, bark, valonia, and shumac, 168 tons; also pigeons' and fowls' dung, costing yearly 52*l*. The hair obtained in the process of depilation is sold for 10*l*. yearly. I have 200 tanpits in my tanyards of various sizes. Do not use any dye wares. The spent tan is carted away for manure, and also the spent lime and pigeons' dung. The liquid refuse produced at the tanyards flows into sewers, and thence into the river. Use steam 10 nominal horse-power. Consume yearly tons of coal, the ashes from which are carted away to repair roads. The excrements of my workpeople are removed by contractors under the Corporation. Have no suggestions to offer.
		Basin of the Aire (South Bank).
William & John Slingsby, Cotton Spinners and Manufacturers.	Carleton, near Skipton.	Our works are situated on the *Carleton Beck*, a tributary of the *Aire*. Employ 400 hands. Rateable value of works, 1,000*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above, nor by mines. Obtain a supply of water from the stream, which is clear and colourless. Manufacture yearly 750 tons of goods, of the value of 90,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Do

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, South Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William & John Slingsby, Cotton Spinners and Manufacturers — *cont.*	Carleton, near to Skipton—*cont.*	not use either soap, alkali, or urine. Use steam, 200 nominal horse-power. Consume yearly 3,750 tons of coal, the ashes from which are used as ballast by the railway company. The excrements of our workpeople are collected and used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Turner, Worsted Weaver.	Cononley -	My works are situated on *Cononley Beck*, a tributary of the *Aire*. Employ 160 hands. Rateable value of works, 148*l*. The bed of the river opposite my works silts up, but the servants of the Midland Railway Company clear out the bed. My works are not affected by floods. The condition of the stream has been growing gradually worse for years; it is polluted by works above, and chiefly by lead mines. Obtain supply of water from the *Beck*, but do not know the annual consumption at my works. In the summer time I use the entire volume of the stream for condensing and other purposes. If the stream were rendered clear and colourless it would be of direct money value to me of from 20*l*. to 25*l*. a year. Manufacture yearly 106 tons of goods, of the value of 44,000*l*. The whole of the waste liquid produced at my works flows direct into the *Beck*. Do not use dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly 450 tons of coal; make 60 tons of ashes, which are used partly for repairing roads, and partly as ballast on the railroads. The excrements of my workpeople are used for agricultural purposes. I would suggest, as the best means of avoiding pollution in future, that refuse from manufactories and mines should be kept out of rivers and streams.
William Watson, Worsted Manufacturer.	Cowling, near Cross Hills.	My works are situated on the *Ickornshaw Beck*, a tributary of the *Aire*. Employ 180 hands. Rateable value of works, 200*l*. The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has very little altered within my knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from the *Beck*. Manufacture yearly, goods of the value of 40,000*l*. to 45,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. Do not use either dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam and water as power; steam 20, and water 10, nominal horse-power. Consume yearly 550 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. No suggestions to offer.
T. & M. Bairstow, Worsted Spinners and Manufacturers.	Sutton Mills, Cross Hills.	Our works are situated on the *Holme Beck*, a tributary of the *Aire*. Employ 549 hands. Rateable value of works, 604*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not altered very much, except that the banks are washed away more than they were 20 years ago. The stream is polluted by works above, but not by mines. Obtain supply of water from the *Beck*, except for wool washing, and this we obtain from a spring; but cannot tell the annual consumption at our works. Manufacture yearly 557,000 lbs. of goods, of the value of 123,800*l*. The whole of the liquid refuse produced at our works, except the soapsuds, flows into the stream. Do not use dye wares or bleaching materials. Use yearly 1,367 gallons of Gallipoli oil, of the value of 374*l*. 5*s*. 2*d*. Do not card our wool. Use yearly, soap 140 barrels. The soapsuds are treated for the recovery of grease, by which we gain 28*l*. per annum. Use steam and water as power, steam 60, and water 40 nominal horse-power. Consume yearly 1,700 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are mixed with sawdust, and used for manure. No suggestions to offer.
Wilson Brothers, Worsted Spinners and Manufacturers.	Cross Hills -	Our works are situated near to the river *Aire*. Employ 150 hands. Rateable value of works, 150*l*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the river is comparatively clear. It is not polluted by works above. Obtain supply of water from springs, but are not able to give the annual consumption at our works. We manufacture yearly 295,000 lbs. of goods, of the value of 42,900*l*. The whole of the waste liquid produced at our works flows indirectly into the river. Do not use any

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Wilson Brothers, Worsted Spinners and Manufacturers—*cont.*	Cross Hills—*cont.*	dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 26 nominal horse-power. Consume yearly 600 tons of coal; the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are mixed with coal and ashes, and used for agricultural purposes. No suggestions to offer.
Samuel Tetley & Company, Worsted Spinners and Manufacturers.	East Burn, Cross Hills.	Our works are situated near to the river *Aire*. Employ 200 hands. Rateable value of works 247*l*. Our works are not affected by floods. Obtain supply of water from springs, but are not able to give the annual consumption at our works. Manufacture yearly goods of the value of 20,000*l*. The whole of the waste liquid produced at our works flows indirectly into the stream. Do not use dye wares, bleaching materials, oil, soap, alkali, or urine, but we are having wool washing machines erected, and propose to comb our wool on the premises, and shall use those materials. Use steam, 25 nominal horse-power. Consume yearly 450 tons of coal; the ashes from which are used to repair footpaths. The excrements of our workpeople are mixed with ashes and sawdust and used for manure. No suggestions to offer.
John Green, Stuff Manufacturer.	Sutton, Cross Hills.	My works are situated on *Sutton Beck*, a tributary of the *Aire*. Employ 112 hands. Rateable value of works, 107*l*. 12*s*. The bed of the stream has not within my recollection silted up. My works are not affected by floods. The *Beck* has been much in the same condition ever since I have known it, which is for more than 50 years. The stream is not polluted by works above, nor by mines. Obtain supply of water from wells and boreholes, but am not able to state the annual consumption at my works. I weave on commission, and therefore am not able to state the amount or the value of the goods I weave yearly. The whole of the waste liquid produced at my works flows direct into the stream. I do not use dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 14 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for agricultural purposes. No suggestions to offer.
Whittaker, Brothers, Worsted Weavers.	Oxenhope -	Our works are situated on the *Worth*, a tributary of the *Aire*. Employ 120 hands. Rateable value of works, 155*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has very little changed. It is not polluted by works above, nor by mines. Obtain our supply of water from the stream, but are not able to give the yearly consumption at our works. The river is sufficiently clear and colourless for all manufacturing purposes. We manufacture yearly 130 tons of goods on commission, and are therefore unable to state the value. The whole of the liquid refuse produced at our works flows direct into the stream. We do not use any dye wares, bleaching materials, soap, alkali, or urine. Use steam, 14 nominal horse-power. Consume yearly 360 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed from the premises, and used for agricultural purposes. We have no suggestions to offer.
William Greenwood, junior, Worsted Spinner and Manufacturer.	Oxenhope -	My works are situated on an affluent of the *Worth*, a tributary of the *Aire*. Employ 134 hands. Rateable value of works, 177*l*. The bed of the stream has not silted up. My works are not affected by floods. The river is not polluted by works above, nor by mines. Obtain a supply of water from springs, but do not know the volume consumed yearly at my works. Manufacture yearly 104,000 lbs. of goods, of the value of 15,600*l*. The whole of the waste liquid produced at my works flows unfiltered into the stream. Do not use either dye wares or bleaching materials. Use yearly 2 tons of Gallipoli oil, of the value of 120*l*. We do not comb the wool we use, but it is done for us at other works, and therefore we do not use either soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used to repair roads, The excrements of my workpeople are used for manure. I have no suggestions to offer.
Merrall & Sons, Worsted Spinners and Manufacturers.	Lees and Ebor Mills, Haworth.	Our works are situated on the river *Worth* and *Lees Beck*, tributaries of the *Aire*. Employ 800 hands. Rateable value of works, 1,400*l*. The bed of the streams have not silted up. Our works are

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Merrall & Sons, Worsted Spinners and Manufacturers—*cont.*	Lees and Ebor Mills, Haworth—*cont.*	not affected by floods. The condition of the streams have very little changed during the last 30 years. They are polluted, but not seriously, by gas and other works above, but not by mines. Obtain our supply of water from river and stream, and consume yearly 188,000,000 gallons. The water of the streams is sufficiently clear for manufacturing purposes. We manufacture yearly 150 tons of goods, of the value of 120,000*l*. The whole of the liquid refuse produced at our works flows into sewers, and thence into the streams. We do not use either dye wares or bleaching materials. Use yearly 15 tons of Galipoli oil, of the value of 600*l*. Produce yearly about four tons of waste wool in carding, which is used for manure. Use yearly, soap 250 packs, no alkali or urine. The soapsuds are treated for the recovery of grease, and we gain by the extraction about 30*l*. per annum. Use steam, 110 nominal horse-power. Consume 3,000 tons of coal yearly; make 400 tons of ashes, which are used for building purposes and for repairing roads. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Redman & Holt, Worsted Spinners and Manufacturers.	Bridgehouse Mills, Haworth.	Our works are situated on the river *Worth*, a tributary of the *Aire*. Employ 550 hands. Rateable value of works, 488*l*. The bed of the river has not silted up. Our works are not affected by floods. The water of the river is tolerably clear; it is not polluted by works above nor by mines. We obtain our supply of water from the river, and consume yearly in wool washing only 873,600 gallons. The water of the river is sufficiently clear for manufacturing purposes. We manufacture yearly 274 tons of goods, of the value of 82,000*l*. The liquid refuse from our works flows into the sewers, and thence into the river. We do not use any dye wares or bleaching materials. Use yearly 2,800 gallons of olive oil, of the value of 600*l*. We do not produce any wool. Use yearly, soap 250 packs. The soapsuds are treated for the recovery of grease, by which we gain yearly 80*l*. Use both steam and water as power; steam 70, and water 20, nominal horse-power. Consume about 2,000 tons of coal yearly, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Turner, Worsted Spinner and Weaver.	Hollings Mill, Haworth.	My works are situated on the *Sladen Beck*, an affluent of the *Worth*, a tributary of the *Aire*. Employ 100 hands. Rateable value of works. 176*l*. The bed of the river has not silted up. My works are not affected by floods. The condition of the river has not changed within my knowledge. It flows over a rocky bed, and is quite clear. It is not polluted by works above nor by mines. Obtain a supply of water from the stream, but do not know the volume consumed at my works yearly. I use the entire volume of the stream, except in very heavy floods. I prepare and spin about 20,000 lbs. of yarn, and weave 49,500 lbs. of goods yearly. The whole of the waste liquid produced flows into the river. Do not use either dye wares, bleaching materials. oil, soap, alkali, or urine. Do not produce any waste wool in carding. Use steam and water as power; steam 20, and water 40, nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. I have no suggestions to offer.
Butterfield Bros., Worsted Spinners and Weavers.	Lum Foot, Haworth.	Our works are situated on the *Worth*, a tributary of the *Aire*. Employ 98 hands. Rateable value of works, 213*l*. 15*s*. The bed of the stream has silted up, but not to any considerable extent. Our works are slightly affected by floods. There is very little change in the condition of the river within our knowledge. It is slightly polluted by works above; not by mines. Obtain a supply of water from the river, but are unable to give the annual consumption at our works. If the river or stream were rendered clear and colourless it would make very little difference to us. We manufacture yearly 140,000 lbs. of goods, of the value of 20,000*l*. The whole of the waste liquid produced at our works flows into the stream. We do not use either dye wares or bleaching materials. Use, yearly, Gallipoli oil, 150 gallons, of the value of 25*l*. Do not produce any waste wool. Do not use either soap, alkali, or urine. Use steam and water as power; steam 20 and water 20 nominal horse-power. Consume yearly 254 tons of coal, the ashes from which are used to repair roads. The excrements of our work-

steam 2 & coal

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Butterfield Bros., Worsted Spinners and Weavers—*cont.*	Lum Foot, Haworth—*cont.*	people are used for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should not be allowed to throw either solid or liquid refuse into the streams, and that town authorities should be compelled to keep sewage out of the streams also.
James Brockbank, Tanner.	Flappet Springs, Keighley.	My tanyard is situated within three miles of the river *Aire*. Employ two hands. Rateable value of tanyard, 6*l*. Obtain a supply of water from the springs, but do not know the annual consumption at my tanyard. I tan yearly 520 tons of hides, and make 260 tons of leather. Use yearly, lime 52 tons, gambir 104 tons, fowls' dung 1 cwt., salt 12 cwt., alum 12 cwt., tallow 8 cwt., and cod oil 3 tons. Obtain yearly in the process of depilation 2 tons of hair, which is sold to plasterers, and 4 tons of fatty matter in the process of fleshing, which is sold to size boilers. Have eight tanpits, 3 feet by 6 feet by 4 feet. I only occasionally use dye wares, but am not able to state the quantity I use yearly. All the fluid refuse produced at the tanyard is conveyed by a pipe on to land, where it is used for irrigation. Consume yearly 15 tons of coal, the ashes from which are mixed with the excrements and used for manure. I have no suggestions to offer.
J. & J. Craven & Company, Woollen Spinners and Manufacturers.	Walk Low and Dalton Mills, Keighley.	Our mills are situated on the *Worth*, a tributary of the *Aire*. Employ 1,900 hands. Cannot give the rateable value of works. The bed of the river has silted up, caused chiefly by persons throwing in ashes and rubbish, but partly by the sewage of the town flowing into it. Our mills are affected by floods. The river is seriously polluted by refuse from manufactories and sewage; it is not, to our knowledge, polluted by mines. Obtain a supply of water from the river, and consume 2,500,000 gallons yearly. If the river were rendered clear and colourless it would be at present a direct money value to us of 100*l*. a year. We are not able to give the weight or value of the goods we manufacture yearly. The whole of the liquid refuse produced at our works flows direct into the sewers, and thence into the river. Do not use any dye wares or bleaching materials. Use yearly 48,472 lbs. of olive, sperm, and mineral oil, of the value of 1,850*l*. The whole of the waste wool produced in carding is used over again. Use yearly, soap 624 packs. The soapsuds are not treated for the recovery of grease. Use steam, 50 nominal horse-power. Consume yearly 8,000 tons of coal; make 2,000 tons of ashes, which are used to repair roads. The excrements of our workpeople are conveyed into the river. We have no suggestions to offer.
Robert Clough, Worsted Spinner and Manufacturer.	Grove Mills, Keighley.	My works are situated on the *Worth*, a tributary of the *Aire*. Employ 504 hands. Rateable value of mills, 850*l*. The bed of the stream has not silted up. Our works are not affected by floods. There is very little change in the condition of the river to our knowledge. It is polluted by sewage, drainage, road washings, and refuse from manufactories, but not by mines. Obtain a supply of water from the river, but the volume used at our works yearly has not been ascertained. Manufacture yearly 630,000 lbs. of yarns and goods, of the value of 90,000*l*. I produce, yearly, liquid refuse and soapsuds, 1,379,400 gallons. This flows into depositing tanks, but the other waste liquid produced flows direct into the river. I do not use either dye wares or bleaching materials, but use yearly, Gallipoli oil, 12 tons, of the value of 700*l*. Do not produce any waste wool. Use yearly, soft soap, 280 packs, the soapsuds are treated for the recovery of grease, by which I gain 70*l*. Use steam, 100 nominal horse-power. Consume 2,100 tons of coal yearly, the ashes from which are used to repair roads, and are mixed with lime for mortar in building operations. The excrements of our workpeople are mixed with earth, and used for manure. I have no suggestions to offer.
Jonas Sugden & Brothers, Worsted Spinners and Manufacturers.	Dockroyd, Keighley.	Our works are situated on the *Worth*, a tributary of the *Aire*. Employ 529 hands. Rateable value of works, 805*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is not now so pure as formerly; it is polluted by town sewage, and by refuse from gasworks and manufactories above, not by mines. Obtain a supply of water from the river, and use for washing purposes only 500,000 gallons. If the stream were

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Jonas Sugden & Brothers, Worsted Spinners and Manufacturers—*cont.*	Dockroyd, Keighley—*cont.*	rendered clear and colourless it would make no difference to us. We manufacture yearly 700,000 lbs. of raw material, of the value of 140,000*l*. Produce yearly 500,000 gallons of soapsuds, which flow into depositing tanks, but the whole of the other liquid refuse produced flows direct into the river. We do not use either dye wares or bleaching materials. Use yearly Gallipoli oil, of the value of 120*l*. Do not card our wool. Use yearly soap, 40,000 lbs. The soapsuds are treated for the recovery of grease, by which we gain 30*l*. a year. Use steam and water as power; steam 60, and water 100, nominal horse-power. Consume yearly about 2,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Butterfield, Brothers, Worsted Spinners and Weavers.	Keighley -	Our works our situated on the *Worth*, a tributary of the *Aire*. Employ 218 hands. Rateable value of works, 482*l*. 6*s*. 8*d*. The bed of the stream has silted up, but not in any great degree. Our mills are affected by floods, but not to a serious extent. There is very little change in the condition of the river within our knowledge. The river is polluted by town sewage and liquid refuse from manufactories and works above, but not by mines. We obtain a supply of water jointly from the river and from springs; but are not able to give the annual consumption at our works. If the river were rendered clear and colourless it would make very little difference to us. We manufacture yearly 300,000 lbs. of goods, of the value of 35,000*l*. The whole of the liquid refuse produced flows direct into the river. We do not use any dye wares or bleaching materials, but use yearly Galipoli oil, 305 gallons, of the value of 50*l*. We do not card the wool we use. Do not use either soap, alkali, or urine. Use steam, 60 nominal horse-power. Consume yearly 1,270 tons of coal, the ashes from which are used; they are given away to parties who fetch them. A portion of the excrements of our workpeople is used for manure, and a portion flows into the river. We suggest, as the best means of avoiding pollution in future, that sewage, liquid, and solid refuse from manufactories and works, should be kept out of rivers and streams. We have no suggestions to offer as to the conservancy of rivers and streams.
Williamson. Bros., Worsted Spinners and Manufacturers.	Griffe Mills, Keighley.	Our works are situated on the *Worth*, a tributary of the *Aire*. Employ 172 hands. Rateable value of works, 129*l*. 12*s*. 6*d*. The bed of the river has not silted up; on the contrary at times it is deeper opposite our works. Our works are not affected by floods. The condition of the river is much the same as formerly. It is not polluted by works above, nor by mines. Obtain a supply of water from the river, and use a considerable volume yearly, but cannot give the exact quantity. Manufacture yearly goods, of the value of from 35,000*l*. to 40,000*l*. The whole of the waste liquid produced at our works flows unfiltered into the river. We do not use dye wares, bleaching materials, oil, soap, alkali, or urine. Use both water and steam as power: steam 28, and water 20, nominal horse-power. Consume about 30 tons of coal yearly, the ashes from which are placed on the river bank. The excrements of our workpeople are used for manure. No suggestions to offer.
William Haggas & Sons, Worsted Manufacturers.	Cross Roads Mill, Keighley.	Our works are situated near the river *Worth*, a tributary of the *Aire*. Employ 160 hands. Rateable value of works, 210*l*. Obtain our supply of water from wells, but we are unable to give the annual consumption at our works. We manufacture yearly goods of the value of 20,000*l*. Produce, yearly, liquid refuse from soapsuds 142,500 gallons, which flow into depositing tanks; the whole of the other waste liquid produced flows direct into the sewers. We do not use either dye wares or bleaching materials. Use yearly Gallipoli oil of the value of 400*l*. Do not card the wool we use. Use yearly, soap 120 packs. The soapsuds are treated for the recovery of grease, by which we gain 18*l*. yearly. Use steam, 20 nominal horse-power. Consume 600 tons of coal: make 104 tons of ashes, which are used for repairing roads. The excrements of our workpeople are mixed with earth, and used for manure. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Thomas B. Laycock, Woolcomber, Spinner, and Weaver.	Aireworth, Keighley.	My works are situated on the *Worth*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 289*l*. 15*s*. Opposite my works the bed of the river has silted up very considerably; 40 years ago the bed

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thomas B. Laycock, Woolcomber, Spinner, and Weaver—*cont.*	Aireworth, Keighley—*cont.*	was 5 or 6 feet deeper than at present, and the silting up to this great depth has been caused by ashes and rubbish thrown in by manufacturers and others. Formerly trout were very plentiful in the stream, but now no living thing can exist except rats, which feed on the dead carcases of animals thrown in. The river for more than half a mile above my works is very seriously polluted by town sewage and refuse from mills, manufactories, and works; and in the summer the stench is so bad that the smell is perceptible for more than half a mile off. Obtain a supply of water from the river for manufacturing purposes; but do not know the annual consumption at my works. If the river were rendered clear and colourless, it would be of considerable money value to me. I manufacture yearly 100 tons of goods, of the value of 25,000*l.* The whole of the soapsuds produced at my works flow into a tank; the other waste liquid produced flows direct into the sewers, and thence into the river. I do not use any dye wares or bleaching materials. Use yearly 4 tons of Gallipoli oil, of the value of 200*l.* Do not card the wool I use. Use yearly, soap 90 packs, soda 1 ton, but no urine. The soapsuds are treated for the recovery of grease, by which I gain 20*l.* yearly. Use steam (seven months in the year) and water as power, 46 nominal horse-power. Consume yearly 300 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that every manufacturer should be compelled to filter the waste liquid produced at his works before allowing it to flow into the streams, that solid refuse should be kept out of the streams, and that town sewage should be utilized. Keighley is very excellently situated for conveying the sewage on to land; but if the polluted water is turned away on to land, and prevented from flowing past my mill, I shall be deprived of water power, and the public will have to pay me compensation for it. Every person to whom a list of the queries is sent ought to answer them fairly, but I know that they do not intend to do it in this district, because they pollute the river. One firm in particular pollutes the river, and makes the water milky white for more than a mile in length, and this in summer time is most unbearable. I have no suggestions to offer as to the conservancy of rivers and streams.
John Brigg and Company, Combers, Spinners, and Weavers.	Calversyke and Browend, Keighley.	Our works are situated on the *North Beck*, a tributary of the *Aire*. Employ 500 hands. Rateable value of works, 300*l.* The bed of the stream has silted up, caused by débris brought down in time of flood. Our works are to a slight extent affected by floods. The condition of the stream has very little altered within our knowledge. The *Beck* is not polluted by works above, nor by mines. Obtain our supply of water jointly from the stream and from wells; but are not able to give the annual consumption at our works Manufacture yearly, 700 tons of goods of the value of 60,000*l.* We produce yearly, liquid refuse and soapsuds, 650,000 gallons, this refuse flows into depositing tanks, the whole of the other waste liquid produced flows into the river. We do not use either dye wares or bleaching materials. Use yearly, 15 tons of olive oil, of the value of 800*l.* The whole of the waste wool produced in carding is sold to waste dealers. Use yearly, soap 30 tons. The soapsuds are treated for the recovery of grease, by which we gain 40*l.* yearly. Use steam, 90 nominal horse-power. Consume 2,728 tons of coal yearly, the ashes from which are carted to the railway station, and used as ballast. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future, to begin at once and keep out all solid matter, then follow up by keeping out the waste liquid refuse produced by manufacturers, then take up impure contributions of every kind. Immense damage has been done to our stream since the commencement of the inquiry now instituted by the Rivers Pollution Commission, and all local action is paralysed waiting for a full report. For the conservancy of rivers and streams, an official to undertake prosecutions will be necessary; probably if appointed by government, would give the greatest satisfaction; but the local governing bodies ought to have power to take action if required.
Joseph Town & Sons, Paper Manufacturers.	Turkey Mills, Keighley.	Our mills are situated on the *North Beck*, a tributary of the *Aire*. Employ 105 hands. Rateable value of works, 290*l.* The bed of the *Beck* has not silted up. Our mills are not affected by floods. The condition of the river has very little changed within our knowledge. It is polluted, but not materially so, by works above; it is not polluted

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joseph Town & Sons, Paper Manufacturers—*cont.*	Turkey Mills, Keighley—*cont.*	by mines. Obtain a supply of water partly from stream, wells, and boreholes, also from springs; and consume yearly, 100,000,000 gallons. The stream is sufficiently clear for our manufacturing purposes. We use yearly, rags 600 tons, caustic soda 12 tons, bleaching powder 45 tons, crystals of soda 2 tons, alum 3 tons, and antichlor 2 tons. The whole of the water used at our mills is polluted more or less. The chief element is the alkaline ley from the rag boilers, which flows direct into the stream. We have a depositing tank for the bleach refuse which we empty into the river in time of floods. We do not filter any of our liquid refuse. Produce yearly, 300 tons of fine writing paper. Make 40 tons of rag dust, three-quarters of which is sold to brown paper dealers, and one-quarter is put on to land for manure. Use steam, 75 nominal horse-power. Consume 1,900 tons of coal yearly, the ashes from which are laid on the banks of the stream to be carried away in time of flood. The excrements of our workpeople are used for manure. We have used all means in our power to make the pollution as little noxious as possible. We have no special suggestions to offer as to the conservancy of rivers and streams.
Townend Brothers, Worsted Spinners and Manufacturers of Heald and Genappe Yarns and Worsted Stuffs.	Cullingworth Mills, near Bingley.	Our works are situated on the *Cullingworth* and *Ellar Carr Becks*. Employ 800 hands. Rateable value of works, 1,000*l.* The beds of the streams have not silted up. Our works are not affected by floods. The present condition of the streams is much better than it was 20 years ago. The streams are polluted by tanneries to a slight extent, and also to a considerable extent by the washing of cinders and ashes from the surface of the roads in heavy rains. They are not polluted by mines. Obtain supply of water from the streams, wells, boreholes, and waterworks; but cannot tell the annual consumption at our works. We use in the manufacture of our goods 1,248,000 lbs. of wood yearly. We have depositing tanks, and filter the waste liquid from our grease works and dye works, the effluent water from which flows direct into the streams. Use yearly 30 tons of dye stuffs, chiefly logwood, alum, argols, blue vitriol, fustic, copperas, and ammonia. The spent dye stuffs are mixed with the excrements of our workpeople. We do not use any bleaching materials. Use yearly 4,000 gallons of olive and Gallipoli oil, of the value of 1,000*l.* We produce about 3,000 lbs. of waste wool in the process of carding, which are sold. We use yearly 18 tons of Price's oil soap, 21 tons of best Gallipoli oil soap, 15 tons of best London curd soap, and 15 tons of soda ashes. The soapsuds are treated for the recovery of the grease, and we gain 300*l.* a year by the extraction. Use both steam and water as power; steam 500 and water 23 nominal horse-power. Consume yearly for steam boilers and for gas making 6,600 tons of coal. Make about 1,500 tons of ashes, which are carted on to our premises to form filters for the grease extracting process and the liquid refuse from our dye works. The excrements of our workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
S. P. Myers and Company, Woollen Weavers.	Birkshead Mill, Wilsden, near Bingley.	Our works are situated, near to a stream, an affluent of the *Harden Beck*, a tributary of the *Aire*. Employ 150 hands. Rateable value of works, 130*l.* Obtain our supply of water from springs and from disused coal-pits. Manufacture yearly, 160,000 lbs. of goods, of the value of 40,000*l.* We do not produce any liquid refuse at our works. Do not use any dye wares, bleaching materials, soap, alkali, or urine. Use steam, 16 nominal horse-power. Consume yearly, 500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with earth and used for manure. No suggestions to offer.
E. and J. H. Clapham, Woollen Spinner and Weaver.	Spring Mill, Wilsden, near Bingley.	Our works are situated near to a stream, an affluent of the *Harden Beck*, a tributary of the *Worth*. Employ 120 hands. Rateable value of works, 124*l.* The bed of the stream has not silted up. Our works are not affected by floods. The river is not polluted by works above; nor by mines. Obtain our supply of water from the stream, but do not know the annual consumption at our works. Manufacture yearly 140,000 lbs. of goods of the value of 25,000*l.* Do not use any dye wares, bleaching materials, soap, alkali, or urine. The whole of the waste liquid produced at our works flows into the stream. Use steam, 30 nominal horse-power. Consume 480 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, South Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
David Denby, Stuff and Worsted Spinner and Manufacturer.	Wilsden, near Bingley.	My works are situated near to a stream, an affluent of the *Harden Beck*, a tributary of the *Aire*. Employ 120 hands. Rateable value of works, 120*l*. Obtain supply of water from a well and from a disused coal-pit; but do not know the annual consumption at my works. Manufacture yearly 100,000 lbs. of goods of the value of 5,000*l*. Produce liquid refuse and soapsuds, 100,000 gallons; these flow into depositing tanks. Do not use dye wares or bleaching materials. Use yearly, 350 gallons of Gallipoli oil of the value of 80*l*. I do not card the wool I use. Do not use soap, alkali, or urine. Use steam, 25 nominal horse-power. Consume yearly, 400 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. No suggestions to offer.
Hiram Saville, Worsted Manufacturer.	Wilsden, near Bingley.	My works are situated near to a stream, an affluent of the *Harden Beck*, a tributary of the *Worth*. Employ 80 hands. Rateable value of works, . Obtain a supply of water from a well, but do not know the annual consumption at my works. Manufacture yearly 72,000 lbs. of goods of the value of 10,000*l*. The whole of the waste liquid produced flows into the stream. Do not use either dye wares, bleaching materials, soap, alkali, or urine. Use steam, 40 nominal horse-power. Use yearly 350 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure.
Pearson & Clapham, Stuff Manufacturers.	Wilsden, near Bingley.	Our works are situated near to a stream, an affluent of the *Harden Beck*, a tributary of the *Aire*. Employ 92 hands. Rateable value of works, 100*l*. We are not aware that the bed of the stream has silted up. Our works are not affected by floods. The condition of the stream is much the same as formerly, only we think there is not so much water flows down. The stream is polluted by manufactories above; not by mines. Obtain a supply of water from a spring, but am not able to give the annual consumption at our works. Manufacture yearly, 160,000 lbs. of goods, of the value of 200,000*l*. The whole of the waste liquid refuse produced at our works flows into the stream. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Do not produce any waste wool, as we do not either comb or spin wool. Use steam, 16 nominal horse-power. Consume yearly, 360 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Samuel Watmuff & Company, Worsted and Mohair Spinners and Manufacturers.	Harden, near Bingley.	Our works are situated on the *Rycecroft Beck*, a tributary of the *Aire*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above; nor by mines. Obtain a supply of water jointly from the stream and springs, but we are unable to give approximately the volume of water used yearly at our works. Manufacture goods of the value of 120,000*l*. The whole of the waste liquid refuse produced at our works flows into the stream. Do not use any dye wares or bleaching materials. Use yearly, Gallipoli oil, of the value of 200*l*.; soap, 9 tons; and alkali, 9 tons. The soapsuds are treated for the recovery of the grease, by which we gain 30*l*. a year. Use steam, 48 nominal horse-power. Consume 1,600 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted away and used for manure. We have no suggestions to offer as to the best means of avoiding pollution in future or as to the conservancy of rivers and streams.
James Wood & Company, Worsted Manufacturers.	Allerton - -	Our works are situated near a small stream, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 230 hands. Rateable value of works, 289*l*. 8*s*. 4*d*. Obtain supply of water from wells and bore-holes, and consume 438,000 gallons yearly. Manufacture yearly, goods of the value of about 62,000*l*. The whole of the waste liquid refuse produced flows into depositing tanks. Do not use any dye wares or bleaching materials. Use yearly, Gallipoli oil, of the value of 600*l*. Use yearly, soap, alkali, and urine, of the value of 480*l*. The soapsuds are treated for the recovery of grease, by which we gain 40*l*. Use steam, 25 nominal horse-power. Consume yearly, 1,640 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
D. & J. Craven, Shawl Manufacturers.	Pearson Place, Thornton.	Our works are situated on *Thornton Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 60 hands. Rateable value of works, 20*l*. 6*s*. The bed of the stream has silted up. Our works are not affected by floods. The condition of the stream is much the same as formerly. It is polluted by works above, by town sewage, and by mines. We manufacture yearly 50,000 lbs. of goods, of the value of from 15,000*l*. to 20,000*l*. Do not produce any liquid refuse at our works. Do not use dye wares, bleaching materials, oil, soap, alkali, or urine. The whole of our machines are at work. We use yearly only 20 tons of coal (for the purpose of heating iron plates), the ashes from which are mixed with the excrements of our workpeople, and used for manure. Have no suggestions to offer.
Joshua Craven & Sons, Worsted Spinners and Manufacturers.	Prospect Mills, Thornton.	Our works are situated on the *Pinch Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 500 hands. Rateable value of works, 458*l*. 7*s*. The bed of the stream has silted up, caused by stones and sand brought down by floods. Our works are not affected by floods. The condition of the stream has not changed during the last 30 years; there is less water flowing down the stream than formerly; it is polluted by liquid refuse from manufactories, by the sewage of the town, and by water from mines. Obtain a supply of water jointly from the stream and from a well; and consume yearly for condensing purposes 56,000,000, and for washing 1,550,000 gallons. The stream is at present comparatively clean. We manufacture yearly, 400,000 lbs. of yarn, and 300,000 lbs. of goods, of the value of about 110,000*l*. Produce yearly, liquid refuse, as soapsuds, 900,000 gallons; this flows into depositing tanks; the other liquid refuse produced flows into the river. Do not use dye wares or bleaching materials. Use yearly, olive oil (but the water is not fouled by it, as it is all used in the after process), of the value of 500*l*. Do not produce any waste wool. Use yearly, soap 200 packs; the soapsuds are treated for the recovery of grease, by which we gain from 35*l*. to 40*l*. a year. Use steam, 60 nominal horse-power. Consume about 1,200 tons of coal, the ashes from which are used partly to repair roads and partly to fill up an old quarry. The excrements of our workpeople are collected in tanks, and taken away to be used as manure on our own land. We have no special suggestions to offer as to the best means of avoiding pollution in future (but shall do all we can to avoid pollution), nor any suggestions as to the conservancy of rivers and streams.
Francis Craven & Company, Stuff Manufacturers.	Dole Mill, Thornton.	Our works are situated on *Thornton Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 400 hands. Rateable value of works, 416*l*. The bed of the stream has silted up 6 feet during the last 14 years, owing to the owners below erecting dam stones. Our works are affected by floods. The stream is polluted by works above, by town sewage, and by mines. Obtain a supply of water jointly from *Thornton Beck*, from waterworks belonging to the Local Board of Health, and from springs, but do not know the yearly consumption at our works. If the river were rendered clear and colourless, it would be of no direct money value to us. We manufacture yearly, 150 tons of goods, of the value of 60,000*l*. The whole of the waste liquid produced at our works flows direct into the stream; do not use dye wares, bleaching materials, oil, soap, alkali, or urine; do not produce any waste wool. We use steam, 30 nominal horse-power. Consume yearly 1,000 tons of coal, and make 200 tons of ashes, which are used for filling up hollows and levelling up land. The excrements of our workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
W. Grandage & Company, Dyers and Sizers of Cotton Warps.	Thornton Mill, Bradford.	Our works are situated on *Thornton Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 70 hands. We are not able to give the rateable value of the works, as they have not before been used for the purpose to which they are now devoted. The bed of the stream has silted up. Our works are not affected by floods. The stream is tolerably clear near to our works, although it is very foul a little below and nearer to the town. It is polluted by liquid refuse from manufactories, but not by mines. Obtain supply of water from the Bradford Corporation Waterworks, and consume yearly 9,300,000 gallons. We bleach about 150,000 lbs. of goods yearly, of the value of 10,000*l*., and dye yearly 2,000,000 lbs. of goods of the value of 150,000*l*. We produce 9,300,000 gallons of liquid refuse

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
W. Grandage & Company, Dyers and Sizers of Cotton Warps—*cont.*	Thornton Mill, Bradford—*cont.*	more or less polluted; this flows into the sewers and thence into the stream. We use yearly from 5,000,000 to 6,000,000 lbs. of dye wares of all kinds. Part of the dye stuffs are burned. Use 20,000 to 30,000 lbs. of bleaching materials, principally chloride of lime and oil of vitriol. Use yearly, soap 12,000 lbs., but neither alkali or urine. The soapsuds are not treated for the recovery of grease. Use steam, 20 nominal horse-power. Consume yearly, 2,000 tons of coal, the ashes from which are used partly to repair roads, and to make mortar for building purposes. The excrements of our workpeople are used as manure on land adjoining our works. Have no suggestions to offer.
George Mason, Woollen Spinner & Weaver.	Clayton Heights, Bradford.	My works are situated on the *Clayton Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 231*l*. My works are not affected by floods. Obtain supply of water from gathering ground, and consume 4,380 tons yearly. Manufacture yearly 200,000 lbs. of goods. The whole of the waste liquid produced at my works flows eventually into the stream. Do not use any dye wares, bleaching materials, soap, alkali, or urine. Use steam, 90 nominal horse-power. Consume yearly about 1,700 tons of coal, the ashes from which are used to repair footpaths, roads, and for building purposes. The excrements of my workpeople are used for manure. Have no suggestions to offer.
R. Beanland & Company, Worsted Spinners and Manufacturers.	Spring Grove Mill, Clayton, West Bradford.	Our works are situated on *Clayton Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 450 hands. Rateable value of works, 525*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted very seriously by works above, not by mines. Obtain supply of water for condensing purposes from the stream; for washing and other processes of manufacture from wells; and consume yearly for washing 155,000 gallons. If the river were clear and colourless, from which we might derive our supply of water it would be of considerable money value to us, but cannot fix the amount. We manufacture yearly, from 170 to 180 tons of goods, of the value of from 50,000*l*. to 60,000*l*. Produce yearly, 60,000 gallons of liquid refuse, as soapsuds; this flows into depositing tanks; the other waste liquid produced flows direct into the stream. We do not use either dye wares or bleaching materials. Use yearly, 8½ tons of Gallipoli oil, of the value of 500*l*. Produce yearly, 6 tons of waste wool in the process of carding, which is partly sold to waste dealers, and partly used for manure. Use yearly, soap 13 tons. The soapsuds are treated for the recovery of grease, by which we gain 90*l*. a year. Use steam, 45 nominal horse-power. Consume yearly 2,300 tons of coal, the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are used for manure. No suggestions to offer.
S. Barsdorf, Worsted Manufacturer.	Beck Mill, Clayton, Bradford.	My works are situated on *Clayton Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 200*l*. The bed of the stream has not silted up. My works are not affected by floods. The beck is slightly polluted, but near my works it is in a fair condition, although it is polluted by mines. Obtain supply of water jointly from the beck and from springs; but am not able to give the annual consumption at my works. Manufacture yearly 130 tons of goods, of the value of 35,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. Do not use either dye wares or bleaching materials. Use steam, 25 nominal horse-power. Consume yearly, about 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
George Turner & Company, Worsted Spinners and Manufacturers.	Great Horton, Bradford.	Our works are situated on a small stream, discharging itself into *Thornton Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 750 hands. Rateable value of works, 592*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above; not by mines. Obtain supply of water jointly from a spring and from the Corporation Waterworks; and consume yearly 1,500,000 gallons for washing of wool, but cannot tell what is used for condensing purposes and supplying the boilers. We manufacture yearly goods of the value of 220,000*l*. Produce yearly, liquid refuse, as soapsuds, 1,500,000 gallons; this flows into depositing tanks, and thence into the stream. The other liquid refuse produced flows direct into the stream. Do not use dye wares or

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George Turner & Company, Worsted Spinners and Manufacturers—*cont.*	Great Horton, Bradford—*cont.*	bleaching materials. Use yearly, 8 tons of olive oil, of the value of 450*l*. Do not card the wool we use. Use yearly, soap 400 packs. The soapsuds are treated for the recovery of grease, by which we gain 90*l*. a year. Use steam, 50 nominal horse-power. Consume annually 2,100 tons of coal, the ashes from which are carted away for various purposes. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Edward Cockerham, Worsted Manufacturer.	Legram Shed, Great Horton Bradford.	My works are situated near to *Clayton Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 250 hands. Rateable value of works, 750*l*. Obtain supply of water from collecting grounds, and in droughty weather from old coal-pits by pumping, but am not able to give the annual consumption at my works. Manufacture yearly, goods of the value of 70,000*l*. The whole of the waste liquid produced at my works flows unfiltered into the stream. Do not use dye wares or bleaching materials, oil, soap, or alkali. Use steam, 30 nominal horse-power. As I merely rent power, I am not able to state the quantity of coal consumed, or the ashes made, or the purposes to which they are devoted. The excrements of my workpeople are removed by farmers for agricultural purposes. No suggestions to offer.
Phillipp Haas & Sons, Damask Manufacturers.	Holme Top Mills, Little Horton, Bradford.	Our works are situated near to a beck, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 12 hands. Obtain supply of water from a well, but as we rent the premises and power, are not able to state the annual consumption of water at our works, the quantity of coal used, or what is done with the ashes. We manufacture yearly 36,000 lbs. of goods, of the value of 7,500*l*. The waste liquid produced at our works flows direct into the stream. The excrements of our workpeople are carted away for manure. No suggestions to offer.
John Leach, Stuff Manufacturer.	Holme Top Mill, Little Horton, Bradford.	My works are situated on an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 229*l*. Obtain supply of water from boreholes, and consume daily 160 tons. Manufacture yearly 100 tons of goods, of the value of 36,000*l*. The whole of the waste liquid produced at my works flows through sewers into the stream. Do not use any dye wares or bleaching materials. Use steam, 20 nominal horse-power. Consume yearly 2,290 tons of coal, the ashes from which are carted away from the premises. The excrements of my workpeople flow through sewers into the river. No suggestions to offer.
William Smith, Stuff Manufacturer.	Holme Top Mill, Little Horton, Bradford.	My works are situated on an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 60 hands. Rateable value of works, 97*l*. Obtain supply of water from boreholes, and consume daily 160 tons. Manufacture yearly goods of the value of 8,000*l*. The whole of the liquid refuse produced at my works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials, oil, soap, or alkali. Use steam, 8 nominal horse-power. Do not know the quantity of coal consumed yearly, but the ashes from which are carted away. The excrements of my workpeople are conveyed by watercloset into the sewers, and thence into the stream. No suggestions to offer.
Seth S. Blakey, Sizer.	Gorton Street, Bowling, Bradford.	My works are situated on the *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 13 hands. Rateable value of works, 124*l*. The bed of the stream has not silted up near my works. My works are affected by floods, caused by the *Beck* being covered over, and the arch over Caledonian Street being too small. The stream is very much polluted by refuse from dye and other works, and by sewage; but not by mines. Obtain supply of water from Messrs. Edward Ripley and Sons' works; and consume yearly 1,550,000 gallons. I cannot give the weight or value of the goods operated upon by me, as I only size the warps for other manufacturers. The liquid refuse produced at my works flows into the *Beck*. Use yearly 52 tons of rice flour and 3 tons of tallow in the preparation of size. Use steam, 8 nominal horse-power. Consume yearly about 350 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are conveyed to a manure heap, and used for agricultural purposes. No suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Wilson, Hall, & Company, Worsted Spinners and Manufacturers.	Hall Lane Mills, Bowling, Bradford.	Our works are situated on the *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 220 hands. Rateable value of works, 750*l*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water jointly from wells and from waterworks, and consume yearly 960,000 gallons. Use for washing wool 960,000 gallons, and for condensing purposes 2,300,000 gallons. We manufacture yearly 360,000 lbs. of goods, of the value of 50,000*l*. Produce yearly liquid refuse, as soapsuds, 400,000 gallons; this flows into depositing tanks, and thence into the sewers. The other liquid refuse flows direct into the sewers, and thence into the stream. Use yearly 1,000 gallons of Gallipoli oil, of the value of 250*l*. Produce 5,000 lbs. of waste wool in carding; sold to farmers as manure. Use yearly, soap 27,390 lbs., and alkali 916,960 lbs. The soapsuds are treated for the recovery of grease, by which we gain 30*l*. a year. Use steam, 60 nominal horse-power. Consume yearly 2,000 tons of coal; make 400 tons of ashes, which are used to repair streets. The excrements of my workpeople are removed by a contractor under the Bradford Corporation. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
M. Sharp & Company, Stuff Manufacturers.	Bowling, near Bradford.	Our works are situated on *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 303*l*. The river is polluted by works above, not by mines. Obtain supply of water from the stream; but as the bulk is only used for condensing purposes. We are not able to give the annual consumption at our works. Manufacture yearly 156,000 lbs. of goods, of the value of 26,000*l*. The liquid refuse produced at our works flows direct into the stream. Do not use any dye wares, bleaching materials, oil, soap, or alkali. Use steam, 25 nominal horse-power. Consume yearly 640 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used on land adjacent to our premises for manure. We have no suggestions to offer.
J. F. Martin & Company, Stuff Manufacturers.	Upper Castle Street, Bowling, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 70 hands. Rateable value of works, 390*l*. Our works are not affected by floods. As we rent power and premises from Messrs. Edward Ripley and Sons, we are not able to give the annual consumption of water, the quantity of coal used, the quantity of ashes made, or the purposes to which the ashes are devoted. We manufacture yearly, 50,000 lbs. of goods, of the value of 20,000*l*. The waste liquid produced at our works flows into the stream. The excrements of our workpeople are collected in tanks, and used for manure. No suggestions to offer.
Clapham and Butler, Manufacturers of Stuff Goods.	St. Stephens Shed, Manchester Road, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 60 hands. Rateable value of works, 150*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not altered during our occupancy of the works for the past three years. The present condition of the stream is anything but satisfactory, so much so that at times a horrid stench penetrates to all parts of our premises; this is caused by polluting materials cast into the stream from works above. The stream is not polluted by mines. Obtain supply of water from the Corporation waterworks, but we use yearly only a very small quantity. We manufacture yearly 45,000 lbs. of goods, of the value of 15,000*l*. Do not produce any liquid refuse at our works. Do not use either dye wares, bleaching materials, oil, soap, alkali, or urine. We rent steam-power from Messrs. J. Cure and Company, wool combers. The excrements of our workpeople are conveyed into tanks, which are regularly emptied, and the contents used for agricultural purposes. Have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Mitchell, Brothers, Mohair Spinners and Manufacturers.	Manchester Road, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 1,050 hands. Rateable value of works, 2,400*l*. The bed of the stream has not silted up. Our works are not affected by floods. The channel of the stream is sometimes dry, and at other times a fair volume of water flows down. It has been much in the same condition for the last 50 years. The river is so fearfully polluted that the water is unfit for use, except after a very heavy flood; it is not polluted by mines. Obtain supply of water from wells, bore holes, and sometimes from the stream, when clear.

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Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Mitchell, Brothers, Mohair Spinners and Manufacturers—*cont.*	Manchester Road, Bradford—*cont.*	Consume yearly from bore holes 15,000,000 gallons, and from *Beck* 750,000 gallons. As we have a good supply of water from our wells we should not use the *Beck* water to any extent, even if it were rendered clear and colourless. We manufacture yearly 1,040,000 lbs. of goods of the value of 174,000*l*. Produce yearly liquid refuse from soapsuds 3,000,000 gallons; this flows into depositing tanks; the other waste liquids produced at our works flow direct into the *Beck*. We do not use either dye wares or bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,000*l*. Produce yearly 52,000 lbs. of waste wool in carding, which is sold to waste dealers. Use yearly 100 tons of soap, but no alkali or urine. The soapsuds are treated for the recovery of grease, by which we gain from 80*l*. to 90*l*. a year. Use steam, 135 nominal horse-power. Consume yearly about 4,500 tons of coal, and make about 800 tons of ashes, which are used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Craven, Halliday, & Company, Stuff Manufacturers.	Gordon Street, Bradford.	Our works are situated on the *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 76 hands. Do not know the rateable value of works. The bed of the stream silts up occasionally; the silting is removed when required. Our works are not affected by floods. The condition of the stream has been much the same during the last four years. It is polluted by works above, but we do not think it is by mines. We only hire power from Messrs. Gledhill, Ashworth, and Company, so do not know the quantity of water consumed at these works annually. Manufacture yearly goods of the value of from 15,000*l*. to 16,000*l*. The whole of the liquid refuse produced at our works flows direct into the stream. Do not use oil or soap. The steam power, quantity of coal, and what is done with the ashes, will be returned by Messrs. Gledhill, Ashworth, and Company. The excrements of our workpeople are conveyed into the sewers, and thence into the river. Have no suggestions to offer.
Sugden & Briggs. Alpaca, Mohair, and Worsted Spinners and Manufacturers.	Bowling Mills, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 850 hands. Rateable value of works, 1,320*l*. The bed of the stream has not silted up. Our works are not affected by floods. The river is polluted by works above, not by mines. Obtain supply of water from wells and bore holes; and consume yearly 6,000,000 gallons. We manufacture yearly 700,000 lbs. of goods, of the value of 200,000*l*. Produce yearly, liquid refuse, as soapsuds, about 1,000,000 gallons; this flows into depositing tanks. the other waste liquid produced at our works flows direct into the sewers. Do not use dye wares or bleaching materials. Use yearly, 2,000 gallons of Gallipoli oil, of the value of 500*l*. Produce yearly, 6,000 lbs. of waste wool in the process of carding; this we sell to waste dealers. Use yearly, soap 50 tons; the soapsuds are treated for the recovery of grease, by which we gain 60*l*. a year. We use steam, 70 nominal horse-power. Consume yearly 3,000 tons of coal; make 260 tons of ashes, which are used partly to fill up hollow places, and to be ground with lime for mortar. The excrements of our workpeople are carted away and used for manure. Have no suggestions to offer.
Wheater, Smith, Tankard & Company. Worsted and China Grass Spinners.	Alma Works, Sticker's Lane Bowling, Bradford.	Our works are situated on the *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 140 hands. Rateable value of works, 250*l*. Our works are not affected by floods. Obtain supply of water collected from gathering ground, but are not able to give the annual consumption at our works. Spin yearly 96,000 lbs. of fibre, and weave 156,000 lbs. of yarn. The waste liquid produced at our works flows direct into the stream. Do not use any dye wares, bleaching materials, soap, alkali, or urine. Use steam, 17 nominal horse-power. Consume yearly 780 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We would suggest, in order to avoid pollution in future, that manufacturers should be compelled to filter their waste liquids before allowing them to flow into the streams.
Bottomley and Houldsworth, Wool Weavers.	Portland Street, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 250 hands. We hire power from Mr. J. Rawnsney, and cannot give the rateable value of the mill. The river is very much polluted by liquid refuse from dye works, and the temperature of the water is raised to a very high degree by being frequently used. We manufacture yearly 250,000 lbs. of goods. Do not

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Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Bottomley and Houldsworth, Wool Weavers—*cont.*	Portland Street, Bradford—*cont.*	produce any liquid refuse. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 20 nominal horse-power. The excrements of our workpeople are deposited in tanks, and removed in carts to Stanningley, to be there used for manure. Have no suggestions to offer.
Cristopher Wand & Company, Worsted Spinners.	Britannia Mills, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 700 hands. Rateable value of works, 1,750*l*. The bed of the stream occasionally silts up, but not to any appreciable extent. Our works are affected by floods by reason of contraction of the channel of the *Beck*, where covered over above our works. The condition of the stream becomes gradually worse year by year. It is seriously polluted by town sewage and refuse from dye and other works; it is as noisome as possible, and the temperature of the water is raised, by being so constantly used for manufacturing processes to from 80° to 90° Fahrenheit; it is not polluted by mines. Obtain supply of water jointly from wells and from water-works, and consume yearly about 9,000,000 gallons. If the stream from which we might derive our supply of water were rendered clear and colourless, it would be a direct money value to us of 230*l*. a year. We manufacture yearly about 2,500,000 lbs. of wool of the value of 200,000*l*. Produce yearly liquid refuse, as soapsuds, 1,200,000 gallons; this flows into depositing tanks, but the other waste liquid refuse flows direct into the stream. Do not use either dye wares or bleaching materials. Use yearly 12 tons of olive oil, of the value of 600*l*. The whole of the waste wool produced in carding is used for manure. Use yearly, soap 111 cwt., alkali 400 cwt., but no lime. The soapsuds are treated for the recovery of grease. Use steam, 250 nominal horse-power. Consume yearly 4,200 tons of coal; the ashes from which are used in making mortar for building purposes; and the remainder is tipped into old quarries, or used as ballast by the railway company. Two-thirds of the excrements of our workpeople are used for manure, and the remainder is cast into the *Beck*. Have no suggestions to offer.
Demas Ellis, & Company, Worsted Spinners.	Dudley Hill, Bradford.	Our works are situated on an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 150 hands. Rateable value of works, 272*l*. The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. Obtain supply of water from land drainage, but do not know the annual consumption at our works. Manufacture yearly 20,000 lbs. of goods. The whole of the waste liquid produced at our works flows direct into the *Beck*. Do not use either dye wares, bleaching materials, oil, soap, alkali, or urine. Produce no waste wool. Use steam, 30 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
J. O. Greenwood & Company, Worsted Manufacturers.	Bank Foot, Near Bradford.	Our works are situated on an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 300 hands. Rateable value of works, 232*l*. 12*s*. 6*d*. Our works are not affected by floods. Obtain supply of water from surface drainage, but do not know the annual consumption at our works. Manufacture yearly goods 55 tons, of the value of 70,000*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 16 nominal horse-power. Consume yearly 520 tons of coal, the ashes from which are carted on to waste land, and used for filling up hollow places, also for repairing roads. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future, that manufacturers and others should be compelled to keep all their refuse out of rivers and streams. No special suggestions to offer as to the conservancy of rivers and streams.
Wilkinson Lund, Worsted and Stuff Manufacturer.	Prospect Mill, Bowling.	My works are situated on an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 48 hands. Do not know the rateable value of works. The bed of the stream has not silted up. My works are not affected by floods. I rent power from Messrs. Cole. Marchents, & Co., and am therefore not able to give the volume of water consumed at my works, the weight of coal used, the ashes made or what is done with them. I manufacture yearly goods of the value of 6,000*l*. Do not use any dye wares, bleaching materials, soap, alkali, or urine. The excrements of my workpeople are removed by a contractor under the Bradford Corporation. No suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George Alderson Smith & Company, Worsted Weavers.	Upper Castle Street, Manchester Road, Bradford.	Our works are situated on *Bowling Beck*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 250 hands. Rateable value of works, 491*l*. The bed of the river has not silted up. Our works are not affected by floods. The *Beck* is seriously polluted by dye and other works; by sewage; but not by mines. Obtain supply of water from the river, which is pumped to a reservoir and allowed to settle; but it is only used for condensing purposes. Manufacture yearly goods of the value of from 60,000*l*. to 70,000*l*. We do not produce any liquid refuse at our works. Do not use either dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 25 nominal horse power. Consume yearly about 800 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople flow into the sewers, and thence into the river. Have no suggestions to offer.
Robert Wilkinson, Worsted Manufacturer.	Spring Head Mills, Bradford.	My works are situated near an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 100 hands. Do not know the rateable value of mill. Obtain supply of water from waterworks, and consume yearly 26,000 gallons. Manufacture yearly 120,000 lbs. of goods, of the value of 14,500*l*. The waste liquid produced at my works flows direct into the sewers, and thence into the stream. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 12 nominal horse-power, but as I rent power am not able to state the quantity of coal used or what is done with the ashes. The excrements of my workpeople flow by waterclosets into sewers, and thence into the stream. Have no suggestions to offer.
John Rawnsney, Worsted Spinner and Manufacturer.	Marshall Mills, Manchester Road, Bradford.	My works are situated on a Beck, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 800 hands. Rateable value of works, 990*l*. The bed of the stream has silted up. My works are not affected by floods. The condition of the stream has not changed within the last 10 years. It is polluted by works above, but not by mines. I obtain a supply of water from the reservoirs of Messrs. Edward Ripley and Sons, but have never measured the volume consumed at my works yearly. If the stream were rendered clear and colourless it would be a direct money value to me of 50*l*. a year. I manufacture yearly 400,000 lbs. of goods, of the value of 60,000*l*. Produce yearly liquid refuse, as soapsuds, 200,000 gallons; these flow into depositing tanks, but the other liquid refuse produced flows direct into the river. Do not use dye wares or bleaching materials. Use yearly 480 gallons of olive oil, of the value of 120*l*. Produce yearly 10,000 lbs. of waste wool, in carding, which is sold to clothiers. Use yearly soap, 20,000 lbs. The soapsuds are treated for the recovery of grease, by which we gain 20*l*. a year. Use steam, 55 nominal horse-power. Consume yearly 2,500 tons of coal. Make 250 tons of ashes, which are used to repair roads. The excrements of our workpeople are removed by farmers in the night-time, and used for manure. Have no suggestions to offer.
Oates, Ingham, & Sons, Dyers of Cotton and Worsted Yarns, Slubbing Pieces, and Finishers of Stuff Goods.	Vale Dye Works, Bradford.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 600 hands. Rateable value of works, 2,342*l*. The bed of the Beck has silted up, caused by solid and other polluting matters thrown into it. Our works are not affected by floods. It is impossible fitly to describe the fearfully polluted state of this *Beck*. It has always been within our knowledge, and is now, *black and filthy*, and is polluted to the fullest extent possible. Obtain supply of water from wells and from the Corporation waterworks, and consume, yearly 96,000,000 gallons. We finish about 800 pieces daily from 6*d*. to 1*s*. 6*d*. per piece. We dye daily 2,500 pieces black, at 1*s*. 3*d*. per piece; also in slubbing (which is wool already scoured by the spinner) 6,000 lbs. from 1*s*. ½*d*. to 1*s*. 2*d*. per lb., and 2,000 lbs. of cotton black at 2*s*. 0½*d*. per lb. 2,000 lbs. of cotton in various colours at 1*s*. 0½*d*. to 2*s*. 6*d*. per lb. We print daily 240 lbs. of worsted from 10*d*. to 1*s*. 6*d*. per lb. Produce 52,944,000 gallons of liquid refuse from washing, printing, and dyeing, which flows direct into the *Beck*. Use yearly as dye wares, rasped logwood 1,560,000 lbs., chipped logwood 1,048,320 lbs., fustic 34,736 lbs., peachwood 8,736 lbs., sumach 419,328 lbs., chloride of lime 26,480 lbs., gambir 87,360 lbs., bichrome 53,760 lbs., spirits of salts 76,232 lbs., sulphuric acid 154,076 lbs., nitric acid 80,572 lbs., ammonia 28,032 lbs., aniline colours 3,000 lbs., extract of indigo 107,520 lbs., cudbear 35,829 lbs., grain tin 6,720 lbs., soda ash 79,440 lbs., cochineal 10,752 lbs., indigo 1,660 lbs., sulphate of iron 179,200 lbs., sulphate of copper 26,880 lbs. The spent dye woods are burned under our boilers. Use yearly as bleaching materials 26,480 lbs. of chloride of lime, and 13,240 lbs. of sulphuric acid. Use yearly 358,800 lbs. of soap, and 79,440 lbs. of soda and bleaching powder.

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Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Oates, Ingham, & Sons, Dyers of Cotton and Worsted Yarns, Slubbing, Pieces, and Finishers of Stuff Goods —*cont.*	Vale Dye Works, Bradford —*cont.*	The soapsuds are not treated for the recovery of the grease. Use steam, about 350 nominal horse-power Consume yearly 24,258 tons of coal, the ashes from which are piled in a heap, and used for building purposes by ourselves, and any one who likes to fetch them. None are put into the stream. The excrements of our workpeople are used as manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Edward Ripley & Sons, Dyers and Finishers.	Bowling, Bradford.	Our works are situated on the *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 700 hands. Rateable value of works, 1,800*l*. The bed of the stream is entirely dry for months during the summer above the point where we discharge our liquid refuse into it. Our works are not affected by floods. Obtain supply of water from wells sunk to the old coal workings, from bore-holes below the coal workings, and a small quantity from springs; and consume yearly, 450,000,000 gallons. We dye, yearly, goods of the value of about 1,500,000*l*. The whole of the water consumed, viz., 450,000,000 gallons, after being used for dyeing and washing purposes, is discharged into the *Beck*. We have depositing tanks for our own convenience, and the water they contain is used for condensing purposes at the mills situate below our works. We use yearly from 800 to 900 tons of woods and other solid dye-wares, 400 to 500 tons of alum, bichromate of potash, soda, sulphate of copperas, ammonia, glauber salts, and soap. We also use 400 tons of sulphuric, nitric, and muriatic acids. The soapsuds cannot be separated in our operations, and therefore cannot be treated for the recovery of the grease. Use steam, about 1,000 nominal horse-power. Consume yearly about 21,000 tons of coal, the ashes from which are used principally as ballast for railways. The excrements of our workpeople are collected, and used as manure on land. We do not see how pollution can be avoided in our case, except by stopping our works. Have no suggestions to offer as to the conservancy of rivers and streams, as it is a difficult question to be dealt with.
Benjamin Ingham, Dyer and Bleacher.	Eastbrook Dye Works, Bradford.	My works are situated on the *East Brook*, an affluent of *Bradford Beck*, a tributary of the *Aire*. Employ 134 hands. Rateable value of works, 240*l*. The bed of the stream has not silted up within my knowledge. My works are not affected by floods. The condition of the stream is more foul than it was in 1865, when I first occupied these works. The stream is polluted by liquid refuse from manufactories above; not to my knowledge by mines. Obtain supply of water jointly from bore-holes, and from waterworks of the Bradford Corporation, and consume yearly 22,030,000 gallons. If the stream, from which I might derive my supply of water, were rendered clear and colourless, I should not be able to use it profitably, as the supply is so uncertain. I bleach and dye yearly 2,500,000 lbs. of goods, of the value of from 190,000*l*. to 200,000*l*. About one-third of the water used is fouled; but the remainder is only slightly polluted. I have no depositing tanks; the whole of the waste liquid flows direct into the stream. Use yearly 900,000 lbs. of dye woods, drugs, and aniline colours. All the spent dye stuffs are mixed with the coal and burned. Use yearly as bleaching materials, sulphur 11,200 lbs., chloride of lime 9,000 lbs.; do not use any oil. Use, yearly, soap 500 packs. The soapsuds are treated for the recovery of grease by a neighbour, and I receive an equivalent in water. Use steam, 30 nominal horse-power. Consume yearly 3,880 tons of coal, the ashes from which are taken away every day by farmers. The excrements of our workpeople flow by waterclosets into the stream. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
S. H. Kershaw, Worsted Spinner.	Laister Dyke, Bradford.	My works are situated on the *East Brook*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 350 hands. Rateable value of works, 440*l*. Obtain supply of water jointly from wells and from waterworks company, but do not know the annual consumption at my works. Manufacture yearly 800,000 lbs. of yarn, of the value of 120,000*l*. The whole of the waste liquid produced except soapsuds flows direct into sewers, and thence into the river. Do not use either dye wares or bleaching materials, but use yearly 2,400 gallons of Gallipoli oil, of the value of 600*l*., and soap 75,000 lbs.; the soapsuds are treated for the recovery of grease, by which I gain 80*l*. a year. Use steam, 62 nominal horse-power. Consume yearly 2,500 tons of coal; the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, South Bank)—*continued.*

Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joseph Jowett, Worsted Stuff Weaver.	Laister Dyke Mills, Bradford.	My works are situated on the *East Brook*, an affluent of *Bradford Beck*, tributary of the *Aire*. Employ 70 hands. I hire power from S. H. Kershaw. Manufacture yearly 156,000 lbs. of goods, of the value of 27,000*l*. The whole of the waste liquid produced by us flows direct into the sewers, and thence into the *Beck*. As I hire power from S. H. Kershaw, we refer to answers to queries furnished by him as to the horse-power, the weight of coal used, and what is done with the ashes. The excrements of my workpeople are carried away in carts to be used as manure. Have no suggestions to offer.
G. H. Leather, Manufacturing Chemist.	Wharf Street, Bolton Road, Bradford.	My works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 16 hands. Rateable value of works, 255*l*. The bed of the stream has silted up, caused by solid refuse thrown into it from works and manufactories. My works are not affected by floods. The *Beck* is very seriously polluted by every kind of manufacturing refuse, by town sewage, and by mines. Obtain supply of water from wells, and consume yearly about 500,000 gallons. There are at my works three condensing towers, 18 feet high, 2 feet 6 square. Use yearly 1,100 tons of sulphur, and 92½ tons of nitrate of soda. Produce yearly 6,200,000 lbs. vitriol sp. gr. 1·720, and 862,600 lbs. sp. gr. 1·845; also aquafortis 4,266 lbs. sp. gr. 1·160, and 2,441 lbs. sp. gr. 1·320. Do not produce any liquid refuse. Use yearly 1,470 tons of coal; the ashes produced at my works are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Samuel Sutcliffe and Sons, Cotton Spinners.	Valley Road, Bradford.	Our works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 280 hands. Rateable value of works, 2,220*l*. The bed of the stream has silted up, caused by solid and liquid refuse thrown into it from manufactories and works. Our works are slightly affected by floods. The condition of the river has been most foul, and seriously polluted. Obtain supply of water from springs, and in very dry weather from the Corporation waterworks, but have no means of ascertaining the volume used yearly in our works. We manufacture 520,000 lbs of goods (spinning and doubling). The whole of the liquid refuse produce at our works flows direct into the river. Do not use either soap, alkali, or urine. Use steam, 160 nominal horse-power. Consume yearly 4,200 tons of coal, the ashes from which are used for levelling land and repairing roads. The excrements of our workpeople are cast into the *Beck*. No suggestions to offer.
Critchley, Armstrong, & Company, Cotton and Worsted Manufacturers.	Holdsworth Street, Bradford.	Our works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 130 hands. Rateable value of works, 400*l*. The bed of the stream opposite our works is paved; our works are affected by floods, owing to the contraction of the river channel. The river is polluted to a serious extent by refuse from woollen manufactories, dye and bleach works, and by town sewage. Obtain supply of water jointly from wells and from waterworks, but do not know the annual consumption at our works. Manufacture yearly 109,508 lbs. of goods, of the value of 16,426*l*. The waste liquid produced at our works flows direct into the stream. Use steam, 20 nominal horse-power Consume yearly 800 tons of coal; the ashes from which are carted away from our premises. The excrements of our workpeople flow into the *beck*. Have no suggestions to offer.
S. Townshend, Cotton, Hank, Printer, Winder, and Warper.	Albert Mill, Miller's Gate, Bradford.	My works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 40 hands. Rateable value of works, 150*l*. The bed of the stream has not silted up opposite my works. My works are not affected by floods. The *Beck* is arched over near the works, and it is seriously polluted by works above. Obtain supply of water from the Bradford Corporation Waterworks, and consume yearly 800,000 gallons. If the stream from which we might derive our supply of water were rendered clear and colourless, it would be a direct money value to me of 30*l*. yearly. I print yearly 70,000 lbs. of yarns, of the value of 12,000*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the *Beck*. Use yearly as dye wares: logwood liquor, 5,000 lbs.; iron and red liquor, 200 lbs.; gums, 800 lbs. Use yearly bleaching materials: chloride of lime, 1,680 lbs.; soda ash, 560 lbs.; vitriol, 2,000 lbs. Do not use any oil, soap, or urine, but use, yearly, alkali, a quarter of a ton. Use steam, 2 nominal horse-power. Consume yearly 150 tons of coal, the ashes from which are used in paving the streets. The excrements of my workpeople are conveyed into sewers, and thence into the river. Have no suggestions to offer.

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Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Gledhill, Ashworth & Company, Sizers.	Gordon Street, Bradford.	Our works are situated on *Bowling Beck*, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 11 hands. Rateable value of works, 148*l*. 10*s*. The bed of the *Beck* has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge; it is polluted by works above, but not by mines. Obtain our supply of water from waterworks, but do not know the annual consumption at our works. We size yearly about 300 tons of goods, and use yearly in the making of size 700 sacks of flour. The liquid refuse produced at our works flows direct into sewers, and thence into the *Beck*. Use steam, 16 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are carted away to various places where we can tip them. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the stream. Have no suggestions to offer.
James Walker, Sizer.	Thornton Road, Bradford.	Our works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 12 hands. Rateable value of works, 136*l*. The bed of the *Beck* has not silted up opposite our works. Our works are not affected by floods. The condition of the stream is much the same as it has been for many years. It is very seriously polluted by refuse from dye houses, woollen, and other manufactories. Obtain supply of water from the Bradford Corporation waterworks, and consume yearly 1,090,000 gallons. We, yearly, size goods of the value of from 4,000*l*. to 5,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Use yearly from 500 to 600 sacks of flour as size; but do not use either oil or soap. Use steam, 10 nominal horse-power. Consume 864 tons of coal, the ashes from which are used partly in paving the roads andfor mortar. The excrements of our workpeople are cast into sewers and thence into the river. We suggest, as the best means of avoiding pollution in future, that all liquid refuse should be purified before being allowed to pass into rivers and streams.
Titus Gankroger, Sizer.	Spring Mill Street, Bradford.	My works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 16 hands. Rateable value of works, 100*l*. The bed of the stream has not silted up near our works. Our works are not affected by floods. The stream is very seriously polluted by works above, not by mines. Obtain my supply of water from the reservoir of Messrs. Edward Ripley and Sons. Size yearly, 400,000 lbs. of warps. Use yearly 300 sacks of flour as size, but do not use either oil or soap. The waste liquid refuse produced at my works flows direct into the *Beck*. Use steam, 16 nominal horse-power. Consume 1,000 tons of coal, the ashes from which are carted away. The excrements of our workpeople are carted away for manure. Have no suggestions to offer.
John Mills, Sizer.	Fulton Street, Thornton Road, Bradford.	My works are situated on a goit that flows into *Bradford Beck*, a tributary of the *Aire*. Employ 7 hands. Rateable value of works, 52*l*. 10*s*. The bed of the goit is very much silted up with solid and liquid refuse and spent dye stuffs. My works are affected by floods, but not to any serious extent. The goit is getting gradually worse year by year; it is seriously polluted by every kind of liquid and solid refuse. Obtain supply of water partly from the goit and from the Bradford Waterworks Company. If the water of the goit was rendered clear and colourless, it would be worth, in direct money value to me, 20*l*. a year. I size 539,760 lbs. of warps yearly. The whole of the liquid refuse produced at my works flows into the goit. Use yearly, in the preparation of size, 300 sacks of wheat and sago flour. Do not use any clay. Do not use either oil or soap. Use steam, 8 nominal horse-power. Consume yearly, 600 tons of coal, the ashes from which are used as ballast on railways. The excrements of my workpeople, mixed with stable manure, are used as manure. No suggestions to offer.
George Anderson, Stuff Manufacturer.	Leeds Road, Bradford.	My works are situated near *Bradford Beck*, a tributary of the *Aire*. Employ 120 hands. Rateable value of works, 500*l*. My works are not affected by floods. Obtain supply of water from Corporation waterworks, and consume yearly upwards of 300,000 gallons. Manufacture yearly 180,000 lbs. of goods of the value of 40,000*l*. The liquid refuse produced at my works flows direct into sewers, and thence into the stream. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 90 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are carted away by a contractor, to be used in building operations. The excrements of my workpeople are deposited in tanks, and the contents removed by carts every three months. Have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, South Bank)—*continued.*

Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Hill, Stuff Manufacturer.	Richmond Road, Bradford.	My works are situated near to *Bradford Beck*, a tributary of the *Aire*, Employ 140 hands. Rateable value of works, 305*l*. My works are not affected by floods. Obtain supply of water from Corporation waterworks; and consume yearly 540,000 gallons. Manufacture yearly 80 tons of goods, of the value of 40,000*l*. The whole of the liquid refuse produced at my works flows into sewers, and thence into the stream. Do not use any dye wares or bleaching materials, oil, soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are taken away to be used for street paving and for mixing with lime for mortar. The excrements of my workpeople are conveyed by waterclosets into the sewers, and thence into the *Beck*. I would suggest as the best means of avoiding pollution in future, that the whole of the sewage and refuse should be utilized in irrigation.
W. Mossman, Stuff Manufacturer.	Zetland Mills, North Brook Street, Bradford.	My works are situated near *Bradford Beck*, a tributary of the *Aire*. Employ 130 hands. Do not know the rateable value of works, the rates being paid by the landlord. My works are not affected by floods. Obtain supply of water jointly from wells and waterworks; but do not know the annual consumption at my works. The landlord, under whom H. R. Halstead and I are joint tenants, pays the water rates. I manufacture yearly 200,000 lbs. of goods, of the value of 40,000*l*. The whole of the waste liquid produced at my works flows direct into sewers and thence into the stream. Do not use any dye wares or bleaching materials, soap, alkali, or urine. Steam power is used jointly by H. R. Halstead and myself; this also is provided by our landlord. The solid excrements of our workpeople are conveyed by sewers into the stream, but the urine is removed by clothiers to be used in the cloth manufacture. Have no suggestions to offer.
H. R. Halstead, Worsted Manufacturer.	Zetland Mills, North Brook Street, Bradford.	My works are situated near the *Bradford Beck*, a tributary of the *Aire*. Employ 100 hands. I do not know the rateable value of the works, the rates being paid by the landlord. My works are not affected by floods. Obtain supply of water jointly from wells and waterworks; but do not know the annual consumption at my works. The landlord, under whom W. Mossman and I are joint tenants, pays the water rates. I manufacture yearly 104,000 lbs. of goods of the value of 30,000*l*. The whole of the waste liquid produced at my works flows into sewers, and thence into the stream. Do not use any dye wares or bleaching materials, soap, alkali, or urine. Steam power is used jointly by W. Mossman and myself; this also is provided by our landlord. The solid excrements of our workpeople are conveyed by sewers into the stream, and the urine is removed by clothiers, to be used in the cloth manufacture. Have no suggestions to offer.
Robert Petty & Company, Stuff Manufacturers.	Thornton Road, Bradford.	Our works are situated on *Bradford Beck*. Employ 90 hands. Rateable value of works, 117*l*. The bed of the stream has silted up. Our works are partly affected by floods. The condition of the stream is a perfect nuisance, especially in hot weather. It is seriously polluted by every kind of manufacturing refuse, and by town sewage. Obtain our supply of water from the Bradford waterworks, but do not know the annual consumption at our works. We manufacture yearly from 60 to 70 tons of goods, of the value of 30,000*l*. The whole of the liquid refuse produced at our works flows direct into the *Beck*. Use steam jointly with other persons, and are therefore unable to give the nominal horse-power, the weight of coal consumed, or what is done with the ashes. The excrements of our workpeople flow into the *Beck*. Have no suggestions to offer.
Getz & Company, Stuff Manufacturers.	Fleece Mills, Thornton Rd., Bradford.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 82 hands. Rates paid by the landlord The bed of the stream has silted up. Our works are not affected by floods. The condition of the stream is very dirty; it stinks continually, and has done so for several years past. It is seriously polluted by dye works and mills above, and is in fact perfectly black. Obtain supply of water from the stream; but do not know the annual consumption at our works. We manufacture yearly 184,000 lbs. of goods, of the value of 30,000*l*. The whole of the waste liquid produced at our works flows direct into the *Beck*. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 40 nominal horse-power. The coal is supplied by the landlord, from whom we hire power; do not know what is done with the ashes. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future, that the waste liquids from manufactories should be filtered, and town sewage kept out of rivers and streams.

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Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Lockwood & Company, Stuff Manufacturers.	Ripley Mills, Bradford.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 80 hands. Do not know the rateable value of the works, rates are paid by the landlord. Our works are not affected by floods. The river is seriously polluted by works above, not to our knowledge by mines. Obtain our supply of water from the beck, but do not know the annual consumption at our works. We do not know the value of the goods manufactured at our works yearly. The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials, oil, soap, alkali, or urine. Use steam, 10 nominal horse-power. The coal is supplied by the landlord of the premises from whom we hire power; do not know what is done with the ashes. The excrements of our workpeople are carted away and used for manure. No suggestions to offer.
Sawer, Shackleton, & Company, Stuff Manufacturers.	Concordia Mills, Leeds Road, Bradford.	Our works are situated near the *Bradford Beck*. Employ 150 hands. Rateable value of works, 260*l*. Our works are not affected by floods. Obtain supply of water from wells. Manufacture yearly, goods of the value of 30,000*l*. The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. Do not use either dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 29 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used for the making of mortar for building purposes. The excrements of our workpeople are conveyed into sewers, and thence into the stream. Have no suggestions to offer.
Henry Mason, Worsted Spinner and Manufacturer.	North Brook Street, Bradford.	My works are situated near the *Bradford Beck* a tributary of the *Aire*. Employ 573 hands. Do not know the separate rateable value of works. The *Beck* has silted up, caused by solid refuse thrown into it. My works are not affected by floods. During the past 30 years the *Beck* has been much fouled by the increase of dye works, mills, and factories, and by town sewage; but I believe it is not polluted by mines. Obtain supply of water jointly from wells and from the Bradford Waterworks Company; cannot tell the annual consumption at my works. Manufacture yearly goods of the value of 100,000*l*. The whole of the liquid refuse produced at my works flows direct into the sewers, and thence into the *Beck*. I do not use either dye wares or bleaching materials, oil or soap. I hire power from Messrs. William Ross and Company. Do not know the weight of coal consumed, or what is done with the ashes. The excrements of my workpeople are carted away to be used as manure. No suggestions to offer.
Northend and Taylor, Worsted Manufacturers.	Girlington, near Bradford.	Our works are situated on an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 90 hands. We are not able to state the rateable value of works. Our works are not affected by floods. Obtain supply of water from the Bradford Corporation Waterworks, and consume yearly 250,000 gallons. Manufacture yearly 125,000 lbs. of goods, of the value of 16,000*l*. The whole of the liquid refuse produced at our works flows direct into sewers and thence into the stream. Do not use any dye wares, or bleaching materials, oil, soap, alkali, or urine. Use steam, 12 nominal horse-power. Consume yearly 300 tons of coal, the ashes from which are carted away from the premises. The excrements of our workpeople are removed by a contractor under the Corporation. Have no suggestions to offer.
J. Cure & Company, Wool Comber.	Manchester Road, Bradford.	Our works are situated on a *Beck*, separating the townships of Horton and Bowling, an affluent of the *Bradford Beck*, a tributary of the *Aire*. Employ 37 hands. Rateable value of works, 159*l*. Our works are not affected by floods. The stream is polluted by works above and by mines. Obtain supply of water jointly from the *Beck* and from the Bradford Corporation Company, and consume yearly 884,000 gallons. Manufacture yearly 872,276 lbs. of goods, of the value of 65,420*l*. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the *Beck*, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly six tons of Gallipoli oil, of the value of 330*l*. The waste wool produced in the process of carding is used for manure. Use yearly soap, 260 packs. The soapsuds are treated for the recovery of grease, by which we gain 20*l*. a year. Use steam, 16 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are mixed with the excrements of our workpeople and carted on to land. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Henry Cautley & Company, Worsted Manufacturers.	Portland Mills, Croft Street, Bradford.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 313 hands. Do not know the rateable value of the mill as the rates are paid by the landlord. The bed of the stream has silted up. Our works are affected by floods. The condition of the stream is filthy; it is polluted to a great extent by dye works, manufacturing refuse of all kinds thrown into it, and by town sewage; not by mines. Obtain supply of water jointly from wells and from waterworks company. The water is supplied to us by our landlord in consideration of his receiving the soapsuds in return. Do not know the annual consumption of water at our works. We manufacture yearly goods of the value of 40,000*l*. The whole of the liquid refuse, as soapsuds, produced at our works flows into iron pipes, and so is conveyed to the adjoining works, where they are treated for the recovery of grease, but the other waste liquid produced flows directly into sewers and thence into the stream. We do not use either dye wares or bleaching materials. Use yearly four tons of Gallipoli oil, of the value of 250*l*.; use yearly soap 120 packs. We rent steam power, and are therefore not able to give the quantity of coal used, or say what is done with the ashes. The excrements of our workpeople flow direct into the *Beck*. Have no suggestions to offer.
Alfred Priestman & Company, Worsted Spinners and Manufacturers.	Black Lane Mills, Bradford.	Our works are situated near the *Bradford Beck*, a tributary of the *Aire*. Employ 350 hands. Rateable value of works 960*l*. Our works are not affected by floods. Obtain supply of water from the Bradford Waterworks Company. Consume yearly 2,500,000 gallons. Manufacture yearly goods of the value of 80,000*l*. The whole of the waste liquid, as soapsuds, flows into a tank; the other waste liquid produced flows into the town sewers, and thence into the river. We do not use either dye wares or bleaching materials. Use yearly Gallipoli oil, of the value of 500*l*., and soap 140 packs, but no alkali or urine. The soapsuds are treated for the recovery of grease, and we gain 4*s*. per pack by the extraction. Use steam, 33 nominal horse-power. Consume yearly about 2,000 tons of coal, the ashes from which are used with mortar for building purposes. The excrements of our workpeople are conveyed by waterclosets into sewers and thence into the *Beck*. No suggestions to offer.
J. G. Horsfall & Company, Worsted Manufacturers.	North Wing Mills, Bradford.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 300 hands. Rateable value of works 497*l*. Our works are not affected by floods. Obtain supply of water from wells, but do not know the annual consumption at our works. Manufacture yearly 312,000 lbs. of goods, of the value of 50,000*l*. Do not use either dye wares, bleaching materials, oil, soap, or alkali. Use steam, 40 nominal horse-power. Consume yearly 700 tons of coal. Make 100 tons of ashes, which are carted away for repairing the roads. The excrements of our workpeople are carted away for manure. Have no suggestions to offer.
Charles Hastings & Company, Combers and Spinners of Worsted Yarns.	Providence Mills, Thornton Road, Bradford.	Our works are situated on a goit which flows into *Bradford Beck*, a tributary of the *Aire*. Employ 220 hands. Rateable value of works 737*l*. The bed of the goit silts up, but is occasionally cleared out. Our works are not affected by floods. The goit is now very foul from town sewage, liquid refuse from dye and other works, and it is polluted to a very considerable extent. Obtain supply of water for condensing purposes from the goit, and for other purposes from wells and from the Bradford Corporation Waterworks, but do not know the annual consumption at our works. We comb yearly 813,327 lbs. of goods, of the value of 81,333*l*., and spin 313,984 lbs. of the value of 35,324*l*. Produce yearly liquid refuse, as soapsuds, 2,000,000 of gallons; these flow into a depositing tank. The other waste liquid produced flows direct into the goit, and thence into the river. We do not use either dye wares or bleaching materials. Use yearly 13 tons of Gallipoli oil, of the value of 720*l*. We produce yearly 9,000 lbs. of waste wool in carding, which is sold to waste dealers. Use yearly soap 60,000 lbs., alkali 12,000 lbs., but no urine. The soapsuds are treated for the recovery of grease, and we gain by the extraction 70*l*. per annum. Use steam 35 nominal horse-power. Consume yearly 2,100 tons of coal, the ashes from which are carted away for repairing roads. The excrements of our workpeople flow into the mill goit, and thence into the stream. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Edward Smith & Company, Worsted Manufacturers.	Industry Mills, Thornton Rd, Bradford.	Our works are situated near *Bradford Beck*. Employ 200 hands. As we rent power as well as premises from Mr. William Carter, of Neal Street, Bradford, we do not know the rateable value of works,

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Edward Smith & Company, Worsted Manufacturers —*cont.*	Industry Mills, Thornton Road, Bradford—*cont.*	or the annual consumption of water for condensing purposes. The water we require for other purposes is only a small quantity, and this we obtain from the Bradford Corporation. We manufacture, yearly, goods of the value of 50,000*l.*, but do not produce any liquid refuse. Do not use oil or soap. As the steam power is rented with the premises we are unable to give the horse-power; the quantity of coal used; or to state what is done with the ashes. The excrements of our workpeople are conveyed by a sewer into the *Beck*. Have no suggestions to offer.
William Woodhead & Company, Worsted Weavers and Manufacturers.	Thornton Road, Bradford.	Our works are situated on a goit which flows into *Bradford Beck*, a tributary of the *Aire*. Employ 150 hands. Rateable value of works, 248*l.* The goit is polluted by refuse from manufactories, and by sewage; obtain our supply of water from the goit, but do not know the annual consumption at our works. We manufacture yearly 254,800 lbs. of goods, of the value of 36,400*l.* Do not use oil or soap. Use steam, 15 nominal horse-power; but as this power is rented with the premises we are unable to give the weight of coal used; or what is done with the ashes. The excrements of our workpeople are removed by carts and used for manure. Have no suggestions to offer.
James Procter, Worsted Manufacturer.	Penny Oaks Mills, North Parade, Bradford.	Our works are situated on a stream which flows into *Bradford Beck*, a tributary of the *Aire*. Employ 90 hands. Do not know the rateable value of the works as the landlord pays rates. The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above, and by sewage. Obtain supply of water partly from the river and partly from the corporation waterworks; but do not know the annual consumption at our works. We manufacture yearly from 60 to 70 tons of cotton, of the value of from 22,000*l.* to 24,000*l.* The whole of the waste liquid produced at our works flows into the brook. We do not use dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 10 nominal horse-power; but as we hire steam-power from Mr. B. Ingle, the proprietor of the mills, we are unable to give the weight of coal used, or to state what is done with the ashes. The urine of our workpeople is carted away to woollen mills to scour cloth, and the solid excrement is conveyed to land to be used as manure. Have no suggestions to offer.
Daniel Sharp & Sons, Worsted Manufacturers.	Tatler Street, Thornton Road, Bradford.	Our works are situated upon a goit which flows into *Bradford Beck*, a tributary of the *Aire*. Employ 75 hands. Rateable value of works, 390*l.* The bed of the stream has silted up. Our works are not affected by floods. The water of the goit is as black as ink. This has been its state for the last 15 years. It is very seriously polluted by works above, by town sewage; but not by mines. Obtain our supply of water partly from the goit and partly from waterworks, but are unable to state the annual consumption at our works. Manufacture yearly 124,000 lbs. of goods, of the value of 18,000*l.* The whole of the liquid refuse produced at our works flows unfiltered into the goit, and thence into the *Beck*. We do not use dye wares, bleaching materials, oil, alkali, soap, or urine. Use steam, two-thirds of 25 nominal horse-power, there being two other tenants besides ourselves; we are therefore unable to state the quantity of coal used, or what is done with the ashes. The excrements of our workpeople flow into the goit and thence into the *Beck*. We have no suggestions to offer.
A. C. Bartum & Company, Worsted Spinners and Weavers.	Newland Mills, Bradford.	Our works are situated near *Bradford Beck*. Employ 250 hands. Rateable value of works, 857*l.* Obtain our supply of water jointly from springs and from waterworks, but cannot give annual consumption at our works. Manufacture yearly, goods of the value of 65,000*l.* The whole of the waste liquid produced at the works flows direct into a sewer, and thence into the *Beck*. Use yearly 160 gallons of Gallipoli and sperm oils, of the value of 40*l.* Do not use soap, alkali, or urine. Use steam, 220 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are used partly for repairing roads, and partly for building purposes. The excrements of our workpeople are conveyed into tanks and thence on to land for agricultural purposes. We suggest as the best means of avoiding pollution in future that the whole of the sewage should be utilized in irrigation, and that manufacturers should be prevented from turning solid or liquid refuse into rivers and streams. Have no special suggestions to offer as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Taylor & Bateman, Worsted Manufacturers.	Valley Works, Manningham, near Bradford.	Our works are situated on *Bradford Beck*, a tributary of the *Aire*. Employ 280 hands. The bed of the stream has silted up. Our works are not affected by floods. There has been very little alteration in the condition of the stream during the last 5 years. It is polluted to an enormous extent by every species of liquid and solid refuse, but not by mines. We hire room and power, and our landlord pays rates and supplies the water for our consumption, we are unable to give the quantity used yearly. If the river, from which we might derive our supply of water, were rendered clear and colourless, it would be of considerable money value to us. We manufacture yearly goods 360,000 lbs. of the value of 50,000*l.* Produce yearly, liquid refuse, as soapsuds, 2,470,000 gallons. This and the whole of the other waste liquid produced flows direct into *Bradford Beck*. We do not use either dye wares or bleaching materials, but use yearly 380 gallons of Gallipoli oil, of the value of 81*l.*, also soap 35 packs, and soda ash 85 cwt. The soapsuds are not treated for the recovery of grease. As we only hire power from Messrs. S. Sutcliffe and Sons, who are joint occupiers with us, we are unable to state the nominal steam power, the quantity of coal used, what is done with the ashes, or what is done with the excrements of our workpeople. Have no suggestions to offer.
John Exley & Son, Worsted Spinners.	Fuzzing Hill, Shipley.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 200*l.* The bed of the stream has silted up. Our works are not affected by floods. The *Bradford Beck* is very seriously polluted by works above and by town sewage; not by mines. Obtain supply of water from a *Beck* flowing from Wrose Hill, Idle, but are not able to give the annual consumption at our works. Manufacture yearly, 100 tons of yarn of the value of 18,000*l.* to 20,000*l.* The whole of the liquid refuse produced at our works flows unfiltered into the sewers. Do not use dye wares or bleaching materials, but use yearly 140 gallons of Gallipoli oil, and soap, 80 packs. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly, 700 tons of coal, the ashes from which are used to repair roads and for building purposes. The excrements of our workpeople are used for manure. No suggestions to offer.
G. & T. Denby, Worsted Spinners and Manufacturers.	Wood End, Wind Hill, and Low Well Mills, Shipley.	Our works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 140 hands. Rateable value of works, 431*l.* 13*s.* 4*d.* The bed of the stream has silted up. Our works are not affected by floods. The stream is seriously polluted by town sewage and liquid refuse from manufactories and works above; not to our knowledge by mines. Obtain supply of water from stream and springs. Manufacture yearly, 80 tons of goods of the value of 16,000*l.* Produce yearly, liquid refuse, as soapsuds, 150,000 gallons; this flows into depositing tanks. The other waste liquid produced flows direct into the *Beck*. Do not use dye wares or bleaching materials. Use yearly 600 gallons of olive and sperm oil, of the value of 150*l.* Do not produce any waste wool. Use yearly, soap 50 packs. The soapsuds are treated for the recovery of grease, by which we gain 15*l.* yearly. We rent power, and therefore are unable to state the horse-power used, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
William Wright, Paper Manufacturer.	Hurst Mills, Shipley.	My mills are situated on the river *Aire*. Employ 11 hands. Rateable value of mills, 270*l.* The bed of the river has not silted up. My mills are not affected by floods. The condition of the stream has not altered within my knowledge. It is polluted by works above; not by mines. Obtain supply of water from the river, but am not able to state the annual consumption at my mills. Use yearly, rags 70 tons. The whole of the waste liquid produced at my mills flows unfiltered into the river. Produce yearly, 40 tons of press paper. Do not make any rag dust. Use water as power, 20 to 30 nominal horse-power. Use 80 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople flow by waterclosets into the river. No suggestions to offer.
G. Garnett & Sons, Woollen Manufacturers.	Valley Mills, Shipley Bridge.	Our works are situated on the *Haigh Beck*, a tributary of the *Aire*. Employ 60 hands. Rateable value of works, 170*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above, and by mines. Obtain supply of water from wells; and consume, yearly, 8,000,000 gallons. Manufacture yearly, goods of the value of 12,480*l.* Produce, yearly, 8,000,000 gallons

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
G. Garnett & Sons, Woollen Manufacturers—*cont.*	Valley Mills, Shipley Bridge—*cont.*	of liquid refuse from washing, which flows direct into the sewers, and thence into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly Gallipoli and cloth oil. The whole of the waste wool produced in carding is sold to waste dealers. Use yearly, soap, 3 tons: soda, 4 tons, and urine, 70 tons. The soapsuds are not treated for the recovery of grease. Use steam, 16 nominal horse-power. Consume yearly, 1,040 tons of coal; make about 200 tons of ashes, which are used principally for building purposes. The excrements of our workpeople are used for manure. No suggestions to offer.
Benjamin Crabtree, Worsted Spinner and Manufacturer.	Cragg Mills, Windhill.	My works are situated on the *Bradford Beck*, a tributary of the *Aire*. Employ 220 hands. Rateable value of works, 343*l.* 7*s.* The bed of the stream has silted up. My works are not affected by floods. The condition of the stream has not varied much within my knowledge. It is very seriously polluted by works above; not by mines. Obtain supply of water jointly from *Bradford Beck* and the waterworks company. Do not know the annual consumption at my works. Manufacture yearly goods of the value of from 30,000*l.* to 40,000*l.* Have no depositing tanks. The whole of the liquid refuse produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly Gallipoli oil, of the value of 120*l.* Do not use either soap, alkali, or urine. Use steam, 40 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
The New Mill Company, Woollen Manufacturers.	Idle - -	Our works are situated near the river *Aire*. Employ 100 hands. Rateable value of works, 430*l.* 8*s.* Our works are not affected by floods. The river is polluted by town sewage and works above. The main sewer of the village of Idle passes through our premises, and conveys the whole of the sewage of the village and the refuse from the manufactories into the river *Aire*. Obtain supply of water jointly from wells and from the Bradford waterworks. Manufacture yearly, 52,000 lbs. of goods. The whole of the waste liquid produced at our works flows into sewers, and thence into the river. Do not use dye wares or bleaching materials. Use yearly, Gallipoli oil and Price's patent oil, of the value of 1,800*l.* Produce 28 tons of waste wool in the process of carding, which is sold to waste dealers. Use yearly, soap, 7 tons; alkali, 6 tons; and urine, 50,000 gallons. The soapsuds are treated for the recovery of grease. Use steam, 40 nominal horse-power. Consume yearly, 1,040 tons of coal, the ashes from which are partly ground with lime and used for building purposes, and partly used for repairing roads. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
William Wormersley, Thornton, & Company, Woollen Scribblers, Spinners, and Fullers.	Union Mills, Eccleshill.	Our works are situated near to *Bagley Beck*, a tributary of the *Aire*. Employ 80 hands. Rateable value of works, 360*l.* Obtain supply of water from surface drainage and from the Bradford waterworks, but do not know the annual consumption at our works. We scribble, spin, and full yearly, 432,000 lbs. of wool, of the value of 32,400*l.* We have depositing tanks for the soapsuds and liquid refuse, and the effluent water is used for irrigating land. Do not use either dye wares or bleaching materials. Use yearly, 7,500 gallons of Gallipoli and cloth oil, of the value of 1,500*l.* Produce 4,800 lbs. of waste wool in carding, which is sold to waste dealers. Use yearly, soap, 12 tons; alkali, 24 tons; and urine, 300 tons. The soapsuds are treated for the recovery of grease, by which we gain 50*l.* a year. Use steam, 44 nominal horse-power. Consume yearly, 2,500 tons of coal, the ashes from which are used partly to repair roads and partly for mixing with mortar for building purposes. The excrements of our workpeople are used for manure. No suggestions to offer.
Smith and Hutton, Woollen Manufacturers.	Eccleshill -	Our works are situated near the *Eagley Beck*, a tributary of the *Aire*. Employ 30 hands. Rateable value of works, 120*l.* The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water jointly from wells and waterworks, and consume yearly 40,000 gallons. Manufacture yearly, goods 40 tons, of the value of 8,000*l.* The whole of the waste liquid produced at our works flows unfiltered into sewers and thence into the river. Do not use any dye wares or bleaching materials. Use yearly 10 tons of olive and cloth oil, of the value of 500*l.* Produce 3 tons of wool in the process of carding, which is used over again for the lower class of goods. Use yearly, soap 5 tons, alkali 8 tons, and urine 25 tons. The soapsuds are not

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Smith & Hutton, Woollen Manufacturers—*cont.*	Eccleshill—*cont.*	treated for the recovery of grease. Use steam 12 nominal horse power. Consume yearly 500 tons of coal; make 50 tons of ashes, which are used for building purposes. The excrements of our workpeople are carted away and used in agriculture. No suggestions to offer.
Kellett, Brown, & Company, Cloth Scribblers.	Calverley -	Our works are situated near the river *Aire*. Employ 65 hands. Rateable value of works, 350*l.* The condition of the river in warm weather is very offensive. It is polluted by town sewage and refuse from manufactories. Obtain supply of water from springs, but we are not able to give the annual consumption at our works. Manufacture yearly, goods of the value of 46,800*l.* The whole of the liquid refuse produced at our works flows direct into the sewers, and thence into the stream. Use yearly, 16 tons of dye wares, principally logwood, peachwood, and barwood. Do not use any bleaching materials. Use yearly, rape and olive oil. The whole of the waste wool produced in carding is sold to the respective owners of the goods we operate upon. Use yearly, soap of the value of 600*l.* The soapsuds are treated for the recovery of grease, by which we gain 25*l* a year. Use steam, 30 nominal horse-power. Consume yearly, 1,820 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are sold for manure. No suggestions to offer.
David Yewdall & Sons, Woollen Manufacturers. (*See also answers from Bramley, page* 142).	Calverley Bridge and Waterloo Mills, Bramley.	Our works are situated on the river *Aire*. Employ 1,000 hands Rateable value of works, 650*l.* The bed of the river has not silted up. Our works are not affected by floods. Ten years ago the river *Aire* was clear, and abounded with fish; it is now most offensive, especially in hot weather; it is polluted by Bradford, by other towns and villages situated on its banks, and by dye and other works; also by the carcases of dead animals which are thrown into the river. Obtain supply of water from the river *Aire*. The yearly consumption at our works is very considerable, but are not able to state the quantity. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be of incalculable value to us, but we are unable to fix the amount. We produce, yearly, 600,000 lbs. of goods. The whole of the waste liquid produced at our works, except the soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly, 12,000 gallons of Gallipoli oil, of the value of 3,000*l.* Produce yearly, 37,440 lbs. of waste wool, the best part of which we re-use, and the remainder is sold to waste dealers. Use yearly, soap 20,800 lbs.; alkali 174,720 lbs.; and urine 104,000 gallons. The soapsuds are treated for the recovery of grease, by which we gain yearly 75*l.* Use steam and water as power; steam 25, and water 36 nominal horse-power. Consume yearly, 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
William & Samuel Varley, Worsted Manufacturers.	Stanningley -	Our works are situated on the *Stanningley Beck*, a tributary of the *Aire*. Employ about 400 hands. Rateable value of works, 1,314*l.* 10*s.* 0*d.* The bed of the stream has not silted up. Our works are not affected by floods. The *Beck* is not polluted by works above, nor by mines. Obtain supply of water from the *Beck*, but do not know the annual consumption at our works. Manufacture yearly, 840,000 lbs. of goods, of the value of 80,000*l.* The whole of the liquid refuse from our works flows direct (except soapsuds) into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly, 1,500 gallons of olive oil, of the value of 330*l.* The whole of the waste wool produced in carding is sold to waste dealers. Use yearly, 29,000 lbs. of soap, 13,000 lbs. of alkali, and no urine. The soapsuds have not been treated for the recovery of the grease since January 1871. Use steam, 60 nominal horse-power. Consume yearly, 2,230 tons of coal, the ashes from which are carted away. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
Smith & Wade, Woollen Manufacturers.	Stanningley -	Our works are situated on the *Stanningley Beck*, a tributary of the *Aire*. Employ 52 hands. Rateable value of works, 169*l.* The bed of the stream has silted up, caused partly by ashes and solid refuse thrown into it by the people living on its banks. Our works are slightly affected by floods. Fourteen years ago the stream was of a dark colour, but every year it has become gradually worse until now it is quite black. It is polluted by works above and by sewage, but not by mines. Obtain supply of water from wells, and consume yearly about 2,400,000 gallons. If the river were rendered clear and colourless, from which we might obtain a supply of water, it would be a direct money value to us of 30*l.*

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Smith & Wade, Woollen Manufacturers—*cont.*	Stanningley—*cont.*	yearly. Manufacture yearly, 80 tons of goods, of the value of 26,000*l.* The whole of the liquid refuse produced at our works flows direct, unfiltered, into the stream. Use yearly as dye wares, 72,000 lbs. of logwood, barwood, fustic, camwood, madder, argol, alum, copperas, and bi-chrome. The spent dye stuffs are mostly burned, the remainder is carted away for agricultural purposes, and the spent dye liquor turned into the *Beck*. Do not use any bleaching materials. Use yearly, 16 tons of olive and rape oil, of the value of 700*l.* Produce yearly, 12 tons of waste wool in the process of carding, which is sold to waste dealers. Use yearly, soap 5 tons; soda, 6 tons; and urine, 130 tons. The grease is partly extracted from the soapsuds, we sell the soapsuds for 7*l.* a year. Use steam, 20 nominal horse-power. Consume yearly, 800 tons of coal, make about 80 tons of ashes, which are carted away for the repair of roads. The excrements of our workpeople are removed by farmers for agricultural purposes. No suggestions to offer.
Roberts, Ross, & Company, Scribblers and Fullers.	Sunny Bank Mills, Farsley.	Our works are situated near the river *Aire*. Employ 75 hands. Rateable value of works, 433*l.* 5*s.* 5*d.* The bed of the river has not silted up near our works. Our works are not affected by floods. Obtain our supply of water jointly from wells and from waterworks company, but are not able to state the annual consumption at our works. Manufacture yearly, 387,250 lbs. of goods, of the value of 25,000*l.* The whole of the liquid refuse produced at our works flows into sewers, and thence into the river. We only scribble for manufacturers, and, therefore, do not use any dye wares, bleaching materials, or oil. Use yearly, soap 183 cwts.; soda, 326 cwt.; and urine, 2,250 cwt. The soapsuds are not treated for the recovery of the grease. Use steam, 55 nominal horse-power. Consume yearly, 2,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed by farmers and used for manure. No suggestions to offer.
Daniel Hainsworth, Woollen and Cloth Manufacturer.	Nether Cape Mill, Farsley.	My works are situated near a tributary of the *Aire*. Employ 30 hands. Rateable value of works, 140*l.* Obtain supply of water from wells and bore-holes, and consume yearly 100,000 gallons. Manufacture yearly 50 tons of yarn, and dye 30 tons of wool. The whole of the liquid refuse produced at my works flows direct into the sewers. Use as dyewares 50,000 lbs., chiefly logwood and barwood. The spent dye stuffs are mixed with coals and burnt. Do not use any bleaching materials. Use yearly, 2,600 gallons of olive, rape, and cloth oil, of the value of 500*l.* Produce yearly, 16 tons of waste wool in the process of carding, which is sold to waste dealers. Use yearly 2 tons of soda ash, but no soap or urine. Use steam, 16 nominal horse-power. Consume yearly, 800 tons of coal, and make about 150 tons of ashes, which are used for repairing roads. The excrements of our workpeople are mixed with coal ash, and carted away for agricultural purposes. No suggestions to offer.
John Hainsworth, & Sons, Woollen Manufacturers.	Beck Bottom, Farsley.	Our works are situated on a tributary of the *Aire*. Employ 200 hands. Rateable value of works, 380*l.* The bed of the stream has silted up. Our works are not affected by floods. The *Beck* used to be formerly an open watercourse; it is now covered over, and it is very seriously polluted by works above, and it is perfectly useless for manufacturing purposes. It has not been, within our knowledge, polluted by mines. Obtain supply of water jointly from wells, bore-holes, and springs. We are not able to give the annual consumption at our works, but we use a very considerable volume. If the stream, from which we might derive a supply of water, were rendered clear and colourless, it would be of very great importance to us, but we are not able to fix the money value. We manufacture yearly, 150 tons of goods, of the value of 45,000*l.* The whole of the waste liquid produced at our works flows direct unfiltered into the stream. We use as dye wares 26,000 lbs. of logwood, fustic, and barwood. The spent dye stuffs are partly burned and partly carted away to repair roads. Do not use any bleaching materials. Use yearly, 24 tons of rape and Gallipoli oil, of the value of 1,000*l.* Produce 31,200 lbs. of waste wool in carding, which is sold to waste dealers. Use yearly, soap 8 tons, alkali 8 tons, and urine 500 tons. The soapsuds are treated for the recovery of grease, by which we gain 20*l.* Use steam, 35 nominal horse-power. Consume yearly 2,000 tons of coal. Make 290 tons of ashes; these are carted away for repairing roads. The solid excrements of our workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future or as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Reuben Gaunt & Sons, Worsted Spinners and Woollen Manufacturers.	Springfield Mill, Farsley.	Our works are situated on a tributary of the *Aire*. Employ 220 hands. Rateable value of works, 308*l.* The bed of the stream has not silted up. Our works are not affected by floods; formerly there was more water flowing down the stream; the quantity has been reduced by the draining of lands above. The stream is polluted by works above, but not by mines. Obtain supply of water partly from the stream, from bore-holes, and from waterworks, and consume yearly, for scouring purposes only, 1,000,000 gallons. If the stream, from which we might have derived a supply of water, had been clear and colourless it would have saved us a cost of 1,500*l.* in forming a reservoir and sinking and boring wells, and an indefinite future value. At present we do get a certain proportion occasionally of water from the *Beck*, which source of supply will be curtailed and probably entirely destroyed by means of population and manufactories above us. We manufacture yearly, yarn 225 tons, of the value of 25,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly, 20 tons of Gallipoli and other oils, of the value of 1,000*l.* Produce 15,600 lbs. of waste wool in the process of carding, which is sold partly, and partly used for cloth manufacturing purposes. Use yearly, 110 packs of soap, 10 tons of alkali; no urine. Use steam, 40 nominal horse-power. Consume yearly, 1,400 tons of coal. Make 200 tons of ashes, which are carted away to repair roads and for filling up hollow places. The excrements of our workpeople are carted on to a farm, and there used for agricultural purposes. No suggestions to offer.
The Airedale Mill Company, Woollen Manufacturers.	Rodley - -	Our works are situated on the river *Aire*. Employ 100 hands. Rateable value of works, 588*l.* 10*s.* 0*d.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the river is much more foul than it was six years ago. It is polluted to a great extent by town sewage and liquid refuse from manufactories and works; we are not aware that it is polluted by mines. Obtain supply of water from the river. If the river, from which we might obtain our supply of water, were rendered clear and colourless it would be of considerable money value to us, but are not able to fix any amount. Manufacture yearly, goods of the value of 62,000*l.* The whole of the waste liquids produced at our works flows, except the soapsuds, into the river. Use yearly, 100 tons of dye wares, chiefly dye woods. The spent dye liquors are run into the river, the spent dye stuffs are carted to old quarries. Do not use any bleaching materials. Use yearly, 50 tons of Gallipoli and Price's patent cloth oil, of the value of 2,500*l.* The waste wool produced in carding is sold to waste dealers. Use yearly, soap 12 tons, alkali 40 tons, and urine 32,500 gallons. The soapsuds are treated for the recovery of grease, by which we gain 30*l.* a year. Use steam, 40 nominal horse-power. Consume yearly, 2,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Tunstall & Company, Tar Distillers.	Newlay - -	Our works are situated on the river *Aire*. Employ 6 hands. Rateable value of works, 85*l.* The bed of the river has silted up; our works are affected by floods. There has been no alteration in the condition of the river since we have known it. It is polluted to a very serious extent by town sewage and works above, but not to our knowledge by mines. Obtain supply of water from river, but are unable to state the annual consumption at our works. If the river were rendered clear and colourless it would be of no money value to us. We use yearly, 300,000 gallons of tar, and produce 9,000 gallons of naphtha, and 125,000 gallons of creosote oil. We filter the waste liquid refuse, which afterwards flows into the river. Use steam, 6 nominal horse-power. Consume yearly, 500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Harris & Company, Worsted Manufacturers.	Fulneck -	Our works are situated on an affluent of the river *Aire*. Employ 200 hands. Rateable value of works, 348*l.* Obtain our supply of water from storage, reservoirs, and a spring, but do not know the annual consumption at our works. Manufacture yearly, 90 tons of goods, of the value of 18,200*l.* The whole of the liquid refuse produced at our works flows direct into the sewers and thence into the river. Do not use dye wares or bleaching materials. Use yearly, 520 gallons of Gallipoli oil. Do not use either soap, alkali, or urine. Use steam, 35 nominal horse-power. Consume yearly, 250 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Claughton Garth Mill Company, Scribblers, Spinners, and Fullers.	Fartown, Pudsey.	Our works are situated on a tributary of the *Aire*. Employ 58 hands. Rateable value of works, 364*l*. 9*s*. 7*d*. Obtain supply of water partly from drainage and from the Calverly district waterworks company. Are not able to state the weight or value of the goods manufactured yearly at our works. The whole of the waste liquid, except the soapsuds, flows direct into drains, and thence into the stream. Use yearly, 20 tons of dye wares, chiefly logwood, barwood, and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use 25 tons of olive, Price's patent, and Simpson & Company's cloth oil, of the value of 1,000*l*. The whole of the waste liquid produced in carding is sold for the purpose of having the grease extracted therefrom. Use yearly, soap, alkali, and urine, 650 tons. The soapsuds are treated for the recovery of grease, by which we gain yearly 35*l*. Use steam, 30 nominal horse-power. Consume yearly, 2,000 tons of coal, the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are used for manure. No suggestions to offer.
Beaumont, Harrison, & Company, Scribblers and Millers of Woollen cloth.	Albion Mill, Pudsey.	Our works are situated on a tributary of the *Aire*. Employ 56 hands. Rateable value of works, 335*l*. Obtain supply of water partly from wells, waterworks, and a private reservoir; but do not know the annual consumption at our works. Manufacture yearly 90 tons of goods, of the value of 35,000*l*. The whole of the waste liquid produced at our works, except the soapsuds, flows into the sewers and thence into the stream. Use a small quantity only of dye wares, but no bleaching materials. Use yearly rape and Price's oil of the value of 800*l*. The whole of the waste wool produced in carding is sold to waste dealers. Use yearly of soap 7 tons and soda 5 tons. The soapsuds are treated for the recovery of the grease, by which we gain 14*l*. a year. Use steam, 35 nominal horse-power. Consume yearly 1,700 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted away for manure. No suggestions to offer.
The Union Mill Company, Scribblers and Fullers of Cloth.	Little Moor, Bottom, Pudsey.	Our works are situated on a stream, an affluent of the *Aire*. Employ 60 hands. Rateable value of works, 340*l*. Obtain supply of water from wells, bore-holes, and waterworks, and consume from the latter source yearly 900,000 gallons. Manufacture yearly 268,100 lbs. of goods. The waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly cloth oil, but are not able to state the quantity. The whole of the waste wool produced in carding is sold to waste dealers. Use yearly soap 6 tons, alkali 8 tons, and urine about 80,000 gallons. The soapsuds are treated for the recovery of grease, by which we gain 14*l*. a year. Use steam, 30 nominal horse-power. Consume yearly 1,600 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed to land and used for agricultural purposes.
John Crowther, Woollen Manufacturer.	Union Bridge Mill, Tong Stream, Pudsey.	My works are situated on the *Tong* stream, a tributary of the *Aire*. Employ 87 hands. Rateable value of the works, 187*l*. 10*s*. The bed of the stream has silted up, but not to any appreciable extent. My works are not affected by floods. The condition of the stream is the same as when I first knew it. It is polluted by works above; not by mines. Obtain supply of water from the stream, and consume yearly 6,000,000 gallons. If the river were rendered clear and colourless it would be of considerable value to me, but I am not able to state the amount. Manufacture yearly goods of the value of 8,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. Use yearly 16 tons of dye wares, chiefly logwood and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use 4,000 gallons of olive and Price's patent cloth oil. The whole of the waste wool produced in carding is sold to dealers. Use yearly soap 7 tons, soda 16 tons, urine 200 tons. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for agricultural purposes. No suggestions to offer.
William Walton & Company, Scribblers and Woollen Manufacturers.	Pudsey -	Our works are situated on a beck, a tributary of the *Aire*. Employ 50 hands. Rateable value of works, 342*l*. The bed of the beck has not silted up. Our works are not affected by floods. The condition of the stream is very little changed; there is scarcely so much water flowing down as in former years. It is not polluted by works above, nor by mines. Obtain supply of water jointly from stream and from

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Walton & Company, Scribblers and Woollen Manufacturers—*cont.*	Pudsey—*cont.*	wells, and consume yearly about 100,000 gallons. We manufacture yearly 360,000 lbs. of goods. The whole of the waste liquid, except the soapsuds, flows direct into the *Beck* and thence into the river. Use 112,000 lbs. of dye wares, chiefly logwood, barwood, camwood, fustic, peachwood, madder, argol, alum, and copperas. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 8,500 gallons of Seville, rape, and Price's patent cloth oil, of the value of 2,000*l*. Produce 10,000 lbs. of waste wool in carding, which is sold to waste dealers. Use yearly soap 4 tons, alkali 3 tons, urine 200 tons. The soapsuds are treated for the recovery of grease, by which we gain 16*l*. a year. Use steam, 35 nominal horse-power. Consume yearly 1,900 tons of coal, and make 150 tons of ashes, which are carted away to repair roads. The excrements of our workpeople are taken away and used for manure. Have no suggestions to offer.
The Waterloo Mill Company, Woollen Scribblers and Millers.	Pudsey - -	Our works are situated on *Pudsey Beck*, a tributary of the *Aire*. Employ 75 hands. Rateable value of works 429*l*. 7*s*. 10*d*. The bed of the river has not silted up. Our works are not affected by floods. The stream is polluted by works above; not by mines. Obtain supply of water jointly from stream, wells, bore-hole, and from waterworks; also from land drainage; and consume yearly 10,000,000 gallons. We scribble and mill yearly 1,626,288 lbs. of goods; produce liquid refuse from dyeing, 288,000 gallons, and soapsuds, 2,197,000 gallons. The whole of the waste liquid produced at our works flows on to land for irrigation, and the effluent water flows into the *Beck*. Use yearly 176,720 lbs. of dye wares, chiefly logwood, fustic, barwood, camwood, madder, and alum; parts of the spent dye stuffs are burned, and the remainder used for manure. Do not use any bleaching materials. Use yearly 6,945 gallons of Seville, rape, and Price's patent oil, of the value of 1,188*l*. Produce yearly 2,340 stone of waste wool in carding, which is partly re-used and partly sold to waste dealers. Use yearly, soap 30,534 lbs.; ammonia 30,720 lbs.; soda 5,025 lbs.; and urine 231,840 gallons. The soapsuds are treated for the recovery of grease, by which we gain 20*l*. a year. Use steam, 40 nominal horse-power. Consume yearly 2,600 tons of coal, the ashes from which are carted away to repair roads and also for building operations. The excrements from our workpeople are sold to farmers for manure. Have no suggestions to offer.
John Booth & Company, Scribblers and Millers.	Union Mill, Girdlesome.	Our works are situated near to an affluent of the *Aire*. Employ 39 hands. Rateable value of works 238*l*. 2*s*. Obtain supply of water from wells and from gathering ground; do not know the annual consumption at our works. We scribble and mill yearly 312,000 lbs. of goods. The whole of the waste liquid produced at our works flows on to land for irrigation. Do not use any dye wares or bleaching materials. Use yearly composition oil, but are unable to state the quantity. The waste wool produced in carding is sold to hop growers for manure. Use yearly, soap from 8 to 10 tons; ammonia 22,560 lbs. Use steam, 25 nominal horse power. Consume yearly, 1,250 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Brown, Brothers, Flax Spinners.	Girdlesome -	Our works are situated on a small beck, an affluent of the *Aire* Employ 120 hands. Rateable value of works, 277*l*. The bed of the river has not silted up. Our works are not affected by floods. Obtain supply of water jointly from wells, bore-holes, and from surface drainage, but do not know the annual consumption at our works. We spin yearly, 200 tons of grey linen, of the value of 20,000*l*. The whole of the waste liquid produced at our works flows into the *Beck*, and thence into the river. Do not use any dye wares or bleaching materials, soap, alkali, or urine. Use steam, 30 nominal horse power. Consume yearly, 1,200 tons of coals, the ashes from which are used for repairing roads and foot-paths. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Booth, Brothers, Cotton Warp and Woollen Weft Manufacturers.	Union Mill, Girdlesome.	Our works are situated on an affluent of the *Aire*. Employ 35 hands. Do not know the rateable value of works. The bed of the stream has not silted up. Our works are not affected by floods. As we are only tenants of the premises and hire power we cannot give the annual consumption of water at our works, the horse power of the engine, the quantity of coal used, or what is done with the ashes. We manufacture yearly, goods of the value of 7,872*l*. The whole of the liquid refuse flows unfiltered direct into the stream and thence into the river. We do not use any dye wares or bleaching materials. Use yearly, 4 tons of Gallipoli oil, of the value of 224*l*. The refuse from the willey and the machines is sold to hop growers. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
B. Barker & Sons, Woollen Manufacturers.	Butter-bowl Mills, Farnley.	Our works are situated on *Farnley Beck*, a tributary of the *Aire*. Employ 130 hands. Rateable value of works, 203*l.* 5*s.* The bed of the *Beck* is almost filled up with ashes and spent dye woods discharged into it above our works. We have found it necessary to form two depositing tanks for the river water to subside before we are able to use it for engine and boiler purposes. Our works are affected by floods. The condition of the stream has not changed within our observation for the last 10 or 12 years; it is polluted to such a very serious extent that we can only use it for engine and boiler purposes, and then only after settling. It is gradually becoming worse; it is also polluted by mines. Obtain our supply of water jointly from the river and stream, surface drainage, and a well; and consume yearly for washing purposes from 5,000,000 to 6,000,000 gallons. If the river or stream were rendered clear and colourless, it would be of considerable money value to us, and it would enable us probably to more than double our trade. We manufacture yearly from 50 to 60 tons of goods, of the value of from 30,000*l.* to 40,000*l.* Produce yearly liquid refuse from washing 3,000,000 gallons, and 2,000,000 gallons from soapsuds. The whole of the waste liquid produced at our works flows direct into the stream. Use yearly about 1 ton of dye wares, chiefly dye woods. The refuse dye stuffs are burnt. Do not use any bleaching materials. Use yearly from 15 to 20 tons of olive oil, of the value of 1,000*l.* Produce yearly about 8 tons of waste wool in the process of carding, which is sold to waste dealers. Use yearly, soap 5 tons, urine 300 tons, and ammonia and alkali from 3 to 4 tons. The soapsuds are not treated for the recovery of the grease. Use steam 40 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are being stored up for future use. The excrements of our workpeople are used for manure. In this neighbourhood the pollution of the streams must continue so long as refuse from mills, dye houses, tan yards and pits as well as the sewage of the town are discharged into them.
Benjamin Crosland & Sons, Woollen Cloth Manufacturers.	Farnley Mills, Farnley.	Our works are situated on the *Tong Beck*, a tributary of the *Aire*. Employ 100 hands. Rateable value of works, 200*l.* 14*s.* 5*d.* The bed of the stream has not silted up near our works. Our works are affected by floods. There has been no change in the condition of the river within our knowledge. Seven years ago the *Beck* was a clear stream; it is now very considerably polluted both by works above and by mines. Obtain supply of water jointly from the *Beck*, wells, and borcholes; but are not able to state the annual consumption at our works. If the stream were rendered clear and colourless, it would be of no direct money value to us now, as we have obtained a splendid supply of good water from wells and boreholes sunk on our premises, and therefore should not require the *Beck* water for washing purposes. Manufacture yearly 156,800 lbs. of goods, of the value of 11,760*l.* The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 15 tons of Gallipoli oil, of the value of 750*l.* The whole of the waste liquid produced at our works is re-used, with the exception of 5 tons of the worst refuse, which is sent into Kent to be used for manure in the hop yards. Use yearly, soap 5 tons, and urine 150 tons. The soapsuds are not treated for the recovery of the grease. Use both steam and water 30 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are removed away for repairing roads and footpaths. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future that refuse from manufactories and mines should not be allowed to be turned into rivers and streams.
Abraham Marshall & Sons, Cotton Warp Manufacturers.	Perseverance Mill, Station Road, Morley.	Our works are situated on a small beck, a tributary of the *Aire*. Employ 28 hands. Rateable value of works, 161*l.* The bed of the stream has not silted up. Our works are not affected by floods. Formerly the stream was in a tolerably pure condition, but for some years past it has been much polluted by town sewage. This has been to a great extent remedied by the Local Board of Health, who have constructed a main intercepting sewer. The stream is polluted by woollen and other mills above; not by mines. Obtain supply of water from a well and from waterworks. If the stream from which we might derive a supply of water were rendered clear and colourless, it would be of considerable money value to us, but we are not able to fix the amount. We are unable to give the quantity or value of the goods manufactured year by us. The whole of the liquid refuse produced at our works (with the exception of the soapsuds) flows into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials. The

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Abraham Marshall & Sons, Cotton Warp Manufacturers—*cont.*	Perseverance Mill, Station Road, Morley—*cont.*	waste wool produced in carding is sold to waste dealers. Do not use either soap, alkali, or urine. The soapsuds are treated for the recovery of grease, by which we gain ten guineas a year. Use steam, 20 nominal horse-power. Consume yearly 520 tons of coal; the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are carted away and used for manure. Have no suggestions to offer.
W. & E. Jackson, Cloth Manufacturers.	Peel Mills, Morley.	Our works are situated on a tributary of the *Aire*. Employ 230 hands. Rateable value of works 500*l.* Obtain supply of water jointly from wells, and from waterworks. Manufacture yearly 130 tons of goods of the value of 40,000*l.* The whole of the waste liquid produced at our works, except the soapsuds, flows direct into the sewers, and thence into the stream. We do not use any dye wares or bleaching materials. Use yearly 12 tons of olive oil, of the value of 600*l.* Produce yearly 40 tons of waste wool in carding, which is sold for manure. Use yearly, soap 15 tons, urine 400 tons. The soapsuds are treated for the recovery of grease, and 20*l.* yearly is gained by the extraction. Use steam, 30 nominal horse-power. Consume yearly 1,500 tons of coals; the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are mixed with ashes and used for manure. No suggestions to offer.
David Hartley, Cloth Manufacturer.	Hembrigg Mill, Morley.	My works are situated near a tributary of the *Aire*. Employ 29 hands. Rateable value of works, 250*l.* Our works are not affected by floods. Obtain supply of water partly from wells and from waterworks. Consume yearly about 60,000 gallons. Manufacture yearly 80 tons of goods of the value of 6,000*l.* The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use either dye wares or bleaching materials. Use yearly, 50 tons of olive, and 40 tons cloth oil. Produce yearly 15 tons of waste wool in carding, which is sent to oil extractors for the purpose of recovering the oil. Use yearly, urine 300 gallons, but not any soap or alkali. The soapsuds are treated for the recovery of grease, the landlord receiving the benefit. Use steam, 35 nominal horse-power. Consume yearly 500 tons of coal, and make 100 tons of ashes, which are tipped on to the nearest spoil heap. The excrements of our workpeople are used for manure.
Baines & Hirst, Union Cloth Manufacturers.	Britannia Mill, Stump Cross, Morley.	Our works are situate near an affluent of the *Aire*. Employ 54 hands. Do not know the rateable value of works. Obtain supply of water from wells; but have no means of ascertaining the volume consumed annually at our works. Manufacture yearly, 125 tons of goods, of the value of 6,000*l.* The whole of the waste liquid produced at our works flows into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly, 6 tons of olive oil of the value of 320*l.*, and 1 ton of Price's patent oil, of the value of 42*l.* Produce 12 tons of waste wool in carding, which is sold to oil extractors. Use yearly 1 ton of soda; we rent power, and are unable to give the nominal horse-power, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Joseph Carter, Woollen Manufacturer.	Wellington Mills, Morley.	My works are situated near a tributary of the *Aire*. Employ 49 hands. Rateable value of works 128*l.* 9*s.* 6*d.* Obtain supply of water jointly from wells and from waterworks. Manufacture yearly 270,400 lbs. of goods, of the value of 9,300*l.* The whole of the waste liquid produced at my works flows direct into sewers, and thence into the river. Do not use any dye wares or bleaching materials. Use Gallipoli and cloth oils. Produce yearly 14 tons of willey waste, which is sold to oil extractors. Use yearly soda 5 tons. Do not extract grease from the soapsuds. The refuse now flows away into sewers, and thence into the stream; I once had 10*l.* a year offered for it. Use steam, 20 nominal horse-power. Consume yearly 800 tons of coal; the ashes from which are used as ballast on the railways. The excrements of my workpeople are used for manure.
George Crowther & Company, Woollen and Union Cloth Manufacturers.	Churwell -	Our works are situated on a tributary of the *Aire*. Employ 100 hands. Rateable value of works, 350*l.* 17*s.* 6*d.* Obtain supply of water, partly from wells and bore-holes, and partly from drainage from adjoining land, collected in two reservoirs situated above our works. Manufacture yearly goods, 293,400 lbs., of the value of 25,400*l.* The whole of the waste liquid produced at our works flows direct into the sewers, which discharge into a ditch not very near, and the refuse passes

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, South Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George Crowther & Company, Woollen and Union Cloth Manufacturers—*cont.*	Churwell—*cont.*	thence into the stream. Use yearly, as dyewares, logwood 8,240 lbs., alum 258 lbs., oil of vitriol 258 lbs., iron liquor and nitrate of iron 1,030 lbs., and argol 520 lbs. Do not use any bleaching materials. Produce yearly 35 tons of waste wool in the process of carding, part re-used, and the remainder sold to hop growers for manure. Use yearly, soap 18,720 lbs., alkali 10,400 lbs., and no urine. The soapsuds are treated for the recovery of grease, by which we gain 25*l.* a year. Use steam, 30 nominal horse-power. Consume 1,300 tons of coal, and make 350 tons of ashes; these are used for repairing roads in the neighbourhood. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Thomas Whitehead, Dyer.	Wellington Bridge Dye Works, Churwell, near Leeds.	My works are situated on the *Aire*. Employ 10 hands. As I hire power from Messrs. D. and J. Cooper, am not able to give the rateable value of the works. My works are not affected by floods. The condition of the stream is very much as it was five years ago. It is very seriously polluted by every kind of solid and liquid refuse. Obtain supply of water from the river, and consume yearly 25,000,000 gallons. The water is pumped into cisterns and allowed to settle, and then is tolerably clear and fit for my business purposes. I dye yearly 400 tons of goods, of the value of 93,600*l.* The whole of the waste liquid produced at my works flows direct into the river. Use yearly as dyewares, logwood 80 tons, fustic 10 tons, barwood 10 tons, shumac and myrobalans 80 tons, alum and copperas 16 tons, argol and sulphate of copper 3 tons, iron liquor 20,000 gallons, and oil of vitrol 16,800 lbs. The spent dye stuffs are partly burned and partly sent into river. Do not use any bleaching materials, oil, soap, or urine. Use a very small quantity of ammonia. Use steam, 6 nominal horse-power; but as the power is supplied to me, I am not able to give the quantity of coal consumed yearly, or what is done with the ashes. The excrements of my workpeople are removed and used for manure. No suggestions to offer.
David Yewdall & Sons, Woollen Cloth Manufacturers.	Waterloo Mills, Bramley, and Calverley Bridge.	Our works are situate near a tributary of the *Aire*. Employ here and at Calverley Bridge (*the evidence from which see, page* 135) 1,000 hands. Rateable value of works at Bramley, 560*l.* Obtain supply of water from Leeds Corporation Waterworks, and consume yearly 4,600,000 gallons. Manufacture yearly (*see evidence from Calverley Bridge*). The whole of the waste liquid, except the soapsuds, flows into sewers, and thence into the river. Do not use any dye wares or bleaching materials. Produce here 50,000 lbs. of waste wool in carding; part is re-used and part sold. Use at these works steam, 60 nominal horse-power. Consume yearly 2,300 tons of coal, and make 520 tons of ashes, which are carted away for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Huggans & Walker, Scribbling and Fulling Millers.	Swinnow Moor Mill, Bramley.	Our works are situate near an affluent of the *Aire*. Employ 47 hands. Rateable value of works, 246*l.* 13*s.* Obtain supply of water jointly from waterworks and from wells, also from land drainage; but are unable to state the annual consumption at our works. We scribble and full yearly 260,000 lbs. of goods, of the value of 15,600*l.* The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly, Gallipoli oil 3,800 gallons, soap 18 tons, alkali 20 tons, and urine 500 tons. The soapsuds are treated for the recovery of the grease, by which we gain 20*l.* a year. Use steam, 30 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Richard Nickols & Sons, Tanners.	Hill Top, Bramley	Our tanyards are situated near to an affluent of the *Aire*. Employ 84 hands. Rateable value of tanyards, 280*l.* 12*s.* Obtain supply of water partly from wells, and from waterworks; consume yearly 3,000,000 gallons. We tan yearly, 25 tons of hides. Produce 14 tons of leather. Use lime 3 tons; and bark, valonia, shumac, gambir, and gall nuts about 20 tons. Do not use either pigeons', fowls', or dogs' dung, bullocks' blood, or human excrement. Obtain yearly in the process of depilation 6,000 bushels of hair, which is sold for manufacturing purposes. Obtain in the process of fleshing, 5 tons of fatty matter, which we make into glue. We have 320 tanpits, varying from 7½ feet long, by 6 feet wide, by 6 feet deep. Do not use any dye wares. The whole of the waste liquid produced at our works flows unfiltered into sewers, and thence into the stream. Use steam, 20 nominal horse-power. Consume yearly 800 tons of coal; the ashes from which are taken away to be applied to the land. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Haste, Tanner.	Hough End, Bramley.	My tanyard is situate on a tributary of the *Aire*. Employ 60 hands. Rateable value of tanyard, 160*l.* The bed of the stream has not silted up. My tanyard is not affected by floods. The *Beck* is polluted by town sewage, and also by refuse from mills, not by mines. Obtain supply of water from surface drainage, but do not know the annual consumption at my tanyard. The source from which I obtain a supply of water is sufficiently pure for tanning. I tan yearly 70,000 hides, skins, and kips; and produce 10,000 lbs. of leather. Use yearly, lime 30 tons, bark 50 tons, valonia 40 tons, shumac 25 tons, gambir and terra japonica 200 tons, and pigeons' and fowls' dung 1,040 bushels; but not any dogs' dung, bullock's blood, or human excrement; I also use in currying 15 tons of cod oil, and 10 tons of tallow. Obtain in the process of depilation, 50 tons of hair, which is sold for manure. Obtain 150 tons of fleshings, which are sold for glue manufacturing. I have 170 tanpits, average size, 5 feet, by 7 feet, by 5 feet. Do not use any dyewares. The whole of the liquid refuse produced at my tanyard flows unfiltered into the *Beck*. Use steam, 15 nominal horse-power. Consume yearly 5,601 tons of coal; make from 100 to 150 tons of ashes, which are used for repairing roads, and filling up old quarries. The excrements of my workpeople are used for manure.
James Webster & Sons, Cloth Manufacturers.	Swallow Hill Mill, Armley.	Our works are situate near to an affluent of the *Aire*. Employ 50 hands. Rateable value of works, 105*l.* Obtain supply of water jointly from bore-holes, a well, and from Leeds Corporation Waterworks; and consume yearly 1,800,000 gallons. Manufacture yearly 150 tons of goods. Produce yearly 1,800,000 gallons of liquid refuse, which flows unfiltered into sewers, and thence into the river. Use yearly 3,360 lbs. of dye wares; chiefly logwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 25 tons of olive and distilled oils, of the value of 1,000*l.* Produce 20 tons of waste wool in carding, which are sold to oil recoverers. Use yearly, soap, 3 tons, but no alkali, or urine. Use steam, 16 nominal horse-power. Consume yearly 700 tons of coal; the ashes from which are used for repairing roads. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer.
William Wilson, Tanner.	Armley Ridge, Armley.	My tanyard is situated near an affluent of the *Aire*. Employ 6 hands. Rateable value of tanyard, 71*l.* The bed of the stream has not silted up. My tanyard is not affected by floods. Obtain supply of water from land drainage, and from the stream, but am not able to state the volume used yearly at my tanyard. If the river from which I now derive my supply of water were rendered clear and colourless it would be a very considerable advantage to me; but I am not able to fix an amount. I tan yearly 3,000 hides; produce 35 tons of leather. Use yearly, lime 6 tons, bark 250 tons, valonia 10 tons, and 200 bushels of pigeons' and fowls' dung; do not use either bullocks' blood or human excrement. Obtain yearly 50*l.* for the hair produced in the process of depilation. Obtain yearly 200 bushels of fleshings, which are sold to size boilers. I have 92 tanpits in my tanyard, 4 feet, by 6 feet, by 6 feet. Do not use any dye wares. The whole of the waste liquid produced at my works flows into sewers, and thence into the river. Use steam, 4 nominal horse-power. Consume yearly 100 tons of coal; the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
William Eyres & Sons, Woollen Manufacturers.	Winker Green Mill, Armley.	Our works are situated on an affluent of the *Aire*. Employ 320 hands. Rateable value of works 698*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream was formerly very pure, but it is now most foul; it is polluted by town sewage, and refuse from manufactories; not by mines. Obtain supply of water jointly from waterworks and from the stream; and consume yearly 9,000,000 gallons. If the stream from which we might derive a supply of water were rendered clear and colourless, it would be a direct money value to us of 50*l.* a year. We manufacture goods yearly, of the value of 50,000*l.* The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. We use, yearly, as dye wares, chiefly logwood, barwood, Sander's wood, and fustic, 30 tons. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 25 tons of best olive oil, of the value of 1,500*l.* Produce, yearly, 20 tons of waste wool in the process of carding, which we sell to waste dealers. Use yearly, soap 12 tons, urine 500 tons. The soapsuds are not treated for the recovery of grease. Use steam, 60 nominal horse-power. Consume yearly 2,600 tons of coal; the ashes from which are used to repair footpaths, and also

Series A, B, C, D, Trades and Manufactures—(Basin of the Aire, South Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Eyres & Sons, Woollen Manufacturers—*cont.*	Winker Green Mill, Armley—*cont.*	deposited where rubbish is required; sometimes they are ground and mixed with lime, to be made into mortar and cement. The excrements of our workpeople are carted away, and used for agricultural purposes. Have no suggestions to offer.
Brown & Rhodes, Woollen Manufacturers and Dyers.	Tong Road Mills, Armley.	Our works are situated on an affluent of the *Aire*. Employ 90 hands. Rateable value of works, 200*l*. Obtain supply of water jointly from wells and from waterworks, and consume yearly, 3,000,000 gallons. Manufacture yearly 120 tons of goods, of the value of 20,000*l*. The whole of the waste liquid produced at our works flows directly into sewers, and thence into the stream. Use yearly 15,000 lbs. of myrobalans and 4,500 lbs. of logwood. The spent dyestuffs are burned. Do not use any bleaching materials. Use yearly 25 tons of olive oil, of the value of 1,500*l*. The whole of the waste wool produced in the process of carding is sold to oil extractors. Use yearly, soap, 7 tons, alkali 20 tons. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly, 1,200 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Hartley Brothers, Woollen Cloth Manufacturers.	Armley - -	Our works are situate on an affluent of the *Aire*. Employ 120 hands. Rateable value of works, 260*l*. Obtain supply of water jointly from boreholes and from Leeds waterworks. We are not able to give the annual consumption at our works. Manufacture yearly 101,088 lbs. of goods. The whole of the liquid refuse produced at our works flows direct into the sewers, and thence into the river. Use yearly 35 tons of dye wares, principally logwood, fustic, camwood, alum, argol, and copperas. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 2,400 gallons of olive oil, of the value of 480*l*. The best of the waste wool, produced in carding, is re-used, and the other is sold to waste dealers. Use yearly about four tons of soap. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly 1,228 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer.
Thomas Dixon, Cloth Manufacturer.	Armley Road, Leeds.	My works are situated on the Leeds and Liverpool Canal. Employ 100 hands. Rateable value of works, 297*l*. 5*s*. My works are not affected by floods. Obtain supply of water jointly from the canal and from waterworks; and consume yearly from waterworks 250,000 gallons. Manufacture yearly, 48 tons of goods, of the value of 9,000*l*. The whole of the waste liquid produced at my works, except soapsuds, flows into the canal. Do not use any dye wares or bleaching materials. Use yearly, 6 tons of olive oil, of the value of 350*l*. Produce yearly, 10 tons of waste wool in carding, which is sold to waste dealers. Use yearly, soap 4 tons, and urine 10,000 gallons. The soapsuds are treated for the recovery of grease, by which I gain 15*l*. a year. Use steam, 36 nominal horse-power. Consume yearly, 800 tons of coal; the ashes from which are carted to the railway for ballast. The excrements of my workpeople are used for agricultural purposes. No suggestions to offer.
Marshall & Company, Flax Spinners, Linen and Thread Manufacturers, and Weavers.	Holbeck, Leeds	Our works are situate on the *Holbeck*, a tributary of the *Aire*. Employ 2,450 hands. Rateable value of works, 3,295*l*. 10*s*. The course of the *Holbeck*, by which our works have been occasionally flooded, has been straightened and the bed levelled, deepened, and paved, and we expect this will ensure our exemption from periodical flooding. The stream is very seriously polluted by solid and liquid refuse from manufactories and works, thrown in above our place, and by town sewage. Obtain supply of water jointly from the river *Aire*, from bore-holes, and from the Leeds Corporation waterworks. Consume yearly of water obtained from the river 750,000,000 gallons; from bore-holes, 30,000,000 gallons; and from waterworks, 12,000,000 gallons. We manufacture yearly goods, 1,300 tons of yarn spun from flax, a portion of which is made into sewing thread and linen cloth. The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. We do not use either dye wares or bleaching materials. Use yearly 50 tons of soda ash, but neither soap nor urine. Use steam, 426 nominal horse-power. Consume yearly 13,000 tons of coal; make 7½ tons of ashes daily, of which 5 are delivered to the railway company for ballast and the rest taken to different parts of the town for street repairs. The excrements of our workpeople are conveyed by waterclosets into sewers and ultimately into the river *Aire*. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thomas Pawson & Sons, and Pawson & Wood, Woollen Cloth Manufacturers.	Wortley -	Our works are situated on the *Tong* and *Marley Becks*, tributaries of the *Aire*. Employ 255 hands. Rateable value of works, 729*l*. 7*s*. 6*d*. The bed of the streams has not silted up. Our works are not affected by floods. The condition of the streams is very dirty; but not perceptibly more so than it was 20 years ago. They are polluted by refuse from mills, tanneries, quarries, and mines, the water is very offensive in summer time. We obtain supply of water jointly from the *Becks*, wells, and from surface drainage; but are unable to give the volume of water consumed yearly at our works; it is a very large quantity. If the river were rendered clear and colourless, it would not affect us very materially in money value. We are unable to state the quantity of goods manufactured by us yearly. The whole of the liquid refuse produced at our works, excepting soap-suds, flows direct into sewers, and thence into the stream. Use yearly 61,262 lbs. of dye wares, as logwood, camwood, barwood, fustic, argol, Sander's, madder, alum, copperas, and bi-chrome, cudbear, shumac, and prussiate of copperas. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 7,500 gallons of best olive oil, of the value of 1,500*l*. Produce yearly 11 tons of waste wool in the process of carding; the best of it is re-used, and the remainder is sold to waste dealers. Use yearly, soap, 11 tons; alkali, 5 tons; urine, 200 tons. The soapsuds are treated for the recovery of grease, by which we gain seven guineas a year. Use steam, 70 nominal horse-power. Consume yearly 2,600 tons of coal; the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Daniel Hinchcliffe, Manufacturer and Finisher of Woollen and Union Cloth.	Low Mill, Wortley.	My works are situated on a tributary of the *Aire*. Employ 70 hands. Rateable value of works, 440*l*. The bed of the *Beck* has not silted up. My works are occasionally affected by floods, owing to the overflowing of the *Beck*. The condition of the *Beck* is much the same as it has been within my own knowledge. It is polluted by works above, by sewage, and by mines. Obtain supply of water from *Beck*, from wells, from bore-holes, and from springs; but am not able to give the quantity consumed yearly at my works. I manufacture yearly 104,000 lbs. of goods, of the value of 7,800*l*., and dye 520,000 lbs. of goods of the value of 63,000*l*. The whole of the waste liquid produced at my works flows unfiltered into the *Beck*. Use yearly as dye wares, 115,000 lbs. of logwood, 57,000 lbs. of myrobalans, and shumac, also iron liquor, nitre, copperas, argol, and vitriol. The spent dye stuffs are partly sent down the *Beck*, and partly mixed with manure. Do not use any bleaching materials. Use yearly 1,400 gallons of Galipoli and olive oil. The waste wool produced at my works is partly used over again, and the remainder is sold to waste dealers. Use yearly 3 tons of soap and 50,000 gallons of urine. The soapsuds are not treated for the recovery of grease. Use steam, 35 nominal horse-power. Consume yearly 1,800 tons of coal, the ashes from which are sent to the railway to be used for ballast. The excrements of my workpeople are used for manure. Have no special suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Bishop, Son, and Hewett, Woollen Manufacturers.	Beeston Royds, near Leeds.	Our works are situated on the *Holbeck*, a tributary of the *Aire*. Employ 120 hands. Rateable value of works, 500*l*. Our works are not affected by floods. Obtain supply of water jointly from the stream and from wells. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be a considerable saving to us in the cost of pumping. Manufacture yearly goods of the value of from 35,000*l*. to 40,000*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Use yearly 10 tons of dye wares, chiefly logwood. The spent dye stuffs are burned, but the spent dye liquor is conveyed into sewers, and thence into the river. Do not use any bleaching materials. Use yearly, 20 tons of Gallipoli and olive oil, of the value of 1,100*l*. Produce yearly, about 8 tons of waste wool in the process of carding, which are sold to grease extractors. Use yearly, soap 5 tons, and urine 30,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 35 nominal horse-power. Consume yearly, 1,500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted away to be used for manure. Have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North and South Banks).

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
		Basin of the Calder (North and South Banks).
Abraham Ormerod & Brothers, Cotton Spinners and Manufacturers.	Ridgefoot, Todmorden.	Our works are situated on the *Calder*. Employ 300 hands. Rateable value of mills, 436*l*. 4*s*. The bed of the stream has not silted up. Our works are not affected by floods. There has been no alteration in the condition of the river within our knowledge. It is polluted by works above, and by mines. Obtain supply of water from the river. If the river were rendered clear and colourless it would not make much difference to us. Manufacture yearly 500 tons of goods. The whole of the liquid refuse produced at our works flows direct into the river. Use both steam and water as power; 100 nominal horse-power. Consume yearly about 2,500 tons of coal, the ashes from which are conveyed to the railway to be used as ballast. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Ormeroyd Brothers, Cotton Spinners and Manufacturers.	Hollin's Mill, Todmorden.	Our mills are situated on the *Calder*. Employ 550 hands. Rateable value of mills, 735*l*. 15*s*. The bed of the stream has not silted up. Our mills are not affected by floods. There has been no alteration in the condition of the river within our knowledge. It is slightly polluted by works above, not by mines. Obtain supply of water from the Rochdale canal. Manufacture yearly 700 tons of goods. The whole of the waste liquid produced at our works flows into the river. Use steam, 150 nominal horse-power. Consume yearly 4,000 tons of coal, the ashes from which are partly thrown into the river. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
Shepherds & Sutcliffe, Cotton Spinners and Manufacturers.	Todmorden -	Our works are situated on the *Calder*. Employ 300 hands. Rateable value of works, 400*l*. Our works are affected by floods. The bed of the stream has within our knowledge silted up 7 feet during the last 30 years, caused chiefly by solid refuse thrown into it from mills and houses situated on its banks; also by débris brought down in time of floods. The river is polluted by works above, not by mines. Obtain supply of water from the river. If the river were rendered clear and colourless it would be of no money value to us. Manufacture yearly 450 tons of goods, of the value of 55,000*l*. The whole of the waste liquid produced at our works flows direct into the river. Use steam, 80 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are used to fill up hollow places in adjoining land. The excrements of our workpeople are removed by a contractor under the Local Board of Health. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should be prevented from turning solid and liquid refuse into rivers and streams, that the offence should be made penal, and the offender on conviction fined in accordance with the magnitude of the offence.
George Hinchcliff, Cotton Spinner and Manufacturer.	Stoodley Bridge, Todmorden.	My mills are situated on the *Calder*. Employ 156 hands. Rateable value of mills, 375*l*. The bed of the river has silted up, caused mainly by the erection of weirs for the purpose of obtaining power for the mills; these obstructions prevent the free course of the water down the channel; and in a heavy rainfall the property on the adjoining banks is flooded. The silting up is also due to solid refuse from mills and houses thrown into the bed of the stream. My works are affected by floods. The river is polluted by works above, and by refuse from coal mines. Obtain supply of water from the canal; but do not know the annual consumption at my works. Manufacture yearly 200 tons of goods, of the value of 30,000*l*. The whole of the liquid refuse produced at my works flows into the stream. Use steam, 50 nominal horse-power. Consume yearly 1,100 tons of coal, the ashes from which and the excrements of my workpeople are thrown into the river. I suggest, as the best means of avoiding pollution in future, that all weirs should be removed, that the waterway of the bridges should be enlarged so as to allow of the free exit of the water in time of flood; and that the channel of the river should be deepened so as to confine the water in its natural course.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North and South Banks)—*cont.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Firth & Haworth, Cotton Spinners and Manufacturers.	Todmorden -	Our works are situated on the *Calder*. Employ 240 hands. Rateable value of works, 448*l*. The bed of the stream has silted up, caused by the large quantity of ashes and solid refuse thrown into it. Several floods have occurred during the last 10 years, and the property on the banks of the river has been damaged to a very serious extent from this cause, owing to the silting up of the bed of the stream. The river is polluted by works above; not to any very great extent by mines. Obtain supply of water from the Rochdale canal; but cannot give the annual consumption at our works. If the river or stream were rendered clear and colourless it would be of no direct money value to us, as we do not obtain our supply of water from it. Manufacture yearly 640,000 lbs. of goods The whole of the liquid refuse produced at our works flows into the canal. Use steam, 25 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are *thrown into river*. The excrements of our workpeople are mixed with earth and used for manure. We suggest, as the best means of avoiding pollution in future, that solid and liquid refuse from manufactories, and the sewage of towns, should be kept out of rivers and streams.
Barker Sutcliffe, Cotton Spinner and Manufacturer.	Manholm Mill, Todmorden.	My works are situated on the *Calder*. Employ 80 hands. Rateable value of works, 158*l*. 5*s*. The bed of the river has silted up, caused by débris washed down from the hills, and large quantities of ashes and other solid refuse continuously thrown into the river bed; also by weirs and dams erected across the river to convey water into goits for manufacturing purposes. My works are affected by floods. The condition of the bed of the river has materially changed during the last 10 years, the date at which my mill was erected; it has risen more than five feet. The river is considerably polluted by works above, by mines, and by town sewage. Obtain supply of water from the Rochdale canal; but do not known the annual consumption at my works. If the river were rendered clear and colourless, from which I might derive a supply of water, it would be worth 20*l*. a year for supplying the boilers alone, besides being of considerable value for other purposes. Manufacture yearly 111 tons of goods, of the value of 13,564*l*. The whole of the liquid refuse produced at my works flows direct into sewers, and thence into the river. Use steam, 75 nominal horse-power. Consume yearly 720 tons of coal, the ashes from which are used to level up low-lying land adjacent to the mill. The excrements of my workpeople are used for agricultural purposes. I suggest in order to prevent pollution in future, that manufacturers and others should be prohibited from turning ashes and other solid and liquid refuse into rivers and streams; that the Todmorden Local Board of Health should be compelled to construct settling tanks and filters at the sewer outfall to intercept, deodorize, and filter the large volume of sewage that will flow into the river after the sewage works are completed, and that floodgates should be put into every weir, or the weirs abolished.
E. Harrison & Company, Manufacturers of Satins and Fancy Goods for Printing and Dyeing.	Crow Carr, Ing's Mill, Todmorden.	Our works are situated on the *Calder*. Employ 70 hands. Rateable value of works, 58*l*. 11*s*. 2*d*. The bed of the river has silted up very much more than a foot during the last four years, being at present nearly level with the roadway. This has been caused by the great quantity of ashes, cinders, and dross daily thrown into the river from mills and iron works in the town; also from gravel and stone brought down from the hill sides in time of flood, which latter cannot be washed away owing to weirs forming obstructions in the river bed. In 1866 a very destructive flood occurred, and we sustained a damage of more than 500*l*., since which time our works have been upon two or three occasions affected by floods. The river is polluted to a slight extent by works above, and it is seriously polluted by works below us, and by mines. We obtain a supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly 104 tons of goods, of the value of 20,000*l*. The liquid refuse produced at our works flows direct into the river. Use steam, 50 nominal horse-power. Consume yearly about 1,000 tons of coal, the ashes from which are carted away to fill up hollow places on land adjoining the mill. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the river. We suggest, as the best means of avoiding pollution in future, that manufacturers should be prevented from turning ashes and solid refuse into the stream. There is a large tract of land in this neighbourhood upon which, for a charge of 2*d*. a load, ashes might be deposited; and the owners of such land require this refuse for levelling up hollow places.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North and South Banks)—*cont.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
James Fielden & Brothers, Cotton Manufacturers.	Carr Mill, Todmorden.	Our mills are situated on the *Calder*. Employ 70 hands. Rateable value of mills, 96*l*. The bed of the river has silted up, caused by solid refuse thrown into it. Our works are affected by floods, owing to the silting up of the bed of the stream. The stream is not polluted by works above, nor by mines. Obtain supply of water from the river; but do not know the annual consumption at our works. Manufacture yearly 250 tons of goods, of the value of 26,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. Use steam, 18 nominal horse-power. Consume yearly 360 tons of coal, the ashes from which are deposited on waste land. The excrements of our workpeople are conveyed by waterclosets into the river. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Eli Higham, Cotton Spinner and Manufacturer.	Friel Hurst Mill, Todmorden.	My works are situated on the *Calder*. Employ 50 hands. Rateable value of works, 135*l*. 19*s*. 11*d*. The bed of the river has silted up. My works are not affected by floods. The condition of the river has not changed during the last three years within my knowledge. It is polluted by works above, not by mines. Obtain supply of water jointly from the river and from land drainage. Manufacture yearly 280,000 lbs. of goods, of the value of 10,400*l*. The whole of the waste liquid produced at my works flows direct into the stream. Use both steam and water as power; steam 10, and water 15 nominal horse-power. Consume yearly about 400 tons of coal, the ashes from which are partly thrown into the river and partly used to repair roads. The excrements of my workpeople are conveyed into the river. No suggestions to offer.
Gledhill, Ashworth, & Company, Cotton Warp Sizers.	Hall Ing's, Todmorden.	Our works are situated on the *Calder*. Employ 24 hands. Rateable value of works, 84*l*. 14*s*. The bed of the river has silted up. Our works are affected by floods. The condition of the river has not changed within our knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from the Rochdale canal; but do not know the annual consumption at our works. We size yearly 12,000,000 lbs. of goods, of the value of 700,000*l*. Use yearly 1,113 tons of flour as size, and 780 tons of clay. The whole of the liquid refuse produced at our works flows direct into the river. Use steam, 14 nominal horse-power. Consume yearly 2,400 tons of coal, the ashes from which are conveyed to the railway for ballast. The excrements of our workpeople flow into the stream, and thence into the river. No suggestions to offer.
Coupe & Law, Cotton Warp Sizers.	Hope Mill, Todmorden.	Our works are situated on the *Calder*. Employ 14 hands. Rateable value of works . The bed of the river has silted up about 4 feet, caused by ashes and other solid refuse thrown into it. Our works are affected by floods, and have been seriously so on two occasions. The river is polluted by works above; not within our knowledge by mines. Obtain supply of water from land drainage: but are not able to state the annual consumption at our works. We size yearly goods of the value of 150,000*l*. Use yearly 125 tons of flour and 100 tons of china clay. The whole of the waste liquid produced at our works flows into sewers, and thence into the stream. Use steam, 10 nominal horse-power. Consume yearly 1,100 tons of coal, the ashes from which are used in levelling up hollow places in land adjoining the mills. The excrements of our workpeople are conveyed by sewers into the river. We suggest, as the best means of avoiding pollution in future, that ashes and other solid refuse should be prevented from being turned into rivers and streams.
Dugdale & Mills, Cotton Spinners and Manufacturers.	Bottom's Mill, Todmorden.	Our works are situated on the *Strines Brook*, an affluent of the *Calder*. Employ 130 hands. Rateable value of works, 300*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by chemical and other works above, and by mines. Obtain supply of water from the stream; but do not know the annual consumption at our works. Manufacture yearly 200 tons of goods, of the value of 20,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Use steam, 30 nominal horse-power. Consume yearly 1,600 tons of coal; the ashes from which, as also the excrements of our workpeople, are turned into the stream. Have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North and South Banks)—*cont.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William & John Sutcliffe, Cotton Spinners and Manufacturers.	Harley House Mill, Todmorden.	Our works are situated on the *Major Clough*, a tributary of the *Calder*. Employ 103 hands. Rateable value of works, 227*l*. The bed of the river has not silted up. Our works are not affected by floods. Obtain supply of water jointly from the stream, from wells, and from bore-holes. Manufacture yearly about 179,000 lbs. of goods, of the value of 11,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Use steam, 25 nominal horse-power. Consume yearly 830 tons of coal, the ashes from which are carted away to fill up hollow spaces in land to be used for building. The excrements of our workpeople are used as manure on our farm. No suggestions to offer.
Horsfall & Stephenson, Cotton Spinners.	Dulton Street, Todmorden.	Our works are situated on the *Calder*. Employ 96 hands. Rateable value of works, 87*l*. 10*s*. The bed of the river has silted up about 4 feet, caused by ashes and other solid refuse turned into it. Our works are affected by floods, caused by the silting up of the bed of the stream. The river is polluted by solid refuse thrown into it from works above; but not to our knowledge by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly 320 tons of goods, of the value of 36,500*l*. The whole of the liquid refuse produced at our works flows direct into the stream. Use steam, 16 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used to fill up hollow places in the land adjoining the mill. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the river. We suggest as the best means of avoiding pollution in future, that ashes and other solid refuse be prevented from being turned into rivers and streams.
		Basin of the Calder (North Bank).
Gibson Brothers, Cotton, Worsted, and Wool Spinners and Weavers.	Lord Holme and Newbridge Mills, Heptonstall.	Our mills are situated on the *Hebden*, a tributary of the *Calder*. Employ 140 hands. Rateable value of mills, 230*l*. 6*s*. The bed of the stream has not silted up. Our works are not affected by floods. There are no works situated above ours on the stream. The stream is not polluted by mines. Obtain supply of water from the river. Manufacture yearly 150,000 lbs. of goods, of the value of 20,000*l*. The whole of the waste liquid produced at the mills flows direct into the stream. Use steam and water as power; steam, 14, and water 20 nominal horse-power; steam is only used in drought. Consume yearly 120 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
Binns Brothers, Silk Waste Spinners.	Eaves Bottom Mill.	Our works are situated on the *Colden Brook*, a tributary of the *Calder*. Employ 50 hands. Rateable value of works, 208*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted occasionally by works above, by refuse from gasworks, and by ashes turned in; not by mines. Obtain supply of water jointly from the stream and gathering ground; cannot give the annual consumption at our works. Manufacture yearly 24,000 lbs. of goods, of the value of 11,871*l*. The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly, soap, 4 tons. The soapsuds are not treated for the recovery of grease. Use water as power, 18 nominal horse-power. Consume yearly 150 tons of coal, the ashes from which are turned into the stream. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer.
Hammond, Turner, & Bate, Braid and Smallware and Lastings Weavers.	Turvin Mills, Mytholmroyd.	Our works are situated on the *Turvin Brook*, a tributary of the river *Calder*. Employ 120 hands. Rateable value of works, 147*l*. 7*s*. 6*d*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the water is clear; it is not polluted, as there are no works situate above ours. Obtain supply of water from the stream; but are not able to state the annual consumption at our works. Manufacture yearly 20 tons of goods, of the value of 9,000*l*. The liquid refuse produced at our works flows into the stream. Use steam and water as power; water 20, and steam 12, nominal horse-power. Consume yearly 230 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled to keep the whole of the refuse from their works out of rivers and streams.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
D. J. Crossley, Cotton Manufacturer.	Clough Mill, Mytholmroyd.	My works are situated on the *Calder*. Employ 80 hands. Rateable value of works, 126*l*. The bed of the stream has silted up, but not to a very serious extent near my works. My works are not affected by floods. The condition of the river has not changed within my knowledge. It is polluted by works above, but not by mines. Obtain supply of water from the river, and it is suitable for my manufacturing purposes. Manufacture yearly 200 tons of goods, of the value of 30,000*l*. The liquid refuse produced at my works flows direct into the river. Use steam, 16 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are conveyed into sewers and thence into the river. No suggestions to offer.
Abraham Robinson & Sons, Cotton Spinners and Manufacturers.	Hebden Bridge	Our works are situated on the *Calder*, the *Hebden*, and *Colden Clough*. Employ 300 hands. Rateable value of works, 730*l*. The bed of the streams has silted up, but not recently. Our mills are affected by floods. The streams are polluted by works above; not by mines. Obtain supply of water from the river, from the streams, and a spring; but are not able to give the annual consumption at our works. If the rivers were rendered clear and colourless it would be of considerable money value to us, but we are not able to fix the amount. Manufacture yearly 900,000 lbs. of goods, of the value of 60,000*l*. The whole of the liquid refuse produced at our works flows direct into the streams. Use steam, 100 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are put into the streams. The excrements of our workpeople are partly turned into the streams, and partly used for manure. We suggest, as the best means of avoiding pollution in future, that solid and liquid refuse from manufactories and works, and sewage, should be kept out of rivers and streams.
Lacy Brothers, Cotton Manufacturers.	Callis Mill, near Hebden Bridge.	Our works are situated on the *Calder*. Employ 250 hands. Rateable value of works, 700*l*. The bed of the river has silted up 2 feet, caused by solid refuse turned into it. Our works are affected by floods. The river is polluted by solid and liquid refuse from manufactories and works; but not to a considerable extent by mines. Obtain supply of water from the river. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be of considerable value to us, but are not able to fix the amount. Manufacture yearly 1,000,000 lbs. of goods, of the value of 58,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. Use both steam and water as power, 125 nominal horse-power. Consume yearly 2,000 tons of coals, the ashes from which are used to fill up hollow places. The excrements of our workpeople are collected in a tank and used for manure. We suggest that a law should be passed to prevent the pollution of rivers by solid and liquid refuse.
William & Henry Horsfall, Cotton Spinners.	Waterside Mill, Hebden Bridge.	Our works are situated on the *Calder*. Employ 100 hands. Rateable value of works, 190*l*. 7*s*. 6*d*. The bed of the river has silted up. Our works are not affected by floods. The condition of the river has very little changed within our knowledge. It is polluted by works above; not by mines. Obtain supply of water jointly from the river and from *Colden Clough*. Manufacture yearly 325,000 lbs. of goods, of the value of 20,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. Use steam, 45 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are partly thrown into the river, and partly used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
William Horsfall, Cotton Spinner.	Winter's Mill, Stansfield, near Hebden Bridge.	My works are situated on the *Dale Clough*, an affluent of the *Calder*. Employ 65 hands. Rateable value of works, 80*l*. The bed of the river *Calder* has silted up, but that of *Dale Clough* has not. The silting up is caused by the throwing in of ashes, and of other solid refuse. My works are not affected by floods. The condition of the river and stream has not changed within my knowledge; they are seriously polluted by works above, and by mines. Obtain supply of water from the *Dale Clough*; and consume yearly the entire volume of the stream, but am not able to give the quantity consumed. Manufacture yearly 250,000 lbs. of goods, of the value of 10,000*l*. The whole of the liquid refuse produced at my works flows direct into the stream. Use steam, 16 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. No suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Horsfall Brothers, Cotton Manufacturers.	Calder Mill, Hebden Bridge.	Our works are situated on the *Calder*. Employ 80 hands. We rent room and power from the Hebden Bridge Cotton Company. The bed of the river has silted up. Our works are not affected by floods. The condition of the river has not changed during the last three years. Obtain supply of water from the canal, but are unable to give the annual consumption at our works. Manufacture yearly 630,000 lbs. of goods, of the value of 40,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Use steam, but as we hire room and power from the Hebden Bridge Cotton Company are not able to state the nominal horse-power, the weight of coal consumed, or what is done with the ashes. The excrements of our workpeople are thrown into the river. Have no suggestions to offer.
D. J. Crossley, Cotton Manufacturer.	Hebden Bridge	My works are situated on the *Calder*. Employ 36 hands. Rateable value of works, 85*l*. The bed of the river has silted up. My works are not affected by floods. Obtain supply of water from canal. Manufacture yearly 70 tons of goods, of the value of 10,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. As I hire power and room from Mr. James Lister, I am not able to state the nominal horse-power, the quantity of coal used, or what is done with the ashes. The excrements of my workpeople flow into the river. No suggestions to offer.
Thos. Barker & Sons, Dyers and Finishers.	Hanging Royd Mill, Hebden Bridge.	Our works are situated on the *Hebden*, a tributary of the *Calder*. Employ 9 hands. Rateable value of works, 185*l*. The bed of the stream has silted up. Our works are affected by floods, and were seriously so in 1866. The river is polluted by works above, and by mines. Obtain supply of water from the stream, but are not able to state the annual consumption at our works. Dye yearly 340 tons of goods. We have one depositing tank, the waste liquid produced at our works flows into the tank, and thence into the river. Use yearly 12 tons of dye wares, principally shumac, fustic, and logwood. The spent dye stuffs are mixed with manure. Use yearly as bleaching materials, 4 tons of chloride of lime. Use yearly 52 gallons of Gallipoli oil. Use steam, 10 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used principally for repairing roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Joseph Eastwood & Sons, Worsted Spinners and Manufacturers.	Midgley	Our works are situated on the *Luddenden Brook*, a tributary of the *Calder*. Employ 600 hands. Rateable value of works, 560*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from springs, but do not know the consumption at our works yearly. Manufacture yearly 400,000 lbs. of goods, of the value of 60,000*l*. The whole of the liquid refuse produced at our works, except the soapsuds, flows direct into a sewer, and thence into the stream. Do not use dye wares or bleaching materials. Use yearly Gallipoli oil of the value of 600*l*., and soap, 240 packs. The soapsuds are treated for the recovery of grease, by which we gain 80*l*. a year. Use steam, 90 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Hodgson & Sons, Cotton and Worsted Spinners.	Luddenden Foot	Our works are situated near to the *Calder*. Employ 140 hands. Rateable value of works, 250*l*. Our works are not affected by floods. Obtain supply of water from springs situate on our own property; but are not able to give the annual consumption at our works. Manufacture yearly goods of from 100,000 to 150,000 lbs. The whole of the liquid refuse produced at our works flows into brooks, and eventually into the river. Use steam, 150 nominal horse-power. Consume yearly 550 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future, that manufacturers and others should be compelled to keep solid and liquid refuse out of rivers and streams.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Jonathan Bracken & Sons, Paper Manufacturers.	Deans Mills, Luddenden.	Our mills are situated on the *Luddenden Brook*, a tributary of the *Calder*. Employ 50 hands. Rateable value of mills, 357*l.* 2*s.* 6*d.* The bed of the stream has not silted up. Our mills are not affected by floods. The condition of the river has not changed within the last four years. It is polluted by works above, not to any great extent, and is not polluted by mines. Obtain supply of water from the stream, but are unable to state the annual consumption at our mills. Use yearly, rags, 835 tons; bleaching powder, 7 tons; alum, 47 tons; lime, 40 tons; vitriol, 2 tons; and antichlor, 1 ton. We have one depositing tank, and a portion only of the liquid refuse from our works is passed through it before being turned into the river. Manufacture yearly 625 tons of packing paper. The rag dust produced is used for manure. Use steam and water as power; steam 58, and water 40, nominal horse-power. Consume yearly 1,800 tons of coal, the ashes from which are used partly to repair roads, and to level up waste land. The excrements of our workpeople are mixed with farm manure and used for agricultural purposes.
John Ambler & Sons, Worsted Spinners.	Peel House Mills, near Luddenden Foot.	Our works are situated on the *Luddenden Brook*, a tributary of the *Calder*. Employ 300 hands. Rateable value of works, 700*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above and by paper mills; not by mines. Obtain supply of water jointly from the stream and waterworks, but do not know the quantity consumed at our works yearly. Manufacture yearly 600,000 lbs. of goods, of the value of 90,000*l.* The whole of the waste liquid produced, except the soapsuds, flows direct into the stream. Do not use dye wares or bleaching materials. Use yearly 12 tons of Gallipoli oil, of the value of 600*l.*, and 75,000 lbs. of soap. The soapsuds are treated for the recovery of grease, and the liquid refuse afterwards flows into the stream. Use both steam and water as power; steam 75, and water 20, nominal horse-power. Consume yearly 1,800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure on our own land. No suggestions to offer.
Clay & Horsfall, Woollen Manufacturers.	Luddenden Foot	Our works are situated on the *Luddenden Brook*, a tributary of the *Calder*. Employ 100 hands. Rateable value of works, 317*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted by paper-mills and other works above; not by mines. Obtain supply of water jointly from the stream and from waterworks. Manufacture yearly 300,000 lbs. of goods, of the value of 22,000*l.* The whole of the liquid refuse produced at our works, except the soapsuds, flows direct into the sewers, and thence into the stream. Use yearly, Gallipoli and whale oil of the value of 550*l.* The waste wool produced in carding is sold to waste dealers. Use yearly, soap and alkali, 12 tons. The soapsuds are treated for the recovery of grease. Use both steam and water, 30 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed and used for manure. We suggest, as the best means of avoiding pollution in future, that solid and liquid refuse from mills and manufactories, and town sewage, be prevented from being turned into rivers and streams.
S. Priestley & Sons, Woollen Manufacturers.	Luddenden Foot	Our works are situated on the *Luddenden Brook*, a tributary of the *Calder*. Employ 80 hands. Rateable value of works, 179*l.* 5*s.* The bed of the river has silted up. Our works are affected by floods, and were particularly so in 1866, when damage to the extent of 1,000*l.* was done to our works. The condition of the brook has become gradually worse year by year. It is polluted by works above, not by mines. Obtain supply of water jointly from the brook and from the stream; but are not able to give the annual consumption at our works. If the stream were rendered clear and colourless it would be a direct money value to us of 70*l.* a year. Manufacture yearly 80 tons of goods, of the value of 12,000*l.* The whole of the liquid refuse produced at our works flows into sewers, and thence into the stream. Do not use any dye wares. Use as bleaching materials 4 tons of sulphur in a solid state. Use recovered oil from the waste wool of the value of 360*l.* yearly. Produce 100 tons of waste wool in the process of carding, which are sold to blanket manufacturers. Use yearly, soap 4 tons, alkali 4 tons, and urine 250 gallons. The soapsuds are not treated for the recovery of grease. Use steam, 10 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used principally to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Calder, North Bank)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Wallis & Co., Manufacturers of Tarpaulin and Oil-cloth, and Cotton and Linen Tillot Printers.	Rose Hill, Sowerby Bridge.	Our works are situated on the *Calder*. Employ 50 hands. Rateable value of works 149*l.* 10*s.* Our works, are not affected by floods. Obtain supply of water from the Waterworks Company, and consume yearly 200,000 gallons. We manufacture yearly goods of the value of 36,500*l.* The whole of the liquid refuse produced at our works flows into the sewers and thence into the river. Use steam, 7 nominal horse-power. Consume yearly 280 tons of coal, the ashes from which are carted away from our premises and used for various purposes. The whole of the excrements of our workpeople are conveyed by watercloset into sewers, and thence into the river. No suggestions to offer.
John Atkinson & Sons, Woollen Manufacturers.	Watson Mills, Sowerby Bridge.	Our works are situated on the *Ryburn Brook*, a tributary of the *Calder*. Employ 100 hands. Rateable value of works, 347*l.* 7*s.* 6*d.* The bed of the stream has silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted by works above, not by mines. Obtain supply of water from the river and from wells, but cannot give the annual consumption at out works. If the river were rendered clear and colourless it would be a benefit to us. Manufacture yearly 1,300 packs of goods, of the value of 23,400*l.* The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 15 tons of cloth and Gallipoli oils, of the value of 500*l.* Produce yearly 8 tons of waste wool in the process of carding, which are sold to waste dealers. Use yearly, soap 4 tons, alkali 3 tons. The soapsuds are treated for the recovery of grease, but as this operation has only been carried out for a space of three or four months we cannot state the gain to us. Use steam, 40 nominal horse-power. Consume yearly 624 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future that all liquid refuse from manufactories, and water that has been fouled, should be filtered before being passed into streams.
James Greenwood & Son, Woollen Manufacturers.	Holme Mill, Sowerby Bridge.	Our works are situated on the *Calder*. Employ 100 hand Rateable value of works, 500*l.* The bed of the stream has not silted up near our works. Our works are not affected by floods. The river is polluted by works above, not by mines. Obtain supply of water jointly from the river and from springs. If the river were rendered clear and colourless it would be a direct money value to us, but we are not able to fix the amount. Manufacture yearly 150 tons of goods of the value of 20,000*l.* The whole of the liquid refuse, except soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 12 tons of cloth oil of the value of 408*l.* Produce 8 tons of waste wool in the process of carding, which is sold to oil extractors. Use yearly, soap 3 tons, and alkali 3 tons. The soapsuds are treated for the recovery of grease, by which we gain 30*l.* a year. Use steam, 50 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are conveyed into the river. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Edwards & Sons, Heavy Woollen Manufacturers.	Canal Mills, Sowerby Bridge.	Our works are situated on the *Calder*. Employ between 400 and 500 hands. Rateable value of works 1,456*l.* The bed of the river has silted up near our works, and we attribute the cause of it to the clay and other solid refuse thrown in from Messrs. W. J. Norris and Brothers' chemical works, and also to ashes and refuse thrown in by millowners at Sowerby Bridge (in defiance of the Act of Parliament) which are washed down by floods. These (Canal) mills are situated considerably above the level of the river, but at our Mearclough Mills the dam for the water-wheel is constantly silting up from the before-mentioned causes. We obtained an injunction against Messrs. Norris some years ago, to restrain them from casting refuse into the river; but it is now almost a dead letter. The river is very seriously polluted by all kinds of manufacturing refuse, and by sewage, the water being always in a filthy state, especially in the summer, when the effluvia arising from it is almost unbearable. The water in the river then lies almost stagnant in pools, but periodical floods wash it away, and to some extent purify the bed of the stream. Obtain supply of water principally from springs, but in very droughty seasons from the river: consume yearly about 131,000,000 gallons. If the river were rendered clear and colourless it would be of considerable money value to us, but we are not able to fix

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Edwards & Sons, Heavy Woollen Manufacturers—*cont.*	Canal Mills, Sowerby Bridge—*cont.*	the amount. Manufacture yearly 650 tons of goods, of the value of 130,000*l.* The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the river. Use yearly 270 tons of dye wares, chiefly lac dye, cochineal, indigo, log and other woods, tartar and argols. The whole of the spent dye wares and liquids flow into the river. Do not use any bleaching materials. Use yearly 50 tons of Gallipoli oil, of the value of 2,750*l.* The whole of the waste wool produced in carding is sold, and used for the manufacture of the coarser articles. Use yearly, soap 70 tons, but no alkali or urine. The soapsuds are treated for the recovery of grease, by which we gain 80*l.* a year. Use steam, 300 nominal horse-power. Consume yearly 5,000 tons of coal, the ashes of which are carted to a heap near to our manufactory. The excrements of our workpeople are removed from the works every fortnight to a manure heap, mixed with solid refuse and shoddy, and then used for agricultural purposes. We suggest, as the best means of avoiding pollution in future, that all liquid refuse from bleach, chemical, dye, and other works should be filtered before being passed into streams; that a very heavy fine be inflicted upon all persons throwing these polluting liquids unfiltered, and also solid refuse of any kind, into streams; and that an officer should be appointed to prosecute all persons committing these offences.
James Clay & Sons, Woollen Manufacturers.	Sowerby Bridge	Our works are situated on the *Calder*. Employ 450 hands. Rateable value of works, 960*l.* The bed of the river has not silted up near our premises. Our works are affected by floods, but not so frequently as formerly. The condition of the river was formerly pure, and it was well stocked with fish, but now fish are not able to live in it. It is considerably polluted by every kind of liquid and solid refuse, but not by mines. Obtain supply of water from the river, and consume yearly about 40,000,000 gallons. If the river were rendered clear and colourless it would be a direct money value to us of from 50*l.* to 100*l.* a year. Manufacture yearly 630,000 lbs. of wool, of the value of 60,000*l.* We dye 80,000 lbs. of goods, of the value of 2,000*l.* We produce 20,000,000 gallons of liquid refuse from washing, 10,000,000 from dyeing, and 10,000,000 from soapsuds. The whole of the waste liquid, except soapsuds, flows direct into the river. Use yearly, as dye wares, aniline, 140 lbs.; argol, 2,688 lbs.; dyewoods, 32,493 lbs.; cochineal, 1,832 lbs.; cudbear, 10,134 lbs.; spirits, 17,328 lbs.; indigo, 4,617 lbs.; prussiate, 336 lbs.; bichrome, 1,596 lbs.; lac dye, 1,636 lbs.; and as bleaching materials 29,000 lbs. of sulphur in a solid state. The spent dyewoods are burned; the remainder is turned into the river. Use yearly Gallipoli and cloth oils of the value of 2,000*l.* Produce yearly 550 packs of waste wool in carding, which is sold to be used again for a low class of goods. Use yearly soap, from 12 to 15 tons. The soapsuds are treated for the recovery of grease, by which we gain 140*l.* a year. Use both steam and water as power; steam 20, and water 45, nominal horse-power. Consume yearly 2,100 tons of coals; the ashes from which are used to fill up hollow places in the land, and repairing the roads. The excrements of our workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
John Maude, Woollen Manufacturer.	Prospect Mill, Sowerby Bridge.	My works are situated on the *Calder*. Employ 34 hands. I rent room and power; rates are paid by my landlord. The bed of the river has silted up. My works are not affected by floods. The stream is polluted by works above to a very great extent; not by mines. Obtain supply of water from the river and wells. If the river were rendered clear and colourless it would be of considerable money value to me, but I am not able to state the amount. Manufacture yearly 480 packs of wool. The whole of the liquid refuse produced at my works flows direct into the river. Do not use dye wares or bleaching materials. Use yearly, olive oil 948 gallons. The waste wool produced in carding is sold to waste dealers. Use yearly, soap and alkali 12 tons. The soapsuds are not treated for the recovery of grease. Use steam, 7 nominal horse-power, but as I rent power I am not able to state what quantity of coal is consumed, or what is done with the ashes. The excrements of my workpeople are conveyed into the river. No suggestions to offer.
John Forster & Sons, Mohair, Alpaca, and Worsted Spinners and Manufacturers.	Black Dyke Mills, Queensbury.	Our works are situated near a tributary of the *Calder*. Employ 2,500 hands. Rateable value of works, 3,200*l.* Obtain supply of water from wells, but do not know the annual consumption at our works. In the manufacture of goods at our works 3,000,000 lbs. of wool is used yearly, of the value of 400,000*l.* We manufacture yearly

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Forster & Sons, Mohair, Alpaca, and Worsted Spinners and Manufacturers—*cont.*	Black Dyke Mills, Queensbury—*cont.*	1,200,000 lbs. of goods of the value of 500,000*l.*, and 1,300,000 lbs. of yarns of the value of 200,000*l.* The whole of the waste liquid produced at our works flows into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 28 tons of Gallipoli oil, of the value of 1,550*l.* Use yearly 193 tons of soap; no alkali or urine. The soapsuds are treated for the recovery of grease, by which we gain 1,500*l.* a year. Use steam, 350 nominal horse-power. Consume yearly 10,260 tons of coal, the ashes from which are used for mixing with lime for building purposes, and also for repairing roads. The excrements of our workpeople are removed from the premises and used as manure. No suggestions to offer.
Paul Speak & Son, Worsted Spinners and Manufacturers.	Queensbury -	Our works are situated near an affluent of the *Calder*. Employ 300 hands. Rateable value of works, 309*l.* Obtain supply of water from gathering grounds stored in reservoirs, but are unable to state the annual consumption at our works. We use yearly in the manufacture of goods, 300,000 lbs. of wool, and 80,000 lbs. of cotton warps, of the value of from 50,000*l.* to 55,000*l.* The whole of the waste liquid produced at our works flows into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 6 tons of Gallipoli oil, of the value of 300*l.*; also soap, 80 packs. The soapsuds are not treated for the recovery of grease. Use steam, 40 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed from the premises, and used for manure. No suggestions to offer.
George Scholes & Company, Woollen Manufacturers.	Clough House Mill, Fartown.	Our works are situate on a stream which flows into the *Hebble*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 334*l.* The bed of the river has not silted up. Our works are not affected by floods. The condition of the river is clean. It is not polluted by works above; nor by mines. Obtain supply of water from the stream, but are not able to state the annual consumption at our works. Manufacture yearly 200,000 lbs. of yarn, of the value of 20,000*l.* The whole of the waste liquid produced at our works flows into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 26 tons of olive oil, of the value of 1,430*l.* Produce yearly eight tons of waste wool in the process of carding, which is sold partly for manufacturing purposes, and to be used as manure. Use yearly, soap, 5 tons, ammonia, 3,700 gallons, but no other alkali or urine. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly 780 tons of coal; and make 100 tons of ashes, which are used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Lightowler Brothers, Dyers and Bleachers.	Wheatley, near Halifax.	Our works are situated on the *Hebble*, a tributary of the *Calder*. Employ 30 hands. Rateable value of works, 70*l.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The stream is polluted by works above, not by mines. Obtain supply of water from springs, but are not able to give the annual consumption at our works. We bleach yearly 50,000 lbs. and dye 100,000 lbs. of goods. The whole of the waste liquid produced at our works flows into depositing tanks, thence into sewers, and then into the stream. Use yearly 100,000 lbs. of dye wares, gambir, shumac, logwood, prussiate of potash, bi-chromate of potash, aniline colours, and vitriol. The spent dye stuffs are carted away. Use yearly, as bleaching materials, 10 tons of bleaching powder. Do not use any oil. Use yearly, soft soap 36 packs, and hard soap 12 cwts. The soapsuds are not treated for the recovery of grease. Do not use either steam or water as power. Consume yearly 960 tons of coal, the ashes from which are carted away. The excrements of our workpeople are used for manure. No suggestions to offer.
John Crossley & Sons (Limited), Carpet Manufacturers.	Dean Clough Mills, Halifax.	Our works are situate on the *Hebble*, a tributary of the *Calder*. Employ 4,920 hands. Rateable value of works, 8,650*l.* The bed of the stream has not silted up. Our works are not affected by floods. 50 years ago the *Hebble* was a pure stream; it is now much polluted, and after its junction with the *Ovenden Brook* seriously so. The *Hebble* is not polluted by refuse from mines, but the *Ovenden Brook* is. Obtain supply of water jointly from river, from wells, bore-holes, and from waterworks; but it is quite impossible to estimate the annual consumption at our works. If the river or stream from which we might derive a supply of water were rendered clear and colourless, it

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Crossley & Sons (Limited), Carpet Manufacturers—*cont.*	Dean Clough Mills, Halifax—*cont.*	would be of considerable value to us; but it is difficult to estimate the amount. We manufacture yearly 5,150 tons of goods, of the value of 900,000*l.* The whole of the liquid refuse from our works flows direct into the stream. Use yearly all kinds of dye wares, but are not able to give the weight. Do not use any bleaching materials. Use yearly 75 tons of oil, of the value of 3,900*l.* Produce yearly 5 tons of waste wool in carding, which is sold to other manufacturers. Use yearly, soap 312 tons. The soapsuds are treated for the recovery of the grease. Use steam, from 400 to 500 nominal horse-power. Consume yearly 24,000 tons of coal; the ashes from which are carted away to a "tip," or ground provided for that purpose. The excrements of our workpeople are removed in carts from tanks provided for their reception. We suggest as the best means of avoiding pollution in future, and for the conservancy of rivers and streams, that inspectors in the form of river police should be duly appointed.
John Crossley & Sons, Carpet and Rug Manufacturers.	Albion Mills, Halifax.	Our works are situated on the *Hebble*, a tributary of the *Calder*. Employ 350 hands. Rateable value of works, 920*l.* 15*s.* The bed of the stream has silted up, caused by solid refuse from various sources thrown into it. Our works are not affected by floods. The condition of the stream has not changed in the last 10 or 15 years. It was then very considerably polluted by works above, and is so now, but not by mines. Obtain supply of water jointly from wells and from waterworks, and consume yearly about 14,000,000 gallons. Manufacture yearly 832,000 lbs. of goods, of the value of 80,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Use yearly, 60 tons of dyewares of various kinds. The spent dye stuffs are turned into the stream. Do not use any bleaching materials. Use yearly 18 tons of Gallipoli and sperm oil, of the value of 1,070*l.* The whole of the waste wool produced in carding is either re-used or sold for manure. Use yearly soap, 74 tons; alkali, 40 tons; and urine, 1,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain yearly 40*l.* Use steam, 50 nominal horse-power. Consume yearly, 2,000 tons of coal; the ashes from which are carted on to waste land. The whole of the excrements of our workpeople are conveyed into the stream. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
James Ackroyd & Son, Worsted Spinners and Manufacturers.	Haley Hill, Halifax, and Copley.	Our works are situated on the *Calder* and *Hebble*. Employ 2,500 hands. Rateable value of the works, 4,146*l.* 5*s.* The bed of the streams has not silted up near our works. Our works are not affected by floods. The rivers are polluted by works above and by mines. Obtain our supply of water jointly from rivers, wells, and Corporation Waterworks, and consume at the works at Copley, for genappe scouring and wool washing, 939,420 gallons yearly. We are unable to state the quantity consumed at our works at Haley Hill. If the water of the streams was rendered chemically pure, it would be of considerable money value to us, but simply decolourized it would be no great gain to us. We are unable to give the weight and value of the goods operated upon at our works, as we cannot separate the goods manufactured or operated upon, either wholly or in part. The goods are sold when combined with or even formed of materials bought, not operated upon. The whole of the waste liquid produced at our works flows into the sewers, and thence into the rivers *Calder* and *Hebble*. Do not use any dye wares or bleaching materials. Use yearly 55 tons of olive oil of the value of 2,640*l.* Produce about two tons of waste wool in the process of carding, which is sold. Use yearly, soap, 113 tons; alkali, 18 tons; but no urine or ammonia. The soapsuds are sold to grease extractors. Use both steam and water as power, steam, 1,180, and water 30 nominal horse-power. Consume yearly 6,300 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are conveyed partly through the town sewers into the river, and partly carted away by farmers in the neighbourhood to be used for manure. We do not see any means at present for avoiding pollution in future without interfering with the trade of the district, but we would suggest that all solid matters should be kept out of rivers and streams. The formation of reservoirs at the heads of rivers and streams, for storing flood water and allowing the water to flow in times of drought down the river channels, seems to us the most feasible plan of ameliorating pollution.
The Ovenden Worsted Company (Limited).	Holmfirth and Shay Lane, Ovenden.	Our works are situated on the *Ovenden Beck*, a tributary of the *Calder*. Employ about 700 hands. Rateable value of works, 1,200*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has improved during the last 20 years. The river is not polluted by works above, or by mines.

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		Obtain supply of water jointly from the stream and from wells; and consume yearly 300,000 gallons. If the river were rendered clear and colourless it would not be of any direct money value to us. We manufacture yearly 800,000 lbs. of goods, of the value of 90,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Do not use either dye wares or bleaching materials. Use yearly, olive oil, 5,500 gallons, of the value of 1,200*l.* Use yearly, soap, 200 packs; soda, 30 cwt.; no urine. The soapsuds are treated for the recovery of grease. Use steam, 50 nominal horse-power. Consume yearly 700 tons of coal; make 300 tons of ashes, which are used to repair roads. The excrements of our workpeople are conveyed into tanks, and are afterwards mixed with other refuse and used for manure. No suggestions to offer.
Thomas Robertshaw & Son, Worsted Spinners and Manufacturers.	Forest Mill, Ovenden.	Our works are situated near *Ovenden Brook*, a tributary of the *Calder*. Employ 280 hands. Rateable value of works, 500*l.* The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water jointly from a spring and from land drainage; but have no means of ascertaining the volume consumed at our works. Manufacture yearly 319,760 lbs. of goods, of the value of 47,964*l.* The whole of the waste liquid produced at our works flows by sewers into the stream. Do not use any dye wares or bleaching materials. Use steam, 40 nominal horse-power. Consume yearly 950 tons of coal, the ashes from which are used for the repair of roads. The excrements of our workpeople are deodorized, mixed with refuse, and removed every week to our farm for agricultural purposes. We suggest as the best means of avoiding pollution in future, that manufacturers and others should be compelled to keep their refuse out of rivers and streams.
John Dennison & Son, Woollen Manufacturers.	Lee Bridge, Halifax.	Our works are situated on the *Ovenden Brook*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 298*l.* The bed of the stream has silted up, caused by refuse thrown in from works and houses above. Our works are affected by floods, and in 1856 suffered very considerable damage. The river is at present a filthy stream, although some four years ago it was very clear. It is polluted by dye and other works above to such an extent that we are now obliged to cleanse out the goit which supplies our works six or eight times in the course of a year. It is not polluted, to our knowledge, by mines. Obtain supply of water from the stream. Owing to the polluted state of the water we are not able to scour our goods at the works. If the water was clear and colourless we should be able to do so, and it would be a very considerable gain to us, although we are not able to fix the amount. The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 4 tons of rape oil, of the value of 160*l.*; 17½ tons of cloth oil, of the value of 660*l.*; and 33 gallons of olive oil, of the value of 8*l.* Produce yearly 12 tons of waste wool in the process of carding, which is sold to oil extractors. Do not use either soap, alkali, or urine. Use both steam and water as power; steam 28, and water 8, nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are carted away to repair roads. The excrements of our workpeople are removed by farmers for manure. Have no suggestions to offer.
W. H. Rawson & Company, Woollen Manufacturers.	Old Lane, Halifax.	Our works are situated on the *Ovenden Brook*, a tributary of the *Calder*. Employ 300 hands. Rateable value of works, 600*l.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The condition of the stream has very little changed during the last 30 years. It is polluted by works above, not by mines. Obtain supply of water partly from the river and partly from the Halifax Corporation Waterworks, and consume yearly about 2,000,000 gallons. If the stream or river were rendered clear and colourless, it would be of no direct money value to us, as we only use the river water for condensing purposes. Manufacture yearly 1,393,000 lbs. of goods, of the value of 140,000*l.* The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 40 tons of olive and cloth oil, of the value of 2,000*l.* The better portion of the waste wool produced in carding is re-used, and the remainder sold for manure. Do not use either soap, alkali, or urine. Use steam, 60 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are carted away from the premises. The excrements of our workpeople are used for manure. No suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
F. E. Rawson, Woollen Manufacturer.	Thorpe Mill, near Halifax.	My works are situated on the *Rybarn*, a tributary of the *Calder*. Employ 90 hands. Rateable value of works, 420*l*. The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream is comparatively pure. It is slightly polluted by ashes and other solid refuse thrown into it, not by mines. Obtain supply of water from the stream, but are not able to give the annual consumption at my works. Manufacture yearly 64 tons of goods, of the value of 7,000*l*.; and scour and finish 350 tons, of the value of 30,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. Do not use either dye wares or bleaching materials. Use 9 tons of patent cloth oil, of the value of 300*l*. Produce 12 tons of waste wool in the process of carding, which is used for manure. Use yearly, soap 3½ tons, alkali 18 tons, but no urine. The soapsuds are treated for the recovery of grease. Use steam and water as power, steam 14, and water 22 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are mixed with earth, and carted away to be used as manure. No suggestions to offer.
John Sheard & Company, Carpet Manufacturers.	Shaw Hill, Halifax.	Our works are situated on the *Hebble*, a tributary of the *Calder*. Employ 215 hands. Rateable value of works, 352*l*. The bed of the river has silted up, but not to any appreciable extent within our knowledge. Our works are not affected by floods. The river is seriously polluted by works above, but not that we are aware of by mines. Obtain supply of water from the canal, from wells, and from the Corporation Waterworks, but do not know the annual consumption at our works. If the river were rendered clear and colourless, it would be of money value to us, but we are not able to fix the amount. Do not know the weight or value of the goods manufactured yearly. The whole of the liquid refuse produced at our works flows direct into the stream. Use yearly 262,680 lbs. of dye wares, chiefly logwood, cochineal, cudbear, orchil, fustic, lac dye, alum, tartar, extract of indigo, tartaric acid, and spirits of various sorts. The spent dye stuffs are thrown into the stream. Do not use any bleaching materials. Use steam, 35 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are conveyed partly to the railway to be used for ballast, and partly deposited at other places. The excrements of our workpeople are partly carted from the premises to be used for manure, and partly conveyed by sewers into the stream. No suggestions to offer.
David Smith, Manufacturing Chemist.	Kensington Works, Exley, Halifax.	My works are situated on the *Hebble*, a tributary of the *Calder*. Employ 20 hands. Rateable value of works, 223*l*. 18*s*. The bed of the stream has silted up. My works are not affected by floods. The condition of the stream is much the same as it has been for many years past. It is polluted to a very considerable extent by works above, not within my knowledge by mines. Obtain supply of water jointly from wells and from the Halifax Corporation Waterworks, and consume yearly from 400,000 to 500,000 gallons. Could not with advantage use the river water, as I am not situated sufficiently near. Use and produce yearly 150 tons of pyrites, 300 tons of copperas, flavine, and dyer's solutions. Have no depositing tanks, and the liquid refuse produced at my works flows into sewers, and thence into the stream. Use steam, 12 nominal horse-power. Consume yearly from 700 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are removed by farmers for manure. Have no special suggestions to offer, but if filtration of polluting liquids be carried on as far as practicable it may mitigate the evil.
Ingham, Brothers, Dyers and Bleachers.	Green Mount, Halifax.	Our works are situated on the *Calder* and *Hebble*. Employ 200 hands. Rateable value of works, 400*l*. The beds of the streams have not silted up. Our works are not affected by floods. The condition of the streams has changed but very little within our knowledge. They are polluted by works above, but not to our knowledge by mines. Obtain supply of water jointly from wells, and from Halifax Waterworks Company, and consume yearly 60,000,000 gallons. We bleach yearly 150,000 lbs. and dye 1,800,000 lbs. of goods. Produce yearly 40,000,000 gallons of liquid refuse from washing, and 10,000,000 from bleaching, 9,000,000 from dyeing, and 1,000,000 from soapsuds. Have no depositing tanks. The whole of the waste liquid produced at our works flows direct into sewers and thence into the river. Use yearly 1,854,958 lbs. of dye wares, viz., alum, 268,800 lbs; ammonia, 13,600 lbs.; aquafortis, 50,000 lbs.; aniline colours, 6,500 lbs.; annatto, 800 lbs.;

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Ingham, Brothers, Dyers and Bleachers—*cont.*	Green Mount, Halifax—*cont.*	bleaching powder, 47,500 lbs.; bi-chromate of potash, 33,600 lbs.; cochineal, 18,000 lbs.; cuta fustia, 110,900 lbs.; copperas, 31,360 lbs.; cudbear, 23,672 lbs.; gambir, 106,848 lbs.; indigo, 2,500 lbs.; indigo extracts, 41,072 lbs.; logwood, 313,600 lbs.; lead sugar, 1,400 lbs.; limawood, 67,200 lbs.; lac dye, 700 lbs.; prussiate of potash, 22,400 lbs.; vitriol, 20,160 lbs.; sulphuric acid, 120,700 lbs.; shumac, 170,688 lbs.; soap, 99,360 lbs.; soda ash, 15,680 lbs.; spirits salts, 32,900 lbs.; tartar and argol, 21,000 lbs.; tin, 8,508 lbs.; turmeric, 13,440 lbs.; glauber crystals, 168,000 lbs.; nitrate of iron, 22,670 lbs.; tin crystals, 1,400 lbs. The spent dye stuffs are burned, but the liquids are thrown into sewers, and thence flow into the stream, the spent shumac is used as manure. Use yearly, as bleaching materials, chloride of lime 10,000 lbs., soda 15,000 lbs., and vitriol 10,000 lbs. Do not use any oil. Use yearly, soap 40,000 lbs., and ammonia 10,000 lbs. The soapsuds are not treated for the recovery of the grease. Use steam, 30 nominal horse-power. Consume yearly 6,000 tons of coal, the ashes from which are used for paving and repairing roads and streets. The excrements of our workpeople are carted away by farmers to be used as manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Thomas Crossley & Sons, Dyers, Stovers, and Finishers.	Bailey Hall Works.	Our works are situated on the *Hebble*, a tributary of the *Calder*. Employ 112 hands. Rateable value of works, 150*l*. The bed of the stream has not silted up opposite our works. Our works are not affected by floods. Some years ago the water of the river was sufficiently clean to wash goods in it; it is now so much polluted by works above and by town sewage as to be totally unfit for that purpose. Obtain supply of water for condensing purposes from the river, and for dyeing, from wells, and for scouring from Corporation Waterworks. If the river were rendered clear and colourless, from which we might derive a supply of water, it would be of value to us of more than 100*l*. a year. We dye, stove, and finish 450 tons of goods yearly. The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. Use yearly 143,000 lbs. of dye wares, principally ground logwood, fustic, and shumac; part of the spent dye stuffs is burnt and the remainder is used for manure. Use 2,250 lbs. of bleaching materials, chiefly brimstone, but occasionally use chloride of lime. Use yearly, soap 20,000 lbs., ammonia 39,000 lbs. The soapsuds are not treated for the recovery of the grease. Use steam, 12 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are carted away to be used for manure. The excrements of our workpeople are also carted away by farmers to be used for agricultural purposes. No suggestions to offer.
James Lord & Company, Dyers and Finishers.	Water Lane, Halifax.	Our works are situate near to the *Hebble*, a tributary of the *Calder*. Employ 67 hands. Rateable value of works, 142*l*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from wells, boreholes, and from Waterworks Company. Consume yearly from wells 13,000,000 gallons, and from Waterworks Company 4,000,000 gallons. We have no right to a supply of water from river or stream, and therefore if the river were rendered clear and colourless it would be of no direct money value to us. We operate yearly upon goods, of the value of 14,000*l*. Produce yearly, liquid refuse from bleaching 6,000,000, from dyeing 8,500,000, and from soapsuds 2,500,000 gallons. Have no depositing tanks. The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. Use yearly 140,000 lbs. of dye wares, principally dye woods. The spent dye stuffs are burned. Use as bleaching materials 17,444 lbs. of bleaching lime, 24,400 lbs. of D.O.V., and 3,332 lbs. of soda ash. Do not use any oil. Use yearly, curd soap 2,240 lbs., olive oil, 5,760 lbs., urine 1,400 gallons. The soapsuds are not treated for the recovery of grease. Use steam, 6 nominal horse-power. Consume yearly 2,400 tons of coal, and make 300 tons of ashes, which are carted away to be used as ballast on the railway. The excrements of our workpeople are carted away by farmers to be used as manure. Have no suggestions to offer.
George & John Pilling, Dyers and Stovers.	Lee Bridge Works, Halifax.	Our works are situated on the *Hebble*, a tributary of the river *Calder*. Employ 33 hands. Rateable value of works, 178*l*. 17*s*. 6*d*. The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The condition of the stream is much the same as when we first knew it. It is polluted by works above: not by mines. Obtain supply of water jointly from river and from water-

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George & John Pilling, Dyers and Stovers—*cont.*	Lee Bridge Works, Halifax—*cont.*	works; consume yearly 3,130,000 gallons. If the river were rendered clear and colourless it would make but very little difference to us. We dye yearly 572 tons of goods. Produce yearly, liquid refuse from washing, 1,043,333; from dyeing, 1,565,000; and soapsuds, 521,667 gallons. Have no depositing tanks. The whole of the liquid refuse produced at our works flows direct into the stream. Use yearly, as dye wares, indigo 8,162 lbs., indigo extract 14,756, aniline 960, dye woods 71,388, dye wood extract 8,336, orchil liquor 21,528, cochineal 6,449, cudbear 3,693, madder 2,296, picric acid paste 2,294, sulphuric acid 73,953, oxalic acid 3,777, shumac 5,341, bi-chrome 3,920, alum 56,000, argol 2,386, scarlet spirit 6,661, muriate of tin 3,855, and ammonia 2,104 lbs. The spent dye stuffs are burned. The liquid refuse produced at our works is conveyed into the stream. Use yearly, as bleaching materials, sulphur 2,240 lbs. Do not use any oil. Use yearly, soft soap, 7 tons; soda, 10 tons. The soapsuds are not treated for the recovery of the grease. Use steam, 14 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are carted away to railways for ballast. The excrements of our workpeople are turned into the stream. Have no suggestions to offer.
Stott, Storey, & Walshaw, Dyeware Grinders.	Skircoat, Halifax.	Our works are situated on the *Hebble*, a tributary of the *Calder*. Employ 5 hands. Rateable value of works, 15*l*. 16*s*. The bed of the stream has silted up, caused by solid refuse thrown into it. Our works are affected by floods, caused by the silting up of the stream. Twenty-six years ago the water of the stream was comparatively pure; it is now very much polluted by works of various kinds, and by sewage. Obtain supply of water from the stream, but do not know the annual consumption at our works. We cut and prepare yearly 520 tons of dye woods of the value of 4,000*l*. The whole of the waste refuse produced at our works passes direct into the stream. Use water, 16 nominal horse-power. The excrements of our workpeople are mixed with ashes, and used for manure. Have no suggestions to offer.
James J. Barraclough, Dyeware Grinder.	Paper Mill, Halifax.	My works are situated on the *Hebble*, a tributary of the *Calder*. Employ 3 hands. Rateable value of works, 8*0l*. The bed of the stream has silted up. My works are affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from the stream. I grind yearly 150 tons of dye wares. The whole of the liquid refuse produced at my works flows direct into the stream. Use water as power. The excrements of our workpeople are conveyed on to land, and used for agricultural purposes. Have no suggestions to offer.
Thomas Lees & Company, Oil Cloth and Tarpaulin Manufacturers.	King's Cross, Halifax.	Our works are situated near to the *Hebble*, a tributary of the *Calder*. Employ 9 hands. Rateable value of works, 32*l*. Our works are not affected by floods. The volume of water used at our works is very small. Do not produce any liquid refuse. Consume yearly 50 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Joseph Smithson & Company, Fancy Dress Stuff Manufacturers.	Brunswick Mills, Halifax.	Our works are situated near to the *Hebble*, a tributary of the *Calder*. Employ 180 hands. Rateable value of works, 375*l*. Our works are not affected by floods. Obtain supply of water chiefly from wells and boreholes, but partly from Waterworks Company. Do not know the annual consumption at our works. Manufacture yearly 300,000 lbs. of goods, of the value of 70,000*l*. Have no depositing tanks. The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials, soap, alkali, or urine. Use steam, 10 nominal horse-power. Consume yearly 250 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the stream. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled to return the liquid refuse produced at their works into rivers and streams, not containing more than a certain standard of impurity, and that town sewage should be kept out of rivers and streams.
Isaac Firth & Sons, Worsted Spinners and Manufacturers.	Square Road Mill, near Halifax.	Our works are situated near to the *Hebble*, a tributary of the *Calder*. Employ 121 hands. Rateable value of works, 300*l*. Our works are not affected by floods. Obtain supply of water jointly from springs and from the Halifax Corporation Waterworks. The whole

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Isaac Firth & Sons, Worsted Spinners and Manufacturers—*cont.*	Square Road Mill, near Halifax—*cont.*	of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly Gallipoli oil, but no soap, alkali, or urine. The soapsuds are not treated for the recovery of grease. Use steam, 30 nominal horse-power. Consume yearly about 1,400 tons of coal, the ashes from which are carted to the railway to be used for ballast. The excrements of our workpeople are removed in barrels, and used for manure. Have no suggestions to offer.
Baldwin & Walker, Worsted Spinners.	West Croft Mills, Kings Cross, Halifax.	Our works are situated near to the *Hebble*, a tributary of the *Calder*. Employ 107 hands. Rateable value of works, 416*l*. 5*s*. Obtain supply of water jointly from wells and from the Halifax Corporation Waterworks; and consume yearly 2,000,000 gallons. We spin yearly 1,300 packs of goods of the value of 28,000*l*. The whole of the liquid refuse produced at our works, except soapsuds, flows into sewers, and thence into the stream. Do not use any dyewares or bleaching materials. Use yearly two tons of Gallipoli oil, of the value of 100*l*. The waste wool produced in carding is sold and carted away. Use yearly about five packs of soft soap. The soapsuds are treated for the recovery of grease. Use steam 150 nominal horse-power. Consume yearly 800 tons of coal; the ashes from which are carted away from the premises to various "*tips*." The excrements of our workpeople are taken away in barrels to be used for manure. No suggestions to offer.
Lister & Company, Silk Spinners and Weavers.	Wellington Mills, Lower Wade Street, Halifax.	Our works are situated near to the *Hebble*, a tributary of the *Calder*. Employ 400 hands. Rateable value of works, 752*l*. 10*s*. Our works are not affected by floods. Obtain supply of water jointly from wells and the Halifax Corporation Waterworks. Manufacture yearly 104,000 lbs. of goods, of the value of 100,000*l*. The whole of the waste liquid produced, except soapsuds, flows direct into sewers, and thence into the stream. Do not use any dye wares, bleaching materials, or oil. We purchase soapsuds and recover the grease, and obtain by the process 200*l*. a year. Use steam, 90 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are carted away and used for building purposes. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the stream.
Samuel Lister, Worsted Spinner.	Park Mill, Halifax.	My works are situated on the *Hebble*, a tributary of the *Calder*. Employ 80 hands. Rateable value of works, 250*l*. The bed of the stream has silted up. My works are not affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from a well on my own premises, but do not know the annual consumption at my works. I spin yearly 150,000 lbs. of goods, of the value of 10,000*l*. The whole of the waste liquid produced at my works flows direct into sewers, and thence into the stream. Do not use any dyewares or bleaching materials. Use yearly 700 gallons of olive oil, of the value of 120*l*. Produce yearly about 8,000 lbs. of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly 20,000 lbs. of soap. The soapsuds are sold to a grease extracter for 20*l*. a year. Use steam, 20 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are carted to the railway to be used for ballast. The excrements of our workpeople flow into sewers and thence into the stream. Have no suggestions to offer.
John Holdsworth & Company, Worsted Manufacturers.	Shaw Lodge Mills, Halifax.	Our works are situate on a tributary of the *Calder*. Employ 3,000 hands. Rateable value of works, 3,000*l*. The bed of the river has silted up, caused by the pouring in of sewage by the Corporation and millowners, also by ashes, dye wares, and other filth thrown into the stream. Our works are affected by floods, and considerable damage is often done to them. Within our recollection the stream was comparatively pure; now it is nothing better than a disgusting sewer, polluted by every kind of manufacturing refuse, and by town sewage; but we are not aware whether it is polluted by mines. Obtain supply of water jointly from the stream, canal, wells, and Corporation waterworks. Our consumption is very large, but are not able to state the volume used at our works. If the river or stream from which we might derive a supply of water were rendered clear and colourless, it would be of very great money value to us, and save us every year a considerable sum. We manufacture yearly, goods of the value of from 200,000*l*. to 250,000*l*. The whole of the liquid refuse produced at our works, with the exception of soapsuds, flows direct into the stream. Use yearly 50 tons of Gallipoli oil, of the value of 2,500*l*. The whole of the waste wool pro-

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Holdsworth & Company, Worsted Manufacturers—*cont.*	Shaw Lodge Mills, Halifax—*cont.*	duced in carding is sold to woollen manufacturers. We use yearly, soap of the value of 1,000*l.* The soapsuds are treated for the recovery of the grease, by which we gain yearly 120*l.* Use steam 240 nominal horse-power. Consume yearly about 7,000 tons of coal, the ashes from which are carted away from our premises. The excrements of our work-people are partly carted away by farmers for manure, and are partly used on our own land. We suggest, as the best means of avoiding pollution in future, that all solid and liquid refuse from manufactories, mills, and works, should be kept out of rivers and streams as far as practicable; that the turning in of this pollution be made penal, and that the offender be fined on conviction. We have no special suggestions to offer as to the conservancy of rivers and streams, only that municipal corporations should not form a board of conservators.
Cyrus Brook & Company, Worsted Manufacturers.	Victoria Street East, North Gate, Halifax.	Our works are situated near the *Hebble*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 370*l.* 5*s.* Our works are not affected by floods. The condition of the stream is much the same as it always has been within our recollection. It is polluted by works above, but not by mines. Obtain supply of water partly from Halifax Corporation Waterworks, the remainder from wells, and consume yearly 2,500,000 gallons. Manufacture yearly, 1,164,800 lbs. of goods, of the value 116,480*l.* The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly, soap 50 packs. The soapsuds are not treated for the recovery of the grease. Use steam, 200 nominal horse-power. Consume yearly 1,450 tons of coal, the ashes from which are used for filling up hollow places on waste land. The excrements of our workpeople flow into the brook, and thence into the stream. Have no suggestions to offer.
Benjamin Mellor & Sons, Woollen Manufacturers.	Holywell Mills, near Halifax.	Our works are situated on the *Carr Hall Brook*, an affluent of the *Calder*. Employ 120 hands. Rateable value of works, 551*l.* 8*s.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is comparatively clear, is not polluted by works above, nor by mines. Obtain supply of water principally from springs, but partly from *Carr Hall Brook*, but are not able to state the annual consumption at our works. We manufacture yearly about 200,000 lbs. of goods, of the value of 36,400*l.* The whole of the waste liquid produced at our works flows into depositing tanks, and thence by pipes into the river *Calder*. Use yearly, 52 tons of dye wares, principally logwood, shumac, and argol. The whole of the spent dye stuffs are burned. The liquid dye waste is sent into the river. We do not use any bleaching materials. Use yearly 2 tons of Gallipoli oil, of the value of 100*l.*, about 20 tons of patent oil of the value of 500*l.* Produce 20 tons of waste wool in the process of carding, which is sold to oil crushers, and to hop growers for manure. Use yearly 104 tons of soap, alkali, and urine. The soapsuds are treated for the recovery of the grease, by which we gain 26*l.* a year. Use steam, 40 nominal horse-power. Consume yearly upwards of 2,000 tons of coal, the ashes from which are used for repairing roads. The excrements of our work-people are removed and mixed with soil and ashes, and used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Saml. Eagleston, Woollen and Worsted Manufacturer.	Saville Mill, Saville Park Road, Halifax.	My works are situate near the *Calder*. Employ 74 hands. Rateable value of works, 450*l.* My works are not affected by floods. Obtain supply of water partly from wells and from Waterworks Company; and consume yearly 900,000 gallons. Manufacture yearly, 150 tons of goods, of the value of 50,000*l.* The whole of the liquid refuse produced at my works flows into sewers, and thence into the river. Do not use either dye wares or bleaching materials. Use yearly 1,000 gallons of cloth oil, of the value of 150*l.* Do not use either soap, alkali, or urine. Use steam, 16 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are carted away for manure. Have no special suggestions to offer.
Bancroft & Wilcox, Worsted Weavers.	Cross Hill Mill, Halifax.	Our works are situated on the *Calder*. Employ 49 hands. Rateable value of works, 40*l.* We hire power and room from Messrs. Eddlestone, and therefore are unable to state the volume of water consumed, the steam-power used, the coal consumed, or what is done with the ashes. We manufacture yearly 150,000 lbs. of goods, of the value of 24,000*l.*

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Bancroft & Wilcox, Worsted Weavers—*cont.*	Cross Hill Mill, Halifax—*cont.*	The whole of the liquid refuse produced at our works flows into sewers, and thence into the river. Do not use any dye wares or bleaching materials, soap, alkali, or urine. The excrements of our work-people are removed and used as manure. Have no suggestions to offer.
Scarborough Bros., & Oakes, Worsted Spinners.	Trafalgar Works, West Croft Mills, Halifax.	Our works are situated near to the *Hebble*, a tributary of the *Calder*. Employ 300 hands. Rateable value of works, 420*l.* The bed of the stream has not silted up. Our works are not affected by floods. The river is seriously polluted, and is black in colour, caused by refuse from dye and other works thrown into it, and it has always been in this condition within our knowledge; it is not polluted by mines. Obtain supply of water partly from wells and from Waterworks Company. Consume yearly about 2,000,000 gallons. Manufacture yearly 800,000 lbs. of goods, of the value of 100,000*l.* The whole of the waste liquid produced at our works flows into sewers, and thence into the river. Do not use either dye wares or bleaching materials. Use yearly 2 tons of Gallipoli oil, of the value of 115*l.* Use yearly 50 packs of soap; no alkali or urine. The soapsuds are not treated for the recovery of grease. Use steam, 60 nominal horse-power. Consume yearly 500 tons of coal; make about 50 tons of ashes, which are used for repairing roads. The excrements of our workpeople are conveyed by water-closets into sewers, and thence into the river. We cannot see how the pollution of the stream can be prevented without interfering with the trade of the district, and we are of opinion that if the bed of *Hebble Brook* was paved and an invert formed in it, so as to reduce the water-way by narrowing the channel, and thereby causing the water to flow more rapidly down the course, it would be a great advantage to the town of Halifax.
Benjamin Hallewell & Company, Woollen Manufacturers.	Moorfield Works, near Halifax.	Our works are situated near to the *Calder*. Employ 15 hands. Our works are not affected by floods. Obtain supply of water from wells; but do not know the annual consumption at our works. Manufacture yearly 23,000 lbs. of goods, of the value of 3,000*l.* The whole of the liquid refuse produced at our works is used for irrigation. Do not use any dye wares or bleaching materials. Use yearly 400 gallons of Galipoli oil, of the value of 100*l.* Produce about 3,000 lbs. of waste wool in carding, which is partly sold to hop growers for manure, and to oil extractors. Use steam, 12 nominal horse-power. Consume yearly about 60 tons of coal, the ashes from which are used to fill up hollow places. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Speak & Normanton, Shoddy Manufacturers.	West Vale, near Halifax.	Our works are situate on *Blackburn Brook*, a tributary of the *Calder*. Employ 50 hands. Rateable value of works, 380*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above; not by mines. Obtain supply of water from the Deanhead reservoir; but do not know the annual consumption at our works. Manufacture yearly 234 tons of goods. The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use 3,582 gallons of olive oil, of the value of 400*l.*, and brown whale oil of the value of 200*l.* Do not use any soap, alkali, or urine. Use steam, 25 nominal horse-power. Consume yearly 800 tons of coal; make 100 tons of ashes, which are used for repairing roads. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer.
Daniel Sharpe & Sons, Worsted Spinners and Stuff Manufacturers.	Norwood Green, Hipperholm, near Halifax.	Our works are situated near to an affluent of the *Calder*. Employ 60 hands. Rateable value of works, 74*l.* Our works are not affected by floods. Obtain supply of water from land drainage. Manufacture yearly 29 tons of goods, of the value of 8,000*l.* The whole of the liquid refuse produced at our works flows into the stream. Do not use any dye wares or bleaching materials, soap, alkali, or urine. Use steam, 10 nominal horse-power. Consume yearly 350 tons of coals, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
William Barraclough & Sons, Woollen Manufacturers.	Boys and Bottom's Mills, SouthOwram, Halifax.	Our works are situated on the *Hebble*, a tributary of the *Calder*. Employ 73 hands. Rateable value of works, 431*l.* 8*s.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above, not by mines. Obtain supply of water from the stream for power only; and for manufacturing purposes from well. Manufacture yearly, goods of the value of 15,000*l.* to 20,000*l.* The whole of the waste liquid produced at our works flows

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William Barraclough & Sons, Woollen Manufacturers—*cont.*	Boys and Bottom's Mills, SouthOwram, Halifax—*cont.*	direct into the stream. Do not use any dye wares or bleaching materials. Use yearly, olive and cloth oils, of the value of 240*l.* The waste wool produced in carding is sold for manure. Do not use any soap. Use yearly, 16 tons of alkali, but no urine. Use both steam and water as power; steam 24, and water 20 nominal horse-power. Consume yearly 700 tons of coals, the ashes from which are used to repair roads. The excrements of our workpeople are partly conveyed into sewers, and thence into the stream, and partly used for manure. Have no suggestions to offer.
M. Bottomley & Son, Worsted Spinners and Manufacturers.	Shelf, near Halifax.	Our works are situated near to a tributary of the *Calder*. Employ 900 hands. Rateable value of works, 799*l.* 18*s.* The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water jointly from wells and from land drainage; but are not able to give the annual consumption at our works. We wash and scour yearly, about 620,000 lbs. of sheep's wool, mohair, and alpaca; and manufacture goods of the value of 180,000*l.* The whole of the waste liquid produced at our works flows into tanks, and thence into the stream. Do not use any dye wares. We use yearly, in the process of manufacture, 8,000 lbs. of sulphur. Use yearly 4,000 gallons of Gallipoli oil, of the value of 900*l.* Produce no waste wool. Use yearly, soap, 400 packs. The soapsuds are not treated for the recovery of grease. Use steam, 96 nominal horse-power. Consume yearly, 3,120 tons of coal; make 400 tons of ashes, which are used partly for repairing roads, and the remainder is ground and mixed with lime for making mortar. The excrements of our workpeople are removed from the premises and used for manure. No suggestions to offer.
H. C. McCrea & Company, Worsted Spinners and Manufacturers.	Lum Brook Mills, Shelf, near Halifax.	Our works are situated on the *Lum Brook*, a tributary of the *Calder*. Employ 450 hands. Rateable value of works, 580*l.* The bed of the stream near our works is almost dry, except in very rainy seasons; it has not silted up. Our works are not affected by floods; formerly there was a large volume of water flowing down the stream, but it has been diverted for the stone quarries. The river is not polluted by works above, nor by mines. Obtain supply of water jointly from the river, from wells, and also from reservoirs formed by ourselves for impounding water, cannot give the annual consumption at our works. Manufacture yearly, goods of the value of 160,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream, and the effluent water from the soapsuds tanks also flows into the stream. Do not use any dye-wares or bleaching materials. Use yearly, 2,000 gallons of olive oil, of the value of about 440*l.* Use yearly about 150 packs of soap. The soapsuds are sold to a grease extractor, for which we receive 30*l.* a year. Use steam, 50 nominal horse-power. Consume yearly, 1,500 tons of coal; the ashes from which are carted away to repair roads. The excrements of our workpeople are removed and used for agricultural purposes. We suggest as the best means of avoiding pollution in future, that liquid and solid refuse from manufactories and works should be conveyed into settling tanks, and sufficient time allowed for the matters held in suspension to deposit; and by the use of several of these tanks (the liquid flowing from one into the other), seven-eighths of the pollution would, in our opinion, be arrested and prevented from passing into the river or stream. In manufactories or works where there is little room for the construction of tanks, several millowners or proprietors, whose works are situated on the same stream, might combine together, and settling tanks might be formed below the lowest works to receive the liquid refuse from their several works.
Firth, Willans, & Company, Carpet Manufacturers.	Clifton Mills, Brighouse.	Our works are situated on *Clifton Beck*, a tributary of the *Calder*. Employ 350 hands. Rateable value of works, 700*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by dyeworks alone, not by mines. Obtain supply of water jointly from the stream, wells, and waterworks; and consume yearly about 9,000,000 gallons. Manufacture yearly 9,350 tons of goods, of the value of 70,000*l.*; bleach 240,000 lbs., print 240,000 lbs., and dye 70,000 lbs. Produce yearly, liquid refuse from washing, 7,150,000; bleaching, 250,000; printing, 100,000; dyeing, 750,000; and soapsuds, 750,000 gallons. The soapsuds are treated for the recovery of grease, and the effluent water flows into the stream; the whole of the other waste liquid produced flows direct into the stream. Use 10 tons of dye wares yearly, chiefly dyewoods. The spent dye stuffs are conveyed into the stream. Use yearly as bleaching materials

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Firth, Willans, & Company, Carpet Manufacturers—*cont.*	Clifton Mills, Brighouse—*cont.*	1 ton of solid brimstone. Use yearly 5 tons of Gallipoli and sperm oils, of the value of 250*l.* Produce yearly 3 tons of waste wool in the process of carding, which are sold for manure. Use yearly, soap, 200 packs, but no alkali or urine. The soapsuds are treated for the recovery of grease, by which we gain 35*l.* a year. Use steam, 35 nominal horse-power. Consume yearly 2,000 tons of coal; make about 100 tons of ashes, which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Edward Fairburn, Fulling Miller and Card Manufacturer.	Kirklees Mills, Clifton.	My mills are situated on the *Calder*. Employ 24 hands. Rateable value of mills, 239*l.* 2*s.* 7½*d.* The bed of the river has silted up. My works are affected by floods. The river is seriously polluted by works above, by town sewage, and by mines. Obtain supply of water from the river. If the river from which I derive my supply of water were rendered clean and colourless, the finished goods would be of a very much brighter colour, but I am not able to fix the direct money value. I am not able to state the weight or the value of the goods fulled yearly at my works. The whole of the waste liquid produced at my works flows direct into the river. Do not use any bleaching materials or oil. Use yearly, soap, 3 tons; alkali, 3 tons; but no urine. The soapsuds are not treated for the recovery of the grease. Use water, 15 nominal horse-power. Consume yearly about 100 tons of coal, the ashes from which are mixed with the excrements of my workpeople, and used on my farm. I suggest as the best means of avoiding pollution in future, that manufacturers should be compelled to filter their refuse before allowing it to pass into streams, and that dry earth or ash closets should be used instead of watercloset s.
R. Kershaw & Company, Silk Spinners.	Albert Mill and Calder Bridge Mill, Brighouse.	Our works are situated on the *Calder*. Employ from 300 to 400 hands. Rateable value of Albert mill, 248*l.* 8*s.* Calder Bridge mill is rated to owner. The bed of the river has silted up. Our works are not affected by floods. There has been no perceptible alteration in the condition of the river within our knowledge. It is very seriously polluted by towns and works above, and is at times as black as ink. Obtain supply of water jointly from the river and from the Halifax Waterworks Company, but are not able to give the annual consumption at our works. Manufacture yearly goods of the value of from 50,000*l.* to 60,000*l.* The whole of the waste liquid produced at our works flows direct into the river. Use yearly 52 gallons of orchil and indigo. Do not use any bleaching materials. The waste silk produced is sold for manufacturing purposes. Use yearly 36 tons of curd soap. The soapsuds are not treated for the recovery of the grease. Use steam, 34 nominal horse-power. Consume yearly about 2,000 tons of coal, the ashes from which are given away to those who cart them from our mills. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Wilkinson & Airey, Silk Spinners.	Victoria Mills, Brighouse.	Our works are situated on a goit, a tributary of the *Calder*. Employ 220 hands. Rateable value of works, 336*l.* Our works are not affected by floods. The river within our knowledge was considerably cleaner that it is at the present time. The river is polluted by works above, but not that we are aware of by mines. Obtain supply of water from waterworks for washing purposes, and consume yearly from that source 500,000 gallons. If the river, from which we might derive our supply of water, were rendered clear and colourless, the water would be still too hard for our purpose. Manufacture yearly 53,000 lbs. of goods, of the value of 40,000*l.* Produce yearly 500,000 gallons of soapsuds. This and the other liquid refuse produced flows into sewers, and then direct into the stream. Do not use any dye wares, bleaching materials, or oil. Use yearly 22 tons of soap. The soapsuds are not treated for the recovery of the grease. As we rent power from the trustees of the Halifax Joint Stock Banking Company we are unable to state the nominal horse-power, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are removed in carts and used for manure. We suggest, as the best means of avoiding pollution in future, that the whole of the liquid refuse from manufactories and town sewage should be utilized, and kept out of rivers and streams.
Benjamin Noble & Company, Silk Spinners.	Brighouse	Our works are situated on the *Hebble* and *Calder* navigation. Employ 90 hands. Rateable value of works, 163*l.* Obtain supply of water from the canal, and consume yearly about 100,000 gallons. Manufacture yearly 25,000 lbs. of goods. Produce yearly liquid refuse in washing 75,000, and soapsuds 25,000

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Benjamin Noble & Company, Silk Spinners—*cont.*	Brighouse—*cont.*	gallons. The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use any dye wares. Use yearly, 20 gallons of methylated spirits, ; 5 lbs. of opal blue ; and 9 tons of soap. Use steam, 12 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used to repair roads. No suggestions to offer.
J. A. & T. Riley-Brooks, Silk Spinners.	Mod Mill, Clifton Bridge, Brighouse.	Our works are situated on a tributary of the *Calder*. Employ 70 hands. Rateable value of works, 150*l*. The bed of the river has silted up 3 feet. Our works are affected by floods. The river is polluted by works above and by mines. Obtain supply of water from the stream, and consume yearly 50,000 gallons. Manufacture yearly 50,000 lbs. of goods, of the value of 20,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Do not use dye wares, bleaching materials, oil, or soap. Use steam, 20 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are carted away. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
Edward & John Robinson, Stuff Printers.	Clifton Vale, Brighouse.	Our works are situated on the *Calder*. Employ 50 hands. Rateable value of works, 130*l*. Our works are not affected by floods. Obtain supply of water jointly from the Halifax Water Company and from wells ; but are not able to give the annual consumption at our works. We print yearly 72 tons of goods, of the value of 14,000*l*. The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use steam, 20 nominal horse-power. Consume yearly, 650 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are carted away and used for manure. No suggestions to offer.
John Turner & Son, Tanners.	Brighouse -	Our tanyard is situated on a tributary of the *Calder*. Employ 3 hands. Rateable value of tanyard, 19*l*. The bed of the stream has not silted up. Our tanyard is not affected by floods. The stream is polluted by works above, not by mines. Obtain supply of water from the stream, but cannot give the annual consumption at our tanyards. Tan yearly 300 hides. Use yearly, bark one ton, valonia one ton, gambir two tons, lime half a ton, shumac half a ton, tar half a ton, oil half a ton, and a small quantity of pigeons', fowls', and dogs' dung, but no human excrement. The hair obtained from depilation is sold to plasterers, and the fatty matter obtained in fleshing is sold to size boilers. We have 12 tanpits of various sizes. Do not use any dye wares. The whole of the waste liquid produced at our tanyard flows direct into sewers, and thence into the stream. Use steam, 34 nominal horse-power. Consume yearly 100 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Pickering & Yeardley, Wood Stewers.	Brighouse -	Our works are situated on the *Clifton Beck*, a tributary of the *Calder*. Employ 7 hands. Rateable value of works, 15*l*. The bed of the stream has not silted up. Our works are occasionally affected by floods. The *Beck* is polluted by dyeworks above, not by mines. Obtain supply of water from the stream, but do not know the annual consumption at our works. We use and produce yearly 300 tons of wood, 52 tons of charcoal, and 40,000 gallons of iron liquor. The whole of the waste liquid produced at our works flows into the stream. Use steam 4 nominal horse-power. Consume yearly 312 tons of coal, the ashes from which are used for ballast on the railway. The excrements of our workpeople are used for manure. No suggestions to offer.
S. Bottomley & Brothers, Worsted Spinners, and Manufacturers.	Buttershaw Mills, Wibsey.	Our works are situated near to a tributary of the *Calder*. Employ 1,100 hands. Rateable value of works, 1,180*l*. Our works are not affected by floods. Obtain supply of water from the stream for steam boiler purposes, and for waterworks for washing purposes; consume yearly from latter source 1,400,000 gallons. Manufacture yearly 850,000 lbs. of goods, of the value of 170,000*l*. Produce, yearly, liquid refuse, as soapsuds, 1,400,000 gallons, which flows into depositing tanks, and the effluent water into the stream. Do not use any dye wares or bleaching materials. Use yearly 2,600 gallons of Gallipoli oil, of the value of 520*l*. Do not produce any waste wool in carding. Use, yearly, soap 84,000 lbs. of the value of 1,050*l*. The soapsuds are treated for the recovery of the grease, by which we gain from 7 to 8 per cent. Use steam, 80 nominal horse-power. Consume yearly 3,000 tons of coal;

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
S. Bottomley & Brothers, Worsted Spinners, and Manufacturers—*cont.*	Buttershaw Mills, Wisbey—*cont.*	make 500 tons of ashes, which are used partly for repairing roads and the remainder are mixed with lime for mortar. The excrements of our workpeople are removed and used for agricultural purposes. We suggest, as the best means of avoiding pollution in future, that all liquid refuse produced should be filtered before being allowed to enter the streams.
B. Wright & Sons, Worsted Spinners and Manufacturers.	Prospect Mill, Wibsey.	Our works are situated on a tributary of the *Calder*. Employ 492 hands. Rateable value of works, 531*l*. 12*s*. 6*d*. Our works are not affected by floods. Obtain supply of water from bore-holes, and from waterworks, and consume yearly 2,184,000 gallons. Manufacture yearly 200 tons of goods, of the value of 80,000*l*., and 35 tons of worsted yarn of the value of 50,000*l*. Produce liquid refuse, 364,000 gallons as soapsuds, which flow into depositing tanks, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 600 gallons of Gallipoli oil, of the value of 200*l*. Use yearly, soap 28,800 lbs. The soapsuds are treated for the recovery of the grease, by which we gain 40*l*. a year. Use steam, 45 nominal horse-power. Consume yearly 1,500 tons of coal, make 200 tons of ashes, which are used for repairing roads. The excrements of our workpeople are used for agricultural purposes. No suggestions to offer.
Michael Mortimer, Worsted Spinner and Weaver.	Folly Hall Mill, Wibsey.	My works are situated on a tributary of the *Calder*. Employ 120 hands, but as I rent power and room, am not able to state the rateable value of the works. Obtain supply of water from gathering grounds, but am not able to state the annual consumption at my works. Manufacture yearly 70,000 lbs. of cotton and woollen goods, of the value of from 16,000*l*. to 20,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. Do not use any dye wares, bleaching materials, soap, alkali, or urine. As before stated, I rent power, and am not able to state the nominal horse-power used, the quantity of coal consumed, or what is done with the ashes. The excrements of my workpeople are conveyed finally into the stream.
Leedham, Binns, & Company, Stuff Manufacturers.	Lowmoor -	Our works are situated on the *Oakenshaw Beck*, a tributary of the *Calder*. Employ 80 hands. We rent room and power. The bed of the stream has not silted up within our knowledge. Our works are occasionally affected by floods. The stream is polluted by works above; but not that we are aware of by mines. We only use water for drinking purposes, therefore do not produce any liquid refuse at our works. Manufacture yearly goods of the value of from 30,000*l*. to 40,000*l*. As we rent power and room, are not able to state the nominal horse-power used, the weight of coal consumed, or what is done with the ashes. The excrements of our workpeople are carted away for manure.
William Haigh & Company, Worsted Spinners and Manufacturers.	Low Moor, Bradford.	Our works are situated on a tributary of the *Calder*. Employ 400 hands. Rateable value of works not known. Our works are not affected by floods. Obtain supply of water from gathering grounds, but are not able to give the annual consumption at our works. Manufacture yearly 240,000 lbs. of goods, of the value of 60,000*l*. The whole of the waste liquid produced at our works flows unfiltered into old mines. Do not use any dye wares or bleaching materials. Use yearly 3 tons of Gallipoli oil, of the value of 150*l*. Use yearly 12,800 lbs. of soft soap, and alkali 9,600 lbs. The soapsuds are treated for the recovery of grease, by which we gain 10*l*. a year. Use steam, 30 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are carted on to the Moor. The excrements of our workpeople are removed and used for manure. No suggestions to offer.
John Sutcliffe, Worsted Manufacturer.	Odsall Lane, North Bierley.	My works are situated on an affluent of the *Calder*. Employ 350 hands. Rateable value of works, 390*l*. My works are not affected by floods. Obtain supply of water from gathering grounds, but cannot state the annual consumption at my works. Manufacture yearly 300,000 lbs. of goods, of the value of 45,000*l*. The whole of the waste liquid produced at my works, except the soapsuds, flows direct into the stream. Do not use any dye wares or bleaching materials. Use nearly 6 tons of Galipoli oil, of the value of 350*l*. Produce about 7 tons yearly of waste wool in the process of carding, which is sold. Use yearly, soap 180 packs. The soapsuds are treated for the recovery of the grease. Use steam, 42 nominal horse-power. Consume yearly 1,200 tons of coal; the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joshua & J. & R. Taylor, Cloth Manufacturers, Dyers, and Finishers.	Hunsworth Mills, Cleckheaton.	Our works are situated on the *Spen Beck*, a tributary of the *Calder*. Employ 140 hands. Rateable value of works, 653*l*. 14*s*. 2*d*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above to a slight extent, but not by mines. Obtain supply of water from the stream and from gathering grounds; but cannot state the annual consumption at our works. Manufacture yearly goods of the value of from 40,000*l*. to 50,000*l*. The whole of the liquid refuse produced at our works flows direct into the stream. Use yearly, as dye wares, argol, 2,912 lbs.; lac, 16,548 lbs.; alum, 34,720 lbs.; madder, 28,028 lbs.; tartar, 6,056 lbs.; fustic, 12,320 lbs.; oxalic acid, 3,136 lbs.; shumac, 980 lbs.; logwood, 2,240 lbs.; peachwood, 5,040 lbs.; prussiate, 2,016 lbs.; cochineal, 3,528 lbs.; munjeet, 6,160 lbs.; wolds, 5,712 lbs.; aniline blue, 113 lbs.; magenta, 120 lbs.; picric acid, 20 lbs.; aniline red, 12 lbs.; cudbear, 840 lbs.; rosine, 15 lbs.; violet, 60 lbs.; flavine, 150 lbs.; turmeric, 84 lbs.; American bark, 112 lbs. The liquid dye refuse is turned into the beck. The spent dye woods are burned. Do not use any bleaching materials. Use yearly olive and Price's patent cloth oils of the value of 600*l*. The whole of the waste wool produced in carding is sold. Use yearly, soap, 7 tons; urine, 23,000 lbs., ammonia, 36,000 lbs.; and other alkali, 15 tons. The soapsuds are treated for the recovery of grease, by which we gain 35*l*. Use steam, 80 nominal horse-power. Consume yearly 3,000 tons of coal; the ashes from which are used to fill up hollow places, and are then covered over with soil. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled either to filter their liquid refuse, or that a separate drain should be laid down valleys, into which the liquid refuse should be conveyed and dealt with in a convenient place.
Firth & Blackburn, Starch Manufacturers.	Spen Mills, Cleckheaton.	Our works are situated on the *Balm Beck*, a tributary of the *Calder*. Employ 21 hands. Rateable value of works, 64*l*. The bed of the stream has silted up, caused by ashes and other solid refuse turned into it. Our works are not affected by floods. The stream was formerly pure, but it is now and has been for some years past very seriously polluted, and in summer time especially its condition is very bad. Obtain supply of water jointly from the beck and from the Cleckheaton Waterworks Company; but are not able to give the annual consumption at our works. The whole of the waste liquid produced at our works flows direct into the stream. Manufacture yearly about 50 tons of wheat starch. Use both steam and water as power; steam 14, and water 14 nominal horse-power. Consume yearly 250 tons of coal, the ashes from which are carted on to railways for ballast. The excrements of our workpeople are conveyed by water into the stream.
John & Joseph Nutter, Oil and Grease Extractors.	Cleckheaton	Our works are situated on the *Calder*. Employ 3 hands. Rateable value of works, 26*l*. 19*s*. 4*d*. Our works are not affected by floods. Obtain supply of water from waterworks company, and consume yearly about 100,000 gallons. The whole of the liquid refuse produced at our works flows into a sewer, and thence into the *Beck*. We extract yearly 50 tons of oil. Consume yearly 80 tons of coal; make 20 tons of ashes, which are used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Joseph Mann & Sons, Starch and British Gum Manufacturers.	Spen Mills, near Cleckheaton.	Our works are situated on the *Spen Beck*, a tributary of the *Calder*. Employ 5 hands. Rateable value of works, 150*l*. The bed of the stream has silted up 12 inches, caused by ashes and other solid refuse thrown into it. Our works are affected by floods. The river is polluted by dye works and other manufactories above, and by town sewage, is quite black, and is rendered totally unfit for our purposes; it is polluted by mines. Obtain supply of water from the stream, which is filtered, and consume yearly 520,000 gallons. If the river or stream from which we obtain our supply of water were rendered clear and colourless, it would be a direct money value to us of from 200*l*. to 300*l*. yearly. We produce about 1,600 gallons of acid liquid from fermentation, which is sold to wire manufacturers; the other liquid refuse produced flows unfiltered direct into the sewers. Manufacture yearly 120,000 lbs. of wheat starch. Use both steam and water as power, 30 nominal horse-power. Consume yearly 250 tons of coal; make 30 tons of ashes, which are used for repairing roads and as ballast on the railway. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that the waste liquids from dyeworks should be precipitated and filtered, that the grease in soapsuds from woollen works should be extracted, and that town sewage should be utilised for irrigation.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Edward Brooke, Tanner.	Cleckheaton -	My tanyard is situated on *Cleckheaton Beck*, a tributary of the *Calder*. Employ 7 hands. Rateable value of tanyard, 50*l*. 5*s*. The bed of the stream has not silted up. My tanyard is not affected by floods. The stream was formerly pure; it is now very dirty; it is polluted by works above and by sewage, but not by mines. Obtain supply of water jointly from wells and waterworks company, but am not able to state the annual consumption at my tanyard. If the river or stream from which I might derive a supply of water were rendered clear and colourless, it would be a direct money value to me yearly, of from 20*l*. to 30*l*. I tan yearly 33 tons of hides. Use yearly, lime, 5 tons; bark, 120; gambir, 3; and pigeons' dung, 1 ton. The hair obtained in the process of depilation is sold to plasterers. Obtain 10 tons of fatty matter in the process of fleshing, which is sold to sizers after the removal of the fat. I have 7 tan-pits, varying in size from 3 feet by 4, and 4 feet 6 deep, to 5 feet by 4, and 4 feet 6 deep. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard flows direct into the *Beck*. Use steam, 4 nominal horse-power. Consume yearly 120 tons of coal; make 30 tons of ashes, which are used for repairing roads. The whole of the excrements of my workpeople are mixed with the spent bark, and used for manure. No suggestions to offer.
Soloman Sykes & Sons, Worsted Spinners and Manufacturers.	Nellroyd Mills, Cleckheaton.	Our works are situated on a tributary of the *Calder*. Employ 250 hands. Rateable value of works, 450*l*. The bed of the stream has silted up by ashes and other solid refuse thrown into it. Our works are affected by floods. The stream, within our knowledge, was pure, and fish were able to live in it. It is now very considerably polluted by works above; not by mines. Obtain supply of water from the *Beck*, but have no means of ascertaining the annual consumption at our works. If the stream from which we might derive a supply of water were rendered clear and colourless, it would be a direct money value to us of 100*l*. a year. Manufacture yearly 150 tons of goods, of the value of 20,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Do not use any dye wares or bleaching materials. Use Gallipoli oil, of the value of 800*l*. Use yearly, soap 20 tons, alkali 5 tons, and no urine. The soapsuds are treated for the recovery of the grease, by which we gain 35*l*. a year. Use steam, 40 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used to fill up an old quarry near our works. The excrements of our workpeople are taken away and used for manure. Have no suggestions to offer.
Edward Myers & Company, Worsted and Cotton Weavers.	Scholes -	Our works are situated on a tributary of the *Calder*. Employ 80 hands. We rent power, and our share of the rateable value of the works is about 120*l*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from gathering grounds, but are not able to give the annual consumption at our works. Manufacture yearly, 40,000 lbs. of cotton warps and worsted wefts, of the value of 15,000*l*. The whole of the waste liquid produced at our works flows into the stream. Do not use either soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly 450 tons of coal. The excrements of our workpeople are used for manure. No suggestions to offer.
Cook, Son, & Law, Manufacturers of Carpet and Carpet Yarns.	Millbridge, Liversedge.	Our works are situated on the *Spen Beck*, a tributary of the *Calder*. Employ 500 hands. Rateable value of works, 786*l*. 19*s*. The bed of the river has silted up, caused by solid and other impurities thrown into it. Our works are affected by floods. 50 years ago the *Beck* was a pure stream, and fish were plentiful in its waters, but now, owing to the refuse it receives, it is a sluggish, idle, polluted stream, rendered practically useless for manufacturing purposes; it is also polluted by mines. Obtain supply of water partly from the river, from waterworks, and from a neighbouring colliery; consume yearly 146,000,000 gallons. If the stream, from which we might derive a supply of water, were rendered chemically pure and colourless, it would be of a direct money value to us of 600*l*. a year. Manufacture yearly 800,000 lbs. of goods, of the value of 83,500*l*. Produce yearly liquid refuse from washing, 73,100,000 gallons; dyeing, 48,600,000 gallons; soapsuds, 24,300,000 gallons. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the beck. Use yearly 336,000 lbs. of dye wares, chiefly logwoods, fustic, madder, turmeric, indigo, aniline dyes, and the variety of chemicals, which are chiefly used in woollen dyehouses. All the spent dye liquids flow into the *Beck*. Use as bleaching material 383,120 lbs. of solid brimstone; this is vapourised, and does not of course affect the *Beck*. Use yearly

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Name of Firm, and Trade or Manufacturer carried on.	Situation of Works.	Answers to Queries on Page 79.
Cook, Son, & Law, Manufacturers of Carpet and Carpet Yarns—*cont.*	Millbridge, Liversedge—*cont.*	olive, and Price's patent cloth oil, 7,229 gallons, and rapeseed oil of the value of 1,193*l.* 14*s.* 11*d.* Produce yearly 50 tons of waste wool in carding, which we sell, partly for manure, and partly to oil extractors. Use yearly, soap 25 tons; carbonate of soda 10 tons. The soapsuds are treated for the recovery of the grease, by which we have gained 32*l.* per annum. Use steam, 100 nominal horse-power. Consume yearly 3,153 tons of coal, and make 312 tons of ashes, which are used to repair roads. The excrements of our workpeople are used for manure. We purify the dirty water of the *Beck* by running it through a series of five reservoirs before using it, which clears it sufficiently for our use. We suggest that some means should be adopted for cleansing foul liquids before they are allowed to be turned into a stream.
Albert Hindley, Carpet Manufacturer.	Millbridge, Liversedge.	My works are situated on the *Spen Beck*, a tributary of the *Calder*. Employ 25 hands. Rateable value of works, 40*l.* The bed of the stream has silted up, caused by ashes and other solid refuse thrown into it. My works are not affected by floods. The condition of the stream has not altered within my knowledge. It is very much polluted by dyeing and woollen works; not by mines, as the water pumped from the coal mines tends rather to do good than harm. Obtain supply of water from the river, which is allowed to settle in a reservoir before being used, and consume yearly 900,000 gallons. Manufacture yearly 7 tons of goods, of the value of 1,480*l.* Dye 19,200 lbs. of goods, of the value of 600*l.* raw in the grease. Produce yearly, liquid refuse from washing, 888,000 gallons, and soapsuds 12,000 gallons; this flows direct into the stream. Use yearly as dye wares, logwood of various sorts, 4,480 lbs.; cochineal, 200 lbs.; lac, 400 lbs.; prussiate of potash, 150 lbs.; tartar, 600 lbs.; alum, 300 lbs.; liquid dyes, 1,200 lbs. The spent dye woods are burned. Do not use any bleaching material or oil. Use yearly, soap, 1,500 lbs.; fullers earth, 6,720 lbs. The soapsuds are not treated for the recovery of grease, but flow direct into the stream. Use steam, 2 nominal horse-power. Consume yearly 82 tons of coal, the ashes from which are used to fill up hollow spaces. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Benjamin Hirst, Coverlet Manufacturer.	Liversedge -	My works ars situate on the *Spen Beck*, a tributary of the *Calder*. Employ 8 hands. Rateable value of works, 7*l.* 13*s.* The bed of the stream has not silted up to my knowledge. My works are not affected by floods. The river is polluted by works above, and by mines. Obtain supply of water from wells, and consume yearly 10,000 gallons. Manufacture yearly 50,000 lbs. of goods, of the value of 600*l.* The whole of the liquid refuse produced at my works flows direct into the stream. Use yearly as dye wares, 4,000 lbs. of logwood. The spent dye stuffs are burned. Do not use any bleaching materials. Do not use any soap or alkali. Do not use any steam power. The excrements of my workpeople are used as manure. Have no suggestions to offer.
Albert Lawford, Blanket and Flannel Manufacturer.	Stanley Mills, Liversedge.	My works are situate on the *Spen Beck*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 12*l.* The bed of the stream has silted up, caused by ashes and other solid refuse thrown into it. My works are very much affected by floods, caused by the silting up of the bed of the stream. The river is very much polluted by refuse from dyehouses and wire mills; but not by mines. Obtain supply of water (jointly) from the stream, and from gathering ground; and consume yearly, 3,000,000 gallons. If the stream, from which I might derive my supply of water, were rendered clear and colourless, it would be a direct money value to me of 50*l.* a year. Manufacture 24,000 lbs., bleach 18,000 lbs., and dye 8,000 lbs. yearly of goods, of the value of 10,000*l.* The whole of the liquid refuse produced at my works flows direct into the stream. Do not use any dye wares; but use as bleaching materials, 56 tons of sulphur. Use yearly, 600 gallons of olive oil, of the value of 100*l.* Produce yearly, 2,240 lbs. of waste wool in the process of carding, which is sold to hop growers for manure. Use yearly, soap 10 tons. The soapsuds are treated for the recovery of the grease, by which I gain 9*l.* a year. Use steam, 16 nominal horse-power. Consume yearly, 600 tons of coal, the ashes from which are carted away to fill up an old quarry. The excrements of my workpeople are used for manure. I suggest, in order to avoid pollution in future, that manufacturers and others should be compelled to purify their liquid refuse before allowing it to flow into the streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
M. R. Blakelock & Son, Flannel Manufacturers.	Liversedge -	Our works are situate on the *Rawfolds Beck*, a tributary of the *Calder*. Employ 40 hands. Rateable value of works, . The bed of the stream has not silted up. Our works are not affected by floods. The stream used formerly to be clear; it is not so now. It is very much polluted by refuse from works above, by dyeworks, and wire mills; but not by mines. Obtain supply of water from the *Beck*; but do not know the annual consumption at our works. If the stream were rendered clear and colourless, we could use it for manufacturing purposes, which we cannot do in its present condition. The whole of the waste liquid produced at our works is used for agricultural purposes. Do not use any dye wares or bleaching materials. Use yearly, 7 tons of olive oil, of the value of 350*l.* The whole of the waste wool produced in carding is used for manure. Use steam, 20 nominal horse-power. Consume yearly, 900 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
The Bradford Dyeing Company, Dyers.	Rawfolds, Liversedge.	Our works are situated on the *Rawfolds Beck*, an affluent of the *Calder*. Employ 70 hands. Rateable value of works, 368*l.* The bed of the stream has silted up. caused by ashes and other solid refuse thrown into it. Our works are not affected by floods, but the land adjoining to the works is occasionally flooded, caused by the silting up of the bed of the stream. The stream is seriously polluted by works above, and the water is rendered useless to us from that cause. Obtain supply of water from wells and bore-holes, and consume yearly 62,000,000 gallons. If the stream from which we might derive our supply of water were rendered clear and colorless, it would be of considerable value to us, but we cannot estimate the amount. We dye 1,500,000 lbs. of goods yearly. The whole of the waste liquid produced at our works flows direct into the Beck. Use yearly as dye wares, dyewoods, 470,000 lbs.; glauber salt, 34,000 lbs.; soda ash, 6,500 lbs.; soda, 34,000 lbs.; shumac, 40,500 lbs.; alum, 40,500 lbs.; bi-chrome, 11,200 lbs.; aniline dyes, 5,000 lbs.; extract of indigo, 5,000 lbs.; and dye liquors, 122,000 lbs. The spent dye stuffs are partly burned. Use yearly 10 tons of bleaching lime, and 2 tons of soap. The soapsuds are not treated for the recovery of the grease. Use steam, 25 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are used to repair roads. One-fifth of the excrements of our workpeople is conveyed into the *Beck*, and four-fifths are used for manure. We suggest as the best means of avoiding pollution in future that all solid and liquid refuse should be kept out of rivers and streams, and that in manufacturing districts sewers should be constructed on each side of rivers and streams to intercept the sewage and liquid refuse. This refuse should be conducted to convenient places, passed through filter beds, and purified before being allowed to flow into rivers and streams; and also that a rate should be levied in the district for carrying out and maintaining this work.
J. B. Oldfield, Medical Officer for the Heckmondwike District of the Dewsbury Union.	Hill Top House, Heckmondwike.	This district is daily growing more important, and contains within it a large population. From the head of the valley at Lowmoor to Ravensthorpe, near Sawbury, there is a population of about 40,000 persons. One of the tributaries of the river *Calder* flows down the valley, receiving the drainage and pollutions of towns and various manufactories in connexion with them. Our large rivers are often more polluted by towns and villages on a tributary than by those on their banks. The river *Spen*, in which forty years ago sported a variety of fish, at present has the appearance of ink, and in fact is the receptacle of every abomination. I trust that the Government will take the necessary steps to remove the evils arising from these pollutions, for I have not much faith in local authorities, especially in manufacturing districts, they are so accustomed to shirks. I think the agitation of our Corporation just now will end in nothing. If a bill is passed by the Government to form drainage districts, the Heckmondwike valley ought to be made into a separate one, for it has little to do with other portions of the neighbourhood, except in polluting the *Calder*, and its connexion with Dewsbury and Batley in the waterworks.
Edwin Firth & Sons, Blanket, Carpet, Railway Rugs, and Woollen Cloth Manufacturers.	Heckmondwike.	Our works are situate on a small tributary of the *Calder*. Employ 2,000 hands. Rateable value of works, 1,235*l.* The bed of the stream has silted up, caused by weirs being placed across the stream at various points, which prevent the ashes and other solid refuse thrown in from being washed freely away in a time of flood. Our main works are situated at too high a level, but a portion of our works is affected by floods, caused by the silting up of the bed of the stream. At present the water of the stream is discoloured, but within the memory of some of our workpeople, it was a pure stream containing fish. It is polluted

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Edwin Firth & Sons, Blanket, Carpet, Railway Rugs, and Woollen Cloth Manufacturers—*cont.*	Heckmondwike—*cont.*	chiefly by works above ours; it is partially polluted by mines. Obtain supply of water from springs, wells, waterworks, and gathering grounds; but are not able to state the whole consumption at our works. Manufacture yearly, goods of the value of 200,000*l.*, print goods of the value of 20,000*l.*, and dye goods of the value of 40,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. We use yearly as dye wares, chipped logwood, 210,916 lbs.; rasped limawood, 2,548 lbs.; peachwood, 57,323 lbs.; Sander's wood, 16,828 lbs.; fustic, 46,171 lbs.; cudbear, 3,925 lbs.; crop madder, 818 lbs.; flavine, 15,962 lbs.; myrobalans, 41,090 lbs.; lac dye, 10,026 lbs.; sumach, 4,286 lbs.; cochineal, 5,749 lbs.; tartar, 20,779 lbs.; argol, 2,957 lbs.; bichrome, 8,926 lbs.; sulphate of iron, 12,508 lbs.; nitrate of iron, 25,325 lbs.; sulphate of copper, 872 lbs.; silicate of soda, 647 lbs.; prussiate of potash, 318 lbs.; extract of indigo, 14,449 lbs.; alum, 31,360 lbs.; grain tin, 1,336 lbs.; oxy-muriate of tin, 4,928 lbs.; aniline colours, 2,284 lbs.; ammonia (liquid), 6,310 lbs.; logwood liquor, 21,716 lbs.; picric acid, 649 lbs.; oxalic acid, 1,935 lbs.; salammoniac, 100 lbs.; nitric acid (liquid), 8,327 lbs.; sulphuric acid (liquid), 22,468 lbs.; muriatic acid, 7,916 lbs.; grain spirits, 13,355 lbs.; sapan liquor, 7,336 lbs.; blue liquor, 850 lbs.; yellow spirits, 13,635 lbs.; blue spirits, 6,514 lbs.; caustic liquor, 2,385 lbs., and methylated spirits, 381¼ gallons. The spent liquids flow into the stream. The solid dye stuffs are burned. Do not use any bleaching materials. Use yearly, chiefly olive or Price's patent cloth oil, of the value of 7,000*l.* A portion of the waste wool produced in carding is re-used, the remainder is sold to hop growers in Kent to be used for manure. Use yearly, soap 20 tons; soda ash, 62 tons; chloride of lime, 1 ton; and 18,286 gallons of urine. The soapsuds are treated for the recovery of the grease, and we gain yearly 62*l.* by the extraction. Use steam, 200 nominal horse-power. Consume yearly 5,934 tons of coal, the ashes from which are ground and used in the manufacture of bricks. The excrements of our workpeople are removed from the premises by farmers, and used for manure. We consider that if the whole of the productions which cause pollution were dealt with and utilized in a comprehensive scheme it would be remunerative.
George Cardwell & Sons, Blanket and Carpet Manufacturers.	Heckmondwike.	Our works are situate on the *Spen Beck*, a tributary of the *Calder*. Employ 150 hands. Rateable value of works, 531*l.* The bed of the river has silted up, caused by ashes and other solid refuse thrown into it. Our works are affected by floods. In the summer of 1868 we lowered the bed of the *Beck* under the bridge 36 inches, to make room for the floods to pass off. The river is polluted by works above; we think not by mines. Obtain supply of water partly from the *Beck* and from the river, but are not able to state the annual consumption at our works. If the *Beck*, from which we might derive a supply of water, were rendered clear and colourless, it would be a direct money value to us of 20*l.* a year. Manufacture yearly 290,000 lbs. and dye 160,000 lbs. of goods, of the value of 24,000*l.* The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. Use yearly 55,000 lbs. of dye wares, chiefly logwood, peachwood, fustic, argols, cudbear, extracts of indigo, copperas, bi-chrome, picric acid, flavine, oil of vitriol, scarlet spirits, ammonia, and blue spirits. The spent dye stuffs are burned, and the liquids flow into the *beck*. Use yearly as bleaching materials, 4 tons of solid brimstone, which is vaporised. Consume yearly oil of the value of 1,000*l.* The whole of the waste wool produced in carding is sold for manure. Use yearly, soap 11,200 lbs., and 26,880 lbs. of soda crystals and soda ash. The soapsuds are not treated for the recovery of grease. Use steam, 30 nominal horse-power. Consume yearly 1,600 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with flue ashes and used for manure on our own land. Have no suggestions to offer.
Henry Oates & Sons, Blanket Manufacturers.	High Street, Heckmondwike.	Our works are situate on a tributary of the *Calder*. Employ from 120 to 130 hands. Rateable value of works, 458*l.* 12*s.* 6*d.* Our works are not affected by floods. Obtain supply of water partly from wells, from stream, and from waterworks; but are not able to state the annual consumption at our works. Manufacture yearly 220 tons of wool, of the value of from 18,000*l.* to 20,000*l.* The whole of the waste liquid produced at our works flows direct into the *Beck*. Do not use any dye wares. Use 10 tons of rolled sulphur, which is vaporised. Use yearly 6,000 gallons of rape and Gallipoli oils, of the value of 1,250*l.* The whole of the waste wool produced in the process of carding is either sold or mixed with manure. Use yearly soap 11 tons, alkali 2 tons, urine 2,000 gallons. The soapsuds are not treated for the re-

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Henry Oates & Sons, Blanket Manufacturers—*cont.*	High Street, Heckmondwike—*cont.*	covery of grease. Use steam, 30 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are carted away to repair roads. The excrements of our workpeople are mixed with fine ashes and are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Richard Clarkson & Company, Carpet Manufacturers.	Heckmondwike.	Our works are situate on the *Spen*, a tributary of the *Calder*. Employ 120 hands. Rateable value of works, 314*l.* The bed of the stream has not silted up. Our works were once affected by floods. The condition of the stream has been much the same during the last 20 years; it is polluted by works above, and is the general receptacle of all the waste liquid from mills and dyeworks, and also town sewage. As the stream flows along it is of various colours, black, red, and blue, according to the liquids which are poured into it, but it is chiefly black. Obtain supply of water from the stream for steam boiler purposes, after it has settled for some time in reservoirs; and from the waterworks for drinking purposes. Manufacture yearly goods of the value of 36,000*l.* The waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use 8,260 gallons of olive and Price's patent cloth oil, of the value of 1,652*l.* Produce yearly 25 tons of waste wool in the process of carding, which is sold to oil extractors. Do not use any soap, alkali, or urine. Use steam, 30 nominal horse-power. Consume yearly 600 tons of coal; the ashes from which are used to repair roads. The excrements of our workpeople, mixed with ashes and flue dust, are used for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to filter and clarify the liquid refuse produced at their works before turning it into rivers and streams.
Fairfax, Kelley, & Sons, Carpet Manufacturers.	Crystal Mills, Heckmondwike.	Our works are situate on the *Spen*, a tributary of the *Calder*. Employ 450 hands. Rateable value of works, 415*l.* 10*s.* The bed of the stream has silted up, caused by solid and other refuse thrown into it. Our works are occasionally affected by floods. The river is polluted by works above, not by mines. Obtain supply of water from wells, and from stream; consume yearly, 33,726,000 gallons. If the stream were rendered clear and colourless, it would be of very little value to us, as we like the water of the stream better than the well water for boiler purposes. Manufacture yearly, 2,000 tons of goods, of the value of 70,000*l.* Produce yearly, liquid refuse from washing, dyeing, and soapsuds, 33,726,000 gallons. The whole of the liquid refuse produced at our works, except the soapsuds, flows direct into sewers, and thence into the river. Use nearly 80 tons of dye wares; chiefly logwood, peachwood, fustic, aniline dyes, lac dye, and indigo. Do not use any bleaching materials. Use yearly, 50 tons of Price's patent cloth oil, of the value of 2,000*l.* The whole of the waste wool produced in carding is sold for manure. Use yearly, soft soap 10,500 lbs., and alkali 80,000 lbs. The soapsuds are sold to oil and grease extractors, by which we gain 15*l.* Use steam, 24 nominal horse-power. Consume yearly, 1,200 tons of coals, the ashes from which are used partly to repair roads, and partly to fill up an old quarry. The excrements of our workpeople are used for manure. Have no suggestions to offer.
George Rhodes & Sons, Worsted Yarn Spinners, Dyers, and Carpet Manufacturers.	Ings Mill and Smithies Mill, Heckmondwike.	Our works are situate on the *Spen*, a tributary on the *Calder*. Employ 186 hands. Rateable value of works, 380*l.* The bed of the river has silted up, caused by ashes and other solid refuse thrown into it. Our works are occasionally affected by floods. The condition of the river is very much worse than it was 20 years ago; we could then use it for dyeing and cleansing purposes, but we cannot do so now; it is seriously polluted by works above, and by mines. Obtain supply of water partly from the stream, from a well, from waterworks, and from gathering grounds, but are not able to state the annual consumption at our works. Manufacture yearly 600,000 lbs. of goods, of the value of 24,000*l.*, and dye 200,000 lbs., of the value of 2,000*l.* The whole of the waste liquid produced at our works flows direct into sewers and thence into the stream. Use yearly 118,636 lbs. of dye wares, chiefly logwood, peachwood, fustic, tartars, argol, lacs, cochineal, flavine, alum, turmeric, bi-chromate of potash, prussiate of potash, copperas, extract of indigo, annatto, and spirits. The spent dye woods are burned; the spent liquids flow direct into the stream. Do not use any bleaching material. Use yearly 50 tons of olive, Gallipoli, and Price's patent cloth oils, of the value of 1,500*l.* Produce yearly 50 tons of waste wool in the process of carding, which is sold to oil extrac-

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George Rhodes & Sons, Worsted Yarn Spinners, Dyers, and Carpet Manufacturers—*cont.*	Ings Mill and Smithies Mill, Heckmondwike—*cont.*	tors. Use yearly, soap 15,000 lbs.; alkali, 2,400 lbs.; no urine. The soapsuds are not treated for the recovery of grease. Use steam, 60 nominal horse-power. Consume yearly 1,500 tons of coal; the ashes from which are used to repair roads. The excrements of our workpeople are carted away by farmers to be used for manure. Have no suggestions to offer.
Armitage, Frith, & Ward, Carpet Manufacturers.	Heckmondwike.	Our works are situate on a tributary of the *Calder*. Employ 10 hands. Rateable value of works, 38*l*. Our works are not affected by floods. Obtain supply of water partly from gathering grounds, and partly from waterworks; but do not know the annual consumption at our works. Manufacture yearly 72,000 lbs. of goods, of the value of 1,800*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Use 8 tons of dye wares yearly, chiefly logwood, limawood, and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly olive oil 600 gallons, of the value of 80*l*. The waste wool produced in carding is re-used. We hire room and power from Messrs. Spivey and Brierley, and therefore are unable to state the nominal horse-power used, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are used for manure. Have no suggestions to offer.
George Tattersfield & Company, Blanket and Woollen Manufacturers.	Springpiece Mills and Oakland Mills, Mirfield.	One of our works is situated on the *Calder*, and the other a short distance from it. Employ from 500 to 600 hands. Rateable value of works, 829*l*. The bed of the river has not silted up. Our mills are not affected by floods. The river is polluted by works above, but we have no reason to complain of it; we are not aware that it is polluted by mines. Obtain supply of water from the river, and consume yearly 30,000,000 gallons. Manufacture yearly, goods of the value of from 200,000*l*. to 300,000*l*. The whole of the waste liquid, except soapsuds, produced at our works, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 82 tons of olive, rape, and Price's patent cloth oil, of the value of 3,690*l*. The greater part of the waste wool produced in carding is sold, the remainder is used for manure. Use yearly 25 tons of soap, 60 tons of alkali, and 500 tons of urine. The soapsuds are treated for the recovery of grease, by which we gain 100*l*. a year. Use steam, 100 nominal horse-power. Consume yearly 3,500 tons of coal, the ashes from which are used chiefly to repair roads, none are thrown into the river. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to prevent all solid refuse from flowing into rivers and streams. With regard to the conservancy of rivers and streams, we think it is a moonshine piece of business, that it would be of no practical use to the country, but would work immense injury to manufacturing interests.
James Hewgate & Sons, Woollen Manufacturers.	Ravensthorpe Mills, Ravensthorpe.	Our works are situate on the *Calder*. Employ 650 hands. Rateable value of works, 986*l*. The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The river necessarily gets dirtier year by year as mills increase, and this has been the case to a considerable extent during the last few years. Obtain supply of water direct from the river. The goods we manufacture yearly weigh in the grease 2,100,000 lbs., and when scoured 1,400,000 lbs., and are of the value of 120,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into sewers, and thence into the stream. Use yearly 300,000 lbs. of dye wares, chiefly logwood, fustic, barwood, and peachwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 90 tons of Gallipoli and Price's patent oil, of the value of from 4,000*l*. to 5,000*l*. Produce yearly 100 tons of waste wool, which is sold to oil extractors. Use yearly, soap 30 tons; alkali, 60 tons; and urine, 300 tons. The soapsuds are treated for the recovery of the grease, by which we gain 120*l*. yearly. Use steam, 100 nominal horse-power. Consume yearly 5,000 tons of coal, the ashes from which are partly ground and mixed with lime for mortar, and partly used for reparing roads and filling up hollow places. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Day & Fox, Woollen Manufacturers.	Gow Mills, Mirfield.	Our works are situate on the *Calder*. Employ 200 hands. Rateable value of works, 625*l*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the river has not changed within our knowledge. It is polluted by works above and by mines. Obtain supply of water from the river, and consume yearly 20,000,000 gallons. If the river were rendered clear and colourless, it

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Day & Fox, Woollen Manufacturers—*cont.*	Gow Mills, Mirfield—*cont.*	would be of considerable value to us, but we are not able to state the amount. Manufacture yearly 465,420 lbs. of goods. Produce liquid refuse from washing, 2,500,000; from dyeing, 2,000,000; and from soapsuds, 500,000 gallons. The whole of the liquid refuse produced at our works, except soapsuds, flows unfiltered into the river. Use yearly as dye wares 140,000 lbs. of solid, and 2,300 lbs. of liquid. The spent dye stuffs are thrown into the river. Do not use any bleaching materials. Use yearly 10,000 gallons of Gallipoli and olive oils, of the value of 2,860*l*. Produce yearly 42 tons of waste wool in the process of carding, which is sold to oil extractors. Use yearly, soap 10,000 lbs.; alkali 63,200 lbs.; and urine 40,000 gallons. The soapsuds are sold to grease extractors, by which we gain 60*l*. Use steam and water as power, steam 26 and water 20 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are carted away and used as manure.
John Burnley & Sons, Fullers.	West Mills, Mirfield.	Our works are situated on the *Calder*. Employ 7 hands. Rateable value of works, 10*l*. Our works are occasionally affected by floods. Obtain supply of water from the river, but are not able to state the annual consumption at our works. Except immediately after a flood the water is sufficiently clear for our purposes. We full yearly, 552,000 lbs. of goods, of the value of 42,000*l*. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly, soap 27,000 lbs.; the soapsuds are sold to grease extractors. Use steam, 16 nominal horse-power. Consume yearly 550 tons of coal; make 75 tons of ashes, which are used to fill up old quarries, and such like places. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Thomas Ackroyd & Sons, Worsted Spinners and Manufacturers.	Birkenshaw -	Our works are situated near to an affluent of the *Calder*. Employ 470 hands. Rateable value of works, 1,080*l*. Our works are not affected by floods. Obtain supply of water jointly from springs and from Bradford Waterworks Company; and consume yearly 1,000,000 gallons. Manufacture yearly 324 tons of wool, of the value of 120,000*l*. The whole of the waste liquid produced at our works, except the soapsuds, flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 20 tons of olive oil, of the value of 1,000*l*. The waste wool produced in the process of carding is sold to waste wool dealers. Use yearly, soap 93,184 lbs. The soapsuds are treated for the recovery of the grease, by which we gain from 200*l*. to 300*l*. a year. Use steam, 100 nominal horse-power. Consume yearly about 3,000 tons of coal, the ashes from which are used to fill up hollow places in the neighbourhood. The excrements of our workpeople are used for manure. Have no suggestions to offer.
James Oddy, junior, Worsted Spinner and Manufacturer.	Birkenshaw -	My works are situated near to an affluent of the *Calder*. Employ 400 hands. Rateable value of works, 65*l*. 13*s*. 10*d*. My works are not affected by floods. Obtain supply of water for wool washing from Bradford Corporation Waterworks, and for other purposes from gathering grounds, which is stored in reservoirs; consume yearly of the water obtained from the Bradford Waterworks Company, 2,000,000 gallons. Manufacture yearly 200 tons of goods, of the value of 90,000*l*. The whole of the waste liquid produced at my works, except soapsuds, flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 9 tons of olive oil, of the value of 520*l*. The whole of the waste wool produced in the process of carding is sold to waste dealers. Use yearly, soap 200 packs, no alkali or urine. The soapsuds are treated for the recovery of the grease, and we gain 50*l*. a year by the extraction. Use steam, 60 nominal horse-power. Consume yearly 2,100 tons of coal, the fine ashes from which are mixed with the excrements of my workpeople, and used for manure; the coarser ashes are used to repair roads. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Firth, Wright, & Company, Scribblers and Millers.	Gomersal -	Our works are situated near an affluent of the *Calder*. Employ 80 hands. Rateable value of works, 42*l*. Our works are not affected by floods. Obtain supply of water jointly from gathering grounds and from bore-holes, and consume yearly 50,000 gallons. We scribble and mill yearly 340 tons of goods, of the value of 22,800*l*. The whole of the liquid refuse produced at our works flows directly into the stream. Do not use any dye wares or bleaching materials. Use yearly 8,500 gallons of olive oil, of the value of 1,275*l*. Do not

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Firth, Wright, & Company, Scribblers and Millers —*cont.*	Gomersal—*cont.*	use soap, alkali, or urine. Use steam, 30 nominal horse-power. Consume yearly 700 tons of coal; make 150 tons of ashes, which are used to repair roads. The excremants of our workpeople are used for manure. No suggestions to offer.
Thomas C. Taylor & Company, Dyers.	Birstal	Our works are situated on the *Birstal Beck*, a tributary of the *Calder*. Employ 23 hands. Rateable value of works, 151*l.* 8*s.* 4*d.* The bed of the stream has not silted up within our knowledge. Our works are slightly affected by floods, caused by a weir upon the stream. The stream is polluted by works above and by mines. Obtain supply of water jointly from the stream, from wells, waterworks, and from gathering ground; and consume yearly about 400,000,000 gallons. If the stream, from which we might obtain a supply of water, were rendered clear and colourless, it would be a direct money value to us of 80*l.* a year. We dye yearly 462,000 lbs. of goods, of the value of 91,000*l.* Produce yearly liquid refuse, from washing, 300,000,000 gallons; and dyeing, 100,000,000 gallons. Have no depositing tanks, and the liquid refuse flows direct into the stream. Use yearly 521,796 lbs. of dye wares, chiefly alum, cochineal, myrobalans, logwood, peachwood, fustic, madder, munjeet, lac, aniline, cudbear, turmeric, sulphate of indigo, caoutchouc, flavine, wolds, picric acid, nitro-muriate of tin, tartar, argol, sulphuric acid, and bran. The soluble portion of the spent dye stuffs flows into the stream. The spent dye woods are used either for repairing roads or burned. Use yearly from 40 to 44 tons of urine. Use steam, 23 nominal horse-power. Consume yearly 1,320 tons of coal; the ashes from which are used as ballast on railways. The excrements of our workpeople are removed by farmers for manure. Have no suggestions to offer.
John Nussey, Scribbler and Spinner.	Smithies Mill, Birstal.	My works are situated on the *Birstal Beck*, a tributary of the *Calder*. Employ 38 hands. Rateable value of works, 260*l.* The bed of the stream has not silted up. My works are not affected by floods. Formerly the stream was pure; it is now extremely polluted by works above, and by mines. Obtain supply of water for fulling from wells and waterworks, and for steam boiler purposes from the stream; consume yearly from wells and waterworks 2,000,000 gallons. If the stream were rendered clear and colourless, the water would be still too hard for fulling purposes, and therefore would be of no direct money value to me. Operate yearly upon 478,000 lbs. of goods. Produce yearly 2,000,000 gallons of liquid refuse from scouring, which flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 1,100 gallons of olive and Price's patent cloth oils, which is provided by the person for whom I spin. The whole of the waste wool produced in carding is sold for manure. Use yearly, fuller's earth 12 tons, soap 1 ton, alkali 2 tons, and urine 8,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 20 nominal horse-power. Consume yearly 1,133 tons of coal, the ashes from which are used partly as ballast on railways and partly for the repair of roads. The excrements of my workpeople are mixed with the finer ashes and used for manure. I suggest, as the best means of avoiding pollution in future, that cinders and all solid refuse should be kept out of rivers and streams.
Birstal Britannia Mill Company, Scribblers and Millers.	Birstal	Our works are situated on a tributary of the *Birstal Beck*, an affluent of the *Calder*. Employ 82 hands. Rateable value of works, 467*l.* 15*s.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is not affected by floods within our knowledge. The stream is polluted by refuse from a brewery above; not by mines. Obtain supply of water jointly from wells and, waterworks and consume yearly, from the latter source, 300,000 gallons. We scribble and mill, yearly, 3,888,000 lbs. of goods of the value of 18,000*l.* The whole of the waste liquid produced at our works flows unfiltered into the stream. Do not use any dye wares or bleaching materials. Use yearly olive, rape, patent, and black oils, of the value of 3,000*l.* Produce waste wool about 20,000 lbs. in the process of carding, which is sold partly to oil extractors and partly used for manure. We do not use either soap, alkali, or urine. The soapsuds are not treated for the recovery of the grease. Use steam, 40 nominal horse-power. Consume yearly 1,400 tons of coal; make 200 tons of ashes, which are partly used for repairing roads and for ballast to railway. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Carrs Mill Company, Woollen Scribblers, Spinners, and Weavers.	Birstal	Our works are situated on *Noviah Beck*, a tributary of the *Calder*. Employ 100 hands. Rateable value of works, 400*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Carrs Mill Company, Woollen Scribblers, Spinners, and Weavers —*cont.*	Birstal—*cont.*	is polluted by works above, not by mines. Obtain supply of water from the stream, wells, bore-holes, and from waterworks; but cannot state the annual consumption at our works. We scribble, spin, and weave yearly 4,000 packs (240 lbs. each) of goods, of the value of 33,000*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. We do not use any dye wares or bleaching materials. Use yearly 2,500 gallons of olive and patent oils, of the value of 450*l.* We produce 130 packs of waste wool in the process of carding, which is sold for manure. Use yearly, soap of the value of 50*l.* The soapsuds are treated for the recovery of the grease, by which we gain yearly 18*l.* Use steam, 35 nominal horse-power. Consume yearly 1,200 tons of coal; makes 200 tons of ashes, which are used for repairing roads. The excrements of our workpeople are carted away from the premises. Have no suggestions to offer.
Ellis, Purdy, and Company, Blanket Manufacturers.	Spring Mills, Carlinghow, Batley.	Our works are situated on *Common Lane Dyke*, a tributary of the *Calder*. Employ 35 hands. Rateable value of works, 163*l.* 17*s.* 6*d.* The bed of the stream has not silted up. Our works are not affected by floods. The stream opposite our works has been for more than 30 years clear; it is now so much polluted by works above ours that it is totally unfit for our purposes. It is not polluted by mines. Obtain supply of water jointly from the stream and from a well. If the stream were rendered clear and colourless it would be a direct money value to us of 200*l.* a year. We spin yearly 131,200 lbs. of goods, of the value of 5,093*l.* The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 1,540 gallons of olive oil, of the value of 385*l.* The whole of the waste wool produced in carding is partly sold to oil extracters and partly used for manure. Use yearly, soap, 1 ton; urine, 8,320 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 20 nominal horse-power. Consume yearly 520 tons of coal; make 65 tons of ashes, which are used chiefly for road repair and for mixing with lime for mortar. The excrements of our workpeople are removed by farmers and used for manure. No suggestions to offer.
Joshua Ellis and Company, Woollen Manufacturers, Scribblers, Spinners, Weavers, and Finishers.	Batley Carr, and at Ravensthorpe.	Our works are situate at Batley Carr, on the *Batley Carr Beck*, and at Ravensthorpe, on the *Calder*. Employ at Batley Carr 320 hands, and at Ravensthorpe 17 hands. Rateable value of works at Batley Carr, 1,074*l.* 5*s.*, and Ravensthorpe, 142*l.* 10*s.* The bed of *Batley Carr Beck* has silted up, caused by the throwing in of ashes and other solid refuse. Our works are not affected by floods. The condition of the streams gradually becomes worse year by year. They are polluted by works above and by mines. Obtain supply of water jointly from streams, from wells, and from waterworks. We keep no account of the quantity consumed at Batley Carr, but at Ravensthorpe consume yearly 35,640,000 gallons. Manufacture yearly 480,000 lbs. of goods, of the value of 90,000*l.* Dye yearly 320,000 lbs. of goods, of the value of 60,000*l.* Produce yearly, liquid refuse from washing, 4,500,000; from dyeing, 4,500,000; from soapsuds, 360,000; and seak, 360,000 gallons. The whole of the liquid refuse produced at our works, except soapsuds and seak, flows direct into the stream. We use yearly as dye wares, logwood, 89,690 lbs.; barwood, 5,600 lbs.; fustic, 22,400 lbs.; camwood, 560 lbs.; Sander's, 11,200 lbs.; myrobalans, 67,200 lbs.; argol, 2,800 lbs.; finishing spirits, 1,380 lbs.; madder, 1,126 lbs.; archil, 33,600 lbs.; indigo, 5,250 lbs.; copperas, 560 lbs.; alum, 1,120 lbs.; iron liquor, 13,500 lbs.; oil of vitriol 1,200 lbs.; blue spirits, 1,250 lbs.; nitrate of iron, 48,060 lbs.; and bi-chrome, 4,896 lbs. Do not use any bleaching materials. Use yearly 7,000 gallons of olive oil, of the value of 1,750*l.* The whole of the waste wool produced in carding is sold either to oil extractors, or used for manure. Use yearly, soap 10,740 lbs., alkali 39,440 lbs., and urine 80,000 gallons. The soapsuds and seak were formerly sold to grease extractors for 70*l.* per annum, but at present they are turned into stream. Use steam, at Ravensthorpe 20, and at Batley Carr 50 nominal horse-power. Consume yearly at Ravensthorpe 1,000 tons, and at Batley Carr 2,000 tons of coal, the ashes from which are given away to repair roads. The excrements of our workpeople are carted away for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
J. Senior & Son, Size and Glue Boilers.	Mill Road, Batley Carr.	Our works are situated on a tributary of *Batley Carr Beck*, an affluent of the *Calder*. Employ 2 hands. Rateable value of works, 22*l.* 5*s.* Our works are affected by floods. Obtain supply of

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
J. Senior & Son, Size and Glue Boilers—*cont.*	Mill Road, Batley Carr —*cont.*	water from waterworks, but do not know the annual consumption at our works. We size yearly, 124,800 lbs. of goods of the value of 37,440*l.* In the manufacture of size we use bones and sloughs. Consume yearly, 120 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
John Jubb & Sons, Rag, Wool Manufacturers and Heavy Woollen Goods Manufacturers.	Bradford Road, Batley.	Our works are situated on *Batley Carr Beck*, a tributary of the *Calder*. Employ 200 hands. Rateable value, 497*l.* 2*s.* The bed of the stream has silted up, caused by ashes and other solid refuse thrown into it. Our works are affected by floods; but this is not due entirely to the silting up of the bed of the stream. Formerly, within our knowledge, the water of the *Beck* was clear and bright; it is now dirty, and almost the colour of ink. It is polluted to a considerable extent by works above, and by mines. Obtain supply of water partly from the *Beck* and partly from waterworks. Use very little water other than for steam boiler purposes. Manufacture yearly goods of the value of 40,000*l.* The whole of the liquid refuse produced at our works flows direct into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly, 50 tons of olive and cloth oils, of the value of 1,300*l.* Produce 26 tons of waste wool in the process of carding, which is partly sold to oil extractors, and partly used for manure. Do not use either soap, alkali, or urine. Use steam, 40 nominal horse-power. Consume yearly, 1,000 tons of coal; make 200 tons of ashes, which are used for repairing roads. The excrements of our workpeople are passed into the *Beck*. Have no suggestions to offer.
Brearley, Hall, & Company, Woollen Manufacturers.	Clark Green, and Purlwell Mills, Batley.	Our works are situated on an affluent of *Batley Carr Beck*, a tributary of the *Calder*. Employ 173 hands. Rateable value of works, 419*l.* 13*s.* 6*d.* Our works are not affected by floods. Obtain supply of water jointly from waterworks and springs; and consume yearly 12,000,000 gallons. Manufacture yearly 3,120 packs of goods, of the value of 18,700*l.*; and dye yearly about 2,080 pieces of woollen cloth, of the value of 16,640*l.* Produce yearly 12,000,000 gallons of waste liquid, which, with the exception of the soapsuds, flows direct into sewers, and thence into the stream. Use yearly 83,200 lbs. of dye wares, logwood, fustic, Sander's, myrobalans, iron liquor, nitrate of iron, ammonia, O.V. bi-chrome, alum, and argol chiefly. The spent dye woods are burned. Do not use any bleaching materials. Use yearly Gallipoli and cloth oils, of the value of 1,200*l.* Produce yearly 40 tons of waste wool in the process of carding, which is sold to oil extractors, by which we gain 35*l.* a year. Use yearly, alkali 50 tons, and urine 10,000 gallons. Use steam, 50 nominal horse-power. Consume yearly 2,400 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are carted away by farmers for manure. No suggestions to offer.
Michael Sheard & Sons, Woollen Manufacturers.	Batley	Our works are situated on the *Batley Beck*, a tributary of the *Calder*. Employ 450 hands. Rateable value of works, 140*l.* The bed of the stream has silted up, caused by sewage and manufacturing refuse thrown into it. Our works are not affected by floods. The stream has always been foul within our knowledge. It is so polluted by works above that it is rendered entirely useless for any other purpose than generating steam. Obtain supply of water for steam boiler purposes from the stream; and for other purposes from wells, bore-holes, and waterworks; and consume yearly 20,000,000 gallons. If the stream were rendered clear and colourless, it would be of considerable value to us; but we are not able properly to state the exact amount. We manufacture yearly 1,760,000 lbs. of goods, of the value of 110,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Use yearly 200,000 lbs. of dye wares, of all kinds of dye woods suitable for woollen goods. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 60 tons of olive and composition oils, of the value of 2,700*l.* Produce 75 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap 7 tons, alkali 60 tons, and urine 100 tons. The soapsuds are treated for the recovery of the grease, by which we gain 100*l.* a year. Use steam, 150 nominal horse-power. Consume yearly 4,400 tons of coal, the ashes from which are used partly on the railway for ballast, and partly ground with lime for mortar. The excrements of our workpeople are carted away to be used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Jubb & Brother, Woollen Manufacturers.	Birchwood Mill, Batley.	Our works are situated on *Batley Beck*, a tributary of the *Calder*. Employ 105 hands. Rateable value of works, 450*l.* The bed of the stream has silted up to some extent, caused by ashes and other solid refuse discharged into it. Our works are affected by floods, partly due to the silting up of the bed of the river, and also to weirs erected across the stream. The condition of the stream has gradually become year by year more dirty; it is polluted to a considerable extent by works above, not, we think, by mines. Obtain supply of water for condensing from the river, from wells, and from bore-holes; for scouring, from waterworks company; and for dyeing, from water collected from a gathering ground. Consume yearly from the waterworks 6,500,000 gallons; but are unable to state the volume from the other sources. If the stream, from which we might derive our supply of water, were rendered clear and colourless, it would be a direct money value to us of 150*l.* a year. Manufacture yearly 873,000 lbs. of goods, of the value of 50,000*l.*; and dye 370,000 lbs. of goods, of the value of 30,000*l.* The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the stream. Use yearly 328,433 lbs. of dye wares, in addition to 6,854 gallons of pyrolignate of iron. The dye wares used are chiefly logwood, fustic, Sander's wood, madder, limawood, d.o.v., blue spirits, finishing spirits, alum, copperas, myrobalans, bi-chromate of potash, prussiate of potash, nitrate of iron, and pyrolignate of iron. Do not use any bleaching materials. Use yearly from 10,000 to 11,000 gallons of cloth oil, of the value of 1,900*l.* Produce yearly 87,000 lbs. of waste wool in the process of carding, which is sold to oil extractors. Use yearly, soap 58,000 lbs.; alkali, 50 tons; and urine, 57,600 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 50*l.* a year, but they are sold under their present value. Use steam, 50 nominal horse power. Consume yearly 2,444 tons of coal; make 600 tons of ashes, which are used for repairing roads. The excrements of our workpeople are carted away by farmers to be used for manure. Have no suggestions to offer.
Joseph Parker & Sons, Heavy Woollen Manufacturers.	Park Lane, and Wheatcroft Mills, Batley.	Our works are situated on the *Batley Beck*, a tributary of the *Calder*. Employ 83 hands. The bed of the stream has silted up, caused by ashes and other solid refuse thrown into it. Our works are not affected by floods. The bed of the stream used formerly to be clear, it is now very much polluted by manufactories above and by mines. As we merely rent the premises and power, we are unable to state the volume of water annually consumed. We manufacture yearly 242,000 lbs. of goods, of the value of 20,000*l.* Use yearly 2,000 gallons of Gallipoli and 2,000 gallons of cloth oils, of the value of 674*l.* Produce yearly about 50 tons of waste wool in the process of carding, which is sold to oil extractors. Use steam, 50 nominal horse-power, but as we rent power, are not able to state the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are regularly removed by farmers to be used as manure. Have no suggestions to offer.
Joseph Jubb & Company, Woollen Manufacturers.	Victoria Mills, Carlington, and Bank Foot, Batley.	Our works are situated near to *Batley Beck*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 810*l.* 12*s.* The bed of the stream has silted up, caused by solid and other refuse thrown into it. Our works are not affected by floods. The river is polluted to a serious extent, so much so by works above that we cannot use it for any purposes but for steam boilers. Obtain supply of water from wells, bore-holes, and waterworks, and consume yearly 100,000,000 gallons. Manufacture yearly from 100 to 150 tons of goods, of the value of from 30,000*l.* to 40,000*l.* Produce yearly 50,000,000 gallons of refuse from washing and 50,000,000 from dyeing, which flow direct into the stream. Use yearly 26 tons of dye wares, chiefly logwood, fustics, and argol. The spent dye stuffs are used for fuel. Do not use any bleaching materials. Use yearly 52 tons of olive and cloth oils, of the value of 2,000*l.* Produce yearly 26 tons of waste wool in the process of carding, which are partly sold to oil extractors, and partly used for manure. Use yearly, soap 1½ tons; alkali 20 tons; and urine 50 tons. The soapsuds are not treated for the recovery of the grease. Use steam, 60 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are partly mixed with lime for mortar, and partly used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Sands, Wilson, & Company, Woollen Spinners.	Batley -	Our works are situated on the *Birstal Beck*, a tributary of the *Calder*. Employ 51 hands. Rateable value of works, 289*l*. 7*s*. 6*d*. The bed of the stream has silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted by works above, not by mines. Obtain supply of water from the stream, from wells, and bore-holes; and consume yearly 57,000,000 gallons. Manufacture yearly 2,400 packs of goods. The whole of the waste liquid produced at our works flows into the stream. Do not use any dye wares or bleaching materials. Use yearly 6,000 gallons of olive and Price's patent cloth oils. Produce yearly 370 packs of waste wool in the process of carding, which is sold to oil extractors. Do not use any soap, alkali, or urine. Use steam, 27 nominal horse-power. Consume yearly 1,200 tons of coal; make 300 tons of ashes, which are carted to the railway to be used for ballast. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Colbeck Brothers, Woollen Cloth Manufacturers.	Batley -	Our works are situated on the *Tinsley Wood Beck*, an affluent of the *Calder*. Employ 300 hands. Rateable value of works, 1,216*l*. 19*s*. The bed of the stream has not silted up. Our works are not affected by floods. Formerly the condition of the stream was very pure, and abounded with trout; it is now polluted to such a considerable extent as to make it entirely worthless for washing purposes; it is not polluted, within our knowledge, by mines. Obtain supply of water for condensing from the stream, and for dyeing and scouring purposes from wells, from bore-holes, and from waterworks; and consume from latter source, yearly, 18,000,000 gallons. If the stream were rendered clear and colourless, it would be a direct money value to us of 250*l*. a year. We manufacture yearly 300 tons of goods, of the value of 48,000*l*. Produce yearly 9,000,000 gallons of liquid refuse from washing and soapsuds, and 9,000,000 gallons from dyeing. The whole of the waste liquid from the dyeing flows direct into the stream, and that from washing and soapsuds we sell to Messrs. Le Paige and Company. We extract the grease from the suds, and the effluent water is allowed to flow into the stream. Use yearly 536,000 lbs. of dye wares, chiefly logwood, potash, myrobalans, pyrolignate, fustic, copperas, Sander's wood, and argols. The spent dye stuffs flow into the stream. Do not use any bleaching materials. Use yearly, olive and Price's patent cloth oil, of the value of 2,177*l*. Produce yearly 50 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap, 2¼ tons; alkali, 29 tons; and urine, 108,000 gallons. The soapsuds are treated by Messrs. Le Paige and Company, by which we gain 65*l*. a year. Use steam, about 109 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are used to repair roads, mixed with lime, and also used for brickmaking. The excrements of our workpeople are used for manure. If the manufacturers of this town were not allowed to turn the refuse water from dyeing and scouring into the stream, they would be compelled to suspend operations, unless some method was devised to get rid of it by common sewers, or otherwise. The stream is more of a common sewer than a stream, and the water is totally useless for washing or scouring purposes. We think that the most likely plan for avoiding pollution in future would be, that all liquid refuse should be pumped into reservoirs on high grounds, for the purpose of irrigation or distribution on farm lands. It would be a very good fertilizer, and the country here is most favourable for such a mode of utilization.
John Skelsey, Woollen Manufacturer.	Baulk Street, Batley.	My works are situated on a tributary of the *Calder*. Employ 170 hands. Rateable value of works, 412*l*. My works are not affected by floods. The bed of the stream has not silted up. The condition of the stream has not changed within my knowledge. It is polluted by works above, not by mines. Obtain supply of water from the *Beck*, from waterworks, and from gathering grounds collected in reservoirs; but am not able to give the annual consumption at my works. Manufacture yearly 1,700 packs of goods, of the value of 18,000*l*. The whole of the waste liquid produced at my works, except soapsuds, flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly Gallipoli and Price's patent cloth oil, of the value of 800*l*. The whole of the waste wool produced in carding is sold. Use yearly, soda ash 10 tons, and urine 20,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 20*l*. Use steam, 90 nominal horse-power. Consume yearly 900 tons of coal; the ashes from which are deposited on my premises. The excrements of my workpeople are removed by carts and used for manure. Have no suggestions to offer.

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Graham & Hirst, Finishers of Woollen Goods.	Providence and New Brighton Mills, Batley.	Our works are situated on the *Batley Carr Beck*, a tributary of the *Calder*. Employ 20 hands. Our works are not affected by floods. Obtain supply of water from wells, and consume 36,500 gallons yearly. Manufacture yearly 520 packs of goods. The whole of the liquid refuse produced at our works is conveyed again into the mill dam, and used over again for the boiler. Use yearly 6 tons of dye wares, but no bleaching materials. The spent dye stuffs are burned. Use yearly 6 tons of olive oil of the value of 300*l*., 1 ton of alkali; but no soap or urine. Produce 6 tons of waste wool in carding, which is sold. Use steam, 12 nominal horse-power. Consume yearly 312 tons of coal; the ashes from which are deposited in hollow places. The excrements of our workpeople are used for manure. Have no suggestions to offer.
John Nussey & Company, Woollen Manufacturers.	Carlinghow, Batley.	Our works are situated on *Batley Beck*, a tributary of the *Calder*. Employ 300 hands. Rateable value of works, 839*l*. 2*s*. The bed of the stream has silted up about 18 inches, caused by ashes, dye wares, and other solid refuse thrown into it. Our works are to a slight extent affected by floods. The *Beck* is shallower, and the water is now nearly of the colour of ink, from extensive pollution above. Obtain supply of water jointly from the stream, wells, and waterworks; and consume yearly from the stream 732,560,000 gallons; from wells and bore-holes, 36,209,000 gallons; and from waterworks, 5,000,000 gallons. If the river were rendered clear and colourless, it would be a direct money value to us of 60*l*. a year. Manufacture yearly 699,600 lbs. of goods, of the value of 90,500*l*. Produce yearly 36,809,000 gallons of liquid refuse from washing, 4,000,000 gallons from dyeing, and 400,000 gallons from soapsuds. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the *Beck*. Use yearly 239,300 lbs. of dye wares, chiefly logwood. A portion of the spent dye stuffs is burned and a portion turned into the *Beck*. Do not use any bleaching materials. Use yearly 6,000 gallons of Gallipoli oil, of the value of 1,500*l*. Produce yearly 12 tons of waste wool in the process of carding, which is sold to oil extractors. Use yearly, soap 20 tons, alkali from 5 to 6 tons, and urine 30,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 50*l*. a year. Use steam, 50 nominal horse-power. Consume yearly about 3,000 tons of coal; make 500 tons of ashes, which are carted away to quarries or used for repairing roads. The excrements of our workpeople are carted away and used for agricultural purposes. Have no suggestions to offer.
George Crawshaw, Woollen Manufacturer.	Batley Carr Top.	My works are situated on *Batley Carr Beck*, a tributary of the *Calder*. Employ 80 hands. Rateable value of works, 311*l*. 16*s*. 8*d*. The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has been getting gradually worse during the last 20 years. There are two manufactories situated above mine, where dyeing and milling are carried on, and thus the stream is polluted. Obtain supply of water jointly from wells, and also from waterworks company; but am not able to give the annual consumption at my works. I only use the water of the *Beck* for condensing purposes, and as there is not a sufficient supply for scouring, what quantity of it flows down, if rendered clear and colourless, would be of a direct money value to me of from 20*l*. to 30*l*. a year. Manufacture yearly from 80 to 90 tons of goods, of the value of 14,000*l*. The whole of the waste liquid produced at my works flows direct into the *Beck*. Do not use any dye wares or bleaching materials. Use yearly 12 tons of olive and rape oil, of the value of 500*l*. Produce yearly 30 tons of waste wool in the process of carding, which is sold to oil and grease extractors; and about 20 tons of dry dust and waste, which are sold for manure. Use yearly, soap 4 tons, alkali 15 tons, and urine 100 tons. The soapsuds are not treated for the recovery of the grease, but are turned direct into the stream. Use steam, 25 nominal horse-power. Consume yearly from 900 to 1,000 tons of coal; the ashes from which are carted away by farmers for manure. Have no suggestions to offer.
John Fenton, Woollen Manufacturer	Bradford Road, Batley Carr.	My works are situated on the *Batley Carr Beck*, a tributary of the *Calder*. Employ 86 hands. Rateable value of works, 300*l*. The bed of the stream has not silted up. My works are sometimes affected by floods. The *Beck* has always been a muddy and dirty stream since I have known it; it is polluted to a great extent by works above, but not by mines. Obtain supply of water from wells and waterworks, but cannot state the annual consumption at my works. Manufacture yearly 78 tons of goods, of the value of 9,000*l*. The whole of the waste liquid produced at my works flows direct into

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Fenton, Woollen Manufacturer—*cont.*	Bradford Road, Batley Carr —*cont.*	sewers and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 18 tons of olive and patent cloth oil, of the value of 660*l.* Produce yearly 20 tons of waste wool in the process of carding, which is sold to farmers and hop growers for manure. Use, yearly, soap 2 cwt., alkali 20 tons, and urine 5 tons. The soapsuds are not treated for the recovery of the grease. Use steam, 17 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used for the repair of roads. The excrements of my workpeople are carted away by farmers for manure. Have no suggestions to offer.
The Albion Mill Company, Woollen Manufacturers.	Batley Carr -	Our works are situated on *Batley Carr Beck*, a tributary of the *Calder*. Employ 92 hands. Rateable value of works, 372*l* The bed of the stream has silted up, caused by ashes and other solid refuse thrown into it from dye and other works. Our works are not affected by floods. Formerly the stream was clear and pure, but it is now so much polluted that it is scarcely possible to make it worse; it is polluted by works above, not by mines. Obtain supply of water jointly from wells and from waterworks company, but are not able to give the annual consumption at our works. Manufacture yearly, 780,408 lbs. of goods. Produce liquid refuse from dyeing, 200,000 gallons, but are not able to state the volume of liquid refuse produced from other sources. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the sewers. Use yearly, as dye wares, 7,400 lbs. of Sander's wood, 2,240 lbs. of peachwood, and 10,000 lbs. of logwood. The whole of the spent dye stuffs are sold for manure. Do not use any bleaching materials. Use olive and Price's patent cloth oils, of the value of 900*l.* The whole of the waste wool produced in carding is sold to Messrs. Le Paige and Company, grease extractors. Use yearly, soap, 4,480 lbs.; soda, 36,320 lbs.; and urine, 28,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain, yearly, 40*l.* Use steam, 40 nominal horse-power. Consume yearly 1,694 tons of coal, the ashes from which are removed by farmers to be ground with lime to make mortar. The excrements of our workpeople are sold for manure. We have no suggestions to offer.
Tattersfield, Oddy and Company, Blanket Scribblers and Spinners.	Staincliffe Mill, Dewsbury.	Our works are situated near to *Batley Beck*, a tributary of the *Calder*. Employ 80 hands. Rateable value of works, 590*l.* Our works are not affected by floods. Obtain supply of water jointly from wells and from waterworks; consume yearly about 18,000,000 gallons. Manufacture yearly 619 tons of goods, of the value of 75,770*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 6,498 gallons of olive oil, of the value of 1,370*l.*; and 9,857 gallons of rape oil, of the value of 432*l.* Produce yearly 55 tons of waste wool in the process of carding, which is sold to hop growers for manure. Use yearly, soap, 28 tons; alkali, 12 tons; and urine, 7,700 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 45*l.* Use steam, 40 nominal horse-power. Consume yearly 2,250 tons of coal; the ashes from which are used to repair roads. The excrements of our workpeople are removed by farmers for manure.
J. B. Newsome, Heavy Woollen Manufacturers.	Staincliffe Low Mills.	My works are situated on *Batley Carr Beck*, a tributary of the *Calder*. Employ 140 hands. Rateable value of works, 270*l.* My works are not affected by floods. The river is polluted by liquid refuse from manufactories and by sewage. Obtain supply of water partly from the stream, from wells, and waterworks, but am unable to state the annual consumption at my works. Manufacture yearly 100 tons of goods, of the value of 25,000*l.* The whole of the waste liquid produced at my works flows direct into the sewers, and thence into the stream. Use yearly 2 tons of dye wares, chiefly logwood. The spent dye stuffs are burnt. Do not use any bleaching materials. Use yearly from 30 to 40 tons of olive oil, of the value of 2,000*l.* Produce yearly half a ton of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap, 6 tons; alkali, 20 tons; and urine, 100 tons. The soapsuds are treated for the recovery of grease, by which I gain 40*l.* a year. Use steam, 40 nominal horse-power. Consume yearly 1,000 tons of coal; the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. I suggest as the best means of avoiding pollution in future, that manufacturers and others should be compelled to filter their liquid refuse before allowing it to flow into rivers and streams. Have no suggestions to offer as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
James Fenton, Blanket Manufacturer.	Low Mill, Dewsbury Moor.	My works are situated near to a tributary of the *Calder*. Employ 86 hands. Rateable value of works, 300*l.* My works are not affected by floods. Obtain supply of water jointly from gathering grounds and waterworks company, and consume yearly 624,000 gallons. Manufacture yearly 780 packs of goods, of the value of 15,600*l.* The whole of the waste liquid produced at my works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 10 tons of olive oil, of the value of 500*l.* Produce 12 tons of waste wool in carding, which is sold for manure. No goods are finished on my works; therefore do not use soap, alkali, or urine. Use steam, 16 nominal horse-power. Consume yearly 365 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. No suggestions to offer.
Thos. Greenwood, Tanner.	Dewsbury Moor.	My tanyard is situated near to a tributary of the *Calder*. Employ 16 hands. Rateable value of tanyard, 70*l.* My tanyard is not affected by floods. Obtain supply of water from Dewsbury Waterworks Company and from gathering grounds; but am not able to state the annual consumption at my tanyard. Tan yearly 100 tons of English hides, and produce 48 tons of leather. Use yearly, lime 25 tons, bark 300 tons, valonia 25 tons, gambir 10 tons, and pigeons' dung 4 tons. Obtain yearly 6 tons of hair in the process of depilation, which is sold to plasterers. The fleshings are sold to glue and size boilers. I have 100 tan pits, varying in sizes from 6 feet by 4 feet by 5 feet to 3 feet 6 in. by 3 feet 6 in. by 5 feet. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard flows into sewers, and thence into the *Beck*. Use steam, 4 nominal horse-power. Consume yearly 300 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople flow by waterclosets into sewers, and thence into the *Beck*. No suggestions to offer.
Thomas Cook, Son and Wormald, Manufacturers of Blankets and other Woollen Fabrics.	Dewsbury -	Our works are situated on the *Calder*. Employ 530 hands. Rateable value of works, 3,000*l.* The bed of the stream has silted up, caused by refuse thrown in from mills and dye houses. Our mills are affected to some extent by floods, caused chiefly by the silting up of the bed of the stream. 20 years ago the water of the stream was comparatively pure, was used largely for domestic purposes, and abounded with fish; now it is very foul, and there is no fish in it. Obtain supply of water jointly from the river and from waterworks, and consume yearly 40,000,000 gallons. If the river were rendered clear and colourless, it would be a direct money value to us of 500*l.* We manufacture yearly 2,000,000 lbs. of goods, and dye 500,000 lbs., of the value of 200,000*l.* Produce yearly 40,000,000 gallons of liquid refuse, from washing, dyeing, and soapsuds; the whole of this, with the exception of about 6,000,000 gallons, which are forced across the river to some scak works, flows direct into the stream. Use yearly as dye wares, 33,600 lbs. of dye woods; lac, 3,000 lbs.; and cochineal, 3,000 lbs. The spent dye woods are burnt. Use yearly as bleaching materials, rough and rolled brimstone, 67,200 lbs. Use yearly 200 tons of olive, rape, and patent oils, of the value of 9,000*l.* Produce 100 tons of waste wool in the process of carding, which is sold to oil extractors. Use yearly, soap, 100 tons; alkali, 25 tons; and urine, 50,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain yearly 130*l.* Use steam and water as power,—steam 45, and water 100 nominal horse-power. Consume yearly 2,000 tons of coal; make 300 tons of ashes, which are used partly to repair roads, and partly ground up with lime for mortar. The excrements of our workpeople are partly utilized by earth closets for manure, and the remainder flows into the river. We suggest, as the best means of avoiding pollution in future, and for the conservancy of rivers and streams, that a central representative authority for each river basin should be appointed, with very adequate powers.
B. Hepworth & Sons, Blanket and Travelling Rug Manufacturers.	New Wakefield Mills, Dewsbury.	Our works are situated on the *Batley Beck*, a tributary of the *Calder*. Employ 135 hands. Rateable value of works, 280*l.* 12*s.* The bed of the stream has silted up, caused partly by a weir formed across the stream three-quarters of a mile below our works, on which account the stream is very sluggish, and the solid matters in suspension are deposited. Our works are not affected by floods; but floods are caused, not so much by the silting up of the bed of the stream as by the arching over of the *Beck*; the waterway is very much contracted and not of sufficient capacity to take away the water in time of flood. The *Beck*

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
B. Hepworth & Sons, Blanket and Travelling Rug Manufacturer—*cont.*	New Wakefield Mills, Dewsbury—*cont.*	in our recollection was well stocked with fish, but now, since the great development of the woollen trade in this district, it is polluted to such a degree as to render it unfit for manufacturing purposes; it is polluted also by mines. Obtain supply of water from wells, springs, and from a gathering ground collected in a reservoir, and consume yearly 5,200,000 gallons. We manufacture yearly about 233,000 lbs. of goods, of the value of 14,700*l.* Produce 3,450,000 gallons of liquid refuse from washing, and 1,500,000 gallons from dyeing. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into sewers, and thence into the stream. We use yearly as dye wares 102,800 lbs. of dye woods. The spent dye stuffs are burnt. Do not use any bleaching materials. Use yearly 18 tons of olive oil, of the value of about 1,000*l.* Produce yearly from 12 to 15 tons of waste wool in the process of carding, which is sold for manure. Do not use any soap, but use yearly, alkali 7 tons, and urine 12,000 gallons. The fulling refuse is treated for the recovery of grease, by which we gain 25*l.* a year. Use steam, 25 nominal horse-power. Consume yearly 1,300 tons of coal, the ashes from which are used for repairing roads and for brick making. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Samuel Bates & Sons, Carpet Manufacturers.	Water Gate, Dewsbury.	Our works are situated on the *Calder*. Employ 120 hands. Rateable value of works, 320*l.* The bed of the river has silted up. Our works are not affected by floods. The condition of the river was formerly clear; it is now very much discoloured, being considerably polluted by refuse from dye and other works. We are not aware that it is polluted by mines. Obtain supply of water from the river, and consume yearly 6,200,000 gallons. If the river, from which we derive our supply of water were rendered clear and colourless, it would be of considerable value to us. Manufacture yearly 104 tons of carpets. The whole of the liquid refuse produced at our works flows unfiltered direct into the river. Use yearly 35 tons of dye wares, chiefly logwood, peachwood, and fustic, and 26 tons of ammonia, nitrate of tin, and sulphuric acid; also 16 tons of alum and tartar. The spent dyewoods are burned. Use yearly 20 tons of olive and other oil, of the value of 800*l.* Produce yearly 52 tons of waste wool in the process of carding, which is sold to manure manufacturers. Use yearly 20 tons of soap and soda ash. The soapsuds are not treated for the recovery of the grease. Use steam, 35 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Asa H. Pyrah, Carpet Yarn Spinner.	Cloth Hall, Dewsbury.	My works are situated on the *Dewsbury Beck*, a tributary of the *Calder*. Employ 31 hands. Rateable value of works, 70*l.* The bed of the stream has silted up. My works are not affected by floods. The condition of the stream is much the same as formerly. It is polluted by works above; not by mines. Obtain supply of water jointly from stream and waterworks. Manufacture yearly 500 packs of goods. The whole of the liquid refuse produced at my works flows unfiltered direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 1,000 gallons of olive and cloth oils. Do not use any soap, alkali, or urine. Do not use steam power. The excrements of my workpeople are used for manure. Have no suggestions to offer.
M. Holroyd, Woollen Manufacturer.	Dewsbury and Batley.	My works are situated on a *Beck*, a tributary of the *Calder*. Employ 1,700 hands. Rateable value of works, 6,000*l.* The bed of the stream has silted up, but not to any considerable extent, caused by solid refuse thrown into it. My works are affected by floods, but not caused by the silting up of the bed. The river and stream are polluted to a very considerable extent by works above; not to my knowledge by mines. Obtain supply of water jointly from the river *Calder*, from *Beck*, and from Dewsbury, Batley, and Heckmondwyke Waterworks, and consume yearly 155,000,000 gallons. If the stream were rendered clear and colourless it would not be of any great money value to me, as I get pure water from the waterworks, and as cheaply as I could pump it, if clear, from the stream. Manufacture yearly goods of the value of from 300,000*l.* to 400,000*l.*, and dye goods of the value of from 250,000*l.* to 300,000*l.* The whole of the waste liquid produced at my works, except that from washing, flows direct into the stream. Use yearly dye wares, chiefly dye-woods, shumac, bi-chrome, and alum. The spent dye wares are partly burned and partly turned into the stream. Do not use any bleaching materials. Use, yearly, olive oil

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
M. Holroyd, Woollen Manufacturer—*cont.*	Dewsbury and Batley—*cont.*	chiefly, of the value of 10,000*l.* Produce yearly about 100 tons of waste wool in the process of carding, which is sold to neighbouring farmers for agricultural purposes. Use yearly, soap 50 tons, alkali 150 tons, and urine about 80,000 gallons. The soapsuds are treated for the recovery of the grease, but I am not able to state the amount I gain by the process; it pays well for the trouble. Use steam, 300 nominal horse-power. Consume yearly 15,000 tons of coal, the ashes from which are carted away to fill up hollow places, and are stored on spare land. The excrements of my workpeople are partly conveyed into sewers and thence into the stream, and partly used for agricultural purposes. Have no suggestions to offer.
William Blakeley & Company, Woollen Manufacturers.	Wellington Mills, Dewsbury, and College Mills, Birstal.	Our works at Dewsbury are situated on the *Calder*, and at Birstal on a tributary of the river *Calder*. Employ about 400 hands. Rateable value of works, *l.* The bed of the river and stream has silted up, caused by ashes, dye wares, and other solid refuse thrown into them. Our works are affected by floods. The river was formerly deep and clear; it is now shallow and filthy; it is polluted to a very great extent by refuse from works and the sewage of towns above, but not that we are aware of by mines. Obtain supply of water jointly from the river and from well on our premises, and consume yearly 28,207,800 gallons. If the river and stream, from which we might derive a supply of water, were rendered clear and colourless, it would be of very great value to us. Manufacture yearly 5,000 packs of goods, of the value of 80,000*l.* The whole of the waste liquid produced at our works flows direct into the river and stream. Do not use any dye wares or bleaching materials. Use yearly 80 tons of olive oil, of the value of 4 000*l.* The whole of the waste wool produced in carding is sold to oil and grease extractors. Use yearly, soap 4 tons, alkali 30 tons, and urine 90,000 gallons. The soapsuds are treated for the recovery of grease, and we gain 60*l.* a year. Use yearly, steam 90 nominal horse-power. Consume yearly coal of the value of 1,600*l.*, the ashes from which are partly used for repairing roads, and partly ground and mixed with lime for mortar. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
J. B. Oates, Manufacturer of Heavy Woollen Cloths.	West End Mills, Dewsbury.	My works are situated on the *Calder*. Employ 195 hands. Rateable value of works, 500*l.* The bed of the river has silted up, caused by spent dye stuffs, ashes, and other solid refuse thrown into in. My works are affected by floods. Formerly, the river within my knowledge was comparatively pure; it is now very seriously polluted by refuse from mills and dyeworks, by the sewage of towns above, and by mines. Obtain supply of water jointly from the river and waterworks, and consume from the river 8,500,000 gallons, and from waterworks 2,700,000 gallons yearly. If the river or stream, from which I might derive a supply of water, were rendered clear and colourless, it would be of great advantage to me. Manufacture yearly 300,000 lbs. of goods, of the value of 15,600*l.* The whole of the waste liquid produced at my works flows into sewers, and thence into the river. Use yearly, wares, chiefly logwood, camwood, and shumac. The spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly, 26 tons of olive and Price's patent cloth oils, of the value of 1,300*l.* Produce yearly 26 tons of waste wool in the process of carding, which are sold to oil and grease extractors. Use yearly, soap 4,480 lbs., alkali 33,600 lbs., and urine 8,000 gallons. The soapsuds are treated for the recovery of the grease, and we extract 18 tons of grease per annum. Use steam, 50 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are partly used for filling up hollow places, and partly ground with lime to be made into mortar. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Porritt, Senior, & Company, Manufacturers of Heavy Woollen Cloths.	Savile Town, Dewsbury.	Our works are situated on the *Calder*. Employ 130 hands. Rateable value of works, 574*l.* The bed of the stream has silted up, caused by solid and other refuse thrown into it. Our works are only occasionally affected by floods. The stream within our knowledge was once clear, and contained fish; but now it is very seriously polluted by all kinds of refuse from works and mills, and by the sewage of towns and villages; it is also polluted by mines. Obtain supply of water jointly from the river, and from the Dwsbury and Batley Waterworks Company. As we do not manufacture a fine class of goods, the condition of the river does not make much difference to

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Porritt, Senior, & Company, Manufacturers of Heavy Woollen Cloths—*cont.*	Savile Town, Dewsbury—*cont.*	us; but if it becomes much worse we shall have to purchase all water, even for washing purposes, from the Waterworks Company. Manufacture yearly 2,340 packs of goods. The whole of the waste liquid produced at our works, except the soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly Gallipoli and cloth oils, of the value of 68*l.* Produce yearly 29 tons of waste wool in the process of carding, the oil from which is extracted, and the refuse is afterwards used for manure. Use yearly alkali 20 tons, and urine 45 tons. The soapsuds are treated for the recovery of the grease, by which we gain 80*l.* a year. Use steam, 50 nominal horse-power. Consume yearly, 1,200 tons of coal, the ashes from which are used partly for the repair of roads, and partly ground and mixed with lime for mortar. The excrements of our workpeople are used for manure. The chief polluters of the *Calder* are the dyers; and if they were compelled to filter the refuse before turning it into rivers and streams, they would be comparatively clear. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Isaac Colbeck, Woollen Manufacturer.	Lady Anne Mill, Soot-hill.	My works are situated on *Lady Anne Dyke*, a tributary of the *Calder*. Employ 204 hands. Rateable value of works, 370*l.* 15*s.* The bed of the stream has not silted up. My works are not affected by floods. The stream is nearly dry in summer. It is not polluted by works above, nor by mines. Obtain supply of water jointly from the stream and from a well; but am not able to state the annual consumption at my works. Manufacture yearly 540,000 lbs. of goods, of the value of 30,000*l.* The whole of the waste liquid produced at my works, except soapsuds, flows direct into the stream. Use yearly 60,000 lbs. of dye wares, chiefly dye woods. The spent dye stuffs are burned; the liquid portion only flowing into the stream. Do not use any bleaching materials. Use yearly 30 tons of olive oil, of the value of 1,500*l.* Produce yearly 15 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Do not use any soap. Use yearly, alkali 20 tons, and urine 30 tons. The soapsuds are treated for the recovery of the oil and grease, by which I gain 30*l.* a year. Use steam, 30 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are carted away to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Alexandra Mill Company, Woollen Manufacturers.	Soot-hill, Batley	Our works are situated on *Batley Beck*, a tributary of the *Calder*. Employ 180 hands. Rateable value of works, 433*l.* The bed of the stream has silted up, caused by ashes, dye wares, and other solid refuse thrown into it. Our works are not affected by floods. Thirty years ago the stream was clear and nearly pure; it is now as black as ink, the temperature is greatly increased, and it is seriously polluted. Obtain supply of water for condensing purposes from the river, and for scouring from wells and waterworks. If the river or stream were rendered clear and colourless it would be of great money value to us, but we are not able to state the amount. Manufacture yearly 520,000 lbs. of goods, of the value of 50,000*l.* The whole of the waste liquid produced at our works, except the soapsuds, flows direct into the *beck*. Do not use any dye wares or bleaching materials. Use yearly 7,000 gallons of olive oil, of the value of 2,000*l.* The whole of the waste wool produced in carding is sold to oil and grease extractors. Use soap 5 tons, alkali 20 tons, and urine 10,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 35*l.* yearly. Use steam, 40 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are used to fill up hollow places in brick-fields, and in repairing roads. The excrements of our workpeople are conveyed into the stream. We suggest, as the best means of avoiding pollution in future, that manufacturers should be compelled to filter all liquid refuse before allowing it to flow into streams, and that ashes, spent dye wares, and other solid refuse should be prohibited from being turned into streams.
Syke Ing Mill Company, Blanket Manufacturers.	Earls Heaton -	Our works are situated on the *Chikenley Beck*, a tributary of the *Calder*. Employ 150 hands. Rateable value of works, 352*l.* 12*s.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted to a small extent by works above, not by mines. Obtain supply of water occasionally from the stream,

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Syke Ing Mill Company, Blanket Manufacturers—*cont.*	Earls Heaton —*cont.*	but chiefly from wells and boreholes; also from surface drainage and from an adjacent colliery, and consume yearly 10,000,000*l.* gallons. If the stream, from which we might derive our supply of water, were rendered clear and colourless, it would be a direct money value to us of 50*l.* a year. Manufacture yearly 480,000 lbs. of goods, of the value of 24,000*l.*; and also operate upon 480,000 lbs. of goods. Produce yearly 5,000,000 gallons of liquid refuse from washing, and 2,000,000 from soapsuds. The whole of the liquid refuse produced at our works flows direct into the stream. We have only just commenced dyeing, and therefore are unable to state the quantity of dye wares used yearly. Do not use any bleaching materials. Use yearly 25 tons of Gallipoli, rape, and Price's oil, of the value of 1,000*l.* Produce yearly 30 tons of waste wool in the process of carding, which is partly sold to oil and grease extractors, and partly used for manure. Use yearly, soap 10 tons, soda ash 15 tons, and urine 12,000 gallons. We have only just commenced to treat the soapsuds for the recovery of the grease. Use steam, 40 nominal horse-power. Consume yearly 1,600 tons of coal; make 200 tons of ashes, which are partly used as ballast for the railway, and partly thrown into the stream. The excrements of our workpeople are used for manure.
John H. Harrop & Sons, Blanket Manufacturers.	Chikenley, Dewsbury.	Our works are situated on the *Chikenley Beck*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 340*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is comparatively clear; it is polluted to a slight extent, but not by mines. Obtain supply of water jointly from a well and from boreholes, and consume yearly 31,349,600 gallons. Manufacture yearly 50 tons of goods, of the value of 5,000*l.* The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the *Chikenley Beck*. Do not use any dye wares or bleaching materials. Use yearly 5,000 gallons of olive, rape, and Price's patent oil, of the value of 875*l.* Produce yearly 12 tons of waste wool in the process of carding, which are sold for manure. Use yearly, soap 990 lbs., alkali 15 tons, and urine 2,400 gallons. The soapsuds are treated for the recovery of the grease, by which we expect to gain 20*l.* a year. Use steam, 30 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted away and used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Wilson, Senior, & Preston, Blanket and Horse-rug Manufacturers.	Earls Heaton -	Our works are situated on a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 370*l.* Our works are not affected by floods. Obtain supply of water from wells, and consume yearly 1,000,000 gallons. Manufacture yearly 3,000 packs of goods, of the value of 36,000*l.* The whole of the waste liquid produced at our works flows direct into sewers. Use yearly 26 tons of dye wares; chiefly dye woods. The spent dye stuffs are used for manure. Do not use any bleaching materials. Use yearly 8,500 gallons of patent cloth oil, of the value of 1,700*l.* Produce yearly about 100 tons of waste wool in the process of carding, which is sold for manure. Use yearly, fullers earth 90 tons, soda ash 8 tons, and urine about 6,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 50 nominal horse-power. Consume yearly 1,550 tons of coal; make 300 tons of ashes, which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Daniel Rhodes & Sons, Manufacturers of Heavy Woollen Cloths.	Scarr End Mill, Earls Heaton, and Sands Mill, Dewsbury.	Our works are situated on the *Calder*. Employ 150 hands. Rateable value of works, 650*l.* The bed of the stream has not silted up to any considerable extent opposite our works. Our works are not affected by floods. The condition of the stream was formerly clear, but it is now very black in colour, and is polluted to a considerable extent by refuse of manufactures and by town sewage; it is also polluted by mines. Obtain supply of water from the river; and consume yearly 62,100,000 gallons. Manufacture yearly 170 tons of goods, of the value of 24,000*l.* The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the river. Use yearly 246,400 lbs. of dye wares; chiefly dye woods. The spent dye stuffs are partly burned, and partly turned into the river. Do not use any bleaching materials. Use yearly 22 tons of cloth oil, of the value of 770*l.* Produce yearly 20 tons of waste wool in the process of carding, which are sold for manure. Use yearly, alkali 60 tons, and urine 15,000 gallons. Use both steam and water as power; steam 40, and water 35 nominal horse-power. Consume

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Daniel Rhodes & Sons, Manufacturers of Heavy Woollen Cloths—*cont.*	Scar End Mill, Earls Heaton, and Sands Mill, Dewsbury—*cont.*	yearly 1,800 tons of coal; make 200 tons of ashes, which are used for repairing roads. The excrements of our workpeople are partly used for manure, and partly turned into the river. Have no suggestions to offer.
Amos Holt & Company, Stuff Manufacturers.	East Ardsley -	Our works are situated on a tributary of the *Calder*. Employ 300 hands. Rateable value of works, 300*l*. Our works are not affected by floods. Obtain supply of water from a well, but do not know the annual consumption at our works. Manufacture yearly 80 tons of goods, of the value of 55,000*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly Gallipoli oil, of the value of 80*l*. Do not use any soap, alkali, or urine. Use steam, 25 nominal horse power. Consume yearly 800 tons of coal; the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
William Gartside, Woollen Cloth Dyer.	Ossett - -	My works are situated on the *Calder*. Employ 60 hands. Rateable value of works, 310*l*. 11*s*. 6*d*. The bed of the river has silted up. My works are not affected by floods. The condition of the stream has not changed within my knowledge. It is very much polluted by manufactories and dye works above; and by mines. Obtain supply of water jointly from wells and bore-holes; and consume yearly 30,000,000 gallons. I dye yearly about 360,000 lbs. of wool, and about 6,000 pieces of cloth. The whole of the waste liquid produced at my works flows direct into sewers, and thence into the stream. Use yearly 560,000 lbs. of dye wares; chiefly logwood, barwood, Sander's wood, and fustic, but do not use any bleaching materials or oil. Use yearly soap, 4 tons; and soda, 30 tons. The soapsuds are not treated for the recovery of the grease. Use steam 20 nominal horse power. Consume yearly 1,600 tons of coal; the ashes from which are used for the repair of roads, and filling up hollow places. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Healy Old Mill Company, Fullers, Scribblers, and Carders.	Ossett - -	Our works are situated on the *Calder*. Employ 56 hands. Rateable value of works, 434*l*. Our works are not affected by floods. Formerly the river was very clear, and fish could live in it; now no fish can exist in it. It is polluted to a very serious extent by works above; it flows down a very black and foul stream, and is quite unfit for manufacturing purposes; it is not polluted within our knowledge by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. If the river was rendered clear and colourless, it would be of considerable value to us, but are not able to fix the amount. We full and scribble yearly 43,680 lbs. of goods. The whole of the waste liquid produced at our works flows direct into the river. Use yearly 15,000 lbs. of dye wares; chiefly log and other woods and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly Gallipoli oil, but as this is found by persons who send us the goods to operate upon, we are unable to give the quantity consumed. The whole of the waste wool produced in carding is sold, and removed from the premises every week. Use yearly, soap 12 tons, alkali 2 tons, and urine 50 tons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 30, and water 30, nominal horse-power. Consume yearly about 1,100 tons of coal; the ashes from which are used to repair roads. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer.
Healy New Mill Company, Fullers, Millers, and Scribblers.	Ossett - -	Our works are situated on the *Calder*. Employ 15 hands. Rateable value of works, 274*l*. The bed of the river has silted up. Our works are not affected by floods. The river is polluted to a very great extent; but not within our knowledge by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. We scribble and full yearly 360 tons of goods, of the value of 20,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 1,500 gallons of olive oil. The whole of the waste wool produced in carding is sold to oil and grease extractors. Use yearly soap 11 tons, alkali 4 tons, and urine 200 tons. The soapsuds are treated for the recovery of the grease, by which we gain 40*l*. a year. Use steam, 32 nominal horse-power. Consume yearly about 700 tons of coal; the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.

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Name of Firm and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Healy Low Mill Company, Fullers, Scribblers, and Millers.	Ossett - -	Our works are situated on the *Calder*. Employ 20 hands. Rateable value of works, 270*l*. The bed of the river has silted up. Our works are not affected by floods. The river is polluted by works above; not to our knowledge by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. We scribble and full yearly 135 tons of goods. The whole of the waste liquid produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 2,430 gallons of olive oil, of the value of 486*l*. The whole of the waste wool produced in carding is sold to oil and grease extractors. Use yearly, soap 6 tons, alkali 3 tons, and urine 150 tons. The soapsuds are not treated for the recovery of grease. Use steam, 30 nominal horse-power. Consume yearly 1,000 tons of coal; the ashes from which are used as ballast on railways. The excrements of our workpeople are sold and used for manure. No suggestions to offer.
John Speight and Sons, Shoddy and Mungo Manufacturers.	Ossett - -	Our works are situated on an affluent of the *Calder*. Employ 100 hands. Rateable value of works, 250*l*. Our works are not affected by floods. Obtain supply of water from wells; but do not know the annual consumption at our works. Manufacture yearly, goods of the value of 20,000*l*. The waste liquid produced at our works flows direct into sewers, and thence into the river. Use yearly 40 tons of Gallipoli oil, of the value of 2,000*l*. Do not use either soap, alkali, or urine. Use steam, 28 nominal horse-power. Consume yearly 1,300 tons of coal, the coarse ashes from which are used for ballast on the railways. The excrements of our workpeople are mixed with the finer ashes and used for manure. We are of opinion that the conservancy of rivers and streams should be an Imperial measure, and not one to be left in the hands of town authorities or private individuals.
John Westerman & Sons, Mungo Manufacturers.	Ossett - -	Our works are situated near the *Calder*. Employ 40 hands. Rateable value of works, 170*l*. Obtain supply of water from wells, and consume yearly 620,000 gallons. Manufacture yearly, goods of the value of 8,000*l*. The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Do not use any soap, alkali, or urine. Use steam, 30 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
John Rowley & Sons, Worsted and Woollen Yarn Spinners.	Owl Mills, Ossett.	Our works are situated near the *Calder*. Employ 110 hands. Rateable value of works, 372*l*. 9*s*. 9*d*. Our works are not affected by floods. Obtain supply of water from gathering grounds which is impounded in reservoirs, and consume yearly 800,000 gallons. We manufacture yearly 338,000 lbs. of goods, of the value of 40,000*l*. The whole of the waste liquid produced at our works flows, first, into depositing tanks, thence by drains on to land, and is used for irrigation. The effluent water eventually flows into the river *Calder*. Use yearly 38,500 lbs. of dye wares, chiefly logwood, Sander's wood, camwood, fustic, indigo, and other liquid dyes. The spent dye stuffs are partly used for repairing walks and footpaths, and partly burned. Do not use any bleaching materials. Use yearly 13 tons of olive oil of the value of 710*l*. Produce yearly 6,200 lbs. of waste wool in the process of carding, which is partly re-manufactured; the other part is sold to waste dealers. Use yearly soap, 44,800 lbs., and soda, 49,200 lbs.; do not use any urine. The soapsuds are not treated for the recovery of the grease. Use steam 20 nominal horse power. Consume yearly 1,500 tons of coal, the coarse ashes from which are used for repairing roads; the finer ashes are mixed with the excrements of our workpeople and used for manure. Have no suggestions to offer.
George Harrop, Woollen Manufacturer.	Horbury Bridge	My works are situated on the *Calder*. Employ 200 hands. Rateable value of works, 534*l*. The bed of the river has silted up, caused by manufacturing and other refuse thrown into it. My works are affected by floods. The condition of the stream has not changed within my knowledge during the last 10 years. It is polluted to a very fearful extent by works above, not by mines situate near my works. Obtain supply of water from the river, but it is so exceedingly foul that I contemplate sinking wells to obtain a purer supply of water. If the river were clean, it would save me the expense of sinking wells and bore-holes. Manufacture yearly 120 tons of goods of the value of

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
George Harrop, Woollen Manufacturer—*cont.*	Horbury—*cont.*	30,000*l.* The whole of the waste liquid produced at my works, except soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly olive oil 40 tons, of the value of 2,040*l.* Produce yearly 17 tons of waste wool which is sold to oil and grease extractors. Use yearly, soap 12 tons, soda five tons, and urine 80,000 gallons. The soapsuds are treated for the recovery of grease. Use steam 40 nominal horse-power. Consume yearly 2,000 tons of coal, the whole of the ashes from which are deposited on land adjoining the mill in order to raise it out of the reach of floods. The excrements of my workpeople are conveyed into the river. I suggest as the best means of avoiding pollution in future, that manufacturers and others should be prohibited from turning solid and liquid refuse into rivers and streams under very heavy penalties.
Joseph Baines & Sons, Worsted Yarn Manufacturers.	Addingford Mills, Horbury.	Our works are situated on the *Calder*. Employ 80 hands. Rateable value of works, 265*l.* The bed of the river has silted up, caused by refuse and other solid matter thrown into it. Our works are affected by floods. The condition of the river is gradually becoming year by year worse; it is polluted to a very great extent, and the present condition of the water is very bad; it is not polluted within our knowledge by mines. Obtain supply of water from the river, and consume yearly a very large volume, but are not able to state the quantity. If the river were rendered clear and colourless, it would be of great importance to us, but cannot fix the money value. Manufacture yearly 249,600 lbs. of goods of the value of 20,800*l.*, and dye 9,600*l.* Produce yearly liquid refuse from washing 25,000 gallons, from dyeing 50,000 gallons, and soapsuds 12,500 gallons. The whole of the liquid refuse, except soapsuds, produced at our works, flows direct into the river. Use yearly dye wares 12 tons, chiefly logwood, Sander's wood, fustic, and camwood. The spent dye stuffs are turned into the river. Use as bleaching materials 1,500 lbs. of solid brimstone. Use yearly 12 tons of olive oil, of the value of 600*l.* Produce yearly 20 packs of waste wool in the process of carding, which are sold to other manufacturers. Use yearly, soap 12 tons, and alkali 10 tons. The soapsuds are treated for the recovery of grease by which we gain from 25*l.* to 30*l.* a year. Use steam 25 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are removed in carts, mixed with ashes, and used for manure. Have no suggestions to offer.
Richard Poppleton, Worsted Spinner.	Horbury	My works are situated on the *Calder*. Employ 70 hands. Rateable value of works, 156*l.* The bed of the stream has silted up very considerably, caused by solid and liquid refuse thrown into it. My works are affected by floods. The condition of the stream, within my knowledge, was moderately clear, and there were fish in it; now it is impossible for any fish to live in it. It is seriously polluted by works above, but not, to my knowledge, by mines. Obtain supply of water jointly from the river and from wells. Manufacture yearly 200,000 lbs of goods, and dye about 70,000 lbs. The whole of the liquid refuse produced at my works flows direct into the river. Use yearly about 30,000 lbs. of dye wares, chiefly logwood, camwood, Sander's wood, fustic, and aniline dyes. The spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly six tons of olive oil, of the value of 300*l.* Produce about 6,000 lbs. of waste wool in carding, which is sold. Use yearly, soap 15 tons, alkali 5 tons, but no urine. The soapsuds are not treated for the recovery of grease. Use steam, 15 nominal horse power. Consume yearly about 700 tons of coal, the ashes from which are taken to the railways for ballast. The excrements of my workpeople are partly used for manure, and partly flow into sewers, and thence into the stream. Have no suggestions to offer.
Ellis, Brothers, Fullers and Dyers.	Horbury Bridge	Our works are situated on the *Calder*. Employ 15 hands. Rateable value of works, 156*l.* The bed of the river has silted up. Our works are not affected by floods. The river is polluted to a very considerable extent by works above; not, within our knowledge, by mines. Obtain supply of water from the river, but are not able to state the annual consumption at our works. If the river were rendered clear and colourless, it would be of considerable money value to us; but we are not able to fix the amount. We full and dye yearly 163 tons of goods, of the value of 54,752*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Use yearly 50,000 lbs. of dye wares, chiefly logwood, fustic, American bark, shumac, and myrobalans. Do not use any bleaching materials. Use

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Ellis Brothers, Fullers and Dyers—*cont.*	HorburyBridge—*cont.*	yearly, soap 11 tons, and urine 250 tons. We have only just began to treat the soapsuds for the recovery of the grease. Use steam, 25 nominal horse power. Consume yearly 1,500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted away, and used for manure. Have no suggestions to offer.
John Cardwell, Carpet Manufacturer.	HorburyBridge	My works are situated on the *Calder*. Employ four hands. Rateable value of works, 50*l.* The bed of the river has silted up. My works are affected by floods. Formerly the condition of the stream was tolerably clear, and, to my knowledge, contained fish; but now it is impossible for any fish to live in it. It is seriously polluted by works above and by mines. Obtain supply of water from the river; but do not know the annual consumption at my works. Manufacture yearly 30,000 lbs. of goods, of the value of 2,000*l.* Produce yearly 20,000 gallons of liquid refuse in dyeing; this, together with the other liquid refuse produced, flows direct into sewers, and thence into the river. Use yearly 6,500 lbs. of dye wares, chiefly logwood, peachwood, and fustic. Use yearly 500 lbs. of sulphur as bleaching material. Use yearly about 150 gallons of olive oil, of the value of 32*l.* Produce yearly about three tons of waste wool in the process of carding, which is sold for manure. Do not use any soap, alkali, or urine. The excrements of my workpeople are sold for manure. No suggestions to offer.
		Basin of the Calder (South Bank).
John Hadwen & Sons, Silk Spinners.	Kitroyd Mills, Soyland, Halifax.	Our works are situated on an affluent of the *Rybourne*, a tributary of the *Calder*. Employ 225 hands. Rateable value of works, 739*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is polluted by works above; not by mines. Obtain supply of water from stream. Manufacture yearly 50,000 lbs. of goods, of the value of 46,000*l.* The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares, bleaching materials, or oil. Use yearly, soap 15,000 lbs. The soapsuds are not treated for the recovery of the grease, as they are unuseable, being mixed with the gum from the silk. Use steam and water as power; steam 90, and water 30 nominal horse-power. Consume yearly about 2,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted on to land to be used for manure. Have no suggestions to offer.
Thomas Riley & Company, Dyers.	Greetland, near Halifax.	Our works are situated on the *Blakebourne*, a tributary of the *Calder*. Employ about 30 hands. Rateable value of works, 173*l.* 5*s.* The bed of the stream has not silted up. Our works are affected by floods. The stream is polluted by works above; not by mines. Obtain supply of water jointly from boreholes, waterworks company, and from springs on our own premises, and consume yearly 7,000,000 gallons. We dye yearly 200 tons of goods of the value of 10,000*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Use yearly as dyewares, indigo principally, and a little logwood. Do not use any bleaching materials or oil. Use yearly, soap 560 lbs. Use steam, 8 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are carted to brickfields to be used in brick-making. The excrements of our workpeople are conveyed into the stream. Have no suggestions to offer.
Ely, Smith & Company, Woollen Manufacturers.	Clay House Mill and Scar Bottom, Greetland.	Our works are situated on the *Blakebourne*, a tributary of the *Calder*. Employ 127 hands. Rateable value of works, 476*l.* Our works are not affected by floods. Obtain supply of water from springs, and consume yearly about 35,000,000 gallons. Manufacture and dye yearly, goods of the value of 20,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Use yearly 37,000 lbs. of dye wares, chiefly lac dye, cochineal, logwood, fustic, peachwood, and aniline dyes. The spent dye stuffs are partially burned and partially used for manure. Do not use any bleaching materials. Use yearly 20 tons of cloth oil, of the value of 400*l.* Produce yearly 20 tons of waste wool in the process of carding, which is sold to grease extractors. Use yearly, soap 8 tons, alkali 6 tons, and urine 50 tons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* a year. Use steam, 53 nominal horse-power. Consume yearly 4,000 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Law & Sons, Woollen Manufacturers.	Greetland	Our works are situated on the *Blakebourne*, a tributary of the *Calder*. Employ 120 hands. Rateable value of works, 627*l.* 7*s.* 6*d.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is sometimes clear, and sometimes very dirty; there has not been much difference in the state of it for some years past. It is polluted to a considerable extent by works above; not by mines. Obtain supply of water from the stream for condensing purposes, and for manufacturing purposes from wells and waterworks, but are not able to state the annual consumption at our works. If the stream were rendered clear and colourless it would be of very little value to us, as we have plenty of clean water without using that from the stream. Manufacture yearly 150 tons of goods, of the value of 36,000*l.* The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 30 tons of Gallipoli and olive oil, of the value of 1,500*l.* Part of the waste wool produced in carding is used over again, and part is sold for manure. Use yearly, soap 7 tons, alkali 4 tons, and urine 24,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 35 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are carted away for various purposes. The excrements of our workpeople are carted away from the premises. Have no suggestions to offer.
John Fox & Sons, Woollen Manufacturers.	Greetland	Our works are situated on the *Blakebourne*, a tributary of the *Calder*. Employ 70 hands. Rateable value of works, 128*l.* 10*s.* The bed of the stream has not silted up. Our works are not affected by floods. There has been very little alteration in the condition of the stream within our knowledge. The river is polluted by works above; not by mines. Obtain supply of water from a reservoir at the works of Messrs. Townshend and Phythian for condensing purposes, but do not know the annual consumption at our works. Manufacture yearly about 1,000 packs of wool and shoddy, of the value of 12,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly olive and cloth oil, of the value of 800*l.* The waste wool produced in the process of carding is used for manure. Do not use either soap, alkali, or urine. Use steam, 40 nominal horse-power. Consume yearly 1,250 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with ashes and used for manure. Have no suggestions to offer.
Benjamin Mellor, Paper Manufacturer.	Bradley, near Halifax.	My mills are situated on the *Blakebourne*, a tributary of the *Calder*. Employ 20 hands. Rateable value of mills, 200*l.* The bed of the stream has not silted up. My mills are only affected in heavy floods. The past condition of the stream has been pure and clear, but it is at present so seriously polluted that I am unable to use it for any purpose; it is also polluted by mines. Obtain supply of water from a *beck*, from a reservoir, and springs, but am not able to give the annual consumption at my mills. If the stream were rendered clear and colourless it would be a direct money value to me of from 50*l.* to 100*l.* a year. Use yearly, rags 100 tons, soda ash 3 tons, bleaching powder 1 ton, and soap half a ton. The whole of the waste liquid produced at my mills flows direct into the stream. Manufacture yearly 70 tons of paper, which is used for pressing of cloth. The whole of the rag dust produced is used for manure. Use steam, 20 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Samuel Walker, Fuller.	Stainland	My works are situated on the *Blakebourne*, a tributary of the *Calder*. Employ 4 hands. The bed of the stream has silted up, caused by a weir placed across the stream to give power to a mill below. My works are not affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from the stream, and it is sufficiently pure and clear for fulling purposes. Fish also live in it. Full yearly goods of the value of *l.* The whole of the liquid refuse produced at my works flows direct into sewers, and thence into the stream. Do not use any dye wares, bleaching materials, or oil. Use yearly, soap 10 tons, alkali 12 tons, and no urine. The soapsuds are treated for the recovery of grease, by which I gain 20*l.* a year. I hire power and therefore am unable to state the nominal horse-power, the weight of coal consumed, or what is done with the ashes. The excrements of my workpeople are removed from earth closets and used for manure. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
P. & S. Taylor, Woollen Manufacturers.	Bowers Mills, Stainland.	Our works are situated on the *Blakebourne* a tributary of the *Calder*. Employ 90 hands. Rateable value of works, 450*l.* The bed of the river has not silted up to any great extent, and the condition of it has not changed within our knowledge during the last 20 years. It is polluted by works above, not very much, but it is considerably polluted by works below to a very great extent, because the owners of mills are not prevented from doing it, although they threaten us with proceedings if we pollute the stream; it is not polluted by mines. Obtain supply of water from a reservoir at the head of the stream which is formed for manufacturing purposes, and the whole of the millers on the stream pay rates for supporting and maintaining this supply. Some of the millowners allege that they have a prescriptive right (20 years) to foul the water of the stream. The river at its source, from which we obtain our supply, is clear enough for any other purpose except drinking; but when it flows down the river course for two miles it is so extensively polluted that it is as black as ink, so that the rendering of it clear opposite our works would be of no direct money value to us. Manufacture yearly 1,200 packs of goods, of the value of 18,000*l.* The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 3000 gallons of olive and patent oil, of the value of 600*l.* Produce yearly 1,600 tons of waste wool in carding, which is sold to oil and grease extractors. Use yearly, soap 100 lbs., alkali 10 tons, and the urine of our workpeople. The soapsuds are not treated for the recovery of grease. Use steam and water as power; steam 20, and water 15 nominal horse. Consume yearly 600 tons of coal, the ashes from which are used to repair roads and footpaths. The excrements of our workpeople are used for manure. We are of opinion that 90 per cent. of the liquid refuse from manufactories and mills could be kept out of rivers and streams which is now sent into them if depositing tanks and filters were adopted. Four years ago we built a dychouse connected with our works, but have been prevented from using it because a dyer whose works are situated 300 yards below us near the junction of the *Blakebourne* with the *Calder*, and whose works have only been in operation for seven or eight years, threatens us with proceedings if we turn our liquid refuse into the stream, although he with impunity himself turns all the liquid refuse from his dye vats into the stream, and we are therefore obliged to send to him the whole of our goods to dye. If our dychouse were in operation we should be able to comply with the standards of purity recommended in the report of the Rivers Pollution Commission on the *Mersey and Ribble Basins*, and we are of opinion that everybody could bring all their liquid refuse within that standard of purity before turning it into rivers and streams.
The Trustees of the late J. Buckley, Copperas Manufacturers.	Ainleys, Elland	Our works are situated on a tributary of the *Calder*. Employ 3 hands. Rateable value of works, 168*l.* 10*s.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is clear. It is not polluted by works above, nor by mines. Obtain supply of water from a spring, but are not able to state the annual consumption at our works. Use yearly, pyrites 350 tons, iron turnings and sheet iron scraps 80 tons, and make 750 tons of copperas. The whole of the waste liquid produced at our works is thrown into an old coal pit close to our works. Use steam, 17 nominal horse-power. Consume yearly about 250 tons of coal, the ashes from which are removed from our premises by persons for repairing roads, and the remainder is used for ballast on the railway. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Joseph Beaumont, Fulling Miller.	Elland Mills, Elland.	My works are situated on the *Calder*. Employ 20 hands. Rateable value of works, 300*l.* The bed of the river has silted up, caused by refuse from foundations of buildings, ashes, cinders, scoria from mills and foundries, and other solid refuse thrown in. My works are affected by floods to a considerable extent, and I suffer great loss therefrom. The condition of the river is very foul indeed, it is seriously polluted by refuse from dye houses, mills, and factories; but not much by mines. In the summer time especially the stink from it is very bad, more so when churned up by the water-wheels. Formerly it was a pure stream and contained fish. Obtain supply of water jointly from the Halifax Waterworks Company and from the river, and consume 2,500,000 gallons yearly. I have lost immensely by the foul state of the stream, and in fact have lost my trade to the extent of many thousands a year. I am now trying to regain it by using the water supplied by the Corporation Waterworks, but cannot succeed as I am not confident of having such pure water as my opponents have

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joseph Beaumont, Fulling Miller—*cont.*	Elland Mills, Elland—*cont.*	at the upper parts of the stream. I full yearly 520,000 lbs. of goods. The whole of the liquid refuse produced at my works, except soapsuds, flows into the river. Use yearly, alkali 12 tons. Use chiefly water as power; 40 nominal horse-power, and steam 16 nominal horse-power, but only very seldom. Consume yearly 70 tons of coal, the ashes from which are used to repair roads; but none are thrown into the river. The excrements of my workpeople are used for manure. I suggest as the best means of avoiding pollution in future that sewage and liquid refuse from manufactories, mills, and works, should be applied to irrigate land, and not turned into rivers and streams.
Robert Kaye & Sons, Woollen Manufacturers.	South Lane Mills, Elland.	The mills in which we rent room and power are situated on the *Calder*. Employ 35 hands. The works are not affected by floods. Manufacture yearly 80 tons of goods, of the value of 4,000*l.*, but they are not finished at the mill. We do not use any water for manufacturing purposes. Use yearly, oil of the value of from 250*l.* to 300*l.* Produce yearly 20 tons of waste wool in the process of carding, which is sold to oil extractors. As we rent power, we are unable to give the nominal horse-power, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are carted away from premises for manure. Have no suggestions to offer.
Joshua Dodgson & Sons, Dyers.	Elland - -	Our works are situated on the *Calder*. Employ 8 hands. Rateable value of works, 29*l.* 10*s.* The bed of the stream has silted up. Our works are not affected by floods. The river is the receptacle of all kinds of refuse turned into it from manufactories and from towns from its source downwards, and is thereby very much polluted. Obtain supply of water jointly from the river and from the Halifax Waterworks Company, but are not able to state the annual consumption at our works. If the river were rendered clear and colourless it would be of considerable value to us, but are not able to state the amount. Dye yearly 235,000 lbs. of goods, of the value of from 12,000*l.* to 14,000*l.* The whole of the liquid refuse produced at our works flows unfiltered direct into the river. Use yearly 100,000 lbs. of dye wares, chiefly logwood, peachwood, fustic, myrobalans, madder, solutions of tin, alum, and tartar. The whole of the spent dye stuffs are turned into the river. Do not use any bleaching materials, oil, soap, or alkali. Use yearly 30 gallons of urine. Use steam, 6 nominal horse-power. Consume yearly 220 tons of coal; make 50 tons of ashes, which are carted to the railway to be used as ballast. The excrements of our workpeople are used for manure. Have no suggestions to offer.
X John Ainley, Grease Extractor.	Elland - -	My works are situated on the *Calder*. Employ 7 hands. Rateable value of works, 8*l.* The bed of the river has silted up, caused by solid refuse thrown into it. My works are not affected by floods. The condition of the stream has always been dirty and black within my knowledge, and is polluted by the sewage of towns and refuse from dye and other works above. Obtain supply of water from the Halifax Corporation Waterworks; and consume yearly about 50,000 gallons. Use yearly 90 tons of vitriol, and recover about 150 tons of grease from the soapsuds. The whole of the liquid refuse produced by this process flows direct into the river. Use steam, 3 nominal horse-power. Consume yearly 25 tons of coal, the ashes from which are carted away. The excrements of my workpeople are turned into the river. Have no suggestions to offer.
Wilson & Price, Fancy Woollen Manufacturers.	Rastrick -	Our works are situated on two small tributaries of the *Calder*. Employ 78 hands. Rateable value of works, *l.* The beds of the streams have not silted up. Our works are not affected by floods. The condition of one of the streams is clear, but the other is very foul, and is polluted very much by works above; not by mines. Obtain supply of water partly from the streams and partly from wells. Manufacture yearly 50 tons of goods, of the value of 17,000*l.* The whole of the waste liquid produced at our works flows direct into the streams. Use yearly 58,240 lbs. of dye wares, principally log and other woods. The spent dye stuffs are turned into river. Do not use any bleaching materials. Use yearly 12 tons of Gallipoli oil, of the value of 650*l.* Use yearly, soap 11,648 lbs., alkali 2,900 lbs., and urine 19,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* a year. Use steam, 25 nominal horse-power. Consume yearly about 850 tons of coal; make 150 tons of ashes, which are used to repair roads. The excrements of our workpeople are used for manure on our farm. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
J. & J. Farrar, Scribblers and Fullers.	Upper End Mill, Marsden.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 10 hands. Rateable value of works, 62*l.* 16*s.* The bed of the stream has silted up, caused by solid refuse thrown into it. Our works are affected by floods. The stream has been reduced in width opposite our works by the owner of the land on the opposite side encroaching on the stream. It is polluted by works above, but not by mines. Obtain supply of water from the river, but are not able to state the annual consumption at our works. We scribble and full country work, but are not able to give the weight and value of the goods operated upon yearly. The whole of the liquid refuse produced at our works flows direct into the stream. We use yearly one ton of dye wares, chiefly logwood. Do not use any bleaching materials. We use yearly Gallipoli and olive oil, but as our customers find the oil we are unable to state the exact quantity or value that is used. The whole of the waste wool produced in carding is used for manure. Use yearly, soap 2 tons. The soapsuds are not treated for the recovery of the grease. Use steam, 8 nominal horse-power. Consume yearly 55 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
J. G. & S. Firth, Silk Spinners.	Washhouse Hill, Washhouse, Marsden.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 30 hands. Rateable value of works, 58*l.* 5*s.* The bed of the river has silted up. Our works are not affected by floods. The river is polluted by works above, but not to any great extent; it is not polluted by mines. Obtain supply of water from a gathering ground, and consume yearly about 42,000,000 gallons. Manufacture yearly 5,000 lbs. of goods, of the value of 3,500*l.* The whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use steam, 10 nominal horse-power. Consume yearly about 280 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are conveyed into the stream. Have no suggestions to offer.
James Crowther & Sons, Woollen Manufacturers.	Holme Mill, Marsden.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 50 hands. Rateable value of works, 268*l.* The bed of the river has silted up, caused by solid and other refuse thrown into it. Our works are affected by floods. The condition of the river has very little changed within our knowledge. It is polluted by works above, not by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly 120,000 lbs., and dye 90,000 lbs. of goods. The whole of the waste liquid produced at our works flows into depositing tanks, and thence into the stream. Use yearly 10,000 lbs. of dye wares, chiefly logwood, Sander's wood, boxwood, and alum, and 700 lbs. copperas. The spent dyestuffs are burned. Use yearly as bleaching materials 300 lbs. of Newcastle soda. Use yearly 7 tons of Gallipoli and cloth oils, of the value of 350*l.* Use water as power, 15 nominal horse. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that all solid and liquid refuse should be prohibited from being turned into rivers and streams.
R. Houghton & Sons, Woollen Manufacturers.	Almondbury, Huddersfield.	Our works are situated on a tributary of the *Calder*. Employ 10 hands. Rateable value of works, 27*l.* Our works are not affected by floods. Obtain supply of water from wells; but do not know the annual consumption at our works. Manufacture yearly goods of the value of 2,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials, oil, soap, alkali, or urine. Use steam, 3 nominal horse-power. Consume yearly 100 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
John Farrar, Scribbler.	Bank Gate Mill, Slaithwaite.	My works are situated on the *Cupwith Brook*, a tributary of the *Calder*. Employ 30 hands. Rateable value of works, 256*l.* 2*s.* 6*d.* The bed of the stream has silted up. My works are not affected by floods. It is a clear and beautiful stream to Clough House, a mill immediately above us, and has always been so, but it is polluted by the Clough House mill; not by mines. Obtain supply of water from the *Cupwith* reservoir and its numerous springs, situated one mile from the stream, but do not know the annual consumption at my works. The stream is sufficiently clear for my purposes. Manufacture yearly 180,000 lbs. of wool, waste, and mungo. The whole of the waste liquid produced at my works flows direct into the stream. Use yearly 16 tons of dye wares, principally logwood, fustic, alum, and copperas. The

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Farrar, Scribbler—*cont.*	Bank Gate Mill, Slaithwaite—*cont.*	spent dyestuffs are burned. Do not use any bleaching materials. Use yearly, 1,800 gallons of Gallipoli oil. The whole of the waste wool produced is used over again, and the refuse only used for manure. Do not use either soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are turned into the stream. The excrements of my workpeople are used for manure. I would suggest, that as far as practicable, solid and liquid refuse should be prevented from being turned into rivers and streams.
John & Samuel Horsfall, Woollen Manufacturers.	Spar Mills, Slaithwaite.	Our works are situated on the *Crimble Brook*, a tributary of the *Calder*. Employ 50 hands. The bed of the stream has not silted up. Our works are not affected by floods. The river is polluted to such an extent that at times we cannot use the water; it is not polluted by mines. Obtain supply of water generally from the *Crimble Brook*, and from the London and North-western Canal Company; but do not know the annual consumption at our works. We mill and full for manufacturers yearly 567,000 lbs. of goods. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly, soap 3,000 lbs., alkali 9 tons, and urine 1,900 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 20*l.* a year. Use steam, 30 nominal horse-power. Consume yearly 950 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted on to land for manure.
Henry Hopkinson, Woollen Manufacturer.	Slaithwaite -	My works are situated on the *Crimble Brook*, a tributary of the *Calder*. Employ 40 hands. Rateable value of works, *l.* The bed of the stream has not silted up. My works are not affected by floods. The stream is not polluted by works above, nor by mines. Obtain supply of water jointly from the stream and from wells, and consume at my works, yearly, 205,000 gallons. Manufacture, yearly 186,000 lbs. of goods. The whole of the waste liquid produced at my works flows direct into the stream. Use, yearly, an unknown quantity of logwood, olive oil, soap, alkali, and urine. Do not use any bleaching materials. Use steam, 20 nominal horse-power. Consume yearly 200 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are turned into stream. No suggestions to offer.
Thomas Shaw, Fulling Miller.	Golcar - -	My works are situated on the *Colne*, a tributary of the *Calder*. Employ 5 hands. Rateable value of works, *l.* The bed of the river has silted up, caused by solid refuse and ashes thrown into it. My works are affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from the river, and consume yearly 1,500,000 gallons. Full yearly 300,000 lbs. of goods of the value of 50,000*l.* The whole of the liquid refuse produced at my works, except soapsuds, flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly, soap 10 tons, and alkali 20 tons. The soapsuds are treated for the recovery of the grease, by which we gain 20*l.* a year. Use water as power, 20 nominal horse-power. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that all liquid and solid refuse from manufactories, mills, and dye houses, should be prevented from being cast into rivers and streams.
Thomas Ramsden & Sons, Woollen Manufacturers.	Linthwaite and Golcar.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 120 hands. Rateable value of works, 814*l.* The bed of the stream has not silted up opposite our works. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted by works above, but not by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. If the stream were rendered clear and colourless from which we derive our supply of water, it would be of considerable money value to us; but are not able to state the amount. Manufacture yearly 350,000 lbs. of goods, of the value of 50,000*l.* The whole of the liquid refuse produced at our works flows direct into the river. Use yearly 80,000 lbs. of dye wares, chiefly logwood, camwood, madder, copperas, fustic, alum, and bi-chrome. The whole of the spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly 20 tons of olive oil, of the value of 940*l.* The whole of the waste wool produced in carding is sold.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thomas Ramsden & Sons, Woollen Manufacturers—*cont.*	Linthwaite and Golcar—*cont.*	Use yearly, soap 8 tons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* a year. Use both steam and water as power; water 40, and steam 30 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are used partly to repair roads, and partly thrown into the river. The excrements of our workpeople flow direct into sewers, and thence into the river. No suggestions to offer.
George Mallinson & Sons, Woollen Manufacturers.	Spring Grove Mill, Linthwaite.	Our works are situated on the *Hyle House Clough*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 502*l.* 17*s.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is quite clean; it is not polluted by works above, nor by mines. Obtain supply of water from the stream; but do not know the annual consumption at our works. Manufacture yearly 396,000 lbs. of goods, of the value of 36,000*l.* The whole of the waste liquid, except soapsuds, flows direct into the stream. Use yearly as dye wares, logwood 51,296 lbs., fustic 5,824 lbs., Sander's wood 4,704, and bi-chrome 1,800 lbs. The spent dye stuffs are burned, the liquid portion only flowing into the stream. Do not use any bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,080*l.* The whole of the waste wool produced in carding is re-used. Use yearly, soap 12,444 lbs., alkali 14,224 lbs., and urine 1,560 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* Use steam, 35 nominal horse-power. Consume yearly 1,200 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
David & Charles Shaw, Woollen Manufacturers.	Low Westwood Upper Mill, Golcar.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 31 hands. Rateable value of works, 262*l.* 12*s.* 6*d.* The bed of the river has not silted up. Our works are not affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from the river. If the river, from which we obtain a supply of water, were rendered clear and colourless it would be of no money value to us. Manufacture yearly goods of the value of 5,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Use yearly, 40,880 lbs. of dye wares; chiefly logwood, barwood, Sander's wood, camwood, fustic, madder, copperas, alum, and bi-chrome. The spent dye stuffs are burned. Do not use any bleaching materials; but use yearly 1,866 gallons of Gallipoli oil, of the value of 375*l.* The whole of the waste wool produced in the process of carding is sold. Use yearly, soap 5 tons. The soapsuds are treated for the recovery of grease, by which we gain 20*l.* a year. Use steam, 40 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used on our land as manure. Have no suggestions to offer.
J. & R. Ainley, Woollen Manufacturers.	Heath House, Mill, Golcar.	Our works are situated near to an affluent of the *Calder*. Employ 17 hands. Rateable value of works, 55*l.* Our works are not affected by floods. Obtain supply of water from springs, but are not able to state the annual consumption at our works. Manufacture yearly goods of the value of 3,000*l.* The whole of the liquid refuse produced at our works flows direct into the brook. Use yearly 12,500 lbs. of dye wares; chiefly logwood The whole of the spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 1,020 gallons of olive oil, of the value of 233*l.* The whole of the waste wool produced in the process of carding is sold. Use yearly 3 tons of soap and 5 tons of alkali. The soapsuds are not treated for the recovery of the grease. Use steam, 8 nominal horse-power. Consume yearly 450 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
John Broadbent & Son, Woollen Manufacturers.	Park Wood Mills, Longwood.	Our works are situated on the *Longwood Brook*, a tributary of the *Calder*. Employ 320 hands. Rateable value of works, 852*l.* The bed of the stream has silted up, caused by solid refuse thrown into it. Our works are not affected by floods. There is no alteration in the condition of the river, to our knowledge, except the silting up. It is polluted by works above, but not to any considerable extent; it is not polluted by mines. Obtain supply of water from *Longwood Brook*, but cannot state the annual consumption at our works. The water of the stream is sufficiently clear for our manufacturing purposes. Manu-

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Broadbent & Son, Woollen Manufacturers—*cont.*	Park Wood Mills, Longwood—*cont.*	facture yearly goods of the value of 120,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Use as dye wares, yearly, 224,000 lbs. of logwood, 13,000 lbs. of alum, 5,000 lbs. of fustic, 5,000 lbs. of Sander's wood, 4,800 lbs. of bi-chromate of potash, 14,000 lbs. of soap ashes, and 12,000 lbs. of copperas; also 933 gallons of spirits of tin. The spent dye stuffs are thrown into the stream. Do not use any bleaching materials. Use yearly, 70 tons of Gallipoli oil, of the value of 3,500*l.* The whole of the waste wool produced in the process of carding is used for agricultural purposes. Use yearly, soap 18 tons, alkali 20 tons. The soapsuds are treated for the recovery of the grease, by which we gain 30*l.* a year. Use steam and water as power; steam 40, and water 3 nominal horse-power. Consume yearly 2,400 tons of coal; make 300 tons of ashes, which are used partly to repair roads, and partly ground and mixed with lime for mortar. The excrements of our workpeople are used for agricultural purposes. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
William Shaw & Sons, Woollen Manufacturers.	Longwood	Our works are situated on the *Longwood Brook*, a tributary of the *Calder*. Employ 240 hands. Rateable value of works, 703*l.* The bed of the stream has silted up. Our works are not affected by floods. The condition of the river formerly was clean; it is now exceedingly filthy and polluted by refuse turned into it from works above, but not by mines. Obtain supply of water from the stream, and consume yearly 10,088,000 gallons. As we have had to incur an expense of 300*l.* in constructing works to convey clean water to our mills for manufacturing purposes, the cleansing of the river would not be of any direct money value to us. Manufacture yearly 2,000 packs of goods of the value of 30,000*l.* The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the river. Use yearly 40,000 lbs. of dye wares, chiefly dye woods. The spent dye stuffs are turned into the stream. Do not use any bleaching materials. Use yearly 30 tons of olive oil, of the value of 1,500*l.* A portion of the waste wool produced in carding is worked over again; the remainder is sold to oil and grease extractors. Use yearly, soap 12 tons; alum, 4 tons; urine, 12 tons; and ammonia, 6 tons. The soapsuds are treated for the recovery of the grease, by which we gain 60*l.* a year. Use steam, 40 nominal horse-power. Consume yearly 1,700 tons of coal, the ashes from which are partly used in repairing roads, partly ground and mixed with lime for mortar, and partly turned into the river. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Benjamin Hall, Woollen Manufacturer.	Hirst Mill, Longwood.	My works are situated on a small stream, a tributary of the *Calder*. Employ 30 hands. Rateable value of works, 128*l.* The bed of the stream has not silted up. My works are not affected by floods. There has been no alteration in the condition of the stream during the last twenty-four years. It is not polluted by works above, nor by mines. Obtain supply of water jointly from the stream and springs, but do not know the annual consumption at my works. Manufacture yearly goods of the value of 10,000*l.* The whole of the waste liquid produced at my works flows direct into the stream. Use yearly as dye wares, logwood 8,960 lbs., argol 1,120 lbs., R. V. 560 lbs., and alum 560 lbs. The spent dye wares are thrown into the stream. Do not use any bleaching materials. Use yearly 4 tons of olive oil, of the value of 200*l.* The whole of the waste wool produced in carding is used for manure. Use yearly, soap 3,360 lbs., alkali 7,280 lbs., and urine 20,000 gallons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 8, and water 8 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that all solid and liquid refuse from manufactories, mills, and works, also town sewage, should be kept out of rivers and streams.
Abraham Hall, Sealskin and Mohair Manufacturer.	Quarmby Mill, near Huddersfield.	My works are situated near to an affluent of the *Calder*. Employ 40 hands. Rateable value of works, 130*l.* Obtain supply of water from wells, but do not know the annual consumption at my works. Manufacture yearly goods of the value of 20,000*l.* The whole of the liquid refuse produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 2,080 gallons of olive oil, of the value of 416*l.* The whole of the waste wool

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Abraham Hall, Sealskin and Mohair Manufacturer—*cont.*	Quarmby Mill, near Huddersfield—*cont.*	produced in carding is sold. Do not use either soap, alkali, or urine. Use steam, 8 nominal horse-power. Consume yearly 350 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Edward Hirst & Son, Woollen Manufacturers.	Wildspur Mill, New Mill, Huddersfield.	Our works are situated on the *New Mill Brook*, a tributary of the *Calder*. Employ 104 hands. Rateable value of works, 440*l.* 15*s.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed, to our knowledge, within the last 20 years. It is polluted by works above; not by mines. Obtain supply of water partly from a gathering ground, and partly from the stream; but are not able to state the annual consumption at our works. Manufacture yearly 62 tons of goods of the value of 19,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Use yearly as dye wares, logwood, Sander's wood, and barwood, bi-chrome, shumac, copperas, and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly Gallipoli oil, of the value of 600*l.* The whole of the waste wool produced in carding is sold to farmers for manure. Use yearly, soap 5 tons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 30, and water 10 nominal horse-power. Consume yearly 1,250 tons of coal, the ashes from which are used partly for repairing roads, and partly to be ground and mixed with lime for mortar. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Charles Lockwood, Fancy Woollen Manufacturer.	New Mill, near Huddersfield.	My works are situated on the *New Mill Brook*, a tributary of the *Calder*. Employ 262 hands. Rateable value of works, 523*l.* The bed of the stream has silted up. My works are not affected by floods. The condition of the stream has not changed, to my knowledge, within the last 13 years. It is seriously polluted by works above, and by mines. Obtain supply of water jointly from stream, from wells, and boreholes, but cannot state the annual consumption at my works. Manufacture yearly goods of the value of 30,000*l.* The whole of the liquid refuse produced at my works flows direct into the stream. Use yearly, 30 tons of dye wares; chiefly logwood, Sander's wood, camwood, barwood, and fustic. The whole of the spent dye stuffs are either burned or turned into the river. Do not use any bleaching materials. Use yearly 25 tons of olive and Gallipoli oil. The whole of the waste wool produced at my works in carding is either sold or used for manure. Use yearly, soap 8 tons, and an unknown quantity of urine, all we can get. The soapsuds are treated for the recovery of the grease, by which I gain about one-third of the cost of the oil and soap. Use both steam and water as power; steam 40, and water 80 nominal horse-power. Consume yearly 1,600 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Benjamin John Hey, Dyer.	Turnbridge, Huddersfield.	Our works are situate near to the *Colne*, a tributary of the *Calder*. Employ 15 hands. Rateable value of works, 73*l.* The bed of the stream has silted up, caused by the throwing in of rubbish from excavated foundations, and also ashes. Our works are not affected by floods. Fifty years ago the river was comparatively pure, with plenty of fish in it, but fish are no longer able to live in the water. The river is very considerably polluted by all kinds of refuse from works, and by mines. Obtain supply of water from the canal, from wells, and boreholes; and consume yearly 15,650,000 gallons. If the river, from which we might derive a supply of water, were rendered clear and colourless it would be a direct money value to us of 40*l.* a year. We dye yearly 240,000 lbs. of goods, of the value of 70,000*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Use yearly 190,314 lbs. of dye wares; chiefly logwood, fustic, barwood, Sander's wood, peachwood, shumac, madder, bi-chromate of potash, tartar, sulphate of copper, and sulphate of chrome. The spent dye stuffs are burned. Do not use any bleaching materials, oil, soap, or urine. Use yearly, soda 2,782 lbs. Use steam, 6 nominal horse-power. Consume yearly 982 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Josiah Atkinson, Dyewood Cutter and Dyer.	Bradley Mills, Huddersfield.	My works are situate on the *Colne*, a tributary of the *Calder*. Employ 5 hands. Rateable value of works, 100*l.* The bed of the river has silted up, caused by solid refuse thrown into it from the foundations of new houses in the town. My works are affected by

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Josiah Atkinson, Dyewood Cutter and Dyer—*cont.*	Bradley Mills, Huddersfield —*cont.*	floods. Forty years ago the stream was clear; it is now as black as ink, being polluted to a considerable extent by works above, and by mines. Obtain supply of water from the stream; and consume yearly 620,000 gallons. If the river, from which I obtain my supply of water, were rendered clear and colourless, it would be a direct money value to me of 25*l.* a year. I dye yearly, 124,000 lbs. of goods. The whole of the waste liquid produced at my works flows direct into the river. Use yearly 10 tons of dye wares, chiefly logwood, shumac, myrobalans, bi-chrome, oxide of tin. The spent dye woods are burned, the spent liquors flow into river. I cut and prepare yearly 642 tons of dyewoods. Use water as power, 14 nominal horse-power. The excrements of my workpeople are carted away for manure. Have no suggestions to offer.
John Scofield & Son, Woollen Manufacturers.	Commercial Mills, Firth Street, Huddersfield.	Our works are situate near the *Colne*, a tributary of the *Calder*. Employ from 300 to 400 hands. Rateable value of works 884*l.* 6*s.* The bed of the river has silted up, caused by solid refuse thrown into it. Our works are not affected by floods. The condition of the river has during the last few years been very much polluted, and is gradually getting worse. It is not only polluted by works above, but by mines. Obtain supply of water from the London and North-western canal, and consume yearly 18,000,000 gallons. Manufacture yearly goods of the value of 60,000*l.* The whole of the waste liquid produced at our works flows into sewers, and thence into the river. Use yearly 350,000 lbs. of dye wares; principally logwood, Sander's wood, and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 20 tons of olive oil, of the value of 900*l.* Produce yearly 30 tons of waste wool in the process of carding, which is sold to oil extractors. Use yearly, soap 40 tons, alkali 14 tons, liquid ammonia 70 tons, and urine 100 tons. The soapsuds are treated for the recovery of the grease, by which we gain 120*l.* a year. Use steam, 50 nominal horse-power. Consume yearly 2,500 tons of coal, the ashes from which are partly used for repairing roads, and partly ground and mixed with lime for mortar. The excrements of our workpeople are removed by a contractor under the Corporation. Have no suggestions to offer.
Edward Fisher & Company, Spinners of Silk Waste.	Longroyd Mills, Longroyd Bridge, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 900*l.* The bed of the river has, and is, silting up. Our works are affected by floods. The river is very seriously polluted by works above, and the water is as black as ink. Obtain supply of water from the river and canal, but do not know the annual consumption at our works. As we only use the river water for steam-boiler purposes the pollution of it makes but little difference to us. Spin yearly about 90,000 lbs. of silk waste goods, of the value of 30,000*l.* The whole of the liquid refuse produced at our works flows direct into the sewers, and thence into the river. Do not use any dye wares, bleaching materials, oil, alkali, or urine. Use yearly soap of the value of 250*l.* The soapsuds are not treated for the recovery of grease. Use both steam and water as power; steam 30, and water 20 nominal horse. Consume yearly coal of the value of 500*l.*, the ashes from which are partly used for repairing roads, and as ballast for railways. The excrements of our workpeople are removed and used for manure. Have no suggestions to offer.
James Shaw, Woollen Manufacturer.	Victoria Mills, Huddersfield.	My works are situate on the *Holme*, a tributary of the *Calder*. Employ 150 hands. Rateable value of works, 636*l.* The bed of the river has silted up, caused by solid refuse and ashes thrown into it. My works are affected by floods. The river is very seriously polluted by works above, and by mines. Obtain supply of water jointly from the stream and wells; but am not able to give the annual consumption at my works. If the river were rendered clear and colourless it would be of considerable money value to me; but am not able to state the amount. Manufacture yearly 25,200 lbs. of goods, of the value of 2,000*l.*; and dye goods of the value of 10,000*l.* The whole of the waste liquid, except soapsuds, flows direct into the river. Use yearly 118,600 lbs. of dye wares, chiefly logwood. The spent dyestuffs are burned. Do not use any bleaching materials. Use yearly 20 tons of olive oil, of the value of 1,300*l.* Produce yearly 18,000 lbs. of waste wool in the process of carding, which is sold for manure. Use yearly, soap 5 tons, and alkali and ammonia 11 tons, but no urine. The soapsuds are treated for the recovery of the grease, by which I gain yearly 15*l.* Use steam, 60 nominal horse-power. Consume yearly 1,520 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Henry Hirst, junior, & Company, Woollen Manufacturers.	Turnbridge Mills, Huddersfield.	The mills in which we rent room and power are situated on the *Colne*, a tributary of the *Calder*. Employ 60 hands. We pay for rent of rooms and power 900*l.* a year. The bed of the stream has silted up, caused by solid refuse thrown into it. The mills are not affected by floods. The condition of the river within our knowledge has very considerably deteriorated. It was formerly clear, and abounded with fish; it is now as black as ink, and fish are unable to live in it. It is polluted by works above; not by mines. Obtain supply of water from canal, but are not able to state the annual consumption at our works. Manufacture yearly 312,000 lbs. of goods of the value of 16,881*l.* The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,200*l.* The whole of the waste wool produced in the process of carding is sold to waste dealers. Do not use any soap, alkali, or urine. As we rent room and power, are not able to state the nominal horse-power employed, the quantity of coals consumed, or what is done with the ashes. The excrements of our workpeople are removed by a contractor under the Corporation. We suggest, as the best means of avoiding pollution in future, that ashes and other solid refuse from mills, factories, and works should be prohibited from being turned into rivers and streams.
Henry Lister & Company, Woollen Manufacturers.	Ashbrown Mills, Huddersfield.	Our works are situate on a tributary of the river *Calder*. Employ 73 hands. Rateable value of works, 362*l.* 16*s.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted by works above; not by mines. Obtain supply of water partly from the stream, wells, and land drainage; and consume yearly 10,920,000 gallons. The condition of the stream cannot be better than it is, except at the time of a fresh or a flood, when it is seriously polluted by the washings from roads. We spin yearly 104,000 lbs. of yarn, finish 832,000 lbs., and manufacture 10,000 lbs., of the value of 64,533*l.* The whole of the liquid refuse produced at our works flows through earthenware pipes on to land adjacent to our works; and is there filtered through earth varying from 25 to 50 yards in width, before flowing into the stream. Do not use any dye wares or bleaching materials. Use yearly 1,164 gallons of olive oil, of the value of 216*l.* Produce yearly 10,400 lbs. of waste wool in the process of carding, which are sold for manure. Use yearly about 5 cwt. of soap. Use steam, 32 nominal horse-power. Consume yearly 832 tons of coal; make about 104 tons of ashes, which are partly ground and mixed with lime for mortar, and partly used for repairing roads. The excrements of our workpeople with the refuse from scribbling and carding, and the short flocks from the finishing process, are used for manure. We suggest, as the best means of avoiding pollution in future, that all liquid refuse from mills, dye houses, and manufactories should be filtered before being allowed to flow into streams, and that waterclosets should be abolished, and earth-closets adopted.
John Brooke & Sons, Woollen Manufacturers.	Armitage Bridge, Huddersfield.	Our works are situate on the river *Holme*, a tributary of the river *Calder*. Employ 530 hands. Rateable value of works, 1,689*l.* 15*s.* The bed of the river has silted up above and below us, but not opposite our works. Our works are not affected by floods. The river within our knowledge has always been a dirty stream, but it has gradually become worse year by year. It is polluted to a very great extent by works above, and by mines. Obtain supply of water from the river for condensing purposes; and from wells and boreholes and a pure stream which flows through our premises for manufacturing purposes; and consume yearly about 150,000,000 gallons. We manufacture and dye yearly 597,229 lbs. of wool, and produce 341,000 lbs. of cloth, of the value of 120,000*l.* Produce 78,000,000 gallons of liquid refuse from washing, 4,000,000 from dyeing, and 67,000,000 from soapsuds. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Use as dye wares, indigo and dye woods, but are not able to give the quantities used yearly. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 60 tons of olive oil, of the value of 3,300*l.* Produce in the process of carding about 50 tons of waste wool, the best portion of which is used for manufacturing low-priced goods; the worst is sold to oil and grease extractors. Use yearly, soap 18 tons, urine 260,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain yearly 100*l.* Use steam and water as power; steam 100, and water 150 nominal horse-power. Consume yearly 5,000 tons of

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Brooke, & Sons, Woollen Manufactures—*cont.*	Armitage Bridge, Huddersfield—*cont.*	coal; make about 700 tons of ashes, which are used for various purposes, and none have been put into the river since 1866 The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that it should be declared illegal to turn any solid or liquid refuse into rivers and streams.
George Crossland & Sons, Woollen Manufacturers.	CrosslandMoor Mills, and Lockwood Mills, Huddersfield.	Our works are situated on the *Colne* and *Holme*, tributaries of the *Calder*. Employ from 400 to 500 hands. Rateable value of works, 2,500*l*. The bed of the stream has silted up. Our works are not affected by floods. There has been an alteration in the condition of the streams within our knowledge. They are polluted by works above, and by mines. Obtain supply of water jointly from the river, from wells, boreholes, and from Canal Company; and consume yearly, about 6,000,000 gallons. Manufacture yearly from 200 to 250 tons of goods, of the value of 80,000*l*. Produce yearly, liquid refuse from washing 4,200,000 gallons, from dyeing 1,800,000 gallons; the whole of which, except the soapsuds, flows direct into the river. Use yearly, 200,000 lbs. of dye wares; chiefly argol, bark, logwood, fustic, camwood, Sander's wood, shumac, barwood, bi-chrome, madder, alum, copperas, cochineal, oxide of tin, nitrate of tin, and aniline dyes. Do not use any bleaching materials. Use yearly 10,000 gallons of olive oil, of the value of 2,000*l*. Produce yearly in the process of carding 15 tons of waste wool, which is sold. Use yearly, soap 25 tons, alkali 25 tons, and urine 105,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain yearly 45*l*. Use steam and water as power; steam 120, and water 30 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are deposited in an old stone quarry. The excrements of our workpeople are conveyed by waterclosets into the river. Have no suggestions to offer.
Benjamin Crosland & Sons, Woollen and Mohair Manufacturers.	Oakes Mills, Lindley, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 90 hands. Rateable value of works, 310*l*. Our works are not affected by floods. Obtain supply of water from the waterworks company, and consume yearly 6,000,000 gallons. Manufacture yearly, 124,000 lbs. and dye 50,000 lbs. of goods. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into sewers, and thence into the river. Use yearly, 18,000 lbs. of dye wares, chiefly logwood, Sander's wood, shumac, and bi-chrome. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly, 12 tons of Gallipoli and olive oil, of the value of 600*l*. The whole of the waste wool produced in carding is used over again. Use yearly, soap, 7 tons, alkali 2 tons, and urine 21,000 gallons. The soapsuds are treated for the recovery of grease, by which we gain 18*l*. a year. Use steam, 16 nominal horse-power. Consume yearly, 1,000 tons of coal, the ashes from which are used for the repair of roads. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future, that all solid matters should be kept out of rivers and streams. We are of opinion that the chemicals used in dyeing act as deodorizers, and if it were not for the waste water from mills supplied by reservoirs, the state of the rivers would be much worse in summer in manufacturing districts than they are at present.
Armitage Brothers, Woollen Manufacturers.	Milnbridge, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 255 hands. Rateable value of works, 847*l*. 9*s*. The bed of stream has silted up from 18 inches to 2 feet, caused chiefly by ashes and other solid refuse thrown into it. Our works are not affected by floods. The river is very considerably polluted, chiefly by refuse from chemical works; not by mines. Obtain supply of water jointly from springs, river, and canal. If the river or stream from which we might derive a supply of water were rendered clear and colourless, it would be of considerable money value to us, but we are not able to fix the amount. Manufacture yearly goods of the value of 60,000*l*. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the river. Use yearly 18 tons of dye wares, chiefly logwood, camwood, Sander's wood, and indigo. Do not use any bleaching materials. Use yearly 30 tons of Gallipoli oil, of the value of 1,440*l*. Produce yearly about 8 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap, 13,000 lbs. The soapsuds are treated for the recovery of the grease, by which we gain 45*l*. a year. Use both steam and water as water, about 85 nominal horse-power. Consume yearly 2,600 tons of coal, the ashes from which are partly used for repairing roads, and ground to be mixed with lime

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Armitage Brothers, Woollen Manufacturers—*cont.*	Milnbridge, Huddersfield—*cont.*	for building purposes. The excrements of our workpeople are sold to farmers for manure. We suggest as the best means of avoiding pollution in future, that no solid refuse should be allowed to be thrown into rivers and streams. Have no suggestions to offer as to the conservancy of rivers and streams.
Joseph Dyson & Sons, Woollen Cloth Manufacturers.	Huddersfield -	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 465*l*. Our works are not affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from the canal; but do not know the annual consumption at our works. Manufacture and dye yearly 162 tons of goods, of the value of 40,000*l*. The whole of the waste liquid produced at our works flows direct into the river. Use yearly 5,000 lbs. of dye wares, chiefly logwood. The spent dye stuffs are either burned or used for manure. Do not use any bleaching materials. Use yearly 30 tons of olive oil, of the value of 1,500*l*. The whole of the waste wool produced in the process of carding is partly sold to oil and grease extractors, and partly used over again. Use yearly, soap, 6½ tons; soda crystals, 12 tons; urine, 200 tons; and ammonia, 3 tons. The soapsuds are not treated for the recovery of the grease. Use steam, 43 nominal horse-power. Consume yearly 1,500 tons of coal; the ashes from which are deposited on our land to be afterwards used for repairing roads. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the river. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
James Brooke & Son, Woollen Manufacturers.	Bradley Mills, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 800*l*. The bed of the river has silted up; caused chiefly by ashes and other solid refuse from building excavations thrown into it. Our works are seriously affected by floods. The condition of the river is very bad, and getting worse year by year. It is polluted to a very serious extent by works above, and by mines. Obtain supply of water jointly from the river *Colne*, the canal, and bore holes; but are not able to give the annual consumption at our works. If the river or stream from which we might derive a supply of water were rendered clear and colourless, it would be a very great advantage to us, but we are unable to fix the money value. We manufacture yearly goods of the value of 30,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Use yearly 40,000 lbs. of dye wares, principally logwood, camwood, and fustic. The spent dye stuffs are burned under the boiler furnaces. Do not use any bleaching materials. Use yearly 20 tons of olive oil, of the value of 1,200*l*. A portion of the waste wool produced in carding is re-used by us; the refuse portion (about 20 tons annually) is sold to artificial manure manufacturers. Use yearly, soap, 9 tons; alkali, 10 tons; and urine, 33,800 gallons. The soapsuds are treated for the recovery of the grease, by which we gain about 40*l*. a year. Use both steam and water as power, 50 nominal horse-power. Consume yearly 1,600 tons of coal; the ashes from which are carted on to waste ground, and occasionally used to repair roads. Part of the excrements of our workpeople are used for manure, and the remainder turned into the river. We suggest as the best means of avoiding pollution in future, that manufacturers, dyers, and others, should be compelled to purify all water polluted by them, as far as it is practicable to do so, before turning it into rivers and streams.
George Coles & Company, Woollen Manufacturers.	Victoria Mill, Huddersfield.	Our works are situate near to the *Colne*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 272*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the water is very filthy. The river is polluted by works above; not by mines. Obtain supply of water from the canal; but are unable to state the annual consumption at our works. Manufacture yearly 165,000 lbs. of goods, of the value of 9,500*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 20 tons of olive oil, of the value of 1,100*l*. Produce yearly 6 tons of waste wool in the process of carding, which is partly sold for manufacturing purposes and for manure. Do not use either soap, alkali, or urine. Use steam, 16 nominal horse-power. Consume yearly 650 tons of coal, and make 90 tons of ashes, which are used for repairing roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Learoyd & Sons, Woollen Manufacturers.	Tanfield Mills, Leeds Road, Huddersfield.	Our works are situated on the west bank of the *Colne*, a tributary of the *Calder*. Employ 150 hands. Rateable value of works, 714*l*. Our works are not affected by floods. The river is polluted by works above, and by sewage; but not by mines. Obtain supply of water jointly from the canal, from wells, and bore-holes, and consume yearly 9,000,000 gallons. If the river from which we might derive a supply of water were rendered clear and colourless it would be of considerable money value to us. Manufacture yearly 120,000 lbs. of goods, of the value of 20,000*l*. The whole of the liquid refuse, except soapsuds, produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,000*l*. The whole of the waste wool produced in carding is sold to oil and grease extractors. Use yearly soap, 5 tons; alkali, 7,000 lbs.; and urine, 19,000 gallons. The soapsuds are treated for the recovery of grease, and we gain 25*l*. yearly by the extraction. Use steam 45 nominal horse-power. Consume yearly from 1,400 to 1,500 tons of coal, the ashes from which are carted away for repairing roads. The excrements of our workpeople are carted away for manure. No suggestions to offer.
John Heap & Brothers, Woollen Manufacturers.	Crossland Mills, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 150 hands. Rateable value of works, 783*l*. The bed of the the river has silted up. Our works are not affected by floods. The river is polluted by works above; not by mines. Obtain supply of water jointly from springs and from the river. Manufacture yearly 70 tons of goods, of the value of 30,000*l*. The whole of our liquid refuse, except soapsuds, flows direct into the river. Use yearly 29,120 lbs. of dye wares, chiefly logwood, camwood, fustic, argol, oxide of tin and bi-chrome. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 12 tons of Gallipoli oil of the value of 700*l*. Produce yearly 13 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap, 7 tons; alkali, 4 tons; and urine 20,800 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 26*l*. a year. Use both steam and water as power; steam 40 and water 60 nominal horse-power. Consume yearly 1,040 tons of coal; make about 160 tons of ashes, half of which is turned into the river, and half used for repairing roads. The excrements of our workpeople are used for manure. No suggestions to offer.
Benjamin Lockwood, Fancy Woollen Manufacturer.	Firth Street, Huddersfield.	My works are situate on the *London and North Western Canal*. Employ 150 hands. Rateable value of works, 880*l*. My works are not affected by floods. Obtain supply of water from the canal; but do not know the annual consumption at my works. Manufacture yearly 125,000 lbs. of goods, of the value of 24,000*l*. The whole of the waste liquid, except soapsuds, produced at my works flows direct into a sewer, and thence into the river. Do not use any dye wares or bleaching materials. Use yearly 5,280 gallons of olive oil, of the value of 750*l*. Produce about 8 tons of heavy shoddy in the process of carding, which is sold to oil and grease extractors. Use yearly, soap 8 tons. The soapsuds are treated for the recovery of the grease, by which I gain 35*l*. a year. Use steam 30 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are used to spread over our own land. The excrements of my workpeople are removed by contractors under the Corporation. Have no suggestions to offer.
James Crosland & Sons, Woollen Manufacturers.	Paddock, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ from 60 to 70 hands. Rateable value of works, 483*l*. The bed of the river has not silted up near our works. Our works are not affected by floods. The condition of the stream has been much the same as it is now during the last 20 years. It is very seriously polluted by refuse from dye works and mills, and by town sewage; not by mines. Obtain supply of water from the river, but are not able to state the annual consumption at our works. If the river from which we might derive a supply of water were rendered clear and colourless it would be of a direct money value to us of 20*l*. a year. Manufacture 100,000 lbs. of goods of the value of 20,000*l*., and dye 125,000 lbs. of the value of 6,500*l*. The whole of the waste liquid, except soapsuds, flows direct into the river. Use yearly 48,200 lbs. of dye wares, chiefly dye woods. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 2,000 gallons of olive oil, of the value of 450*l*. The waste wool produced in carding is partly sold to oil and grease extractors, and partly used for manure. Use yearly: soap, 3 tons; alkali, 1 ton; and urine 30,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain yearly 10*l*. Use water and steam as power, steam 25, and water 30 nominal horse-power. Consume yearly 750 tons of coal; the ashes from which are used partly for repairing roads, and partly filled into old stone quarries. The excrements of our workpeople are mixed with refuse shoddy and carted away for manure.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Alfred Rhodes & Company, Manufacturers of Woollen Shawls.	Folly Hall Mills, Huddersfield.	Our works are situated on the *Colne*, a tributary of the *Calder*. Employ 25 hands. We only rent power and room, and therefore are unable to give the rateable value of the works. The bed of the river has silted up. Our works are occasionally affected by floods. All the mills for seven miles above us turn the liquid and solid refuse they produce into the stream, and therefore it is very considerably polluted; it is not polluted by mines. Obtain our supply of water jointly from the river and canal, but do not know the annual consumption at our works. Manufacture yearly 80 tons of goods, of the value of 6,000*l*. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly about 2½ tons of olive oil, of the value of 140*l*. The whole of the waste wool produced in carding is sold. Do not use any soap, alkali, or urine. We hire room and power, and therefore are unable to state the nominal horse-power used, the quantity of coal consumed, or what is done with the ashes. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Lockwood & Keighley, Woollen Cloth Manufacturers.	Upper Head Mills, Huddersfield.	Our works are situated near to the *Colne*, a tributary of the *Calder*. Employ 250 hands. Rateable value of works, 900*l*. Our works are not affected by floods. Obtain supply of water jointly from springs, from the Huddersfield Waterworks Company, and from the canal; but do not know the annual consumption at our works. Manufacture yearly 80 tons of goods, of the value of 36,000*l*. The whole of the waste liquid produced at our works flows into a shaft constructed for that purpose on our premises. Do not use any dye wares or bleaching materials. Use yearly 12 tons of Gallipoli oil, of the value of 700*l*. The whole of the waste wool produced in carding is sold. Use yearly, soap, 22 tons; alkali, 14 tons; and urine, 150 tons. The soapsuds are treated for the recovery of grease, by which we gain 30*l*. a year. Use steam, 64 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are carted away by contractors under the Corporation and used for repairing roads. The excrements of our workpeople are removed by contractors under the Corporation. No suggestions to offer.
R. Roberts & Company, Woollen Manufacturers.	Bath Mills, Huddersfield.	Our works are situated on the *Holme*, a tributary of the *Calder*. Employ 100 hands. Rateable value of works, 343*l*. The bed of the river has not silted up opposite our works. Our works are not affected by floods. The river is polluted to a serious extent by works above; but not to our knowledge by mines. Obtain supply of water jointly from the river and canal. Manufacture yearly 200,000 lbs. of goods, of the value of 25,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Do not use dye wares or bleaching materials. Use yearly Gallipoli oil, of the value of 600*l*. Produce yearly 9 tons of waste wool in the process of carding, which is sold. Use yearly soap 8 tons, and urine 12,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain yearly 30*l*. Use steam 25 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
John Barber & Sons, Fancy Woollen Manufacturers.	Holme Bridge Mills, near Huddersfield.	Our works are situated on the *Holme*, a tributary of the *Calder*. Employ 150 hands. Rateable value of works, 401*l*. 10*s*. The bed of the stream has not silted up opposite our works. Our works are not affected by floods. The condition of the stream has not changed within our knowledge; it is polluted by works above, not by mines. Obtain supply of water partly from waterworks, partly from the "Bilbury reservoir," and partly from the stream; but do not know the annual consumption at our works. Manufacture yearly 150,000 lbs. of goods, of the value of 30,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Use yearly, as dye wares, 35,840 lbs. of logwood, 448 lbs. of argol, 672 lbs. of madder, 1,008 lbs. of bichrome, 244 lbs. of fustic, 224 lbs. of barwood, and 200 lbs. of alum. The spent dye-stuffs are burned. Do not use any bleaching materials. Use yearly 20 tons of olive oil, of the value of from 800*l*. to 1,000*l*. Produce yearly 12 tons of waste wool in the process of carding, ¾ths of which are used over again, the remainder sold for manure. Use yearly, soap, 8,960 lbs.; alkali, 17,920 lbs.; and urine, 800 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l*. per annum. Use both steam and water as power: steam 40, and water 28 nominal horse-power. Consume yearly 1,200 tons of coal; make about 100 tons of ashes, which are used for repairing roads. The excrements of our workpeople are carted away for manure. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Barnicott & Kenyon, Fancy Woollen Manufacturer.	Shepley, near Huddersfield.	Our works are situated on the *Shepley Beck*, an affluent of the *Colne*, a tributary of the *Calder*. Employ 200 hands. Rateable value of works, 560*l*. The bed of the stream has silted up, caused by solid and other refuse thrown into it. Our works are not affected by floods. The condition of the stream varies very much; sometimes it is much more foul than at others. It is considerably polluted by works above, and by mines. Obtain supply of water from the stream, from springs, and from wells, but do not know the annual consumption at our works. As we derive the chief supply of water from wells on our own premises, the condition of the stream does not very much affect us. Manufacture yearly, 83 tons of goods, of the value of 30,000*l*. We have depositing tanks, and used to filter the liquid refuse produced at our works, but it did not answer, and we now pump it on to land. After flowing over or percolating into the land, the effluent water finds its way into the *Shepley Beck*. We use yearly, as dye wares, logwood, 78,400 lbs.; camwood, 2,240 lbs.; Sander's wood, 336 lbs.; fustic, 2,240 lbs.; alum, 1,120 lbs.; and madder, 2,240 lbs. The spent dye stuffs are all burned. Do not use any bleaching materials. Use yearly, 30 tons of Gallipoli oil, of the value of 1,500*l*. Part of the waste wool produced in carding is used again, and the part that we cannot use is sold for manure. Use yearly, soap, 6 tons, alkali, 3 tons, and urine, 30,000 gallons. The soapsuds flow on to land and irrigate it. Use steam, 50 nominal horse-power. Consume yearly about 2,000 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. No suggestions to offer.
John Bower & Sons, Woollen Cloth Manufacturers.	Holmfirth -	Our works are situated on the *Holme*, a tributary of the *Calder*. Employ 120 hands. Rateable value of works, 320*l*. The bed of the river has silted up, but not to any considerable extent. Our works are slightly affected by floods. The river is polluted by works above, not to our knowledge by mines. Obtain supply of water jointly from the river and from springs, but are not able to state the annual consumption at our works. Manufacture yearly, 60 tons of goods, of the value of 28,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Use as dye wares chiefly dyewoods. The spent dye stuffs are used for manure. Use yearly, 25 tons of Gallipoli oil. The waste wool produced in carding is used for manure. Use yearly, soap 5 tons, and 3,000 gallons of urine. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 15, and water 4 nominal horse-power. Consume yearly about 700 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, that all solid and liquid refuse should be kept out of rivers and streams.
William Sandford, Woollen Manufacturer.	Under Bank Mill, Holmfirth.	My works are situate on the *Holme*, a tributary of the *Calder*. Employ 40 hands. As the landlord pays the rates, am not able to state the rateable value of works. The bed of the river has not silted up opposite my works. My works are not affected by floods. The river is not polluted by works above, nor by mines. Obtain supply of water from springs; but do not know the annual consumption at my works. Manufacture yearly 35,208 lbs. of goods, of the value of 3,600*l*. The whole of the liquid refuse produced at my works flows into the stream. Do not use any dye wares or bleaching materials. Use yearly 4 tons of Gallipoli oil, of the value of 200*l*. Produce yearly about three tons of waste wool in the process of carding, which is sold for manure. Do not use any soap, alkali, or urine. Use steam, 20 nominal horse-power. Consume yearly about 450 tons of coal; the ashes from which are used for repairing roads. The excrements of my workpeople are carted away and used as manure. Have no suggestions to offer.
C. M. W. Bashforth, Manufacturer of Fancy Woollen Cloth.	Holmfirth -	My works are situate on the *Holme*, a tributary of the *Calder*. Employ 40 hands. Rateable value of works, 160*l*. The bed of the stream has not silted up near my works. My works are not affected by floods. The condition of the stream has not changed, to my knowledge, within the last 20 years. It is polluted by works above; not by mines. Obtain supply of water from the river and from land drainage; but am not able to state the annual consumption at my works. Manufacture yearly 30,000 lbs. of goods, of the value of 7,000*l*. The whole of the waste liquid produced at my works, except soapsuds, flows direct into the river. Use yearly 8 tons of dye wares, chiefly logwood, camwood madder, and fustic. Do not use any bleaching materials. Use yearly, 5 tons of Gallipoli oil, of the value of 280*l*. Produce yearly about

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
C. M. W. Bashforth, Manufacturer of Fancy Woollen Cloth—*cont.*	Holmfirth—*cont.*	3 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly soap two tons. The soapsuds are treated for the recovery of the grease, by which I gain 6*l*. a year. Use both steam and water, about 20 nominal horse-power, but as I rent the power, I am not able to state the consumption of coal, or what is done with the ashes. The excrements of my workpeople are used for manure. No suggestions to offer.
James Ramsden, Scribbling Miller.	Meltham -	My works are situated on the *Mag*, an affluent of the *Holme*, a tributary of the *Calder*. Employ 35 hands. Rateable value of works, 22*l*. The bed of the stream has not silted up near my works. My works are not affected by floods. The stream is polluted by works above, but not to a considerable extent; but not by mines. Obtain supply of water jointly from the stream and from springs. I scribble and spin yearly goods, of the value of 5,000*l*. The whole of the waste liquid produced at my works flows into sewers, and thence into the stream. Use yearly, 45 tons of dye wares, chiefly logwood, barwood, Sander's wood, and fustic. Use yearly olive oil, but cannot state the weight or value, as the persons for whom I work supply me with the oil. The waste wool produced in carding is taken away by the persons for whom I scribble and spin. Use yearly, 2 tons of alkali and the urine of my workpeople. Use steam, 20 nominal horse-power. Consume yearly 750 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. No suggestions to offer.
H. and G. Oldham, Silk Dyers and Woollen Manufacturers.	Moll Spring, Netherton.	Our works are situated on the *Mag*, an affluent of the *Holme*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 130*l*. The bed of the stream has not silted up near our works. Our works are not affected by floods. The stream is seriously polluted by works above; but not by mines. Obtain supply of water from springs, and consume yearly 20,000,000 gallons. Manufacture yearly 62,000 lbs. of goods of the value of 12,500*l*., and dye 50,000 lbs. of goods yearly. Produce yearly liquid refuse from washing 10,000,000 gallons, from dyeing 5,000,000 gallons, and from soapsuds 5,000,000 gallons. The whole of the liquid refuse produced at our works flows direct into the sewers and thence into the river. Use yearly 80,000 lbs. of dye wares of all descriptions. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 2,330 gallons of olive oil of the value of 500*l*. Produce yearly 15,000 lbs. of waste wool in the process of carding, which are made into shoddy. Use yearly soap 8,000 lbs., and soda 3,000 lbs. The soapsuds are not treated for the recovery of grease. Use steam 40 nominal horse-power. Consume yearly 850 tons of coal, and make 100 tons of ashes, which are used for repairing roads. The excrements of our workpeople are mixed with earth and used for manure. We suggest, as the best means of avoiding pollution in future, that ashes and other solid refuse should be kept out of rivers, and that all fluid and liquid refuse should flow into filtering tanks and be filtered through ashes, sand, and sawdust, and the solid refuse thus deposited to be carted away for manure.
John Littlewood & Sons, Woollen Manufacturers, Scribblers, Millers, and Weavers.	Honley -	Our works are situated on an affluent of the *Colne*, a tributary of the *Calder*. Employ 100 hands. Rateable value of works, 118*l*. 13*s*. The bed of the stream has not silted up near our works. Our works are not affected by floods. Obtain supply of water from a well. Manufacture yearly 102,774 lbs. of wool, and 96,000 lbs. of mungo and waste, of the value of 10,108*l*. The whole of the waste liquid produced at our works flows into sewers and thence into the stream. Do not use any dye wares or bleaching materials. Use yearly 2,270 gallons of Gallipoli and olive oils of the value of 486*l*. 19*s*. Produce yearly 14 tons of waste wool in the process of carding, which is sold to oil and grease extractors. Do not use any soap, alkali, or urine. Use steam 12 nominal horse-power. Consume yearly 640 tons of coals, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
James Jordan, Woollen Manufacturer.	Dalton, near Kirkburton.	My works are situated on an affluent of the river *Colne*, a tributary of the river *Calder*. Employ 160 hands. Rateable value of works, 210*l*. The bed of the stream has silted up, caused by solid and other refuse thrown into it. My works are not affected by floods. The stream is very much polluted by works above, and is very considerably so by works below me, and also by mines. Obtain supply of water from land drainage, but am not able to state the annual consumption at my works. Manufacture yearly goods of the value of from 40,000*l*. to 60,000*l*. The whole of the waste liquid produced at my works flows into sewers, and thence into the river. Use yearly about 10 tons of dye wares, chiefly various kinds of woods. The spent dye-stuffs are burned. Do not use any bleaching materials. Use yearly, soap 5,600 lbs., and

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
James Jordan, Woollen Manufacturer —*cont.*	Dalton, near Kirkburton —*cont.*	ammonia 5,040 lbs.. The soapsuds are treated for the recovery of the grease. Use steam 12 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are carted away by farmers for manure. Have no suggestions to offer.
Benjamin Crook, Tanner.	Whitley -	My tanyard is situated on *Fox Royd Beck*, an affluent of the *Calder*. Employ 4 hands. Rateable value of tanyard, 30*l*. The bed of the stream has not silted up. My tanyard is not affected by floods. The condition of the stream has not changed within my knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from the stream and from a well, and consume yearly about 250,000 gallons. Tan yearly 50 tons of English hides; and produce yearly 30 tons of leather. Use lime 4 tons, bark 80 tons, valonia 3 tons, and pigeons' dung 60 bushels. Obtain about 1 ton 10½ cwt. of hair in the process of depilation, which is sold to plasterers. Obtain about 200 bushels of fatty matter in the process of fleshing, which is sold to size boilers. I have 65 tan pits in my tanyard holding 600 gallons each. Do not use any dye wares. Produce about 100,000 gallons of liquid refuse, which flows direct into the stream. Use steam 5 nominal horse-power. Consume yearly 100 tons of coal; make about 20 tons of ashes, which are used for repairing roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that manufacturers should have depositing tanks and filter the whole of the waste liquid produced at their works before allowing it to flow into rivers and streams.
		Basin of the Calder (North and South Banks).
Benjamin Oakes & Sons, Manufacturers of Knitting Worsted.	Flanshaw, near Wakefield.	Our works are situated on a small affluent of the *Calder*. Employ 130 hands. Rateable value of works, 323*l*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from gathering grounds, which is collected in two reservoirs we have constructed for ourselves; but do not know the annual consumption at our works. Manufacture yearly 250,000 lbs. of goods, of the value of 30,000*l*. The whole of the liquid refuse produced at our works flows into sewers, and thence into the stream. Use yearly 20 tons of dye wares, chiefly logwood, camwood, and barwood. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly olive oil of the value of 380*l*. The worst of the waste wool produced in carding is sold for manure. Use yearly, soap 25 tons; alkali, six tons; no urine. The soapsuds are treated for the recovery of grease, by which we gain 40*l*. a year. Use steam, 30 nominal horse-power. Consume yearly from 1,300 to 1,400 tons of coal, the ashes from which are used chiefly for repairing roads, and partly for manure. The excrements of our workpeople are removed from tanks, and used for manure. Have no suggestions to offer.
G. W. & I. Baylon, Paper Manufacturers.	Calder Grove, Wakefield.	Our mills are situated on the *Blacker Beck*, a tributary of the *Calder*. Employ 60 hands. Rateable value of works, 186*l*. The bed of the stream has not silted up. Our mills are not affected by floods. The stream is comparatively pure; it is only very slightly polluted by works above; not by mines. Obtain supply of water jointly from the stream and from wells; and consume yearly 9,000,000 gallons. Use yearly, rags, 300 tons; Esparto, 400 tons; soda ash, 96 tons; bleaching powder, 90 tons; alum, 40 tons; lime, 50 tons; anti-chlor, 2 tons; and vitriol, 2 tons. The whole of the waste liquid produced at our mills flows into the stream. We do not recover the soda from the waste Esparto liquor. Manufacture yearly 480 tons of white and toned printing papers. Produce yearly 100 tons of rag dust, which is partly used for manure, and partly disposed of to grass paper makers. Use steam, 60 nominal horse-power. Consume yearly 3,400 tons of coal; the ashes from which are used for repairing roads and footpaths in the district, and are also ground and mixed with lime for building purposes. The excrements of our workpeople are carted away for manure.
The Yorkshire Fibre Company (China Grass Manufacturers).	Baln Lane, Wakefield.	Our works are situated on *Baln Beck*, a tributary of the *Calder*. Employ 50 hands. Rateable value of works, 160*l*. The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The bed of the stream is generally clear; it is occasionally fouled by works above, and by refuse from coal mines. Obtain supply of water from a colliery, and consume yearly about 10,000,000 gallons. We use yearly 140 tons of raw material, of the value of 10,000*l*.; manufacture 250,000 lbs. of goods, of the value of 21,625*l*., and bleach 150 tons. We produce yearly: liquid refuse from washing, 7,000,000 gallons; bleaching, 300,000 gallons;

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
The Yorkshire Fibre Company (China Grass Manufacturers)—*cont.*	Baln Lane, Wakefield—*cont.*	and soapsuds, 30,000 gallons. The whole of this liquid refuse produced at our works flows direct into sewers, and thence into the stream. Do not use any dye wares. Use yearly, as bleaching materials, chloride of lime, 15,000 lbs. Use yearly, Gallipoli oil, 400 gallons, of the value of 115*l*. Use yearly: soap, 10 tons; alkali, 36 tons; no urine. The soapsuds are not treated for the recovery of the grease. Use steam, 16 nominal horse-power. Consume yearly 1,600 tons of coal, the ashes from which are carted on to the railway for ballast. The excrements of our workpeople are removed by farmers for manure. We suggest, as the best means of avoiding pollution in future, that manufacturers and others should be compelled to have depositing tanks and filters, and that the whole of the liquid refuse produced should be filtered before being allowed to be turned into rivers and streams.
George Lee & Sons, Worsted and Woollen Yarn Spinners.	West Gate, Wakefield.	Our works are situated on the *Chald Beck*, a tributary of the *Calder*. Employ 400 hands. Rateable value of works, 1,120*l*. The bed of the stream has silted up. Our works are not affected by floods. The stream is considerably polluted by dye and other works above, but not by mines. Obtain supply of water from stream, from wells, and from waterworks; but cannot give the annual consumption at our works. If the stream were rendered clear and colourless, it would be of considerable money value to us, but we are not able to fix the amount. We manufacture, bleach, print, and dye yearly 1,000,000 lbs. of goods. The value of the manufactured goods is about 100,000*l*.; of bleached, 20,000*l*.; of printed, 2,000*l*.; and of dyed, 20,000*l*. The whole of the waste liquid produced at our works flows into the sewers, and thence into the river. Use yearly as dye wares, chiefly log and other woods; also indigo and aniline dyes. The spent dye stuffs are burned. Use 12,000 lbs. of solid sulphur as bleaching material. Use yearly 10,000 gallons of olive oil, of the value of 2,264*l*. The waste wool produced in the process of carding is partly re-used, and partly applied as manure. Use yearly soap, 188,000 lbs., soda-ash, 90,000 lbs., soda, 16,000 lbs., and no urine. The soapsuds are treated for the recovery of the grease, by which we gain yearly 100*l*. Use steam, 150 nominal horse-power. Consume yearly 5,000 tons of coal, the ashes from which are removed from the premises, and used for repairing roads and paving. The excrements of our workpeople are partly treated by the Goux system and used as manure, and partly conveyed by waterclosets into sewers, and thence into the stream. We are of opinion that the best mode of dealing with the polluting substances is to treat them at the outfall and at the expense of the public generally, who contribute to the evil, and therefore should pay for the remedy.
Isaac Briggs and Sons, Worsted Spinners.	Back Lane, Wakefield.	Our works are situated near the *Calder*. Employ 100 hands. Rateable value of works, 180*l*. Our works are not affected by floods. Obtain supply of water from waterworks company; do not know the annual consumption at our works. Manufacture yearly 260,000 lbs., and dye 124,844 lbs. of goods, of the value of 30,000*l*. The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the river. Use yearly as dye wares, camwood, 2 tons; logwood, 6 tons; cochineal, 2,100 lbs., and aniline colours, 200 lbs. Do not use any bleaching materials. Use yearly 2,000 gallons of Gallipoli oil, of the value of 400*l*. Produce yearly 5 tons of waste wool in the process of carding, which is sold for manure. Use yearly, soap, 17 tons, and alkali, 3 tons. The soapsuds are not treated for the recovery of grease, but the whole is turned into sewers, and thence into the river. Use steam, 30 nominal horse-power. Consume yearly 1,600 tons of coal; the ashes from which are carted away as ballast for the railway, and for repairing roads. The excrements of our workpeople are conveyed by waterclosets into sewers, and thence into the river. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Fallon and Shaw, Worsted Spinners.	Providence Mill, Back Lane, Wakefield.	Our works are situated near the *Calder*. Employ 60 hands. Rateable value of works, 150*l*. Our works are not affected by floods. Obtain supply of water from waterworks; and consume yearly 3,000,000 gallons. Manufacture yearly 380,000 lbs. of goods, of the value of 26,000*l*. Produce yearly liquid refuse from washing, 400,000 gallons, dyeing, 400,000 gallons, and soapsuds, 200,000 gallons. The whole of the waste liquid produced at our works, except soapsuds, flows direct into sewers, and thence into the river. Use yearly as dye wares, logwood 6 tons, indigo half a ton, and cochineal half a ton. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 2,600 gallons of Gallipoli and cloth oil, of the value of 500*l*. Produce yearly 7 tons of waste wool in the process of carding, which

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Fallon and Shaw, Worsted Spinners—*cont.*	Providence Mill, Back Lane, Wakefield—*cont.*	are sold for manure. Use yearly, soap, 20 tons; alkali, 12 tons; no urine. The soapsuds are treated for the recovery of the grease, by which we gain 70*l.* a year. Use steam, 40 nominal horse-power. Consume yearly 1,500 tons of coal; the ashes from which are carted away. The excrements of our workpeople are conveyed by sewers into the river. Have no suggestions to offer.
R. H. Barker & Company, Manufacturers of Knitting Worsteds and Lambs Wool Yarns.	Thornes, Wakefield.	Our works are situated on the *Calder*. Employ 250 hands. Rateable value of works, 800*l.* The bed of the stream has not silted up near our works, on account of the dredging performed by the Aire and Calder Navigation Company. Our works are affected by floods, but this is not due to the silting up of the bed of the river. The condition of the river is much more foul than it was a few years ago. It is polluted to a very great extent by works above and by town sewage; but not to our knowledge by mines. Obtain supply of water from the river; and consume yearly for all purposes 20,000,000 gallons. If the river from which we derive our supply of water were rendered clear and colourless, it would undoubtedly be of great advantage to us, but we are not able to fix a money value to it. Manufacture yearly 1,568,000 lbs. of goods, of the value of 140,000*l.* Produce yearly liquid refuse from washing 900,000 gallons, and from dyeing 1,000,000 gallons. The whole of this flows unfiltered into the sewers. Use yearly 130,000 lbs. of dye wares; chiefly logwood, camwood, and Sander's wood. The spent dye stuffs are burned. We also use 2,500 lbs. of indigo, and 9,000 lbs. of cochineal. The spent liquor from these goes into stream. Do not use any bleaching materials. Use yearly 30 tons of Gallipoli oil, of the value of 1,600*l.* Produce yearly 10,000 lbs. of wool in the process of carding, which is sold to waste dealers. Use yearly, soap 60 tons, and alkali from 10 to 15 tons. The soapsuds are treated for the recovery of the grease, by which we gain 200*l.* yearly. Use steam, 100 nominal horse-power. Consume yearly from 2,500 to 3,000 tons of coal, the ashes from which are carted away to repair roads. The whole of the excrements of our workpeople are discharged by waterclosets into the river. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Wade & Son, Union Manufacturers.	Portobello Mills, Thornes Lane, Wakefield.	Our works are situated on the *Calder*. Employ 230 hands. Rateable value of works, 385*l.* 9*s.* The bed of the river has not silted up near our works. Our works are not affected by floods. The river is very considerably polluted by works above, and by mines. Obtain supply of water from the river *Calder*, and consume yearly 9,000,000 gallons. If the river or stream were rendered clear and colourless, it would be of comparatively little direct money value to us. Manufacture yearly 464,100 lbs. of goods of the value of 44,200*l.* Produce liquid refuse from washing 6,000,000 gallons, 1,500,000 from dyeing, and 1,500,000 from soapsuds. We have no depositing tanks, and the whole of the waste liquid produced at our works flows direct into the river. Use yearly 320,000 lbs. of dye wares, chiefly nitrate of iron, finishing and blue spirits, ammonia, shumac, logwood, alum, prussiate of potash, copperas, extract of indigo, chrome, fustic, and argol. The spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly 48 tons of Gallipoli oil, of the value of 2,400*l.* The waste wool produced in carding is sold to oil and grease extractors. Use yearly soap 55,000 lbs., soda 33,000 lbs.; do not use any urine. The soapsuds are not treated for the recovery of the grease. Use steam, 50 nominal horse-power. Consume yearly 1,800 tons of coal, the ashes from which are carted away from the premises. The excrements of our workpeople are conveyed to land to be used for manure. Have no suggestions to offer.
Whitley Spring Mill Company, Carpet Manufacturers.	Ossett Street, Wakefield.	Our works are situated on the *Flush Dyke*, a tributary of the *Calder*. Employ 290 hands. Rateable value of works, 448*l.* 3*s.* 3*d.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed, within our knowledge, it is much the same as it has been for several years. It is polluted by works above, and by mines. Obtain supply of water jointly from the stream and from coal mines, but cannot tell the annual consumption at our works. Manufacture yearly 579,120 lbs. of goods. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Use yearly 96,496 lbs. of dye wares, principally logwood, peachwood, and fustic. The spent dye stuffs are taken away and used for manure. Do not use any bleaching materials. Use yearly 35 tons of rape and olive oil. The whole of the waste wool produced at our works is used for manure. Use yearly

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Whitley Spring Mill Company, Carpet Manufacturers—*cont.*	Ossett Street, Wakefield—*cont.*	soap 12 tons, and alkali 18 tons; but the principal portion of our goods is cleansed with fullers earth, of which we use 20 tons yearly. Use steam, 36 nominal horse-power. Consume yearly about 6,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. No suggestions to offer.
		Basin of the Dearne.
James Peace, Cotton and Woollen Manufacturer.	Denby Dale -	My works are situated on the *Dearne*. Employ 150 hands. Rateable value of works, 160*l.* 5*s.* The bed of the stream has not silted up. My works are not affected by floods. Obtain supply of water from wells, but do not know the annual consumption at my works. Manufacture yearly 7 tons of goods, of the value of 8,000*l.* The whole of the liquid refuse produced at my works flows directly into the river. Use yearly 4 tons of dye wares, chiefly dye woods. The spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly 3¼ tons of Gallipoli oil, of the value of 170*l.* Produce yearly 1,600 lbs. of waste wool in the process of carding, which is sold to oil and grease extractors. Use yearly, soap 1 ton, and alkali 2 tons. The soapsuds are not treated for the recovery of grease. Use steam, 12 nominal horse-power. Consume yearly 750 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are carted on to land to be used for manure. Have no suggestions to offer.
Hirst Brothers, Woollen Cloth Manufacturers.	Birds Edge Mill, Denby Dale.	Our works are situated on the *Dearne*. Employ 180 hands. Rateable value of works, 370*l.* The bed of the stream opposite our works has not silted up. Our works are not affected by floods. The river is not polluted by works above, nor by mines. Obtain supply of water jointly from the stream and from bore-holes; but do not know the annual consumption at our works. The water is sufficiently clean for our purposes. Manufacture yearly 104 tons of goods, of the value of 20,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Use yearly 17,920 lbs. of dye wares, chiefly logwood, Sander's wood, barwood, fustic, and madder. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly 20 tons of Gallipoli oil, of the value of 1,100*l.* Produce yearly 26 tons of waste wool in the process of carding, from which we extract the grease and use the refuse for manure. Use yearly, soap 7 tons, alkali and urine 18 tons. The soapsuds are treated for the recovery of the grease, by which we gain 100*l.* a year. Use steam, 40 nominal horse-power. Consume yearly 1,100 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Samuel Field, Woollen Manufacturer.	Skelmanthorpe	My works are situated on a small tributary of the *Dearne*. Employ 100 hands. Rateable value of works, 55*l.* 15*s.* The bed of the stream has not silted up. My works are not affected by floods. There has been very little alteration, within my knowledge, in the condition of the stream. The stream is seriously polluted, and when it reaches our works it is unfit for manufacturing purposes, and I use it for irrigation; it is not polluted by mines. Obtain supply of water from wells and bore-holes; but do not know the annual consumption at my works. Manufacture yearly 72,000lbs., dye 30,000 lbs., and bleach 400 lbs. of goods. The whole of the waste liquid produced at my works, except soapsuds, flows into sewers and is used for irrigation. Use yearly as dye wares, logwood 2 tons, and also aniline dyes. The solid spent dye stuffs are carted away. Use yearly as bleaching materials 300 lbs. of chloride of lime. Do not use any oil. Use yearly soap 5 tons, and ammonia 20,000 lbs. The soapsuds are not treated for the recovery of grease. Use steam, 6 nominal horse-power. Consume yearly coals of the value of 50*l.*, the ashes from which are used for repairing roads. The excrements of my workpeople are removed in carts and used for manure. I suggest that the liquid refuse from manufactories be used for irrigation.
Coward & Company, Bleachers.	Swithin Bleach Works, Swithin Haig.	Our works are situated on the *Dearne*. Employ 55 hands. Rateable value of works, 42*8l.* The bed of the stream has not silted up opposite our works. Our works are not affected by floods. The river is polluted by works above, and by mines. Obtain supply of water from springs, but are not able to state the quantity consumed at our works. We are unable to state the weight of goods operated upon at our works, as we do not bleach them by weight. The whole of the waste liquid produced at our works flows into sewers, and thence into the stream. Do not use any dye wares. Use yearly as bleaching materials, soaps 8 tons, soda ash 12 tons, bleaching powder 12 tons, and vitriol 10 tons. Use steam, 26 nominal horse-power. Consume yearly

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Coward & Company, Bleachers—*cont.*	Smithies Bleach Works, Smithies Siding—*cont.*	1,000 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted on to land, to be used for manure. Have no suggestions to offer.
Henry Clegg & Co., Tanners.	Ardsley	Our tanyard are situated near the *Dearne*. Employ 6 hands. Rateable value of tanyard, 32*l*. The bed of the stream has not silted up within our knowledge. The tanyard are not affected by floods. The condition of the stream has not changed since we have occupied the tanyard. It is polluted by town sewage; not within our knowledge by mines. Obtain supply of water jointly from the stream and from the canal; but do not know the annual consumption at our tanyard. Tan yearly from 60 to 70 tons of hides, and produce leather 30 tons. Use lime 10 tons, bark 120, valonia 15, gambir or terra japonica 20 tons, and pigeons' dung 60 bushels. Obtain 20 bushels of hair in the process of depilation, which is sold to plasterers. The fatty matter produced in fleshing is sold to size boilers. Have 44 tan pits of various sizes. Do not use any dye wares. The whole of the waste liquid produced at our tanyard flows into sewers, and thence into the stream. Use steam, 5 nominal horse-power. Consume yearly 120 tons of coals, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
John Nickols, Tanner.	Cinder Hill Tannery, Cawthorne, Barnsley.	My tanyard is situated on the *Dankin Brook*, a tributary of the *Dearne*. Employ 4 hands. Rateable value of tanyard, 20*l*. 10*s*. The bed of the stream has not silted up. My tanyard is not affected by floods. The stream is not polluted by works above, nor by mines. Obtain supply of water from springs, and consume yearly 100,000 gallons. The water is sufficiently pure for my manufacturing purposes. Tan yearly, hides, 52 tons. Use yearly, lime, 3 tons, bark, 100 tons, valonia, 3 tons, shumac, 1 ton, and pigeons' dung, 50 bushels. Obtain 200 bushels of hair in the process of depilation, which is sold to plasterers. Obtain 560 lbs. of fatty matter in the process of fleshing, which is sold to curriers. I have 40 tanpits of various descriptions. Do not use any dye wares. The whole of the waste liquid produced at my tanpits is used in irrigation. Use steam, 9 nominal horse-power. Consume yearly 100 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
Thomas Marsden, Paper Maker.	Smithies, Barnsley.	My paper mills are situated on the *Dearne*. Employ 40 hands. The new mill has not yet been rated. The bed of the river has not silted up. My mills are not affected by floods. The river has always been impure within my knowledge. It is polluted by dye works, bleach works, and numerous collieries above my mills; also by dye works and the sewage of the town of Barnsley below my mills. Obtain supply of water from the river, but am not able to give the annual consumption at my mills. Use yearly rags, bagging, and waste, 700 tons; soda ash, 6 tons; bleaching powder, 10 tons; alum, 36 tons; lime, 12 tons; and anti-chlor, 1 ton. The whole of the liquid refuse produced at my works flows into a settling pond and thence into the river. Manufacture yearly, brown paper 250 tons, and sugar paper 350 tons. Produce yearly rag dust or waste 20 tons, this is used for manure. Use both steam and water. 70 nominal horse-power. Consume yearly 2,500 tons of coal, the ashes from which are used for repairing roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in the future, that a series of intercepting sewers should be formed, commencing from the first point of pollution, to take in all polluting liquids from works, collieries, and town sewers, the whole to be conveyed to convenient points for utilization. A universal rate should be levied on the property within the river basin for the erection and maintenance of those works.
Charles Marsden & Son, Paper Makers.	Old Mill, Barnsley.	Our mills are situated on the *Dearne*. Employ 40 hands. Rateable value of mills, 150*l*. The bed of the stream has not silted up. Our mills are not affected by floods. The river has always been in an impure state within our knowledge. It is polluted above our works by paper mills and bleach and dye works, and below by tanneries, dye works, and the sewage of the town of Barnsley. Obtain supply of water from the river, but are not able to give the annual consumption at our mills. Use yearly bagging and jute waste 600 tons. soda ash 6 tons, bleaching powder 80 tons, alum 50 tons, lime 12 tons, and anti chlor 2 tons. The whole of the liquid refuse produced at our mills flows direct into the river. Manufacture yearly fine glazed casing paper 500 tons. Produce yearly 20 tons of rag dust or waste, which is carted away to be made into manure. Use steam, 70 nominal horse-power. Consume yearly 3,600 tons of coal, the ashes from which are all carted away by a contractor for filling up and raising inequalities in land and

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Charles Marsden & Son, Paper Makers—*cont.*	Old Mill, Barnsley—*cont.*	for repairing roads. The excrements of our workpeople are used for manure. We suggest as the best means of avoiding pollution in future, that main sewers should be made from the first point of pollution, so constructed as to intercept pollution from all polluting liquids from collieries and town sewers; that this sewage should be utilized at convenient points; and to carry out and maintain these works a general rate should be levied on all property within the river basin.
		Basin of the Don.
Vickars, Snowdon, & Morris, Manure Manufacturers.	Hazel Head, Penistone.	Our works are situated on the *Don*. Employ 10 hands. Rateable value of works, 100*l*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is not polluted by works above, but by mines. Obtain supply of water from springs, but are not able to give the annual consumption at our works; but it is very small in volume. We have two condensing towers 4 feet square and 20 feet high. We use and produce at our works, pyrites 700 tons, brown oil of vitriol 520 tons, phosphate of lime 600 tons, and bones 250 tons. The whole of the liquid refuse produced at our works flows direct into the stream. Use steam, 8 nominal horse-power. Consume yearly 250 tons of coal, the ashes from which are used for ballast on railways; as is also the ash of the waste pyrites. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Milner & Nokes, Woollen Cloth Manufacturers.	Thurlstone, Penistone.	Our works are situated on the river *Don*. Employ 36 hands. Rateable value of works, 175*l*. 15*s*. The bed of the stream has silted up to some extent owing to the flood water running down, and shale thrown in from quarries. Our works are affected by floods to a limited extent. The stream has been fouled by the refuse ochry water from mines for more than 50 years. Obtain our supply of water jointly from the river, from a stream, and from springs, but are not able to give the annual consumption at our works. If the river or stream were rendered clear and colourless it would be a great advantage to us, but we cannot state the direct money value. Manufacture yearly 20 tons of goods, of the value of 8,000*l*. The whole of the waste liquid produced at our works flows direct into the river. We use yearly 10,000 lbs. of dye-wares, chiefly logwood, camwood, madder, alum, and bi-chrome. The spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly 682 gallons of Gallipoli oil, of the value of 155*l*. The whole of the waste wool produced in carding is partly worked up again, and the remainder sold. Use yearly, soap 2 tons, soda ash 5 cwt., and no urine. The soapsuds are not treated for the recovery of grease. Use both steam and water as power, steam 12 and water 8 nominal horse-power. Consume yearly 450 tons of coal, the ashes from which are used for the repair of roads. The excrements of our workpeople are carted on to land to be used for manure. Have no suggestions to offer.
R. W. Marshall, Paper Maker.	Owlerton, Sheffield.	My paper mills are situated on the *Loxley*, a tributary of the *Don*. Employ 15 hands. Rateable value of mills, 93*l*. 6*s*. The bed of the stream has not silted up. My works are not affected by floods. The stream was formerly clear and fish lived in it; but the water pumped into it from the collieries at Dingworth has destroyed the fish. The river is not polluted by works above nor by mines. Obtain supply of water jointly from the river and from wells, but do not know the annual consumption at my mills. Use yearly, ropes 50 tons, soda ash 5 cwt., alum 6 cwt., and lime 6 cwt. The whole of the waste liquid produced at my mills flows direct into the stream. Manufacture yearly 40 tons of hand made brown paper. Do not produce any rag, dust, or waste. Use water, 24 nominal horse-power. Consume yearly 50 tons of coal; the ashes from which are used to repair roads. The excrements of my workpeople are mixed with fine ashes and used on the land for manure. Have no suggestions to offer.
William King Woodward, Paper Maker.	Olive Paper Mills, Loxley, Sheffield.	My mills are situated on the *Loxley*, a tributary of the *Don*. Employ 8 hands. Rateable value of mills, 110*l*. The bed of the stream has not silted up. My mills are not affected by floods. The condition of the stream is much the same as it has been during the last 30 years, except that a certain volume of water from coal mines is pumped into it, which has destroyed the fish. It is not polluted by works above, but by mines. Obtain supply of water jointly from the river and from the Waterworks Company, but do not know the annual consumption at my mills. If the river were rendered clear and colourless it would be of considerable money value to me, but am not able to state the amount. Use yearly, ropes 52 tons, alum 1 cwt., and lime 12 tons. The whole of the waste liquid produced at my mills flows

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William King Woodward, Paper Maker—*cont.*	Olive Paper Mills, Loxley, Sheffield—*cont.*	direct into the stream. Manufacture yearly rope paper about 42 tons. Do not produce any dust or waste. Use water as power, and consume thereby 6,800,000 gallons a day; this is compensation water furnished by the Sheffield Waterworks Company under their Act of Parliament. Consume yearly 80 tons of coal; the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. No suggestions to offer.
Charles Marsden & Son, Paper Manufacturers.	Rivelin, near Sheffield.	Our mills are situated on the *Rivelin*, a tributary of the *Don*. Employ 50 hands. Rateable value of mills, 214*l.* 2*s.* 6*d.* The bed of the stream has not silted up. Our mills are not affected by floods, because we have formed a reservoir to impound the flood water, and so regulate the flow. The river is polluted by works above; not by mines. Obtain supply of water from the river, but do not know the annual consumption at our mills. Use yearly, rags, 500 tons, soda ash, 5 tons, bleaching powder, 10 tons, alum, 30 tons, lime, 12 tons, and anti-chlor, 1 ton. The whole of the liquid refuse produced at our works flows direct into the stream. Manufacture yearly, 600 tons of rope browns, glazed browns, and green brown paper. The whole of the rag dust produced is used for manure. Use steam and water as power; steam 40, and water, 30 nominal horse-power. Consume yearly, 3,000 tons of coal; the ashes from which are carted on to the highways for repairing the same. The excrements of our workpeople are carted on to land to be used for manure. Have no suggestions to offer.
H. & W. Cooper, Tanners.	Neep's End, Sheffield.	Our tanyards are situated on the river *Don*. Employ 23 hands. Rateable value of works, 220*l.* 13*s.* 4*d.* Our works are not affected by floods. The bed of the river has silted up, but not very considerably; this is caused chiefly by the débris and other solid substances brought down in a great flood, caused by the bursting of the Dale Dyke reservoir. The river is polluted by works above; but when there is a good volume of water flowing down the river, it is not much inconvenience to us; in droughty weather it is a nuisance. The river is not polluted by mines within our knowledge. Obtain supply of water from the river; but do not know the annual consumption at our tanyards. We tan yearly, 300 tons of heavy salted hides; and produce 185 tons of leather. Use yearly, lime, 80 tons, calet, 200, valonia, 200, and gambir, or terra japonica, 70. Obtain yearly 30 tons of hair in the process of depilation, which are sold to these manufacturers. Do not obtain any fatty matter in the process of fleshing. We have 32 tanpits, 8 feet by 6 feet 7 inches by 6 feet 6 inches; 30, 8 feet by 5 feet by 5 feet 6 inches; 16, 10 feet by 10 feet by 7 feet 6 inches; 20, 6 feet by 4 feet by 4 feet 6 inches; 4, 6 feet 3 inches by 6 feet by 5 feet 6 inches; 8, 8 feet by 6 feet by 6 feet 9 inches; and 9, 8 feet by 6 feet 6 inches by 6 feet 6 inches. Do not use any dye wares. The whole of the waste liquid produced at our works flows direct into sewers, and thence into the stream. Use steam, 8 nominal horse-power. Consume yearly, 400 tons of coal; make 50 tons of ashes, which are used for repairing walks and roads. The excrements of our workpeople are carted away, mixed with ashes, and used for manure. Have no suggestions to offer.
Charles Stokill, Tanner.	Balby, near Doncaster.	My tanyard is situated near to the river *Don*. Employ 10 hands. Rateable value of tanyard, 60*l.* The bed of the stream has not silted up near my tanyard. My tanyard is not affected by floods. Obtain supply of water from wells, but cannot tell the annual consumption at my tanyard. I tan yearly 165 tons of hides, and produce 70 tons of leather. Use lime, 12 tons, bark, 350 tons, valonia, 40 tons, and a small quantity of pigeons' dung. Obtain yearly 1,000 bushels of hair in the process of depilation, which is sent off the premises every week. The fatty mater obtained in the process of fleshing is boiled, and the grease sold. Have 150 tanpits of an average size. Do not use any dye wares. The liquid refuse produced at my tanyards is passed into two tanks, then into sewers, and thence into the river. Use steam, 12 nominal horse-power. Consume yearly 200 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. Have no suggestions to offer.
		Basin of the Lune.
Bentham Mills Company, Limited, Flax and Tow Spinners and Manufacturers and Linen Tara Bleachers.	Bentham, near Lancaster.	Our works are situated on the *Wenning*, a tributary of the *Lune*. Employ 560 hands. Rateable value of works, 449*l.* 12*s.* 6*d.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is the same now as we have always known it, a clear unobstructed stream, with a good flow of water. It is not polluted by any works above, but it is occasionally polluted by mines. Obtain supply of water from the river, and consume yearly 4,000,000

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Bentham Mills Company, Limited, Flax and Tow Spinners and Manufacturers and Linen Tara Bleachers—*cont.*	Bentham, near Lancaster—*cont.*	gallons. We manufacture and operate upon yearly 1,644,866 lbs. of goods, of the value of 120,000*l.* The whole of the liquid refuse produced at our works flows into depositing tanks, and thence into the river. Do not use any dye wares. Use as bleaching materials soda ash 144,804 lbs., bleaching powder 97,599 lbs., and vitriol 104,234 lbs. Use yearly, soap 2,717 lbs. The soapsuds are not treated for the recovery of the grease. Use steam, 120 nominal horse-power. Consume yearly 3,200 tons of coal, the ashes from which are used principally for repairing roads. The excrements of our workpeople are conveyed from closets on the dry-earth system, and used for manuring land. No suggestions to offer.
		Basin of the Tame.
Joseph Buckley & Company, Woollen Manufacturers.	Moorcroft Mills, Delph.	Our works are situated on an affluent of the *Tame*, a tributary of the *Mersey*. Employ 60 hands. Rateable value of works, 120*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above, nor by mines. Obtain supply of water from the stream, but do not know the quantity consumed yearly. We manufacture yearly 135,000 lbs. of goods, and dye 32,000 lbs. The whole of the waste liquid produced at our works flows direct into the stream. Use yearly 17,663 lbs. of dye wares, chiefly logwood, camwood, barwood, fustic, bichrome, tartar, cochineal, copperas, and alum. The spent dye stuffs are used for manure. Do not use any bleaching materials. Use yearly 9 tons of Gallipoli oil, of the value of 430*l.* The whole of the waste wool produced in carding is sold. Use yearly, soap 2 tons, alkali 3 tons. Do not know the quantity of urine. The soapsuds are treated for the recovery of the grease, by which we gain 14*l.* a year. Use steam and water as power; steam 17 and water 4 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
J. E. & G. J. Buckley, Woollen Manufacturers.	Linfitts Mill, Delph.	Our works are situated on the *Tame*, a tributary of the *Mersey*. Employ 180 hands Rateable value of works, 311*l.* The bed of the stream has not silted up. Our works are not affected by floods. The stream is very considerably polluted by works above, but not to our knowledge by mines. Obtain supply of water from the stream, and consume yearly 300,000,000 gallons. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be a direct money value to us of 800*l.* a year. Manufacture yearly 94,000 lbs. of goods, of the value of 20,000*l.* The whole of the waste liquid produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 2,000 gallons of Gallipoli oil, of the value of 400*l.* Produce yearly 10,400 lbs. of waste wool in the process of carding, which is sold to waste dealers. Use yearly, soap 6 tons, alkali 6 tons, and urine 8,000 gallons. The soapsuds are treated for the recovery of the grease. Use both steam and water as power; steam 15 and water 50 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are carted on to land and used for manure. Have no suggestions to offer.
Thos. & H. N. Gartside. Woollen Printers.	Woodbrow, Delph.	Our works are situated near the *Tame*, a tributary of the *Mersey*. Employ 12 hands. Rateable value of works, 38*l.* 17*s.* 6*d.* The bed of the stream has not silted up near our works. Our works are not affected by floods. The stream is more polluted than formerly by works above, but not by mines. Obtain supply of water from springs, but do not know the annual consumption at our works. We print on commission, and do not know the value of goods operated upon by us. The whole of the waste liquid produced at our works flows by sewers into the stream. Use yearly as dye wares, lac dye, 2,240 lbs.; cochineal, 672 lbs.: double muriate of tin, 2,100 lbs.; oxalic acid, 1,120 lbs.: yellow prussiate, 56 lbs.: and bark liquor, 20 gallons. Do not use any bleaching materials, oil, soap, alkali, or urine. Do not use either steam or water as power. The excrements of our workpeople are used for manure. No suggestions to offer.
Joseph Clifton, Woollen Manufacturer and Finisher.	Eagle Mill, Delph.	My works are situated on the *Hull Brook*, an affluent of the *Tame*, a tributary of the river *Mersey*. Employ 9 hands. Do not know the rateable value of works, as the rates are paid by the landlord. The bed of the stream has not silted up. My works are not affected by floods. The river is polluted by works above but not to any con-

Series A, B, C, D, Trades and Manufactures—(Basin of the Tame)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joseph Clifton, Woollen Manufacturer and Finisher—*cont.*	Eagle Mill, Delph—*cont.*	siderable extent. Obtain supply of water from the stream, but cannot tell the annual consumption at my works. Manufacture yearly goods of the value of 10,000*l.* The whole of the waste liquid produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 8 tons of Gallipoli oil of the value of 360*l.* Use yearly soap 2 tons, and urine 1,200 gallons. As I rent both steam and water as power I am not able to give the nominal horse-power, the quantity of coal consumed, or what is done with the ashes. The excrements of my workpeople are removed for manure. Have no suggestions to offer.
J. & J. Reynolds, Manufacturers of Flannels and Woollen Shawls.	Grove Mill, Dobcross.	Our works are situated on an affluent of the *Tame*, a tributary of the *Mersey*. Employ 30 hands. Rateable value of works, 125*l.* 16*s.* 6*d.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The stream is not polluted by works above nor by mines. Obtain supply of water jointly from wells and from stream, but am not able to give the annual consumption at our works. Manufacture yearly goods of the value of 3,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Do not use either dye wares or bleaching materials. Use yearly 500 gallons of olive oil of the value of 112*l.* Produce yearly about 2 tons of waste wool in the process of carding, which is sold to oil extractors. Do not use either soap, alkali, or urine. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power, steam 8 and water 3 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with soil and used for manuring land. The occupier of the mill below ours will not allow us to turn the liquid refuse produced at the works into the stream and thereby pollute it; he and the occupiers of the mills which have been established for some years in this district turn the whole of the liquid refuse produced at their works into the streams, but will not permit the occupiers of mills of recent erection, although upon the same stream, to exercise the same privilege; this seriously affects the interest of the occupiers of the last-named mills.
Jonas Eastwood, Dyer.	Dobcross and Tamewater.	My works are situated on the river *Tame*, a tributary of the *Mersey*. Employ 18 hands. Rateable value of works, 93*l.* 1*s.* The bed of the stream has not silted up. My works are not affected by floods. The water of the stream is in a very bad condition. It is polluted to a slight extent by works above; not to my knowledge by mines. Obtain supply of water from a spring, but am not able to state the annual consumption at my works. Dye yearly goods of the value of 4,350*l.* The whole of the waste liquid produced at my works flows direct into a settling pond, and thence into the stream. Use yearly 40 tons of dye wares, chiefly logwood and fustic, indigo, and cochineal. The spent dye stuffs are burnt. Do not use any bleaching materials. Use, yearly, soap 2 tons; alkali, 4 tons; and urine, 3,500 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 6 nominal horse-power. Consume yearly 40 tons of coal, the ashes from which are used to repair roads and fill up hollow places in waste land. The excrements of my workpeople are applied to land as manure. No suggestions to offer.
John Mellor, Wool Carder and Spinner.	Hastead's Mill, Dobcross.	My works are situated on an affluent of the *Tame*, a tributary of the river *Mersey*. Employ 16 hands. Rateable value of works, 80*l.* The bed of the stream has silted up, caused by solid refuse thrown into it. My works are affected by floods. The stream is polluted to a very great extent by works above, so as to be a complete nuisance, especially in the summer time, and several of my workpeople have had to leave the works solely from the stink arising from the polluted stream. Obtain supply of water from the stream, but do not know the annual consumption at my works. Manufacture yearly 26,000 lbs. of goods. The whole of the waste liquid produced at my works flows into the stream. Do not use any dye wares or bleaching materials. Use yearly 1,200 lbs. of olive oil, of the value of 30*l.* Part of the waste wool produced in carding is worked up again, the remainder used for manure. Do not use soap, alkali, or urine. Use steam in time of drought, 12 nominal horse-power. Consume yearly 100 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are used for manure. I suggest, as the best means of avoiding pollution in future, that solid and liquid refuse should be prohibited from being turned into rivers and streams.
Sarah Scofield, Dyer, Finisher, and Woollen Carder.	Hatfields, Saddleworth.	My works are situated on the *Tame*, a tributary of the *Mersey*. Employ 25 hands. Rateable value of works, . The bed of the stream has not silted up near my works. My works are not affected by floods.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Sarah Schofield, Dyer, Finisher, and Woollen Carder—*cont.*	Hatfields, Saddleworth—*cont.*	The river is slightly polluted by works above, but not, to my knowledge, by mines. Obtain supply of water from springs, but do not know the annual consumption at my works. Dye yearly 24,400 lbs. of goods. The whole of the waste liquid produced at my works flows into the mill lodge, and thence into the stream. Use yearly 18 tons of dye wares, chiefly logwood, barwood, and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Use yearly one ton of olive oil. The waste wool produced in carding is returned to the owners whose goods I operate upon. Use yearly soap one ton, and urine 50 barrels. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power, steam 10 and water 4 nominal horse-power. Consume yearly 312 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are put on land as manure. No suggestions to offer.
Allott Brothers, Dyers and Finishers of Woollen Goods.	Upper Mill, Saddleworth.	Our works are situated on the river *Tame*, a tributary of the *Mersey*. Employ 22 hands. Rateable value of works, 70*l.* The bed of the stream has not silted up opposite our works. Our works are not affected by floods. We have noticed very little change in the condition of the river during the last 40 years; it is polluted to a very great extent by works above, not to our knowledge by mines. Obtain supply of water from the river; do not know the annual consumption at our works; but it is a very large volume. We dye yearly goods of the value of 60,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Use yearly 44,800 lbs. of dye wares, chiefly logwood, indigo and aniline dyes. The spent dye stuffs are burned. Do not use any bleaching materials or oil. Use yearly soap, 20,000 lbs.; alkali, 5,000 lbs.; and urine, 2,600 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 16 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are used for repairing roads. The excrements of our workpeople are used for manure. No suggestions to offer.
The Tanned Leather Company, Tanners.	Armett Works, Greenfield,	Our tanyards are situated on an affluent of the *Tame*, a tributary of the *Mersey*. Employ 65 hands. Rateable value of tanyards, 141*l.* The bed of the stream has silted up owing to the solid refuse thrown into it and brought down in time of flood. The country has been denuded of wood within the last 70 or 80 years, and the mosses a good deal drained, consequently the heavy rains have nothing to retain them, and they flow off in considerable floods, carrying sand and *débris*, and silt up the bed of the streams. Our tanyards are affected by floods. There has been no change in the condition of the river within our knowledge, during the last seven years. The stream is not polluted by works above, but the *Tame* is seriously polluted. One of our firm, much to his surprise, caught in the *Tame*, at Upper Mill, one mile above this place, six small fish in good condition, showing that fish can still exist in the stream although it is badly polluted. The stream is not polluted by mines within our knowledge. Obtain supply of water from springs, but cannot tell the annual consumption at our tanyards. Tan yearly 20,000 hides, weighing from 40 to 96 lbs. each. Produce 800,000 lbs. of leather. Use yearly, lime, bark, valonia, shumac, gambir, and gall nuts, about 321 tons; also pigeons' dung, but not a very large quantity. Obtain yearly 72 tons of hair in the process of depilation, which is sold to plasterers. Obtain 60 tons of fatty matter in the process of fleshing, which is partly boiled into size, and partly sold to size boilers. We have 100 tanpits, 7 feet by 6 feet by 6 feet. Do not use any dyeing materials. The whole of the waste liquid produced at our tan-yards flows into depositing tanks, and thence into the stream. Use steam 12 nominal horse-power. Consume yearly 350 tons of coal, the ashes from which are ground and mixed with lime to be used for building purposes. The excrements of our workpeople are removed on to land, and used as manure. We are of opinion that if all manufacturers were compelled not to allow acid or alkali to flow into rivers, it would improve matters very much. Thoroughly constructed filter ponds through which the polluted water could pass on its way to the river would deprive it of its deleterious substances, and would probably not be very costly. If great care is not taken, nothing is more deadly than refuse from a paper mill; yet in many counties, close under a power mill stream, very fine trout can be seen in great numbers, showing that such manufactures can exist and do exist, without polluting the stream. The same means in other districts should produce similar results.

Series A, B, C, D, Trades and Manufactures—(Basin of the Tame)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joseph Clair, Dyer and Finisher of Yarns.	Frenches Mill, Greenfield.	My works are situated on the *Tame*, a tributary of the *Mersey*. Employ 12 hands. Rateable value of works, 75*l*. The bed of the stream has silted up, but not to a very great extent. My works are not affected by floods. The river is polluted to a very serious extent by works above; not to my knowledge by mines. Obtain supply of water from the river, and consume yearly 10,000,000 gallons. Dye yearly 75,000 lbs. of goods, of the value of 8,000*l*. The whole of the liquid refuse produced at my works flows direct into the mill-race and thence into the stream. Use yearly 30,000 lbs. of dye wares, chiefly logwood and fustic. The spent dye stuffs are burned. Do not use any bleaching materials. Do not use either oil, soap, alkali, or urine. Use both steam and water, 24 nominal horse-power. Consume yearly 300 tons of coal; make about 30 tons of ashes, which are used to repair roads. The excrements of my workpeople are taken away by farmers as manure. No suggestions to offer.
		Basin of the Severn.
Edwin Chapman, Flannel Manufacturer.	Newtown, Montgomeryshire.	My works are situated on the *Mule Brook*, a tributary of the *Severn*. Employ 55 hands. Rateable value of works, 65*l*. The bed of the stream has not silted up. My works are not affected by floods. The condition of the brook is quite clear; it is not polluted by works above, nor by mines. Obtain supply of water from the stream, but do not know the annual consumption at my works. Manufacture yearly goods of the value of 4,000*l*. The whole of the waste liquid produced at my works flows direct into the stream. Do not use either dye wares or bleaching materials. Use yearly olive oil of the value of 130*l*. The waste wool produced in carding is sold. Do not use either soap, alkali, or urine. Use water as power. The excrements of my workpeople are removed and used as manure. No suggestions to offer.
Edward Smith, Carder and Slubber.	Green's Mill, Newtown.	My works are situated on the river *Severn*. Employ 3 hands. Rateable value of works, 40*l*. The bed of the stream has not silted up. My works are not affected by floods. The river is not polluted by works above, nor by mines. Obtain supply of water from the river, but do not know the annual consumption at my works. Operate yearly upon 10 tons of goods, of the value of 2,000*l*. Produce one ton of waste wool in carding, which is sold for manure. The whole of the waste liquid produced at my works flows into the river. Do not use any dye wares or bleaching materials. Use yearly 2,000 gallons of Gallipoli oil, of the value of 100*l*. Do not use either soap, alkali, or urine. Use water 6 nominal horse-power. The excrements of my workpeople are used as manure. No suggestions to offer.
Richard Hughes, Flannel Manufacturer.	Abermule, Newtown.	My works are situated in the *Mule*, a tributary of the *Severn*. Employ 4 hands. Rateable value of works, 20*l*. The bed of the river has not silted up. My works are not affected by floods. The water is comparatively clear. It is not polluted by works above, nor by mines. Obtain supply of water from the stream, but do not know the annual consumption at my works. Manufacture yearly goods of the value of 2,000*l*. The whole of the waste liquid produced at my works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly, olive oil of the value of 120*l*. The waste wool produced in carding is sold to oil extractors. Do not use either soap, alkali, or urine. Use steam as part power. Do not know the quantity of coal consumed; the ashes from which are carted away. The excrements of my workpeople are used for manure. No suggestions to offer.
William Matthews, Flannel Manufacturer.	Byander Mills, Newtown.	I am one of five tenants occupying works on the *Severn*. Employ 5 hands. Rateable value of works, 33*l*. 10*s*. The bed of the stream has not silted up. The works are affected by floods. The condition of the stream is much in the same state as it always has been within my knowledge. The river is polluted by works above, not to a very serious extent; but not by mines. Obtain supply of water from wells, but do not know the annual consumption at my works. Manufacture yearly, 12,000 lbs. of goods, of the value of 2,800*l*. The whole of the waste liquid produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials Use yearly, 2 tons of olive oil, of the value of 120*l*. Produce yearly, 200 lbs. of waste wool in carding, which is sold. Do not use either soap, alkali, or urine. Use both steam and water; steam 16 and water 12 nominal horse-power. Consume yearly, 80 tons of coal, the ashes from which are carted away to fill up hollow places. The excrements of my workpeople are conveyed into the river. Have no suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Severn)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 7[c]
John Jones, Flannel Manufacturer.	Tibbott's Mill, Newtown.	My works are situated on the *Severn*. Employ 6 hands. Rateable value of works, 44*l*. The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has not changed within my knowledge. It is polluted by works above, by gasworks, and also by mines, but not within the immediate neigbourhood of Newtown. Obtain supply of water from the river. Do not know the weight and value of goods I manufacture yearly. The whole of the waste liquid produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Do not use soap, alkali, or urine. Use water as power. The excrements of my workpeople are used for manure. Have no suggestions to offer.
E. Shaw & Company, Carpet Manufacturers.	Kidderminster.	Our works are situated on the *Stour*, a tributary of the *Severn*. Employ 120 hands. Rateable value of works, 300*l*. The bed of the stream has silted up. Our works are not affected by floods. The river is polluted by works above, but not in our neighbourhood by mines. Obtain supply of water from the river, and consume yearly 45,000,000 gallons. Clean water would be of great value to us for dyeing operations, and also for steam boiler purposes, but we are not able to fix the amount. Manufacture yearly 200 tons of goods of the value of 45,000*l*. Dye yearly 150 tons of yarn. Produce yearly liquid refuse from washing 25,000,000 gallons, from dyeing 9,000,000 gallons, and soapsuds 800,000 gallons. Have no depositing tanks, and do not filter our liquid refuse, which flows through sewers direct into the river *Stour*. Use yearly 78,000 lbs. of dye wares, chiefly dye woods, cochineal, indigo, and vitriol; also 14,000 lbs. of glue; the spent dye stuffs are turned into the river. Use yearly as bleaching materials 1,000 lbs. of solid brimstone. Do not use any oil, but use yearly 8 tons of soap, and alkali, no urine. The soapsuds are not treated for the recovery of the grease. Use steam 14 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are taken away as rubbish. The excrements of our workpeople pass through sewers into the river *Stour*. Have no suggestions to offer.
John Everard Barton, Carpet Manufacturer.	Vickars Street, Kidderminster.	My works are situated on the *Stour*, a tributary of the *Severn*. Employ 130 hands. Rateable value of works, 331*l*. The bed of the stream has silted up. Our works are not affected by floods. The condition of the stream is very foul and emits a very offensive stink, which is at times almost unbearable. The river is polluted by works above, but not in this neighbourhood by mines. Obtain supply of water from an artesian well, and consume yearly 40,000,000 gallons. If the river were rendered clear and colourless it would be of no direct money value to me, as I have been at the expense of sinking an artesian well, from which I obtain a good supply of water. Manufacture yearly goods of the value of from 40,000*l*. to 50,000*l*. I have no depositing tanks. The whole of the waste liquid produced at my works flows direct into the river. Do not know the weight of the dye wares used yearly. The liquid dye stuffs are turned into the river, and the solid are burned. Use yearly as bleaching materials 340 lbs. of solid brimstone. Do not use any oil. Use yearly 3 tons of soap, 3 tons of soda, and ½ ton of ammonia. The soapsuds are not treated for the recovery of the grease, but are turned into the river. Use steam, 14 nominal horse-power. Consume yearly from 1,400 to 1,500 tons of coal, the ashes from which are carted away on to waste land. The excrements of our workpeople are conveyed into the river.
H. R. Willis & Company, Brussels Carpet Manufacturers.	Worcester Cross Mill, Kidderminster.	Our works are situated on the *Stour*, a tributary of the *Severn*. Employ 90 hands. Rateable value of works, 285*l*. The bed of the stream has silted up. Our works are not affected by floods. We have only been in possession of the works for five months and cannot speak as to the past condition of the river. The river is polluted by works above, not within our knowledge by mines. Obtain supply of water from wells, but do not know the quantity consumed. Manufacture and dye yearly 200 tons of goods, of the value of 40,000*l*. Have no depositing tanks, and the whole of the waste liquid produced at our works flows direct into the river. Use yearly 130,000 lbs. of dye wares, chiefly cochineal, extract of indigo, archil, tartars, argol, logwood, and fustic; the spent dye-stuffs are turned into river. Use as bleaching materials 2,600 lbs. of solid brimstone. Do not use any oil. Use yearly 3½ tons of soap, alkali 2 tons, but no urine. The soapsuds are not treated for the recovery of grease. Use steam, 25 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are carted away on to spare land. The excrements of our workpeople are conveyed by waterclosets into the river. No suggestions to offer.

Series A, B, C, D, Trades and Manufactures—(Basin of the Severn)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Thomas James, Paper Manufacturer.	Hurcott Mill Kidderminster.	My mills are situated on an affluent of the *Stour*, a tributary of the *Severn*. Employ from 50 to 80 hands. Rateable value of mills, 200*l*. The bed of the stream has silted up, but not in a considerable degree. My mills are not affected by floods. There has been very little difference in the condition of the stream within my knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from springs, but do not know the annual consumption at my mills. The water is sufficiently clear for manufacturing purposes. Use, yearly, rags, 91 tons; soda ash, 3 tons; crystals of soda, 5 cwt.; bleaching powder, 2½ tons; alum, 1¼ tons; vitriol, ¾ of a ton; and, soap, 9 firkins. The whole of the waste liquid produced at my works flows direct into the stream. Manufacture yearly 75 tons of superfine writing paper. Produce yearly about one ton of rag dust, which is sold to brown paper makers. Use both steam and water as power, 25 nominal horse-power. Consume yearly 800 tons of coal; the ashes from which are carted away by farmers for repairing roads. The excrements of my workpeople are removed and used as manure. No suggestions to offer.
Charles Hooper & Company, Superfine Woollen Cloth Manufacturers.	Eastington Mills Stonehouse, and Stanley St. Leonards.	Our mills are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 500 hands. Rateable value of works, 725*l*. The bed of the stream has not silted up. Our mills are not affected by floods. The river is polluted by works above, not by mines. Obtain supply of water from the stream; and consume yearly 279,000,000 gallons. If the river, from which we might derive a supply of water, were rendered clear and colourless, it would be of considerable money value to us, but we are not able to fix the amount. Manufacture yearly 200,000 lbs. of goods, of the value of 70,000*l*., of which one-third is dyed at the works. Produce yearly liquid refuse from washing and soapsuds 100,000 gallons and dyeing 100,000 gallons. Have no depositing tanks, and the whole of the waste liquid produced at our works flows direct into the stream. Use yearly 10 tons of dye wares, chiefly logwood, and barwood; also ½ ton of mordants, such as copperas, bichromate of potash, and alum. The spent dye stuffs are discharged into the stream. Do not use any bleaching materials. Use yearly 20 tons of olive oil of the value of 1,100*l*.; and five tons of Price's patent oil, of the value of 180*l*. Fifteen tons of the waste wool produced in the process of carding is sold, the remainder is re-worked again. Use yearly soap, 12 tons; soda, three tons; and urine, 7,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam 150 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are conveyed into the stream. Have no suggestions to offer.
S. S. Marling & Company, Woollen Cloth Manufacturers.	Ebley Mills, Stroud.	Our works are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 515 hands. Rateable value of works, 769*l*. The bed of the stream has not silted up near our works; it is our custom to clean out that portion of it yearly. Our works are not affected by floods. The condition of the stream has not changed within our remembrance. The stream is discoloured by refuse from dye works and by all the woollen cloth mills to some but not to a serious extent. There are no mines in this district. We use the water of the river for all purposes at our works, but are not able to state the quantity. We take what is required from the stream, and return the water after use. Except after heavy rains, or when the mud in the bed of the river is artificially disturbed, the stream is sufficiently clear and colourless for all our manufacturing purposes. We manufacture yearly 2,550 cwt. of goods, of the value of 120,000*l*. Produce yearly, liquid refuse from washing, 800,000 gallons. The whole of the liquid refuse produced at our works, except soapsuds, flows direct into the stream. Do not use any dye wares at these mills. The dyeing is done at public dye works. Do not use any bleaching materials. Use yearly, olive oil of the value of 1,200*l*. Produce yearly from 4 to 5 tons of waste wool in the process of carding, which are sold to dealers in "flocks." and "shoddy." Use yearly, soap 20 tons, soda 15 tons, and urine 50,000 gallons. The soapsuds are partially treated for the recovery of the grease, by which we gain 60*l*. a year. Use both steam and water as power; steam 160 and water 50 nominal horse-power. Consume yearly 2,000 tons of coal, the ashes from which are used for repairing roads and footpaths, and also ground and mixed with lime for mortar. A small portion of the excrements of our workpeople is conveyed into the stream; the larger portion, however, is used for manure. There is a considerable accumulation of mud annually in the river or stream, which is moved by hand labour every summer, the mills being stopped a couple of days simultaneously for this purpose; the sluices being drawn, the water is kept on the scour, and the mud being loosened by spade labour it is

Series A, B, C, D, Trades and Manufactures.—(Basin of the Severn)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
S. S. Marling & Company—*cont.*	Ebley Mills, Stroud—*cont.*	carried away lower down the stream. We have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Marling, Leonard, & Company, Woollen Cloth Manufacturers.	Stanley Mills, Stanley, near Stonehouse.	Our works are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 400 hands. Rateable value of works, 795*l*. This includes the dye houses, sublet to J. Gaynor and Company. The bed of the stream has not silted up. Our works are not affected by floods. The stream is discoloured by refuse from various mills and dye houses up the stream. The colouring matter being chiefly waste indigo and logwood, it has no offensive smell, nor does it seem to destroy fish, except trout. The stream is not polluted by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly from 75 to 80 tons of goods, of the value of 75,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly, olive oil of the value of 800*l*. Produce yearly 3 tons of waste wool in the process of carding, a portion of which is re-manufactured, and the remainder sold to flock and shoddy dealers. Use yearly, soap 15 tons, soda 10 tons, and alkali 20,000 gallons. The larger portion of the soapsuds are treated for the recovery of the grease, by which we gain 40*l*. a year. Use both steam and water as power; steam 100 and water 120 nominal horse-power. Consume yearly 1,400 tons of coal, the ashes from which are used for road making and mending, and mixed with lime for mortar. The excrements of our workpeople are passed by sewers into the river. Have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Ferrabee & Fox, Woollen Manufacturers.	Port Mills, Brimscombe, near Stroud.	Our works are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 80 hands. Rateable value of mills, 125*l*. The bed of the river has not silted up, as it is cleared out periodically; otherwise it would silt up to a considerable extent and become a nuisance. The custom is to send the mud down the stream till it reaches the *Severn*. This plan ought to be abandoned, and the mud should be wheeled out of the bed of the stream and utilized. Our works are not affected by floods. Twenty years ago the stream here was comparatively pure and the water beautifully clear and admirably suited for business purposes; it is now polluted by the refuse from all the shoddy works above, which at times interferes with our wool washing process, and if continued will lead to a lawsuit or compel us to adopt some other mode, more expensive, of washing. The river is polluted by works above; not by mines. Obtain supply of water jointly from the river and from springs, and consume yearly in washing and for cleansing purposes 6,000,000 gallons. Clean water is a necessity in our business, and we must, if possible, prevent its further pollution. We are anxious to see some general rules for avoiding pollution imperative on all manufacturers. We manufacture yearly 25 tons of goods of the value of 12,000*l*. Produce yearly liquid refuse from washing 4,000,000 gallons. We have no depositing tanks, and the whole of the liquid refuse produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly Gallipoli oil of the value of 300*l*. All the waste wool from the various processes is sold, and is an annual gain to us. We use yearly soap, alkali, and urine of the value of 300*l*. a year. The soapsuds are not treated for the recovery of the grease. Use both steam and water 40 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are collected and utilized as manure. We suggest, as the best means of avoiding pollution in future, that all manufacturers be compelled to return the water used in the various processes to the stream practically free from impurities and colouring matter, and that town sewage should be prevented from being turned into rivers. This would, in the case of the manufacturers in the *Frome* valley, involve but little trouble or outlay.
Grist, Sons, & Company, Flock and Shoddy Manufacturers and Woollen Waste Dealers.	Brimscombe	Our mills are at Lewiston, Bourne, and Gussage, situated on the Gloucestershire *Frome*, and its affluents, tributaries of the *Severn*. Employ 175 hands. Rateable value of mills, 364*l*. The bed of the streams have been cleaned out annually for some years past, and are now not silted up. The water is sufficiently clear for all ordinary manufacturing purposes. The streams are polluted to some extent by dye works and flock mills, but not by mines. Obtain our supply of water from the river and stream, and consume yearly from 40,000,000 to 50,000,000 gallons. Manufacture yearly, 600,000 lbs. of shoddy, of the value of 20,000*l*.; 900,000 lbs. of flocks and mattress wools, of the value of 10,000*l*.; and 100,000 lbs. of woollen waste, of the value of 5,000*l*.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Grist, Son, & Company, Flock and Shoddy Manufacturers and Woollen Waste Dealers—*cont.*	Brimscombe—*cont.*	The 40,000,000 or 50,000,000 gallons of water used annually by us carry off into the streams the dirt from the materials we use, probably to the extent of 300 tons per annum, some of this dirt being unquestionably decayed animal matter. We have no depositing tanks, and all this dirt is poured into the stream. We use yearly as dye wares, logwood, 20 tons, the refuse from which is burned; bi-chromate of potash, copperas, and other soluble dye wares, 1 ton; the refuse from this flows into the stream. Do not use any bleaching materials. Use yearly, 25 tons of olive oil, of the value of 1,400*l.* Produce yearly, about 6,000 lbs. of waste wool in the process of carding, which is made into flocks. Do not use any soap or alkali, but 200 gallons of urine yearly. Use both steam and water as power; 105 nominal horse-power. Consume yearly, 1,600 tons of coal; make 200 tons of ashes, which are given away; the fine to make mortar and the coarse to repair roads. The whole of the excrements of our workpeople pass into the river and stream. At present we have no suggestions to offer as to the best means of avoiding pollution in future, or as to the conservancy of rivers and streams.
Phillip, Charles Evans & Company, Woollen Manufacturers.	Brimscombe -	Our works are situated on the Gloucestershire *Frome*, a tributary of the river *Severn*. Employ 289 hands. Rateable value of works, 321*l.* 15*s.* The bed of the stream has silted up, but not to any appreciable extent. Our works are not affected by floods. The condition of the stream has not materially changed within our knowledge. It is polluted occasionally by dye and other works above; not by mines. Obtain supply of water from the stream, but cannot possibly estimate the annual consumption at our works. The river is clear enough for our purposes throughout the greater part of the year. Manufacture yearly 250,000 lbs. of goods, of the value of 50,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Use yearly as dye wares, logwood and bar wood 81 tons, dry salts, such as copperas, 10 tons, indigo 1 ton, oil of vitriol 3 tons, and alum 4 tons. The solid refuse is used on land, and the liquid is turned into the stream. Do not use any bleaching materials. Use yearly 13½ tons of olive oil. Produce yearly about 1½ tons of waste wool in the process of carding, which is sold to waste dealers. Use yearly, soap 14 tons, alkali 15 tons, and urine 19,500 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* Use both steam and water as power; steam 100 and water 30 nominal horse-power. Consume yearly 2,500 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople pass into sewers and thence into the stream. We have no suggestions to offer.
Alfred Smith & Company, Dyers.	Dudbridge Dye Works, near Stroud.	Our works are situated on the *Avon*, an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 24 hands. Rateable value of works, 300*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is better now than it was two or three years ago; there are more fish in it. We attribute this to two causes; first, the extraction of the grease from the soapsuds of woollen works by the Inchbrook Grease Extracting Company; and, secondly, to the slackness of the shoddy and flock trade in this neighbourhood during the last two or three years. The river is polluted by works above, but not to any appreciable extent; not by mines. Obtain supply of water from the stream, but do not know the annual consumption at our works. We dye yearly about 250 tons of wool. The whole of the waste liquid produced at our works flows direct into the stream. We use yearly 100 tons of dye wares, chiefly log and other woods. About two-thirds of the spent dye stuffs are turned into the stream. Do not use any bleaching materials or oil. Use yearly, soda 5 tons, and urine 5,200 gallons; the whole of this also goes into the stream. Use steam, 12 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are used to repair footpaths. The excrements of our workpeople are mixed with sawdust and used for manure. Have no suggestions to offer.
John Howard, Superfine Broad and Narrow Cloth Manufacturer.	Walbridge Mills, Stroud.	My mills are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 100 hands. Rateable value of works, 150*l.* The bed of the stream has silted up, but not to an appreciable extent. My works are not affected by floods. The condition of the stream has been much the same during the last 25 years. The stream is polluted by works above and by mines. Obtain supply of water from the stream and from springs, but cannot tell the annual consumption at my works. Manufacture yearly 250 cwt. of goods, of the value of 10,000*l.* The whole of the waste liquid produced at my works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 5 tons of olive oil. The whole of the waste wool produced in the process of carding is

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Howard, Superfine Broad and Narrow Cloth Manufacturer—*cont.*	Walbridge Mills, Stroud—*cont.*	sold. Use yearly, soap of the value of 60*l.*; soda of the value of 20*l.*; and urine, 2,000 gallons. The soapsuds and urine are turned into the stream. Use both steam and water as power; steam 24 and water 12 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are carted away and used, either for repairing roads or mixing with lime for mortar. The excrements of my workpeople are turned into the stream. Have no suggestions to offer.
George F. Tarram, Shoddy and Flock Manufacturer.	Inchbrook Mills, near Stroud.	My mills are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 55 hands. Rateable value of works, 150*l.* The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has not changed within my knowledge. It is polluted by works above called the Inchbrook Extracting Works, where indigo rags are treated, for the recovery of the indigo, by sulphuric acid in large quantities; the refuse containing this among other acids run into the stream in a liquid state. The stream is not polluted by mines. Obtain supply of water from the stream, but do not know the annual consumption at my works. Manufacture yearly from 200 to 300 tons of goods, of the value of 9,000*l.* I have no depositing tanks, and the whole of the waste liquid produced at my works flows direct into the stream. The dust from the flocks is saved and sold for manure. Do not use any dye wares or bleaching materials. Use yearly olive oil of the value of from 350*l.* to 500*l.* The whole of the waste wool produced in the process of carding is re-used in making flocks. Do not use soap, alkali, or urine. Use steam and water as power; steam 30 and water 25 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are mostly used for repairing roads. The excrements of my workpeople are turned into the stream. I suggest, as the best means of avoiding pollution in the future, that manufacturers should be compelled to filter their liquid refuse before turning it into streams.
Stanton & Sons, Woollen Cloth Manufacturers.	Stroud -	Our works are situated on the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 400 hands. Rateable value of works, 459*l.* The bed of the stream has not silted up, but the mud and sand are yearly removed by disturbance called "mudding." Our works are not affected by floods. The condition of the river is not so clear as formerly (35 years ago), and a more abundant growth of weeds exist, especially the so called "American weed." The river is polluted by works above not by mines. Obtain supply of water jointly from the stream and wells, but are not able to give the annual consumption at our works; use several millions of gallons daily. Manufacture yearly 75 tons of goods, of the value of 60,000*l.* The whole of the waste liquid, except soapsuds, flows direct into the river. There are depositing tanks for the soapsuds, oil, and refuse from the scouring of the cloth after weaving and after milling; about 14,000 gallons of this refuse are treated weekly by a company, by a patent process, for the recovery of the grease. The alkali is neutralized by vitriol, and the grease rises to the surface; the liquid refuse is then turned into the stream: the greasy matter is carted away from the premises for subsequent treatment. Do not use any dye wares or bleaching materials. Use yearly olive oil, Gallipoli, Malaga, and Sicily, of the value of 1,000*l.* The waste wool produced in the process of carding is used again in manufacture. Use yearly soap 22 tons, alkali 9 tons, and urine 30,000 gallons. The soapsuds are treated for the recovery of the grease, but we gain nothing by the extraction. Use both steam and water as power, steam 72 and water 24 nominal horse-power. Consume yearly 1,800 tons of coal, the ashes from which are used for filling up hollows, repairing roads and footpaths, and mixed with lime for building purposes. The excrements of our workpeople are used for manure. Pollution from excrementitious matters may be avoided, but from processes of manufacture it would be difficult, if not impossible, so long as they are carried on in the district. Rivers should be kept in such a state as to be reasonably enjoyed by the dwellers on their banks. Absolute purity is impossible for an open river; it is a question of degree. The state of a stream injurious to health and enjoyment should be prevented, if possible.
Bird & Buer, Woollen Cloth Manufacturers.	South Fields Mills, Stroud.	Our works are situated on an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 80 hands. Rateable value of works, 157*l.* There is more deposit of mud in the bed of the stream than formerly. Our works are not affected by floods. The stream is polluted by works above, not by mines. Obtain supply of water from the stream, but are not able to give the annual consumption at our works. Manufacture yearly 20 tons of goods, of the value of 4,700*l.* The whole of the liquid refuse produced at our works flows direct into

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Bird & Bubb, Woollen Cloth Manufacturers—*cont.*	South Fields Mills, Stroud—*cont.*	the stream. Use yearly 300 lbs. of dye wares, chiefly cochineal. The spent dye stuffs are turned into the stream. Do not use any bleaching materials. Use yearly 2½ tons of Gallipoli oil, of the value of 160*l.* Produce yearly 300 lbs. of waste wool in the process of carding which are sold. Use, yearly, soap, 3 tons: alkali, 3 tons; and urine, 10 tons. The soapsuds are not treated for the recovery of the grease. Use steam and water as power, steam 14 and water 10 nominal horse-power. Consume yearly 200 tons of coals, the ashes from which are partly put on land and partly used to repair roads. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Edward Wise, Cloth Manufacturer.	Woodchester Mills, near Stroud.	My mills are situated on the *Avon*, an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ from 80 to 100 hands. Rateable value of works, 170*l.* The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has not changed within the last 40 years. The river is polluted by works above, not by mines. Obtain supply of water from the stream and from springs; but do not know the annual consumption at my works. Manufacture yearly 30 tons of goods of the value of 12,000*l.* The whole of the waste liquids produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly three tons of Gallipoli oil of the value of 200*l.* Produce yearly two tons of waste wool in the process of carding which are partly sold to flock dealers, and partly used for manure. Use yearly soap, 3 tons; fullers earth, 6 tons; soda, 1 ton; and urine, 7,000 gallons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power, steam 30 and water 20 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are turned into the stream. Have no suggestions to offer.
Samuel Grist, Shoddy and Flock Manufacturer.	Merritts Mill, Woodchester.	My works are situated on the *Avon*, an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 32 hands. Rateable value of works, 110*l.* The bed of the stream has not silted up within my knowledge. My works are not affected by floods. The stream is polluted by works above, especially from the Inchbrook Indigo Extracting works. The river is not polluted by mines. Obtain supply of water from the river, but do not know the annual consumption at my works. I manufacture yearly 200 tons of goods of the value of 7,000*l.* The whole of the waste liquid produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 10 tons of olive oil, of the value of 500*l.* The waste wool produced in carding is used in the manufacture of flocks. Do not use either soap, alkali, or urine. Use steam, 18 nominal horse-power. Consume yearly 200 tons of coal, the ashes from which are used for repairing footpaths; they are carted away from the premises. The excrements of my workpeople are turned into the river. Have no suggestions to offer.
Flint and Sons, Woollen Cloth Manufacturers.	Nailsworth -	Our works are situated on the *Avon*, an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 150 hands. Rateable value of works, 250*l.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The water of the stream is in a very good condition. The river is occasionally polluted by dye works above, not by mines. Obtain supply of water from the stream, but it is impossible to state the annual consumption at our works. Manufacture yearly 30 tons of goods of the value of 30,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 7 tons of Galipoli oil, of the value of 370*l.* The whole of the waste wool produced in the process of carding is sold. Use yearly soda, 6 tons; alkali, 2 tons; and urine, 8,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* a year. Use steam, 90 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are conveyed into the stream. Have no suggestions to offer.
P. P. & C. Playne, Woollen Cloth Manufacturers.	Nailsworth -	Our works are situated on the *Avon*, an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 180 hands. Rateable value of works, 280*l.* The bed of the stream has not silted up. Our works are not affected by floods. The river is polluted to a slight extent by works above, not by mines. Obtain supply of water from the stream, but are not able to state the annual consumption at our works. If the river from which we might derive a supply of water were

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
P. P. & C. Playne, Woollen Cloth Manufacturers—*cont.*	Nailsworth—*cont.*	rendered clear and colourless it would be worth a direct money value to us of 20*l.* Manufacture yearly 50 tons of goods of the value of 35,000*l.* The whole of the waste liquid produced at our works, except soapsuds, flows direct into the stream. Use yearly as dye wares, logwood 40 tons, and alum 4 tons. The spent dye stuffs are either burned or buried. Do not use any bleaching materials. Use yearly olive oil of the value of 300*l.* The waste wool produced in the process of carding is sold. Use yeariy, soap 6 tons, soda 2½ tons, and urine 20,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 25*l.* a year. Use both steam and water as power; steam 24 and water 20 nominal horse-power. Consume yearly 800 tons of coal, the ashes from which are buried. The excrements of our workpeople are used for manure. Have no suggestions to offer.
William Playne, & Company, Woollen Cloth Manufacturers.	Longfolds, Michin-hampton.	Our works are situated on the *Avon*, an affluent of the Gloucestershire *Frome*, a tributary of the *Severn*. Employ 194 hands. Rateable value of works, 430*l.* The bed of the stream has not silted up. Our works are not affected by floods. They are situated at the head of the stream, which is there clear and pure. Obtain supply of water from the river, impounded in a reservoir, 13 acres in area; but do not know the annual consumption at our works. Manufacture yearly 125,000 lbs. of goods of the value of 40,000*l.* The whole of the liquid refuse produced at our works, except the soapsuds, flows direct into the stream. Use yearly as dye wares, logwood 90,000 lbs., and indigo 4,110 lbs. Do not use any bleaching materials. Use yearly 7 tons of olive oil of the value of 400*l.* Produce yearly 2,000 lbs. of waste wool in the process of carding, which are sold to shoddy merchants. Use yearly soap 7 tons, soda 2¾ tons, and urine 40,000 gallons. The soapsuds are treated for the recovery of the grease, by which we gain 15*l.* Use both steam and water, 80 nominal horse-power Consume yearly 800 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are mixed with the spent dye stuffs, and with the worn-out teasles, carted on to the land and used for manure. Have no suggestions to offer.
		Basin of the Windrush.
Charles Early & Company, Blanket, Rug, and Tweed Manufacturers.	Witney Mills, and New Mills, Witney.	Our mills are situated on the *Windrush*, a tributary of the *Thames*. Employ 250 hands. Rateable value of works, 450*l.* The bed of the stream has not silted up. Our mills are affected by floods, but this is not owing to the silting up of the bed of the stream. There has been no material difference in the condition of the river within our knowledge. The stream is not polluted by works nor by mines. Obtain supply of water from the river, which is sufficiently clear for our purpose, but are not able to state the annual consumption at our works. Manufacture yearly, 290,000 lbs. of goods of the value of 28,000*l.* Produce liquid refuse from dyeing, 45,000 gallons, and from soapsuds and washing, 45,000 gallons. The whole of this liquid refuse flows unfiltered direct into the river. Use yearly, 12 tons of dye wares; chiefly logwood, cochineal, madder, tartar, and indigo. The spent dye stuffs are either burned or used for manure. Use as bleaching materials, 4 tons of solid sulphur. Use 20 tons of olive and rape oil of the value of 1,600*l.* Produce yearly, 40,000 lbs. of waste wool in the process of carding, which are either re-used or sold for manure. Use yearly, soap, 10,000 lbs.; alkali, 7,000 lbs.; and urine, 20,000 gallons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power, 50 nominal horse-power. Consume yearly 400 tons of coal; the ashes from which are sold for manure. The excrements of our workpeople are used for manure. Have no suggestions to offer.
Edward Early & Sons, Woollen Manufacturers.	West End, Witney.	Our works are situated on the *Windrush*, a tributary of the *Thames*. Employ 150 hands. Rateable value of works, 160*l.* The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is not polluted by works nor by mines. Obtain supply of water from the river, and it is sufficiently clear for our purpose; but are unable to state the annual consumption at our works. Manufacture yearly 24,000 lbs. of goods of the value of 10,000*l.* The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares. Use yearly, as bleaching materials, 6 tons of solid sulphur. Use yearly 15 tons of rape and Gallipoli oil of the value of 655*l.* Produce yearly from 25 to 30 tons of waste wool in the process of carding, which are sold for manure. Use yearly, soap 2 tons, alkali 13 tons, and urine 50 tons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 10

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Edward Early & Sons, Woollen Manufacturers—*cont.*	Witney—*cont.*	and water 16 nominal horse-power. Consume yearly 100 tons of coals, the ashes from which are used on our own land. The excrements of our workpeople are used for manure. We have no suggestions to offer as to the pollution of rivers and streams.
Henry Early, jun., Blanket Manufacturer.	West End, Witney.	My works are situated on the *Windrush*, a tributary of the *Thames*. Employ 25 hands. Rateable value of works, 72*l*. The bed of the stream has silted up to a very small extent. My works are not affected by floods. The condition of the stream has not changed within my knowledge, except that the volume in passing down is not so great, owing to land drainage. The stream is not polluted by works above, nor by mines. Obtain supply of water from the river, but cannot state the annual consumption at my works. The water of the river is sufficiently clear for my manufacturing purposes. Manufacture yearly 30 tons of goods, of the value of 7,000*l*. I have no depositing tanks, and the whole of the waste liquid produced at my works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 3 tons of rape oil, of the value of 130*l*. Produce yearly 4 tons of waste wool in the process of carding, which are sold for manure. Use yearly, soap 2 tons, alkali 1 ton, fullers earth 6 tons, and urine 500 gallons. The soapsuds are not treated for the recovery of the grease. Use water as power, 12 nominal horse-power. The excrements of my workpeople are taken away from time to time to be used as manure.
Lapworth Brothers, Axminster Carpet Manufacturers.	Wilton, Wilts.	Our works are situate on the river *Wylie*, a tributary of the *Avon*. Employ 320 hands. Rateable value of works, *l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above, nor by mines. Obtain supply of water from well, but do not know the consumption at my works. We bleach and print yearly, 12 tons, and dye 10 tons of goods, of the value of 30,000*l*. The whole of the liquid refuse produced at our works flows direct into stream. Use yearly as dye wares, chiefly fustic, logwood, and chromates, and no indigo. Do not use any bleaching materials. Do not use either oil, alkali, or urine. Use yearly, ½ ton of soap. Use steam, 2 nominal horse-power. Consume yearly, 250 tons of coals, the ashes from which are taken away by farmers. The excrements of our workpeople are conveyed into the river. No suggestions to offer.
J. A. & A. Collier, Blanket Manufacturers.	Crawley Mills, Witney.	Our works are situated on the *Windrush*, a tributary of the *Thames*. Employ 24 hands. Rateable value of works, 60*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. Manufacture yearly goods of the value of 2,500*l*. The whole of the waste liquid produced at our works flows direct into the river. Do not use any dye wares. Use as bleaching materials 7 cwt. of solid sulphur. Use yearly rape oil of the value of 300*l*. The waste wool produced in the process of carding is used for manure. Use yearly soap 30 cwt., but neither alkali nor urine. The soapsuds are not treated for the recovery of the grease. Use water, 7 nominal horse-power. The excrements of our workpeople are used for manure. Have no suggestions to offer.

Basin of the Severn (Lower Avon).

H. D. Pochin & Company, Manufacturing Chemists.	Temple Backs, Bristol.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 23 hands. Rateable value of works, 160*l*. Are not aware that the bed of the stream has silted up. Our works are not affected by floods. Obtain supply of water jointly from waterworks and the river, and consume yearly about 400,000 gallons. We have one coke tower for condensing sulphuric acid. Use yearly, pyrites 800 tons, and sulphuric acid 1,050 lbs., and produce yearly, aluminous cake, about 1,000 tons. The whole of the liquid refuse produced at our works flows direct into the sewers, and thence into the stream. Use steam, 8 nominal horse-power. Consume yearly about 400 tons of coal, the ashes from which are carted away. The excrements of our workpeople are conveyed by watercloset into sewers, and thence into the river. Have no suggestions to offer.
Netham Chemical Company (Limited).	St. George's, Bristol.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 300 hands. Rateable value, 1,048*l*. The bed of the stream has silted up, caused by the muddy tidal water of the *Severn* flowing

Series A. B, C, D, Trades and Manufactures—Basin of the Severn (Lower Avon)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Netham Chemical Company (Limited)—*cont.*	St. Georges, Bristol—*cont.*	over the dam at spring tides, and depositing silt. Our works are not anected by floods. The stream is very turbid, but the condition of it varies. The river is polluted by works above; not, to our knowledge, by mines. Obtain supply of water jointly from river, wells, and waterworks; consume about 54,000,000 gallons yearly. If the river were rendered clear and colourless, the direct money value to us would be inappreciable. We have three condensing towers, 80 feet high 5 feet square; two, 32 feet by 8 feet square. There are also two flush towers. Our works are 38 feet 6 inches high, and 5 feet 4 inches square. The contents of the seven towers are 12,175 cubic feet. We use, and produce yearly, common salt 7,000 tons, sulphur 200 tons, pyrites 6.250 tons, limestone 7,200 tons, lime 2,000 tons, oxide of manganese 1,150 tons, bleaching powder 1,500 tons, alkali 4,200 tons, ammoniacal liquor 1,468,000 gallons, phosphate of lime and bones 733 tons, nitrate of soda 240 tons. We condense for use yearly 2,000,000 gallons of acid, 26°–27° Twad., and 740,000 gallons 22°–24° Twad. We condense and run to waste yearly 2,205,000 gallons of acid 2°–3° Twad., and 7,000,000 0½° Twad. We produce yearly 5,950,000 gallons of liquid refuse, which flow into depositing tanks, and thence into the river. The whole of the alkali waste at our works is operated upon, and 400 tons of sulphur are recovered annually, at a cost of about 5*l*. 2*s*. 6*d*. per ton. The sulphur recovered is about equal to the best seconds "Silesian;" value from 5*l*. to 7*l*. a ton. We do not recover the manganese from the waste chloride of manganese, but we are erecting Deacon's chlorine apparatus, which will avoid the production of waste manganese. Use steam, 105 (Boulton & Watt standard) nominal horse-power. Use yearly 21,500 tons of coal. Make 3,200 tons of ashes, which are thrown on to our waste heap. The excrements of our workpeople are conveyed from dry earth closets, and used for manure. Have no suggestions to offer.
William Butler and Company, Tar and Resin Importers and Distillers.	St. Phillips, Bristol.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 64 hands. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream has not altered within our knowledge. It is polluted by works above, but we think not by mines. Obtain supply of water from the river, and consume 2,500,000 gallons yearly. The water of the river is sufficiently clear for our purpose, except when affected by floods and tide. We use yearly 4,870 tons of coal tar; 1,150 tons of resin; and produce yearly 1,594 tons of creosote; 2,720 tons of pitch; 341 tons of light oil; 805 tons of vegetable oil; 80 tons of resin spirit; 34 tons of acid water; 73 tons of ammonia water; 92 tons of still bottom or pitch; 16 tons of carbolic acid; and 8 tons of anthracene. The water from the stills, and about 150 tons yearly of liquid refuse, flows direct into the river. Use steam, 18 nominal horse-power. Consume yearly 1,144 tons of coal: the ashes from which are used partly for building purposes, and the remainder to repair roads. The excrements of workpeople are discharged into the river. Have no suggestions to offer.
Stone and Tinson, Manufacturing Chemists.	Crew's Hole, Bristol.	Our works are situated on the river *Avon*. Employ 14 hands. Rateable value of works, 65*l*. The bed of the river has not silted up within our knowledge. Our works are occasionally affected by floods. The river is polluted by works and towns above, but not by mines. Obtain supply of water jointly from the river and springs; cannot give the annual consumption at our works. We use yearly 1,040,000 gallons of ammoniacal liquor, and 1,040 tons of muriatic acid, and produce yearly about 208 tons of sal ammoniac. The whole of the waste liquid produced at our works flows direct into the stream. Use steam, 4 nominal horse-power. Consume yearly 7,500 tons of coal, the ashes from which are taken to the new docks. The excrements of our workpeople are conveyed by sewers into the river. Have no suggestions to offer.
T. Palmer & Sons, Glue Manufacturers.	Locks Mills, Bedminster, Bristol.	Our works are situated on the *Malango* stream, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 45 hands. Rateable value of works, 60*l*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from the stream, but do not know the annual consumption at our works. We use yearly 1,000 tons of fleshings, and 3 tons of lime. Produce yearly about 100 tons of glue, and about 70 tons of grease. The whole of the waste liquid produced at our works flows direct into the sewers, and thence into the stream. Do not use steam power. Consume yearly about 300 tons of coal, the ashes from which are used for mixing with lime for building purposes. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Christopher Thomas & Brothers, Soap and Candle Manufacturers.	Broad Plain Soap Works, Bristol.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 180 hands. Rateable value of works, 978*l*. The bed of that portion of the stream opposite our works is prevented from silting up by constant dredging. Our works are not affected by floods. The river *Avon* is polluted by works above and by town sewage to a considerable extent; but we are not aware that it is by mines. Obtain supply of water jointly from the river and from the waterworks company; the consumption at our works is very large; but we are unable to give the volume. The river water is polluted, but not to such an extent as to render it unfit for lixiviating our soda, or for steam-boiler purposes We do not decompose the salt. Use yearly, sulphate of soda 2,010 tons; tallow, 2,900 tons; palm and other grease oils, 1,250 tons; resin, 900 tons; carbonate of soda crystals, 40 tons; common salt, not converted into alkali, 850 tons; quicklime, 700 tons; sulphuric acid, 25 tons; hydrochloric acid, 50 tons; bichromate of potash, 5 tons; and ultramarine, 5 tons. Produce yearly, hard soap, 7,500 tons; candles, 20,160 dozen lbs. "*dips*," and 31,200 dozen lbs. of "*composites*," by the distillation of fats and oils; palm and other refined oils, 520 tons; silicate of soda, 1,000 tons; pitch, 80 tons; and crystallized sulphate of soda, 200 tons. Produce yearly, 4,000,000 gallons of liquid refuse; we have no depositing tanks; and this flows direct into the sewers, and thence into the stream. We are erecting plant for recovering the sulphur from the alkali waste, according to Mond's patent process. Use steam, 45 nominal horse-power. Consume yearly, 9,000 tons of coal; make about 3,000 tons of ashes, which are used in our brickyards. Part of the excrements of our workpeople are deposited in earth closets and utilized for manure; and the remainder passes through the sewers into the river. Have no suggestions to offer. *At a branch works, in St. Philip's Marsh, we recover the sulphur from all our black ash waste and produce from* 2 *to* 2½ *tons of sulphur per week by Mond's process, and use from* 8 *to* 10 *tons of muriatic acid per week there.*
Lawson, Phillips, & Billings, Soap and Candle Manufacturers.	St. Philips Marsh, Bristol.	Our works are situated on the canal near the *Lower Avon*, a tributary of the *Severn*. Employ 80 hands. Rateable value of works, 450*l*. Our works are not affected by floods. Obtain supply of water from the canal, wells, and bore-holes, and from waterworks company, and consume yearly about 60,000,000 gallons. Use and produce yearly at our works, common salt 500 tons, lime 500 tons, oxide of manganese 2 cwt., black ash 2,500 tons, tallow 1,059 tons, grease 174 tons, oil 484 tons, resin 261 tons, soap 3,200 tons, and candles 200 tons. The whole of the liquid refuse produced at our works flows into depositing tanks, thence into the sewers, and thence into the stream. Use steam, 30 nominal horse-power. Consume yearly 4,000 tons of coal; the ashes from which are deposited upon rubbish heaps. The excrements of our workpeople are conveyed by sewers into the river. We suggest as the best means of avoiding pollution in future, that the whole of the sewage of the city, instead of being discharged into the stream, should be taken to the mouth of the river and there utilized by irrigation, as there is plenty of waste ground suitable for that purpose.
J. B. Moore, Soap Maker and Tallow Chandler.	Redcliffe Street. Bristol.	My works are situated on the canal near the *Lower Avon*, a tributary of the *Severn*. Employ 12 hands. Rateable value of works, 70*l*. The bed of the stream has not silted up to any considerable extent owing to frequent dredgings by the men employed by the dock company. My works are not affected by floods. The condition of the river has not changed within my recollection (extending back about 50 years). The course of the *Avon* here was converted into a floating harbour, about 1805. The river is polluted by works above; not by mines. Obtain supply of water partly from the river, and from waterworks; but am not able to give the annual consumption at my works. Use yearly, tallow 86 tons, grease 4½ tons; palm oil 14 tons; soda ash 8 tons; resin 3 tons; bi-chrome 224 lbs.; spirits of salt 840 lbs.; oxide of manganese 560 lbs.; oil of vitriol 2,800 lbs.; and produce soap 51 tons, and candles 57 tons. The waste from the steam tallow melting and tallow bleaching is run down into a receiver and allowed to settle, the surface is then skimmed to guard against waste, and the deposit taken out and sold. The liquid remaining (being a very dilute acid) flows down the sewers and thence into the river. The same remark applies also to palm oil bleaching for soap making. In both cases the quantity of liquid run off is small. Consume yearly 80 tons of coal, the ashes from which are taken away by barge. The excrements of our workpeople flow by sewers into the river. Have no suggestions to offer.
John Carwardine, Tallow Chandler and Melter.	Hopwell Road, Bristol.	My works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 6 hands. Rateable value of works, 40*l*. My works are not affected by floods. Obtain supply of water from the Bristol Waterworks

Series A, B, C, D, Trades and Manufactures—Basin of the Severn (Lower Avon)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
John Carwardine, Tallow Chandler and Melter—*cont.*	Hopwell Road, Bristol—*cont.*	Company, and consume yearly 50,000 gallons. I use yearly, sulphuric acid 3 tons, alkali 2 tons, oxide of manganese 12 cwt., alkali 2 tons, lime 7 cwt., and tallow 120 tons. Produce yearly, candles 100 tons. Produce yearly 20,000 gallons of liquid refuse, which flows unfiltered into sewers, and thence into the river. Use steam, 4 nominal horse-power. Consume yearly 40 tons of coal, the ashes from which are carted away to be used, mixed with lime, for mortar. The excrements of my workpeople are conveyed by waterclosets into the sewers, and thence into the river.
Great Western Cotton Company, Limited, Cotton Spinners.	Barton Hill -	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 1,465 hands. Rateable value of works, 2,380*l*. The bed of the stream has not silted up to an appreciable extent. Our works are not affected by floods. The river is polluted by works above, but not to a serious extent; it is not polluted by mines. Obtain supply of water from the river, and consume yearly 22,781,750 gallons. Manufacture yearly 1,480 tons of goods, of the value of 220,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. Do not use any dye wares, bleaching materials, oil, soap, alkali, or urine. Use steam, 610 nominal horse-power. Consume yearly 9,800 tons of coal; make 1,225 tons of ashes, which are all carted off the premises for railway ballast or for building purposes. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
Phillip B. Butler & Sons, Plaster and Putty Makers.	Cheese Lane St. Phillips, Bristol.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 6 hands. Rateable value of works, 76*l*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the river is tolerably clear. It is polluted by works above, not to any great extent, but not by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. Use yearly, whiting, 400 tons; gypsum, 600 tons; and bleaching powder, 16 tons. Produce yearly, plaster 230 tons, and putty 18 tons. The whole of the liquid refuse produced at our works flows direct into the sewers, and thence into the river. Use steam, 6 nominal horse-power. Consume yearly about 72 tons of coal, the ashes from which are carted away from our premises. The excrements of our workpeople are conveyed by sewers into the river. Have no suggestions to offer.
Cox Brothers, Tanners.	Clift House Tannery, Bedminster, Bristol.	Our tanyards are situate on the *Lower Avon*, a tributary of the *Severn*. Employ about 50 hands. Rateable value of works, 224*l*. 15*s*. The bed of the stream has silted up, caused by the men employed by the dock company throwing the scrapings from the harbour into the tidal river. Our tanyards are not affected by floods. The river is very much polluted by solid and liquid refuse thrown into it, but not by mines. Obtain supply of water jointly from wells and from the waterworks company, and consume yearly about 3,000,000 gallons. Tan yearly about 20,000 heavy hides. Use yearly, lime, 3,000 bushels; bark, 400 tons; and valonia, 300 tons. The whole of the hair obtained in depilation, and the fatty matter obtained in fleshing, is sold to farmers and to glue makers. We have 200 tan-pits varying in sizes from 4 feet to 10 feet square, and from 4 to 7 feet deep. Do not use any dye wares. The spent bark is burned under our steam boilers. The liquid refuse produced at our works flows into sewers and thence into the stream. Use steam, 30 nominal horse-power. Consume yearly about 1,000 tons of coal, the ashes from which are used for building purposes, and the tan ashes for manure. The excrements of our workpeople are used for manure. We suggest, as the best means of avoiding pollution in future, a comprehensive system of sewers for the city, with an outfall to carry the sewage and other liquid refuse 7 miles from the city, on to available waste land for utilization.
P. and S. Evans & Company, Tanners.	Avonside Tannery, Bristol.	Our tanyards are situated on the *Kennet and Avon Canal*, near the *Lower Avon*, a tributary of the *Severn*. The bed of the river has not silted up. Our works are not affected by floods. The condition of the river has not changed within our knowledge. It is polluted by the sewage of Bath and other towns above on the river and tributaries, but not by mines. Obtain supply of water jointly from the waterworks company, the canal, and from wells. Tan yearly, 35,000 hides. Do not use any pigeons', fowls', or dogs' dung. The whole of the hair obtained in depilation, and the fatty matter obtained in fleshing, is sold to glue makers. We have at our tanyards 452 tan-pits of various sizes. Do not use any dye wares. The whole of the liquid refuse produced at our works flows into sewers, and thence into the stream. Use steam, 20 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are taken away by farmers and manure manufacturers. The excrements of our workpeople are conveyed into sewers, and thence

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
P. and S. Evans & Company, Tanners —*cont.*	Avonside Tannery, Bristol —*cont.*	into the stream. We suggest, as the best means of avoiding pollution in future, that sewage and other liquid refuse should be intercepted, and prevented from flowing into the river, and should be conveyed to some distance from the city on to some waste lands near to the mouth of the river to be used for irrigation. *Four applications were made to this firm for complete answers to the queries sent, and in reply to the last application the following letter was received:—* *Avonside Tannery, Bristol,* *Sir,* 31*st August* 1871. *We beg respectfully to decline giving you any further information as to the quantities of the different materials used at these works further than that contained in our letter of March 3rd. We object to sending anything like a false statement, and we very much doubt if any tanner in the locality will send you a true one, if the details are given.* *We are, &c.* *The Secretary to Rivers Pollution Commission, Westminster, S.W.* (*Signed*) *P. & S. Evans & Co.*
W. H. Cox & Company, Tanners.	Bedminster, Bristol.	Our tanyards are situated on the *Malango*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 60 hands. Rateable value of tanyards, 313*l.* 10*s.* The bed of the river has silted up, caused by solid and liquid refuse turned into it. Our tanyards are not affected by floods. The river was formerly very pure and clear, and fit for all purposes; it is now very much polluted, and in summer is most offensive. Obtain supply of water jointly from the river and from wells; and consume yearly about 3,577,200 gallons. If the river or stream were rendered clear and colourless, it would be a direct money value to us of 50*l.* a year. Tan yearly, 754 tons of South American hides. Produce yearly, leather, 498 tons. Use yearly, lime, 320 tons; bark, 150 tons; valonia, 350 tons; gambir or terra japonica, 10 tons. Do not use any pigeons', fowls', or dogs' dung, bullocks' blood, or human excrement. The whole of the hair obtained in depilation, and the fatty matter obtained in fleshing, is sold to glue makers. We have at our tanyards 320 tanpits of various sizes. Do not use any dye wares. The whole of the refuse lime water produced at our works is conveyed into the river, and the refuse tan liquor into sewers, and thence into the stream. Use steam, 14 nominal horse-power. Consume yearly, 520 tons of coal, the ashes from which are carted away from our premises. The excrements of our workpeople are conveyed into waterclosets, and thence into the sewers. We suggest, as the best means of avoiding pollution in future, that rivers and streams should be put under proper inspection.
Alfred Shipley, Tanner.	Hill House Lane, Bedminster.	My tanyard is situated on the *Avon*, a tributary of the *Severn*. Employ 50 hands. Rateable value of works, 90*l.* The bed of the stream has not silted up. My tanyard is not affected by floods. The river is polluted by works above to a small extent, but not by mines. Obtain supply of water from wells, but am not able to state the annual consumption at my tanyard. The water of the river is not available for my purposes, as it is tidal, and therefore salt water. I tan yearly, of East India dry-salted hides, 400 tons; and produce yearly, leather 320 tons. Use yearly, lime 60 tons, valonia 80 tons, shumac 40 tons, gambir or terra japonica 250 tons, pigeons' dung 1,500 bushels, fowls' dung 100 bushels, and cod oil 12 tons. Do not use any dogs' dung, bullocks' blood, or human excrement. Obtain yearly 50 tons of hair in the process of depilation, which are sold for manure. Obtain yearly 300 tons of fleshings, which are sold to glue makers or used for manure. I have 150 tan-pits 6 feet by 5 feet, and 5 feet deep. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard flows direct into the stream. Use steam, 10 nominal horse-power. Consume yearly 1,000 tons of coal, the ashes from which are carted away. The excrements of my workpeople are conveyed by sewers into the river. Have no suggestions to offer.
Macgregor, Rake, & Company, Tanners.	East Street, Bedminster.	Our tanyard is situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 48 hands. Rateable value of tanyard, 230*l.* The bed of the stream has not silted up. Our tanyard is not affected by floods. The river is polluted by works above; not that we are aware of by mines. Obtain supply of water from wells and waterworks; but do not know the annual consumption at our tanyard. Tan yearly, South American hides 450 tons, and produce leather 250 tons. Use yearly, lime 4,500 bushels, bark 300 tons, valonia 500 tons, and a small quantity

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Macgregor, Rake, & Company, Tanners—*cont.*	East Street, Bedminster—*cont.*	of pigeons' dung. The whole of the hair obtained in the process of depilation and the fatty matter obtained in fleshing is sold in a wet state to glue makers. Do not use any dye wares. The whole of the waste liquid produced at our tanyard flows direct into swers, and thence into the river. Use steam, 20 nominal horse-power. Consume yearly 700 tons of coal, the ashes from which are carted away. The excrements of our workpeople are conveyed into sewers, and thence into the river. Have no suggestions to offer.
Henry Pethick, Tanner.	Malago Tannery, Bedminster.	My tanyard is situated on the *Malago* stream, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 35 hands. Rateable value of works, 130*l.* 10*s.* The bed of the river has silted up, caused by liquid and solid refuse turned into it, and by a weir formed below for the purpose of giving power to mills. My works are affected by floods, but not so much as formerly. The stream was formerly clear, and there was a plentiful supply of trout; it is now in a very foul condition, especially so in summer, owing to pollutions from various sources above: it is not polluted within my knowledge by mines. Obtain supply of water partly from the stream, but chiefly from wells. If the river were rendered clear and colourless, it would be of very considerable value to me, because the water is softer than the water obtained from wells. Tan yearly, hides 275 tons, and produce yearly, leather 150 tons. Use yearly, lime 73 tons, bark 100 tons, and valonia 330 tons. Do not use any pigeons', fowls', or dogs' dung, bullocks' blood, or human excrement. The whole of the hair obtained in depilation and the fatty matter obtained in fleshing is sold to glue makers. Have in my tanyard 80 limepits 6 feet by 6 feet and 5 feet deep; 112 tanpits 4 feet 9 inches by 7 feet, and 5 feet 6 inches deep; 12 latches, 10 feet by 10 feet, and 5 feet 6 inches deep. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard is conveyed into sewers, and thence into the stream. Use steam, 14 nominal horse-power. Consume yearly 360 tons of coal, the ashes from which are carted away to be used for building purposes. The excrements of my workpeople are conveyed into sewers, and thence into the stream.
John Score & Company, Tanners.	Keynsham and Twiverton.	Our tanyards are situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 20 hands. Rateable value of works, 280*l.* The bed of the stream has not silted up. Our tanyards are not affected by floods. The stream is not polluted by works above, nor by mines. Obtain supply of water from the stream, but do not know the annual consumption at our tanyards. Tan yearly, hides 185 tons. Produce leather, 93 tons. Use yearly, lime, 120 tons; bark, 350 tons; pigeons' dung, 150 bushels. The hair obtained in the process of depilation, and the fatty matter obtained in fleshing, is sold, in a wet state, to glue makers. We have, at our tanyards, 200 tanpits of various dimensions. Do not use any dye wares. The whole of the liquid refuse produced at our tanyards flows direct into sewers, and thence into the stream. Use steam and water as power; steam 4, and water 4, nominal horse-power. Consume yearly 50 tons of coal, the ashes from which are used for manure. The excrements of our workpeople are turned into the river. Have no suggestions to offer.
Henry Densham, Tanner.	Redcross St., Bristol.	My tanyard is situated on the *Frome*, and affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 11 hands. Rateable value of tanyard, 90*l.* The bed of the stream has not silted up during the last 8 years. My tanyard is not affected by floods. The stream is very much polluted by sewage and by works above, not by mines. Obtain supply of water from wells, but am not able to state the annual consumption at my tanyard. Tan yearly, market hides and skins, 150 tons. Produce yearly, leather 60 tons. Use yearly, lime 10 tons, bark 370 tons, and pigeons' dung, 120 bushels. Obtain yearly 8 tons of hair in the process of depilation, which are sold to plasterers, and 28 tons of fatty matter in the process of fleshing, which are sold to glue makers. I have 112 tanpits of various sizes. Do not use any dye wares. Produce yearly 50,000 gallons of liquid refuse, mostly lime water, which runs direct into the river. Use steam, 6 nominal horse-power. Consume yearly 100 tons of coal, the ashes from which are carted away. The excrements of my workpeople are carried away into sewers, and thence into the river. Have no suggestions to offer.
William Jones, Tanner.	Frome Bridge, Bristol.	My tanyard is situated on the *Frome*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 10 hands. Rateable value of tanyard, 66*l.* The bed of the stream has silted up, caused by filth and liquid and solid refuse thrown into it, and by long neglect. My tanyard is affected by floods, more especially in the last few years; partly owing to the silting up of the bed of the river, but partly owing to the arching

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
William Jones, Tanner—*cont.*	Frome Bridge, Bristol—*cont.*	over of a portion of the river near the centre of the city, and so confining the watercourse. I have been a resident in this locality all my life (48 years) and connected as assistant manager of these works for 34 years. I recollect the stream being pure enough for all manufacturing purposes, but for many years it has been so polluted by sewage and drainage as to be unfit for manufacturing purposes, and is most pestilential during the summer months; it is not polluted to my knowledge by mines. Do not obtain a supply of water from the river, because it is so polluted, nor from two wells sunk expressly on our premises, which have been contaminated by the water of the river infiltrating into them; but obtain supply of water from waterworks, and consume yearly 320,000 gallons. If the river, from which I might derive a supply of water, were rendered clear and colourless, it would be a direct money value to me of 20*l.* a year. Tan yearly, hides 50 tons, and produce yearly, leather 20 tons. Use yearly, lime 1 ton, bark 100 tons, shumac 1 ton, and pigeons' dung 15 bushels. Do not use either dogs' dung, bullocks' blood, or human excrement. Obtain yearly 250 bushels of hair in the process of depilation, which are sold to dealers, and obtain yearly 6 tons of fleshings, which are sold to glue makers. Have 5 tanpits, 9 feet by 6 feet by 6 feet deep; 5—6 feet 6 by 5 feet 2, and 5 feet 6 deep; 36—5 feet 3 by 3 feet, and 5 feet deep; also 5 limepits 10 feet by 3 feet 6 by 5 feet deep; and 3—4 feet by 3 feet, and 5 feet deep. Do not use any dye wares. Produce yearly 150,000 gallons of liquid refuse, chiefly spent tan liquor and lime water, which flow direct into the river, as the authorities will not allow us to turn them into the sewers. The spent lime deposited at the bottom of the pits is carted away afterwards for manure. Do not use steam as power. Consume yearly 24 tons of coal, the ashes from which are carted away for manure. The excrements of my workpeople are conveyed by public sewers into the river. I suggest that the best means of avoiding pollution of rivers in future would be the completing of the system of side or intercepting sewers, which system was commenced by the Bristol Board of Health in or about 1853, but has only been partially carried out, and from which plan, though of great cost to us in the shape of rates, we have received no benefit. The rapid growth of the suburbs of the city and villages, nearly 1,000 houses being built before any proper system of drainage is provided, such an immense quantity of sewage and drainage has poured into the river as to pollute it to a great extent. This is an increasing evil, which ought to be checked. A great deal may be done by cleaning out and improving the bed of the river for some years.
Isaac Carr & Company, Woollen Manufacturers.	Twiverton and Weston.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 800 hands. Rateable value of works, 476*l.* The bed of the stream has not silted up. Our works are not affected by floods. There has been no perceptible difference in the condition of the river within our knowledge. It is polluted, within our knowledge, by the city of Bath and other towns and villages above, situated on the river and its affluents. The river is not polluted, within our knowledge, by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly 300,000 lbs. of goods, of the value of 100,000*l.* The whole of the waste liquid produced at our works flows direct into the river. Use yearly 800,000 lbs. of dye wares, chiefly indigo, and dye woods. The whole of the spent goods are carted away. Do not use any bleaching materials. Use yearly 770 cwt. of Gallipoli oil, of the value of 2,100*l.* Produce yearly 20 tons of waste wool in the process of carding, which are sold. Use yearly soap 18 tons, and of urine an unknown quantity. The soapsuds are treated for the recovery of the grease, by which we gain 20*l.* a year. Use both steam and water as power; steam 18, and water 15, nominal horse-power. Consume yearly 3,500 tons of coal, the ashes from which are carted away from our premises. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
Joseph Hall, Paper Maker.	St. Catherine's Mills, near Bath.	My mills are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 13 hands. Rateable value of works, 120*l.* The bed of the stream has not silted up. My mills are not affected by floods. The stream is polluted by works above, but not to any considerable extent; not by mines. Obtain supply of water from the stream and from springs, but do not know the annual consumption at my mills. Use yearly, bagging and ropes 400 tons; alum 4 tons; lime 4 tons; and antichlor 1 ton. The whole of the waste liquid produced at my mills flows direct into the sewers. Produce yearly, brown and purple papers, 300 tons. Do not produce any rag dust. Use both steam and water as power; steam 31, and water 31, nominal horse-power. Consume

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Joseph Hall, Paper Maker—*cont.*	St. Catherine's Mills, near Bath—*cont.*	yearly 900 tons of coal, the ashes from which are partly sold for building purposes. The excrements of my workpeople are conveyed by waterclosets into cesspools. Have no suggestions to offer.
W. C. Clothier, Tanner.	Bath - -	My tanyard is situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 15 hands. Rateable value of works, 51*l.* The bed of the stream has not silted up. My tanyard is not affected by floods. Obtain supply of water jointly from springs and from wells, and consume yearly 786,240 gallons. Tan yearly, dry salted hides 120 tons, and produce yearly, leather 100 tons. Use yearly, lime 30 tons; bark 150 tons; valonia 100; shumac 3 tons; and pigeons' dung 80 bushels. Do not use any fowls' or dogs' dung, bullocks' blood, or human excrement. Obtain yearly 8 tons of hair in the process of depilation, which is sold to plasterers and used for manure. Obtain yearly 8 tons of fleshings, sold to glue makers. I have 200 tanpits in my tanyard, containing 60,000 cubic feet. Do not use any dye wares. The whole of the liquid refuse produced at my tanyard flows direct into sewers, and thence into the river. Use steam, 10 nominal horse-power. Consume yearly 150 tons of coal, the ashes from which are used for manure. The excrements of my workpeople are mixed with the refuse and used for manure. Have no suggestions to offer.
Harper, Taylor, & Little, Woollen Manufacturers.	Bradford - on-Avon.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 70 hands. Rateable value of work, 200*l.* The bed of the river has not silted up. Our works are not affected by floods. The condition of the river is tolerably good; it is polluted by works above, not by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. Manufacture yearly goods of the value of 20,000*l.* The whole of the liquid refuse produced at our works flows direct into the river. Do not know the quantity of dye wares used yearly; the spent dye stuffs are cast into the river. Do not use any bleaching materials. Use yearly 15 tons of olive oil of the value of 700*l.* Do not produce any waste wool. Use yearly, soap, 5 tons, but neither alkali nor urine. The soapsuds are not treated for the recovery of the grease. Use steam, 20 nominal horse-power. Consume yearly 360 tons of coal, the ashes from which are given away to persons carting them from the premises. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
S. Moulton & Company, Manufacturers of India Rubber.	Kingston Mills, Bradford - on-Avon.	Our mills are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 50 hands. Rateable value of works, 310*l.* The bed of the river has slightly silted up, caused by the washing away of the banks. Our mills are not affected by floods. The river is slightly polluted by the river *Biss*, which brings down the whole of the refuse from the mills and dyeworks, and the sewage of Trowbridge, and which flows into the *Avon* about a mile above our mills. Obtain supply of water from the river, which we use for power only. The whole of the liquid refuse produced at our mills flows direct into the river. Use steam, 50 nominal horse-power. Consume yearly 250 tons of coal, the ashes from which are used for filling up low lying land on the banks of the river. The excrements of our workpeople are conveyed into the river.
William Moore, Woollen Dyer.	Bradford - on-Avon.	My works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 20 hands. Rateable value of works, 80*l.* The bed of the stream has not silted up near my works. My works are not affected by floods. The river is polluted by works above, nor by mines. Obtain supply of water from the river, but am not able to give the annual consumption at my works. I dye yearly 200 tons of wool. The whole of the waste liquid produced at my works flows direct into the river. Use yearly 100 tons of dye wares, chiefly dye woods, and indigo. The spent dye stuffs are used principally for agricultural purposes. The spent dye liquor flows direct into the river. Do not use any bleaching materials, oil, soap, or alkali. Use yearly an unknown quantity of urine. Use steam, 3 nominal horse-power. Consume yearly 500 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are conveyed by waterclosets into the river. No suggestions to offer.
Edmonds & Jones, Woollen Manufacturers.	Bull Pit Mills, Bradford - on-Avon.	Our works are situated on the *Lower Avon*, a tributary of the *Severn*. Employ 75 hands. Rateable value of works, 50*l.* The bed of the stream has not silted up near our works. Our works are not affected by floods. The condition of the stream is very good. It is polluted to a slight extent by works above and the sewage of other towns above Trowbridge; but not by mines. Obtain supply of water from the river, but are not able to state the annual consumption at our works. Manufacture yearly 250,000 lbs. of goods of the value of 5,000*l.* The whole of the waste liquid produced at our works flows into the river.

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Edmonds & Jgnes, Woollen Manufacturers—*cont.*	Bull Pit Mills, Bradford on-Avon*cont.*	Do not use any dye wares or bleaching materials. Use yearly 4 tons of olive oil of the value of 192*l.* The whole of the waste wool produced in the process of carding is sold to shoddy merchants. Use yearly, soap 4 tons, and urine 4,500 gallons. The soapsuds are not treated for the recovery of the grease, but flow direct into the river. Use steam, 16 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are sold for building purposes. The whole of the excrements of our workpeople are conveyed into the river. No suggestions to offer.
John William Applegate, Woollen Manufacturer	Greenfield Mills, Bradford-on-Avon.	My works are situated on the *Avon*, a tributary of the *Severn*. Employ 200 hands. Rateable value of works, 200*l.* The bed of the river has not silted up opposite my works, the soil being soft; but lower down it has silted up considerably, and it is attributable to the detritus of the roads and streets washed into it as well as the solid and liquid refuse thrown in. My works are affected by floods. The river is polluted by the river *Biss*, which brings down the whole of the liquid pollution from the manufactories and town of Trowbridge, also the other towns and villages higher upon the river and its tributaries, but this pollution is appreciable only to a slight extent at these works. It is not polluted by mines. Obtain supply of water from the river. Consume yearly about 10,000,000 gallons, the whole of which is returned into the river. Manufacture yearly goods of the value of 20,000*l.*, and dye about 100,000 lbs. of wool. The whole of the waste liquid produced at my works flows direct into the river. Use yearly 50,000 lbs. of dye wares, principally dye woods. The spent dye woods are either sold or burnt. Do not use any bleaching materials. Use yearly 10 tons of olive and Price's patent oil of the value of 500*l.* Produce yearly 10,000 lbs. of wool in the process of carding, which is sold. Use yearly soap, 8,000 lbs; alkali, 12,000 lbs.; and urine, 10,000 gallons. The soapsuds are not treated for the recovery of the grease. Use both water and steam as power; water 30 and steam 30 nominal horse-power. Consume yearly 750 tons of coal, the ashes from which are sold for building purposes. The excrements of my workpeople are conveyed by closets into the river. No suggestions to offer.
William John Willis Wool Dyer.	Shawford Dye Works, Beckington, Somerset.	My works are situated on the *Frome*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 27 hands. Rateable value of works, 110*l.* The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has not changed during the last 20 years, within my knowledge. I believe it is not polluted by works above, nor by mines. Obtain supply of water from the river, and consume yearly about 8,000,000 gallons. The stream is always sufficiently clear for my purposes, excepting in flood. I dye yearly about 200 tons of wool. The whole of the liquid refuse produced at my works flows direct into the river. Use yearly 370,000 lbs. of dye wares, chiefly logwood, barwood, shumac, indigo, madder, argol, and camwood. The whole of the spent dye stuffs are turned into the river. Do not use any bleaching materials, oil, soap, or urine. Use yearly, alkali 12 tons. Use both steam and water as power, about 25 nominal horse-power. Consume yearly 600 tons of coal, the ashes from which are mixed with lime for mortar, and also the rougher portion for repairing roads. The excrements of my workpeople are conveyed by closets into the river. No suggestions to offer.
Levi Wood, Woollen Manufacturer.	Staple Mead Mills, near Frome.	My works are situated on the *Frome*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 63 hands. Rateable value of works, 200*l.* The bed of the stream has not silted up. My works are, especially in winter time, affected by floods, but this is not attributable to the silting up of the bed of the stream. The condition of the stream has not changed within my knowledge during the last 20 years. It is not polluted by works above, nor by mines. Obtain supply of water from the river, but do not know the annual consumption at my works. It is sufficiently clear for all my purposes. Manufacture yearly goods of the value of 12,000*l.* The whole of the liquid refuse produced at my works flows direct into the river. I use yearly, 3 tons of dye wares, chiefly dye woods. The spent dye chips are burnt. Do not use any bleaching materials. Use yearly 3 tons of olive oil. The waste wool produced in carding is either sold to oil extractors or used for manure. Use yearly, soap, 2½ tons, alkali, 1 ton, and urine, 10,000 gallons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 20 and water 25 nominal horse-power. Consume yearly 250 tons of coal, the ashes from which are used to repair roads. The excrements of my workpeople are conveyed into the river. No suggestions to offer.

Series A, B, C, D, Trades and Manufactures—Basin of the Severn (Lower Avon)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Henry Houston & Sons, Woollen Manufacturers.	Vallis Way, Frome.	Our works are situated on the *Frome*, a tributary of the *Severn*. Employ 140 hands. Rateable value of works, 105*l.* Our works are not affected by floods. Obtain supply of water from wells, and consume yearly about 200,300 gallons. Manufacture yearly 18 tons of goods of the value of 12,000*l.* Produce liquid refuse from washing 120,000, dyeing 65,000, and soapsuds 6,300 gallons. The whole of the liquid refuse produced at our works flows into sewers, and thence into the river. Use yearly 5,000 lbs. of dye wares, chiefly logwood, argol, fustic, and cochineal. The whole of the spent dye stuffs are turned into the river. Do not use any bleaching materials. Use yearly 800 gallons of Gallipoli oil of the value of 180*l.* Produce yearly 1,300 lbs. of waste wool in the process of carding, which is partly re-used and the rest sold to flock makers. Use yearly, soap, 2,200 lbs. The soapsuds are not treated for the recovery of the grease. Use steam, 28 nominal horse-power. Consume yearly 572 tons of coal, the ashes from which are used for building purposes. The excrements of our workpeople are mixed with various kinds of refuse and ashes and used for manure. No suggestions to offer.
Houston & Sons, Wool Scourers, Spinners, and Millers.	Welsh Mill, Frome.	Our works are situated on the *Frome*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 12 hands. Rateable value of works, 38*l.* 10*s.* The bed of the stream has silted up close to our mill, caused by mud gradually accumulating against a weir. Our works are occasionally affected by floods. The river is polluted by dye works and other works above, but not to an injurious extent; it is not polluted by mines. Obtain supply of water from the river, and consume yearly 900,000 gallons. We scour and operate yearly upon 58,000 lbs. of goods of the value of 3,860*l.* Produce yearly liquid refuse from washing 800,000 gallons, and soapsuds 14,000 gallons. The whole of the waste liquid produced at our works flows into the river. Do not use any dye wares, bleaching materials, or oil. Use yearly soap 4,480 lbs., and urine 5,200 gallons. The soapsuds are not treated for the recovery of the grease. Use water, 10 nominal horse-power. Consume yearly 50 tons of coal, the ashes from which are used for manure. The excrements of our workpeople are passed into the river. No suggestions to offer.
James Holroyd & Son, Dye-wood Grinders.	Frome	Our works are situated on the *Frome*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 12 hands. Rateable value of works, 50*l.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The river is polluted by works above, but not to a serious extent; not by mines. Obtain supply of water from the river. We do not use any dye wares, but prepare them for the dyers. The whole of the liquid refuse produced at our works flows direct into the river. Use steam, 25 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are used for building purposes. The excrements of our workpeople flow into sewers, and thence into the river. We do not pollute the river except by the excrements of our workpeople, which we could easily prevent by utilizing them on land adjoining our mills.
Thompson and Le Gros, Silk Manufacturers.	Frome	Our works are situated on the *Frome*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 240 hands. Rateable value of works, 225*l.* The bed of the river has not silted up. Our works are not affected by floods. The main stream of the river has been diverted into a new channel, and near our works the old channel is used as back water. The river is polluted by works above, but not to any serious extent. It is not, within our knowledge, polluted by mines. Obtain supply of water jointly from the river and from springs, and consume yearly 8,000,000 gallons. We manufacture yearly 14,000 lbs. of goods of the value of 30,000*l.* Produce yearly, liquid refuse from dyeing 180,000 gallons, and soapsuds 2,000 gallons. The whole of the liquid refuse produced at our works flows direct into the river. Consume yearly as dye wares, valonia 8 tons, copperas 5 tons, nitrate of iron one ton, and sulphuric acid a quarter of a ton. The spent valonia is used as manure; the copperas nitrate, and acid flow into the river. Do not use any bleaching materials, oil, alkali, or urine. Use yearly one ton of soap. The soapsuds are not treated for the recovery of the grease. Use yearly steam, 54 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are carted away for building purposes. The excrements of our workpeople flow into the river. No suggestions to offer.
B. Grant, Dyer	Spring Gardens, Marston Biggott.	My works are situated on the *Mell Stream*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 7 hands. Rateable value of works, 32*l.* 8*s.* The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has not

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
B. Grant, Dyer—*cont.*	Spring Gardens, Marston Biggott—*cont.*	changed within my knowledge. It is not polluted by works above, nor by mines. Obtain supply of water from the river, but do not know the annual consumption at my works. Do not know the value of the goods dyed yearly. The whole of the waste liquid produced at my works flows direct into drains, and thence into the river. Use yearly 5 tons of dye wares, chiefly logwood. The spent dye stuffs are burnt. Do not use any bleaching materials. Do not use any oil, soap, or alkali, but use yearly 2,800 gallons of urine. Use steam, 3 nominal horse-power. Consume yearly about 100 tons of coal, the ashes from which are used for manure. The excrements of my workpeople are used for manure. Have no suggestions to offer, as the river is perfectly clear.
J. Dix & Sons, Woollen Manufacturers.	Hawkeridge Mill, Westbury.	Our works are situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 8 hands. Rateable value of works, 25*l.* 10*s.* The bed of the stream has not silted up. My works are affected by floods. The river is polluted by works above, but not by mines—by refuse from Bitham Mills. Obtain supply of water from the river, but do not know the annual consumption at our works. Manufacture yearly 2 tons of goods, of the value of 700*l.* The whole of the liquid refuse produced at our works flows into the river. Do not use any dye-wares or bleaching materials. Use yearly Gallipoli oil of the value of 40*l.* The whole of the waste wool produced in carding is sold to farmers for manure. Use yearly, soap 2 tons, alkali ½ ton, and an unknown quantity of urine. The soapsuds are not treated for the recovery of the grease. Use water, 8 nominal horse-power. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
A. Laverton, Woollen Manufacturer.	Bitham Mills, & Angel Mills, Westbury.	My works are situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 500 hands. Rateable value of works, 580*l.* 15*s.* The bed of the stream has not silted up. Our works are affected by floods. Obtain supply of water from springs, but do not know the annual consumption at my works. Manufacture yearly 120 tons of goods of the value of 80,000*l.* The whole of the waste liquid except the soapsuds flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 25 tons of Gallipoli and other vegetable oil of the value of 1,000*l.* Produce yearly 20 tons of waste wool in the process of carding, the best portion of which is re-used and the remainder sold for manure. Use yearly, soap 14 tons, and alkali 15 tons; but do not use any urine. The soapsuds are used for manuring grass fields. Use steam, 120 nominal horse-power. Consume yearly 1,500 tons of coal, the ashes from which are used partly for building purposes and partly mixed with the excrements of my workpeople and used for manure. No suggestions to offer.
Joseph Harrop, Woollen Cloth Manufacturer.	Boger's Mill, Westbury.	My works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 105 hands. Rateable value of works, 268*l.* The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream is clear. It is polluted by works above, but not to a very serious extent; not by mines. Obtain supply of water from the river, but do not know the annual consumption at my works. Manufacture yearly 38 tons of goods of the value of 25,000*l.* The whole of the waste liquid produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 1,000 gallons of Gallipoli oil of the value of 200*l.* Produce yearly 3 tons of waste wool in the process of carding, which is re-used when cleansed and prepared. Use yearly, soap 6 tons, and urine 6,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 35 nominal horse-power. Consume yearly 700 tons of coal; make 150 tons of ashes, which are removed by farmers and others for the repair of roads. The excrements of my workpeople are conveyed by waterclosets into the stream. I suggest, as the most certain way of preventing pollution in future, to do away with manufactories and to pension the proprietors.
Samuel Salter & Company, Woollen Cloth Manufacturers.	Home Mills, Trowbridge.	Our mills are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 450 hands. Rateable value of works, 826*l.* 5*s.* The bed of the stream has not silted up within our knowledge. Our works are not affected by floods. The river is very much polluted by works above, and a large quantity of filth collects in the summer time, especially in a dry season. It is not polluted, within our knowledge, by mines. Obtain supply of water from the river and stream, and use a very large quantity, but are not able to state the volume. If the river were rendered clear and colourless it would enable us to scour the cloth cleaner. Manufacture yearly goods of the value of 100,000*l.* The whole of the waste liquid produced at our works flows

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Samuel Salter & Company, Woollen Cloth Manufacturers—*cont.*	Home Mills, Trowbridge—*cont.*	direct into sewers and thence into the stream. Use yearly 312 tons of dye wares, chiefly dye woods. The spent dye stuffs are conveyed away by farmers for manure. Do not use any bleaching materials. Use yearly, Galipoli oil of the value of 2,000*l.* The whole of the waste wool produced in the process of carding is sold to manufacturers of the cheaper kind of cloth. Use yearly, soap 36 tons, alkali 10 tons, and "sig" or urine 40,000 gallons. The soapsuds are treated for the recovery of the grease, and we gain 40*l.* a year by the extraction. Use steam, 150 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are given away to builders to mix with lime for mortar. The excrements of our workpeople are conveyed by sewers into the river. Have no suggestions to offer.
Moore Brothers, Wool Dyers.	The Courts, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 24 hands. Rateable value of works, 100*l.* The bed of the stream has not silted up near our works. Our works are not affected by floods. We have not observed any alteration in the condition of the stream. It is polluted by works above, but not to a serious extent, not by mines. Obtain supply of water from the river, and consume yearly 480,000 gallons. Dye yearly 100 tons of wool, of the value of 22,400*l.* The whole of the waste liquid produced at our works flows into the stream. Use yearly 150,000 lbs. of dye wares, chiefly logwood, barwood, limewood, fustic, sumach, cudbear, redwood, brazilwood, alum, and also 5,000 lbs. of indigo. The spent dye stuffs are partly burned and partly turned into the stream. Do not use any bleaching materials or oil. Use yearly, alkali, 5 tons; and urine, 9,000 gallons. Use steam, 10 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are used for agricultural purposes. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.
John Thomas Clark, Woollen Cloth Manufacturer.	Trowbridge	My works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 204 hands. Rateable value of works, 512*l.* (This refers only to my works by the river side.) The bed of the stream has silted up. My works are occasionally affected by floods. The river is polluted by works above, not by mines. Obtain supply of water jointly from the river and from wells, but cannot state the annual consumption at my works. Manufacture yearly 200,000 lbs. of goods of the value of 50,000*l.* The whole of the waste liquid, except soapsuds, produced at my works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly, 16 tons of olive oil of the value of 800*l.* The whole of the waste wool produced in carding is sold to shoddy manufacturers. Use yearly, soap 18 tons, alkali, 5½ tons, urine, 40,000 gallons, and pigs' dung 4,000 gallons. The soapsuds are treated for the recovery of the grease, by which I gain 20*l.* a year. Use steam, 100 nominal horse-power. Consume yearly 1,800 tons of coal, the ashes from which are taken away to be mixed with mortar, and also for repairing roads. The excrements of my workpeople are conveyed into the river. I suggest, as the best means of avoiding pollution in future, a better system of town sewerage, embracing the carrying through other channels polluting liquids which now flow into the river, and conveying the same to a suitable place for utilization.
J. & E. Hayward, Woollen Manufacturers.	Upper Mills, The Courts, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 250 hands. Rateable value of works, 383*l.* 15*s.* The bed of the river has not silted up in the immediate vicinity of our works. Our works are not affected by floods. The condition of the stream has not changed, within our knowledge, during the last 25 years. The river is polluted by works above; and in very dry seasons, when there is a scarce supply of water, it is very offensive; it is not polluted by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly, 200,000 lbs. of goods of the value of 35,000*l.* The whole of the liquid refuse produced at our works flows direct into sewers, and thence into the river. Use yearly, 80 tons of dye wares, chiefly woods. The spent dye stuffs are chiefly burned for fuel, or used as manure. Use yearly, 15 tons of Galipoli oil, of the value of 750*l.* The whole of the waste wool produced in the process of carding is sold for manure. Use yearly, soap 7 tons, alkali 4 tons, and urine 400 hogsheads. The soapsuds are not treated for the recovery of grease. Use steam, 67 nominal horse-power. Consume yearly 1,400 tons of coal, the ashes from which are used either for agricultural or building purposes or making roads. The excrements of our workpeople are conveyed into the river. Have no suggestions to offer.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Brown & Palmer, Woollen Cloth Manufacturers.	Trowbridge -	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 500 hands. Rateable value of works, 827*l*. The bed of the stream has silted up, caused by sand and land drainage, and by liquid and solid refuse thrown into it in the town. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is not polluted by works above. Obtain supply of water from the stream, but do not know the annual consumption at our works. Manufacture yearly goods of the value of 80,000*l*. The whole of the waste liquid produced at our works flows into sewers and thence into the stream. Use yearly 180,000 lbs. of dye wares, chiefly dye woods. The spent dye woods are burned. Do not use any bleaching materials. Use yearly 30 tons of Gallipoli oil of the value of 1,500*l*. The whole of the waste wool produced in the process of carding is sold for manure. Use yearly, soap, 40 tons; alkali, 50 tons; and urine, 10,000 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 30 nominal horse-power. Consume yearly 3,000 tons of coal, the ashes from which are used for making roads and for building purposes. The excrements of our workpeople are conveyed by sewers into the river.
John Henry Webb & Sons, Woollen Manufacturers.	Bridge and Castle Mills, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 360 hands. Rateable value of works, 602*l*. 10*s*. The bed of the stream has not silted up near our works. Our works are not affected by floods. We do not consider that the stream is polluted by works above us, but it is polluted by town sewage, not by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. Manufacture yearly 160,000 lbs. of goods of the value of 45,000*l*. The whole of the waste liquid produced at our works, except soapsuds, flows direct into the river. Use yearly 170,000 lbs. of dye wares, chiefly dye-woods. The spent dye stuffs are either burned or used for manure. Do not use any bleaching materials. Use yearly, 15 tons of Gallipoli oil of the value of 720*l*. The best of the waste wool produced in the process of carding is re-used, the worst is sold for manure. Use yearly, soap 8 tons, alkali 7 tons, and urine 36,000 gallons. The soapsuds are treated for the recovery of grease, by which we gain 20*l*. a year. Use steam, 92 nominal horse-power. Consume yearly 2,550 tons of coal, the ashes from which are used either for building or agricultural purposes. The excrements of our workpeople are conveyed by sewers into the river. Have no suggestions to offer.
Chivers & Perkins, Woollen Manufacturers.	Castle Court Factory, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 50 hands. Rateable value of works, 70*l*. The bed of the river has not silted up near our works. Our works are not affected by floods. The condition of the stream has not changed within our knowledge. It is polluted by works above, not by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly 21,000 lbs. of goods. The whole of the waste liquid produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 2 tons of Gallipoli oil. Produce yearly 5 tons of waste wool in the process of carding, which are sold. Use yearly, soap 1 ton, alkali 1 ton, and an unknown quantity of urine. The soapsuds are not treated for the recovery of grease. Use steam, 12 nominal horse-power. Consume yearly 250 tons of coal, the ashes from which are used for agricultural purposes. The excrements of our workpeople are turned into the river. Have no suggestions to offer.
Stancomb Brothers, Woollen Manufacturers.	The Courts, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 189 hands. Rateable value of works, 385*l*. The bed of the stream has not silted up near our works. Our works are not affected by floods. There has been very little change in the condition of the river within our knowledge. It is polluted by works above, not by mines. Obtain supply of water from the river, but are not able to tell the annual consumption at our works. Manufacture yearly 54 tons of goods, of the value of 35,000*l*. The whole of the waste liquid produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly 13 tons of Price's patent, Gallipoli, and olive oil of the value of 695*l*. The whole of the waste wool produced in the process of carding is sold. Use yearly, soap 9 tons, but neither alkali nor urine. The soapsuds are not treated for the recovery of grease. Use steam, 50 nominal horse-power. Consume yearly 1,583 tons of coal, the ashes from which are either used for repairing roads or for manure. The whole of the excrements of our workpeople are turned into the river.

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Cogswell & Company, Woollen Manufacturers.	Innox Mills, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 60 hands. Rateable value of works, 120*l*. The bed of the river has silted up, caused by solid and liquid refuse thrown into it. Our works are occasionally affected by floods. The condition of the stream is now very much worse than we have ever known it. The refuse from slaughter-houses within the last three years has been turned into the stream, as also the sewage of the town, and solid and liquid refuse from manufactories, and the stench, especially in the summer time, is most horrible. It is not polluted within our knowledge by mines. Obtain supply of water jointly from the river and from wells; but cannot state the annual consumption at our works. We should very much prefer to have clean water, if it could be got from the river, but we make our present supply serve our purpose. Manufacture yearly goods of the value of 12,000*l*. The whole of the liquid refuse produced at our works flows direct into the river. Use yearly 20 tons of dye wares, chiefly logwood and barwood, also alum 4 tons, and spirits of salt 600 lbs. Do not use any bleaching materials. Use yearly 3 tons of Gallipoli oil of the value of 200*l*. Produce yearly about 3 tons of waste wool in the process of carding, which is sold. Use yearly soap 3 tons, and an unknown quantity of urine. The soapsuds are conveyed to grease extracting works near, but we gain nothing by the recovery of the grease. Use steam, 20 nominal horse-power. Consume yearly 480 tons of coal, the ashes from which are used either for manure or for mixing with lime for mortar. The excrements of our workpeople are conveyed into the river. We suggest, as the best means of avoiding pollution in future, that sewage and other liquid refuse should be conveyed on to suitable land and utilized, instead of being turned into rivers and streams.
Edward and John Kemp, Woollen Manufacturers.	Silver Street, Trowbridge.	Our works are situated on the *Biss*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 120 hands. Rateable value of works, 228*l*. 15*s*. The bed of the stream has not silted up. Our works are not affected by floods. Obtain supply of water from wells, but cannot give the annual consumption at our works. Manufacture yearly 30 tons of goods of the value of 18,000*l*. The whole of the waste liquid produced at our works is conveyed into sewers, and thence into the river. Do not use any dye wares or bleaching materials. Use yearly 6 tons of Gallipoli oil of the value of 250*l*. The whole of the waste wool produced in the process of carding is sold. Use yearly, soap, 3 tons; but neither alkali nor urine. The soapsuds are not treated for the recovery of the grease. Use steam, 30 nominal horse-power. Consume yearly 570 tons of coal; the ashes from which are either sold for agricultural or building purposes. The excrements of our workpeople are conveyed by sewers into the river.
J. and T. Beaven, Wool Staplers and Fellmongers.	Holt, Trowbridge.	Our tanyard is situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 60 hands. We do not know the rateable value of our premises. The bed of the stream has not silted up. Our works are slightly affected by floods. The stream is slightly polluted by drainage from buildings; but not by works or mines. Obtain supply of water jointly from stream and from wells; but are not able to state the annual consumption at our tanyard. We tan yearly about 52,000 sheep skins, and use yearly, lime 50 tons, bark 50 tons, shumac 12 tons, and a small quantity of dogs' dung. We do not use either pigeons' or fowls' dung, bullocks' blood, or human excrement. We obtain yearly, 15 cwt. of hair in the process of depilation, which are sold to plasterers; and 8 tons of fleshings, which are sold to glue makers. We have 4 taupits of the usual dimensions. We do not use any dye wares. The liquid refuse produced at our works flows direct into the stream. Consume yearly about 70 tons of coal, the ashes from which are used for building purposes. The excrements of our workpeople are carted away, and are used for manure. Have no suggestions to offer.
J. & E. Davies, Woollen Manufacturers.	Holt, Trowbridge.	Our works are situated on the *Chalfield brook*, an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 100 hands. Rateable value of works, 126*l*. The bed of the stream has not silted up. Our works are not affected by floods. The river is polluted by works above; not by mines. Obtain supply of water from the stream, having a storage reservoir at our works, which is filled from the river every night, after the mills above have discontinued work, and we get comparatively clean water. Manufacture yearly 30 tons of goods of the value of 15,600*l*. The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 3 tons of Gallipoli oil of the value of 180*l*. The waste

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Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
J. & E. Davies, Woollen Manufacturers—*cont.*	Holt, Trowbridge—*cont.*	wool produced in the process of carding is sold for manure. Use yearly, soap 3 tons, soda ½ a ton, and urine 6,240 gallons. The soapsuds are not treated for the recovery of the grease. Use steam, 18 nominal horse-power. Consume yearly 362 tons of coal, the finer portion of the ashes from which are taken away by farmers and used for manure, and the coarser portion by any person requiring them. The excrements of our workpeople are conveyed into a tank, deodorized, and removed by farmers for manure. Have no suggestions to offer.
W. Maltravers & Sons, Cloth Manufacturers.	Meltham -	Our works are situate on the *Lower Avon*, a tributary of the *Severn*. Employ 120 hands. Rateable value of works, 122*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the stream is clear. It is not polluted by works above, nor by mines. Obtain supply of water from the river, but are not able to give the annual consumption at our works. Manufacture yearly 60,000 lbs. of goods of the value of 16,000*l*. The whole of the waste liquid produced at our works flows direct into the stream. Do not use any dye wares or bleaching materials. Use yearly 8 tons of Gallipoli oil of the value of 230*l*. The inferior waste wool obtained in the process of carding is sold, and the better portion of it is reworked. Use yearly, soap 7 tons, and alkali 3 tons. The soapsuds are not treated for the recovery of the grease. Use steam, 50 nominal horse-power. Consume yearly 400 tons of coal, the ashes from which are either sold for agricultural purposes or for repairing roads. The excrements of our workpeople are conveyed partly into the river and partly by means of earth closets used for manure. We shall in all probability adopt earth closets for the whole of the excrements. Have no suggestions to offer.
James Smith & Sons, Tanners.	Laycock, near Chippenham.	Our tanyard is situated on an affluent of the *Lower Avon*, a tributary of the *Severn*. Employ 7 hands. Rateable value of tanyard, 30*l*. The bed of the stream has not silted up. Our tanyard is not affected by floods. The condition of the stream is clear; it is not polluted by works above, nor by mines. Obtain supply of water from the stream, but cannot give the annual consumption at our tanyards. We tan yearly, hides 35 tons, and produce leather 15 tons. Use yearly, lime 20 quarters, bark 100 tons, and pigeons' dung 20 bushels. The hair obtained in depilation is sold to plasterers, and the fatty matter obtained in fleshing is sold to glue makers. We have 50 tanpits of various sizes. Do not use any dye wares. The whole of the waste liquid produced at our tanyard flows direct into the stream. The whole of the excrements of our workpeople are used for manure. Have no suggestions to offer.

Basin of the Axe (Somerset).

W. H. Hodgkinson, Paper Maker.	Wookey Hole Mills, Wells.	My mills are situated on the river *Axe*. Employ 155 hands. Rateable value of mills, 370*l*. The bed of the stream has not silted up. My mills are not affected by floods. The river used to be fouled by refuse from lead mines on the Mendip Hills; but it is now clear. Obtain supply of water from the river, but do not know the annual consumption at my mills. Use yearly, rags 255 tons, soda ash 16 tons, crystals of soda 4 tons, hyposulphate of soda 6 tons, bleaching powder 9 tons, alum 5 tons, vitriol 6 tons, soap 2 tons, and anti-chlor 3,500 gallons. Produce yearly 60,000 gallons of liquid refuse, which flows unfiltered into the river. Produce yearly 200 tons of hand-made writing and drawing paper. Produce yearly 20 tons of rag dust or waste, which is sold to other manufacturers. Use both steam and water as power; steam 50 and water 70 nominal horse-power. Consume yearly 1,300 tons of coal, the ashes from which are used for building purposes. The excrements of my workpeople flow into the river. By working our waste liquids over again, we reduce what is already such a slight pollution that cattle and poultry drink the water immediately below our mills.
Tanner & Bridgett, Paper Manufacturers.	Chedder, near Weston-super-Mare.	Our works are situated on a tributary of the *Axe*. Employ 70 hands. Rateable value of works, 80*l*. The bed of the stream has silted up, caused by the "*hush*" or "*slimes*" from lead mines. Our works are affected by floods, but not to any great extent. 20 years ago the water of the river was comparatively pure and clear, but since that time it has been much discoloured by pollution from mines above. Obtain supply of water from springs, and from the stream itself after filtration, and consume yearly 72,000,000 gallons. Use yearly, rags, 7 tons 12 cwt. and 3 qrs.; Esparto, 229 tons 13 cwt.; soda ash, 73 tons 4 cwt.; caustic soda,

Series A, B, C, D, Trades and Manufactures—Basin of the Axe (Somerset)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Tanner & Bridgett, Paper Manufacturers—*cont.*	Chedder, near Weston-super-Mare—*cont.*	18 tons 4 cwt. 3 qrs.; crystals of soda, 1 ton 10 cwt.; bleaching powder, 84 tons 6 cwt.; alum, 17 tons 10 cwt.; lime, 73 tons 4 cwt.; antichlor, 4 tons; vitriol, 10 tons; soap, 1 ton 4 cwt.; straw, 297 tons 11 cwt.; paper shavings, 4 tons 4 cwt. 2 qrs.; wood pulp "prepared," 5 tons 18 cwt. 3 qrs.; and china clay, 35 tons 13 cwt. Produce 150,000 gallons of liquid refuse, which flows unfiltered into the river. We do not recover the soda from the waste Esparto liquor, as the quantity used would not pay us to do so. Manufacture yearly 266 tons of common printing paper. The whole of the waste rag dust produced is used for manure. Use steam and water as power; steam 25 and water 50 nominal horse-power. Consume yearly 1,240 tons of coal, the ashes from which are used for building purposes. The excrements of our workpeople are partly utilized for manure and partly thrown into the stream. Have no suggestions to offer.

Basin of the Parrot.

T. & S. Donne & Sons, Flax Manufacturers.	Castle Cary -	Our works are situate on the *Cary Brook*, a tributary of the *Parrot*. Employ 90 hands. Rateable value of works, 63*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above nor by mines. Obtain supply of water from the river, but do not know the annual consumption at our works. Manufacture yearly 90 tons of goods, of the value of 7,000*l*.; and dye 5 tons of goods of the value of 360*l*. The whole of the waste liquid produced at our works flows direct into the stream. Use yearly 3 tons of dye wares, chiefly logwood. The spent dye stuffs are burned. Do not use any bleaching materials, oil, soap, alkali, or urine. Use steam and water as power, steam 20 and water 8 nominal horse-power. Consume yearly 200 tons of coal, the ashes from which are used to repair roads. The excrements of our workpeople are used for manure. The town is about to be drained throughout, and depositing tanks so placed that no impurities will be conveyed into the river.
James Broadmead, Tanner.	Huish, Langport, Somerset.	My tanyard is situated on the river *Parrot*. Employ 18 hands. Rateable value of tanyards, 83*l*. 3*s*. 5*d*. The bed of the stream has not silted up. My works are not affected by floods. The condition of the stream has not changed within my knowledge. Obtain supply of water partly from the river, but do not know the annual consumption at my works. Tan yearly 6,000 hides. Produce yearly, leather 112 tons. Use yearly, lime 150 hogsheads; valonia, 130 tons; divi divi, 130 tons. Do not use any pigeons', fowls,' or dogs' dung, bullocks' blood, or human excrement. The whole of the hair obtained in the process of depilation is sold to plasterers. Obtain 2 tons of fatty matter in the process of fleshing, which are sold to glue manufacturers. I have 66 tanpits of various sizes. Do not use any dye wares. The whole of the liquid refuse produced at my tanyards flows into the river. Use steam, 6 nominal horse-power. Consume yearly 20 tons of coal, the ashes from which, and the spent tan, are used for manure. The excrements of my workpeople are conveyed into cesspools, and then used for manure. Have no suggestions to offer.
Hutchings & Shepherd, Flax and Hemp Spinners.	Dowlish Ford, Ilminster.	Our works are situated on a tributary of the *Parrot*. Employ 250 hands. Rateable value of works, 300*l*. The bed of the stream has not silted up. Our works are not affected by floods. The stream is not polluted by works above nor by mines, as the spring head is only 2 miles from my works. Obtain supply of water from the stream, but are not able to give the annual consumption at our works. Manufacture yearly about 700 tons of goods. The whole of the waste liquid produced at our works flows direct into the stream. Do not use any oil, soap, alkali, or urine. Use steam, 18 nominal horse-power. Consume yearly 900 tons of coal, the ashes from which are used for building purposes. The excrements of our workpeople are conveyed, partly by watercloset into the stream, and partly into tanks, which are emptied and the contents used for manure. Have no suggestions to offer.

Basin of the Avon (Somerset).

Henry & St. John Hewett, Woollen Cloth Manufacturers.	Upton Marsh, Heytesbury.	Our works are situated on an affluent of the *Avon*. Employ 180 hands. Rateable value of works, 184*l*. The bed of the stream has not silted up. Our works are not affected by floods. The condition of the river is tolerably good; it is not polluted by works above, nor by mines.

Series A, B, C, D, Trades and Manufactures—Basin of the Avon (Somerset)—*continued.*

Name of Firm, and Trade or Manufacture carried on.	Situation of Works.	Answers to Queries on Page 79.
Henry & St. John Hewett, Woollen Cloth Manufacturers—*cont.*	Upton Marsh, Heytesbury —*cont.*	Obtain supply of water from the river, but are not able to state the annual consumption at our works. Manufacture yearly 20 tons of goods of the value of 20,000*l.* The whole of the waste liquid produced at our works flows direct into the river. Do not use any dye wares or bleaching materials. Use yearly from 7 to 8 tons of olive oil of the value of from 450*l.* to 500*l.* A portion of the waste wool produced in the process of carding is re-used and the remainder is sold. Use yearly, soap 3½ tons. The soapsuds are not treated for the recovery of the grease. Use both steam and water as power; steam 40 and water 20 nominal horse-power. Consume yearly 300 tons of coal, the ashes from which are sold to builders to be mixed with lime for mortar. A portion of the excrements of our workpeople is used for scouring cloths, and the remainder flows into the river. Have no suggestions to offer.

PART III.

ORAL EVIDENCE taken at Durham, Darlington, Middlesborough, and Stockton-upon-Tees.

The Council Chamber, Town Hall, Durham.

Wednesday, 5th October 1870.

PRESENT:

Major-General SIR WILLIAM DENISON, K.C.B., in the Chair.
Dr. Edward Frankland, F.R.S. | Mr. John Chalmers Morton.
Mr. S. J. Smith, *Secretary.*

Mr. William Stoker examined.

Mr. W. Stoker.
5 Oct. 1870.

1. (*Dr. Frankland.*) Are you the medical officer of Durham?—I am.

2. How long have you been acquainted with Durham?—All my life.

3. Do you know the cause of the high rate of mortality in the year 1849 given in the return furnished to the Commission as 26·17?—I do not, I have only been recently appointed medical officer, and the returns are in a very imperfect state.

4. In the year 1868 the mortality was 28 per 1,000. Do you remember whether in 1866 or in the previous autumn there was any attack of cholera in Durham?—Of recent years we have had very few cases of cholera in the city. In the immediate neighbourhood of Durham, at Coxhoe, and other outlying villages, there were a good many cases of cholera.

5. Do you mean in places higher up the river?—Yes, at that place there is a very large mining population, there are open ditches, and no real system of drainage is carried out. This place, at the time to which I am referring, was in a very dirty state, the cholera spread there very rapidly and was in many cases fatal.

6. To what, in your opinion was the spread of cholera at that place attributable?—I should say it was owing to bad drainage and overcrowding.

7. What was the quality of the water drunk by the inhabitants at that time?—It was probably bad spring water. A family to my knowledge has just recently been attacked with sickness, and I have no hesitation in saying that it is attributable to the bad supply of water which they obtain from some old pit workings at Coxhoe.

8. Do you know exactly the source of the supply?—No, I cannot give you any account of the source of the water supply.

9. (*Chairman.*) You have spoken of pit workings, did you mean coal pits?—Yes.

10. (*Dr. Frankland.*) Would the water from the pit be contaminated by the excrements of the miners?—I think not.

11. Do any of the miners' cottages drain into the stream as it comes from the mine?—I think not.

12. Do you know whether there was any cholera in 1866 at Bishop Auckland?—I do not.

13. Did any cases of cholera occur on the river above the intake of the water company?—I did not hear of any cases at Bishop Auckland which is above the intake.

14. Then so far as you know there were no cases of cholera on the river above the intake of the water company?—Not that I know of, but there were cases at Shincliffe below the intake.

15. Do you consider that the average rate of mortality in Durham is what it ought to be for so small a city?—No, it is higher than it ought to be.

16. To what causes should you attribute the high rate of mortality?—The mortality is greatest amongst children, caused chiefly by improper nursing; for instance, a child is perhaps attacked with scarlatina, it is sent to school again as soon as it is fairly well in order to get rid of the trouble of nursing it. In this way the disease spreads in all directions, and the town then gets the reputation of being in an unhealthy state, when its unhealthiness is really caused by the carelessness of parents and of the parties at the schools, which are also crowded.

17. Do not these conditions exist in every manufacturing town?—No doubt of it. One of the greatest sources of ill-health in the city was exposed very recently; it became necessary to repair some works on the river below low-water mark; the water impounded above the weir, near the Prebend's Bridge, was then let out, and the bed of the river was found to be in a most filthy state. There was an outbreak of scarlatina directly, and some of the cases were very severe, but as soon as the water was let in again so as to cover the mouths of all the sewage pipes, and carry away the refuse, the outbreak moderated, and the cases that occurred afterwards were all of a mild character.

18. Was there a large quantity of offensive matter exposed at that time?—Undoubtedly.

19. Do you consider that that was the principal cause of the outbreak of fever, or that the opening of the mouths of the sewers and letting the gases escape had something to do with it?—I think that the two causes were combined, and it must be observed that the greater part of the mud in the bed of the river was really the subsidiary part of the sewage.

20. It was collected behind a weir, was it not?—Yes, close to the banks of the river.

21. The water was penned up there?—Yes.

22. Supposing that weir to be removed, would the mud bank cease to exist?—I cannot go into that question; there are three of them.

23. Do you believe that the removal of those weirs would improve the sanitary condition of Durham?—That is not a subject that I know anything about, but I think it would make the river almost standing still. the stream would flow too slowly, and it would be in a worse condition than it is now.

24. You think that that would be the effect of removing the weirs?—Yes, I think the river would flow more slowly. It would undoubtedly narrow the stream considerably.

25. Supposing that sewage and other polluting matters were kept out of the stream and the water was rendered clear, do you think that the weirs would then be objectionable?—I do not think so, I do not see how they could be.

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26. Would they not cause flooding of cellars?—I think not.

27. Or the backing up of the water into the sewers?—Not to any great extent.

28. Is there much overcrowding in the dwellings of the humbler classes in Durham?—In some places there is undoubtedly, but houses are increasing in number rapidly, and I think therefore that the overcrowding is being gradually done away with. The erection of new houses has gone on very rapidly in the city lately.

29. Has it gone on more rapidly than the increase of the population?—I think it has kept pace with it, if not a little more.

30. Is it your opinion that the unhealthiness of the city is in any degree attributable to overcrowding?—It is.

31. Have you observed that any diseases have been remarkably prevalent upon the banks of the river besides the outbreak of scarlatina to which you have referred?—No, I think not; perhaps diarrhœa is one of the complaints that the inhabitants more frequently suffer from.

32. Has that been particularly developed on the banks of the stream?—I do not think it has.

33. Is it your belief that when the river is in its normal condition, and a good volume of water is flowing down it, exercises any particular influence upon the health of the community?—I should not like to say that, but the river is now very much polluted, and undoubtedly occasionally noxious vapours arise from it, that are injurious to health.

34. Have any particular instances come under your notice of these noxious exhalations having any prejudicial effect upon health?—No, not when the river is full.

35. Have you observed that the general tone of health has been lowered amongst the inhabitants who breathe the polluted atmosphere on the banks of the river?—Yes, I think there has been a lowering of the tone of health amongst those people.

36. Have you observed gases escape from the main or branch sewers in this city into court yards and houses?—No.

37. Are the street gullys efficiently trapped?—I believe generally they are.

38. Have you not heard complaints made of the escape of gases into houses?—Not recently.

39. Do you consider that the sewers are efficiently ventilated?—I think they are fairly ventilated.

40. Are the ventilators carried up the sides of the houses like rain spouts?—No, they are in the streets; surface grids.

41. Do you not consider that they are any nuisance to the surrounding neighbourhood?—I have not heard any complaints made.

42. Do you think it important that the sewers should be well ventilated, so that noxious gases could not be long pent up?—Certainly I do. I think that a great improvement might be made in the grids down which all the refuse matter is put; for however well trapped they frequently are in such close places, sometimes even within a house, there must be an escape of noxious gases which would be much better prevented

43. Are there many privies and middens in Durham?—There are.

44. Have you not also a great many water-closets?—Yes.

45. Which of the methods resorted to do you consider the best for getting rid of excrementitious matters?—The water-closet system.

46. Would you prefer to get rid of the excrementitious matters while fresh?—Yes.

47. Have you become acquainted with any process except the water-closet system that would do that effectually?—No. The system of using earth has been recommended, but we have not had any experience of that here; and I think it is a very difficult matter indeed to decide, but of all the methods that I am acquainted with the water-closet system is undoubtedly the best.

48. Do you think that the existence of privies and middens in the neighbourhood of dwelling-houses, and the practice of continually emptying them, is prejudicial to the health of the people living around?—I do.

49. Are there any cases in which the liquid drainage from a midden soaks into the walls of dwelling-houses?—Yes, I know of several cases.

50. Have you known any cases of fever to arise from such a cause?—Perhaps at this moment I do not recollect such a case within the town; but I just recollect outside the borough, and indeed almost within the town, several cases.

51. Do you refer to Western Hill?—Yes, there was one case there which struck me forcibly.

52. Did you in that case satisfactorily trace the cause of the outbreak of fever to the soakage of a privy into the walls of a house?—It was a defective drain.

53. Was fever caused by the gases emanating from the drain; and how many cases occurred?—Yes, I am convinced that in that case it was owing to a want of proper trapping. The water-closet was at the foot of the garden, and the pipe from the kitchen grid was higher than the water-closet; so that when the water-closet was used the smell came up the kitchen grid. This was particularly noticed in the morning after the house had been closed all night; the servants, on entering the kitchen early in the morning, were attacked with sickness. This particular house, being outside the borough, no one had any control over it; and first of all several cases of scarlatina occurred; afterwards three cases of typhoid fever. One family left Durham in consequence of it, and went to Tynemouth. Some time after another family came to the place, and there was another outbreak of scarlet fever in the same house.

54. Was that defective state of things remedied?—Yes, it was after very great difficulty, for the house being outside the borough, I believe the law did not apply so strongly as it would have done if the house had been in the town. The owner of the property was not willing to spend any money.

55. Since that condition of things has been remedied has disease disappeared from the house?—Yes, it has been a healthy house since then.

56. Is it at all the practice in Durham to live in flats?—The people live in tenemented houses, and in some cases one family occupying one or two rooms of a house, but not as they do in Scotland.

57. How many storeys high are the houses generally?—Three or four storeys.

58. Are there cases of excessive overcrowding upon a given area of land?—No.

59. What is your opinion of the quality of the water which is supplied to Durham?—It is fairly good; we are a good deal below Bishop Auckland, and undoubtedly a great subsidence of the sewage and other matters thrown into the river takes place before the water is abstracted by the waterworks company.

60. That is to say, you get rid of a good deal of solid matter?—Yes, part of the water supply is from springs.

61. Is the water supplied to the town always clear and transparent, or is it ever turbid?—It is generally clear.

62. Is it not occasionally turbid?—I have seen it so; there is undoubtedly some defect in the filtration of it.

63. Do you consider that the delivery of an imperfectly filtered water, especially from a stream that is evidently fouled by sewage, is safe or desirable?—Certainly not.

64. Are there any private wells in use in Durham?—Yes.

65. What is the character of those wells; and are they generally shallow?—Yes, they are generally so, but the one at the gaol is a deep one.

66. What is the character of the strata into which they are sunk?—It is freestone.

67. Is the soil upon which Durham is built generally porous?—Yes, the greater portion of it is gravel, another part of it is rock.

68. Is there anything to prevent surface liquids of all kinds permeating through the soil into the shallow wells?—The majority of the wells are outside, and beyond any chance of being so polluted; there are some in the town where possibly soakage might affect them.

69. But the private wells are generally outside the town, are they not?—No, there are public wells and also the company's water wells within the city, and people can draw water when they like; there was one in the market place, but that is destroyed.

70. Do you apply the term "well" as they do in Scotland, to a stand pipe in the street, or to a shaft sunk in the earth?—Not to a stand pipe, but generally to springs, there is only one sunk well, and that is in Gilesgate.

71. Are there not pumps attached to the wells or springs?—There are to some of them.

72. Does the water flow from the others by its own pressure through a pipe?—Yes, there are 40 of them in the town.

73. Are they in the hands of the water company?—No, they are both private and public.

74. Do you know the condition of the water in those wells, and is it in your opinion good?—I do, and I think that the well water is very good.

75. Is it better than the water supplied by the company?—I think it is; I have a well and a pump in my own house, and we always use pump water for drinking purposes in preference to the other.

76. Do you obtain that water from a well sunk close to your house?—It is obtained from a well sunk just underneath my dining room, a very short way down; in fact we were going to deepen the cellar, and the water flowed in, then a sort of box place was made, and we get the water from there; beautiful, clear, bright, cold water.

77. How do you know that the water does not come out of a sewer?—The well is higher than the river is where the sewer empties itself.

78. Is your house near to the river?—Yes.

79. And the water in the well you say stands at a higher level than the water in the river?—Undoubtedly it does.

80. Is it much higher?—Not a great deal, perhaps a couple of feet.

81. Have you never analyzed the water?—No.

82. Do you know the banks of the Wear?—Yes, and I know St. Bede's Well.

83. Where does the water of that well come from?—I think it comes out of the rock.

84. Does it not come out of the churchyard?—I think not; it is below the churchyard, and not a great way from it.

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85. When deep graves are dug in the churchyard does water ever come into them?—Not into any in the cathedral yard.

86. Is it the cathedral yard that is near to this well?—Yes.

87. You say that the graves are not dug so deep as the well?—No; and below that you would come to solid rock.

88. Do you mean that the well goes into solid rock?—Yes.

89. (*Chairman.*) Is it limestone?—No, it is freestone.

90. Do you consider that the quantity of water supplied to Durham is ample for the population?—I think so.

91. The supply would appear to yield about 22 gallons per head.—I never heard any complaint made that the water supply was insufficient.

92. (*Mr. Morton.*) Are you acquainted with the county asylum or the circumstances connected with its sewage, and the experiment made in utilizing it?—No.

93. Is the district to which the death rate applies, exclusively Durham, or does the return include a country district as well?—It is exclusively Durham.

94. Has the condition of the river become much worse within your knowledge?—Very much worse.

95. Do you think that is owing to the extension of the water-closet system?—Undoubtedly.

96. Has the sewerage of Durham been carried out within your remembrance?—It has.

97. Was there immediately afterwards increased pollution of the river?—I cannot go back so far as to be able to state that, but no doubt it would be so.

98. Does it exhibit during the summer drought, or when the water is drawn off, a deposit from sewage water chiefly?—Yes, I think so, and from coal dust, but that, I think, is capable of being remedied.

99. Is not the filthiness of the mud due exclusively to the deposit from sewage matter?—I think so.

The witness withdrew.

(*The Mayor.*) I should mention that the average death rate which has been referred to includes the county gaol, where we have a daily population, I think, of about 500; it also includes the county infirmary and the union workhouse.

100. (*Mr. Morton.*) To what district does the union workhouse extend its operations?—To the Durham union; the larger portion of it is beyond our Parliamentary boundary.

Mr. John H. Collison examined.

Mr. J. H. Collison.

101. (*Mr. Morton.*) Are you borough engineer and inspector of nuisances?—Yes.

102. Does the drainage of Durham find its way into the river by many sewers?—Yes, by 14 separate outlets.

103. Do you mean simply by street sewers?—Yes, that is, the main sewage of all the city.

104. Are there no other exits for the sewage?—There are a few private drains on the river side.

105. Does any liquid refuse from manufactories pass into the sewers?—Yes.

106. From what manufactories?—The information that I have obtained has been put in the form of a report, and I will read it if you will permit me.

107. You had better hand it in. (*The same was handed in, and will be found printed at the end of the evidence of this witness.*)

108. Have you gauged the quantity of sewage produced in Durham?—I have done so approximately.

109. Is that stated in the report?—Yes.

110. Were those gaugings of the sewage discharged into the river from the sewers taken during dry weather?—No, I have taken it approximately upon the average supply of water for domestic and trade purposes by the Durham Water Company.

111. Have you estimated the quantity?—Yes.

112. You have taken the sewage, in fact, to be just the water supplied after it has been fouled?—Yes.

113. Were any considerable springs met with when the sewers were being made?—I have only held my present appointment for a month, and therefore do not know.

114. The quantity that runs out of the sewers would be the rainfall upon the area sewered plus the water supply, and plus the spring water?—Exactly.

115. What population drains into the sewers of Durham?—The whole of the estimated population 16,134, with few exceptions.

116. What proportion of the population of Durham do you suppose uses water-closets?—I am not able to answer that question.

117. I perceive by the return that the number of privies given is about the same as the number of water-closets, are the privies drained into the sewers?—None of them.

118. Then the drainage of the whole population cannot be said to pass into the sewers. There are 1,131 privies within the borough, do they drain into cesspools?—They are on the dry earth system, earth mixed with ashes.

119. All of them?—Yes.

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120. Are they all connected with ashpits?—I believe so.

121. Do you direct the cleansing of them?—Yes, generally.

122. Is the stuff taken out wet or dry?—Wet.

123. Are the cesspools tight?—They are generally so, two or three of them are not so.

124. When the stuff taken out is dry, do you assume that they are not tight?—Just so, or that they are drained.

125. What becomes of the waste of the houses and the slops, in cases where the privies are not connected with the sewers?—They are brought into the yard and thrown down the grid, and they all flow into the sewer.

126. Can you furnish us with any information as to the quantity of stuff collected from the ashpits and privies?—I have had no means during the last month of ascertaining the quantity.

127. Is it considered to be the property of the Corporation?—No; of the occupiers or the owners.

128. Do they arrange for themselves with the neighbouring farmers to take it away?—Yes.

129. Is it only when a nuisance arises that you step in?—Exactly so.

130. Is there any rule laid down requiring this stuff to be collected at intervals?—No; it requires to be done oftener in some districts than in others.

131. Does a nuisance often arise?—Not often.

132. Are the pits not large enough to hold a month's production at one time?—They are cleansed about once a month.

133. Are there many cellar dwellings in the town?—I believe there are only three.

134. Do you know what money value is obtained or the refuse?—No.

135. Are disinfectants used in dealing with this refuse?—Yes, in cases where it is required.

136. What is done with the street sweepings?—They are carted away to a heap, and stored there.

137. And they are afterwards sold for agricultural purposes?—Yes.

138. Are they worth carrying away?—Yes, we get from 2*s.* to 3*s.* a cube yard for them.

139. If any scheme were adopted for the utilization of the sewage of Durham, would it not be necessary to make intercepting sewers on both sides of the river?—Yes, but it would be very difficult, there is only a small portion of land available for irrigation outside of the borough.

140. How far should you have to carry a sewer until it cropped out at the surface?—To encircle the whole of the city it might be about three miles and a half.

141. I mean with reference to the fall to the river, how far from the river must the sewer be taken before it would crop out at the surface?—I cannot say.

142. Is there not sufficient fall?—No.

143. (*Dr. Frankland.*) Have you turned your attention to the ventilation of sewers since you undertook your present office?—I have seen many of them.

144. Are they efficiently ventilated?—Yes, they are.

145. Have you become acquainted with no instance of gases escaping into houses through defective traps, or the pressure of the gases inside?—Not one.

146. Have you any complaint to make of the condition of the river caused by the weirs?—No, I think they are now rather a benefit.

147. Do you flush out the sewers periodically?—Yes, frequently in summer weather.

148. For that purpose do you use the water which is supplied to the town?—Yes.

149. Have you made special arrangements with the company for that purpose?—Yes.

150. What do you pay per 1,000 gallons?

(*Mr. Dodds.*) It is paid for by time, 4*s.* an hour.

151. (*To the witness.*) Is the pipe allowed to run so many hours?—15 minutes in some districts, and in others for half an hour.

152. What quantity of water would issue from the pipe?—That depends upon the pressure; it varies in different parts of the town.

153. (*Mr. Morton.*) Have you any knowledge of the subsoil in the neighbourhood of the middens and ashpits?—No I have never seen them opened.

154. Is any of the house water or slops thrown into the privies?—Yes, if the grid is not convenient to the house.

155. Is the stuff that is taken out as wet as you would expect it to be, considering the quantity of water that is thrown in?—Yes.

156. Do you not think that they leak?—Not generally.

157. How are they constructed?—The walls are built of brick, and many of them have flagged floors.

158. Are they flagged and cemented?—I cannot say that.

159. Do the men use a scoop to take the stuff out?—No, a shovel.

160. But can they get it all out with a shovel?—They mix it together with the ashes, and then it can be easily lifted with a shovel.

The witness withdrew.

Report referred to in Question 107.

BOROUGH OF DURHAM.—RIVERS POLLUTION COMMISSION, 5th OCTOBER 1870.

RIVER WEAR.

I have prepared two Ordnance plans.

The larger plan shows the borough of Durham in wards, and a portion of the river Wear, with two of its principal tributaries, the Browney and the Deerness.

The smaller plan shows the source or rise of the Wear to this city, together with the towns, hamlets, collieries, and manufacturing works situated within the Wear valley. The pink circles show the most populous districts. The blue × shows the collieries, and the remaining coloured marks show works of a contaminating nature, such as tanneries, dye-works, &c.

The river Wear rises at Killhope Moor on an elevation of 2,012 feet above this city, and at a distance of 43 miles by the bed of the stream, giving a fall of 46¾ feet per mile.

The rivers Browney and Deerness combine and enter the Wear about 3½ miles south of the city, or up the stream. There are several becks and mountain streams, but none of them are of much importance.

The borough of Durham is divided into three wards as shown, being North Ward, South Ward, and St. Nicholas Ward.

The river Wear enters the borough at the southern extremity and forms the boundary of a great portion of the eastern side. Its circuitous route gives a length of 3½ miles within the borough, with a fall of 17·7 feet, or 5·6 feet per mile; but the natural flow of the river is intercepted by three weirs within the borough.

The main drainage of the borough enters the Wear by 14 separate outlets, which discharge the sewage from 2,300 dwellings and the refuse from two dye-works, one chemical works, five breweries, two grease works, one soap works, and ten other miscellaneous works.

I have taken a sample of the river water at its entrance into the city and one at its exit, together with a sample of the sewage from each main sewage outlet.

The discharge of the river on the 3rd instant into this borough was 2,788 cubic feet per minute, or 17,425 gallons, and this is chiefly colliery water.

The estimated population of the borough is 16,134, and calculating 14 gallons per head per day, and 48,000 gallons for trade purposes, we shall have a discharge of 273·876 gallons per day to meet 25,092,000 gallons of river water as it comes to us, giving a per-centage of only ·92 at this dry season.

The rainfall in this district for the past month is ·403 inches, being 2·207 below the average for the month for the past 20 years.

The mortality for the Durham registrar's district for the 10 years previous to 1850 was 23 per 1,000 on population, from 1851 to 1860 the same, and for the borough from 1860 to 1869 21·6.

(Signed) J. H. COLLISON,
City Surveyor.

Statistics referred to in Question 107.

CITY OF DURHAM.—RIVERS POLLUTION COMMISSION.—OCTOBER 1870.

PLACES OF BUSINESS WITHIN THE CITY OF DURHAM AND CONTIGUOUS TO THE RIVER WEAR.

Name of Premises.	Situation.	Name and Address of Owner.	Trade or Manufacture carried on.	Source of Water Supply.	For what Purpose is Water used?	Have you Privies or Waterclosets? What number?	Are they connected with the Sewers? Do Sewers in any way?	Description of Engine Power. Rated or Estimated Horse Power of Engines.	How are the Engine Ashes disposed of?	No. of Hands employed.	What quantity of Water will you use per day?
Durham Brewery	New Elvet	Joseph Johnson	Brewery	Well and river	Brewing	1 W.C.	Sewer	6 horse	On bank of river.	7	3,000
Keepier Wood Colliery	Keepier Wood	John Thwaites	Colliery	Pit	Coal pit	Do.	Yes	1 „	On road	4	—
Villa Iron Works	Ellis Leazes	Thomas Douglass	Iron Works	Spring	Engine	Do.	Sewer	20 „	Do.	8	2,000
Gilesgate Brewery	Gilesgate	William Peacock	Brewery	Durham Water Co.	Brewing	2 privies	No	2 „	None	3	3,000
Grease and Oil Works	Do.	William Hall	Grease Manufacturer	Do.	Distillery	1 privy	No	None	Do.	5	Cannot say.
West End Brewery	Western Hill	Joseph Brown	Brewery	Do.	Brewing	Do.	No	4 horse	Footpath	5	2,300
Elvet Colliery	Church Street	Thomas Crawford	Colliery	Spring and river	Engine	None	No	40 „	On road	2	16,000
City Gas Works	Framwellgate	Durham Gas Company	Gas Making	River	Engine, &c.	2 privies	No	4 „	On roads	14	1,900
Henderson's Carpet Works	Back Lane	Messrs. Henderson & Co.	Worsted Spinning, Carpet Weaving, Dye Wood Grinding.	River and Water Co.	Engine, scouring, dyeing.	14 W.C.'s	Sewers	170 „	Roads and heaps.	500	135,000
Black Horse Brewery	New Elvet	Jane Forster	Brewing	Durham Water Co.	Brewing	1 W.C.	Sewer	None	None	2	2,700
Wear Mills	Framwellgate	James Robert Thurlow	Corn Mill	Do.	Engine	Do.	Sewer	6 horse	In the river	2	—
Gilesgate Tannery	Gilesgate	Thomas Summers	Tanning	Spring and the Durham Water Co.	Engine and tanning	1 privy	No	8 „	On walks	10	5,000
Grease Works	Framwellgate	Mrs. Allen	Grease	Durham Water Co.	Condensing	2 privies	No	None	None	4	—
Durham Soap Works	Gilesgate	John Sheldon	Soap Manufacturer	Do.	Boiler and soap lie	1 W.C.	Yes	None	In the yard	6	1,000
Gilesgate Chemical Works	Do.	T. Coulson	Chemist	Do.	Condensing	1 privy	No	—	—	1	20
South Street Dye Works	South Street	Matthew Dean	Worsted and Yarn Manufacturer.	Durham Water Co. and river.	Dyeing, scouring, and washing.	Do.	Yes	None	None	4	300
New Elvet Brewery	New Elvet	William Ramshaw	Brewing*								

* Return refused.

City of Durham.—Rivers Pollution Commission.—October 1870—*continued.*

Name of Premises.	Situation.	Name and Address of Owner.	Trade or Manufacture carried on.	Source of Water Supply.	For what Purpose is Water used?	Have you Privies or Waterclosets? What number?	Are they connected with the River or the Sewers in any way?	Description of Engine Power, and estimated Horse Power of Engines.	How are the Engine Ashes disposed of?	No. of Hands employed.	What quantity of Water will you use per day?
Places of Business between Durham and Bishop Auckland, and contiguous to the River Wear.											
South Brancepeth Colliery.	Bage Bank	Bell Brothers	Mining, Brickworks, and Coke Burning.	River	Engine	2 privies	Yes	305 horse	On roads	500	4,000
Byers Green Colliery	Byers Green	Bolkour, Vaughan, & Co.	Mining and Coke	Pit	Boiler, coke burning, &c.	10 „	No	120 „	Heap	350	1,000
Okenshaw Colliery	Okenshaw	Strakers & Love	Mining	Rain fall	Boiler	70 „	No	—	Do.	340	2,380
Willington Colliery	Willington	Do.	Mining and Coke Burning.	Pit	Boiler and domestic	60 „	No	300 horse	Do.	724	64,980
Furniss Mill	Do.	Robert Mar	Corn Mill	River	Water wheel and engine.	1 privy	No	4 „	Carted	2	Cannot say.
Hunwick and Newfield Colliery.	Bishop Auckland	Lancester & Brogdon	Mining	Spring and river	Engine	—	—	—	—	—	20,000
Brancepeth Colliery	Near Durham	Strakers & Love	Mining, &c.	Rain fall	Engines, coke, and domestic.	170 privies	No	—	Heap	893	88,600
Sunny Brow Gasworks	Willington	Do.	Gas Making	Pit	Cooling cinders from retorts.	1 privy	No	None	Carted	2	250
Willington Brickworks	Do.	Do.	Brick Making	Do.	Puddle	No	No	30 horse	Do.	40	200
Brandon Colliery	Brandon	Do.	Mining	Do.	Engine and domestic	62 privies	No	206 „	Heap	520	103,680
Old Durham Colliery	Old Durham	Earl Vane	Do.	Beck and pit	Boilers and coal washing.	None	No	100 „	Do.	180	180,000
Shincliffe Colliery	Shincliffe	Joseph Love	Mining and Brick Making.	Durham Water Co. and pit.	Engine and coal washing.	Do.	No	245 „	Do.	300	Cannot say.
Houghall Colliery	Houghall	Do.	Mining	Do.	Do.	17 privies	No	91 „	Do.	248	612
East Hetton Colliery	East Hetton	East Hetton Coal Company.	Do.	Mine	Boilers, &c.	No	No	450 „	Do.	600	—
North Brancepeth Colliery	New Durham	Brancepeth Coal Company, Limited.	Do.	Do.	Boiler and coke	No	No	60 „	Do.	80	4,000
Situated on the River Gaunless, a Tributary of the River Wear.											
Gaunless Mills	Bishop Auckland	T. & G. Marley	Corn Mills	River	Water wheel	1 privy	Yes	36 horse	River	7	—
Deanery Mill	St. Andrew	Mrs. Spencer	Do.	Do.	Do.	Do.	No	—	—	2	—
Gaunless Foundry	South Church	J. Hislop	Iron Founder	Bishop Auckland Water Works.	Engine	Do.	No	9 horse	Roads and river.	8	—*
South Church Forge and Foundry.	St. Andrew	R. Race	Foundry	River	Do.	2 privies	No	20 „	Roads	9	150†

* I find that the bed of the stream is silted up midway with ashes.
† The bed of the stream is considerably silted up with ashes.

City of Durham.—Rivers Pollution Commission.—October 1870—*continued.*

28225.—2.

Name of Premises.	Situation.	Name and Address of Owner.	Trade or Manufacture carried on.	Source of Water Supply.	For what Purpose is Water used?	Have you Privies or Waterclosets? What number?	Are they connected with the River or the Sewers in any way?	Description of Engine Power, and estimated Horse Power of Engines.	How are the Engine Ashes disposed of?	No. of Hands employed.	What quantity of Water will you use per day?
Situated on the River Browney, a Tributary of the River Wear.											
Relly Paper Mills	Relly	Archibald McRae	Paper Manufacturer	River	Paper Making	1 privy	No	38 horse	Roads	26	—
Langley Paper Mills	Langley	John Smith	Do.	Do.	Do.	2 privies	Yes	80 „	Do.	100	—
On the River Wear, in and above Bishop Auckland.											
West Mill Manure Works	Near Bishop Auckland.	Thomas Whitfield	Manure Manufactory	River	Driving Engine	1 privy	No	14 horse	—	10	—*
West Mill Corn Mill	Do.	Joseph Wilkinson	Corn Miller	Do.	Do.	1 „	No	16 „	—	6	—
West Mill Forge and Foundry.	Do.	Do.	Iron Foundry	Do.	Water wheel	2 privies	No	None	—	12	—
Witton Park Iron Works	Witton Park	Balkour, Vaughan, & Co.	Iron Works	Do.	Engine	1 privy	No	36 horse	Roads	1,500	791,200†
Wolsingham Saw Mills	Wolsingham	John Coates	Shovel Handle Maker	Do.	Water wheel	No	No	No	No	4	—
Mill Isle Iron Works	Do.	H. M. Blackett	Iron Manufactory	Do.	Do.	No	No	None	—	6	—
Wolsingham Forge	Do.	Jonathan Hall	Do.	Do.	Do.	No	—	—	—	4	—
Newton Gap and George Pit Collieries.	Escomb and Newton Gap.	Henry Stobach & Co.	Coke Burning and Brick Works.	Mines	Coke burning, brick making, and domestic purposes.	200	No	500	Heap	1,500	20,000
West Mill, Wolsingham	Wolsingham	William Henderson	Corn Miller	River	Water wheel	1 privy	No	None	None	2	—
Wolsingham Woollen Mill	Do.	John S. Cowley	Woollen Mill Dyeing	Do.	Do.	—	—	—	—	8	—
Wolsingham Upper Town Tannery.	Do.	John Cheetham	Tanning	Do.	Tanning	—	—	—	—	7	600
Meadhope Street Tanyard	Do.	John Bustin	Do.	Beck	Do.	1 privy	No	—	—	4	— ‡
West End and Sunny Side Lead Mills.	Do.	Wolsingham Lead Co. (Limited).	Lead Washing	Well and beck	Lead washing	2 privies	No	—	—	25	—

* The bed of the stream at this place is in a very filthy condition.

† The bed of the stream is completely obstructed in its natural flow by a large deposit of slag and rubbish.
‡ The bark is deposited into the bed of the stream.

MR. EDWARD DODDS examined.

Mr. E. Dodds. 5 Oct. 1870.

161. (*Dr. Frankland.*) How long have you been engineer to the water company?—I have been in the employ of the company 17 years altogether.

162. You are then no doubt well acquainted with all their works?—Yes.

163. Can you state to the Commissioners what proportion of water you obtain from the river, and what proportion you get from springs?—We get no portion of it from springs direct; they flow into the river, and we get all our supply of water from the river.

164. What are the powers of the company with reference to the quantity of water they can abstract from the river?—We pump about 2,000,000 gallons a week.

165. What is the dry-weather flow of the river in gallons per day at the point where you pump the water?—I do not know.

166. At what place on the river do you pump the water?—At Shincliffe.

167. How far is that above Durham?—A mile and a quarter by the river.

168. Do any of the sewers of Durham discharge themselves into the river above that point?—None.

169. Which is the nearest sewer above your intake?—We have no sewerage at Shincliffe, there are villages there.

170. Is there no sewer which actually discharges itself into the river there?—No, it is only mineral water from the collieries

171. Does not the sewage from Bishop Auckland flow into the river?—Yes.

172. (*Chairman.*) I suppose that every village on the banks of the river discharges its sewage into it?—Yes.

173. (*Dr. Frankland.*) Are there several large places between here and Bishop Auckland from which sewage is discharged into the river?—Yes; above the waterworks.

174. Do you know the total number of the population the drainage from which comes into the river above your intake?—No.

175. Has any attempt been made to purify the sewage of any of those places before it passes into the river?—Not that I am aware of.

176. Have you on any occasion found the river water to be sensibly affected by sewage where you pump it from?—No.

177. Are the Commissioners to understand that you do not in practice complain of sewage?—No; we complain also of coal washings at the collieries, the water of the river being at times discoloured thereby.

178. Where does the pumping engine deliver the water?—It delivers the water into subsiding tanks, which then flows by gravitation on to filtering beds and into pure water wells. The water is forced up to a high service reservoir.

179. What is the description and thickness of the filtering material?—Sand and gravel; 4 feet of sand, and the 5 feet of gravel of various sizes.

180. How often do you find it necessary to scrape off the surface of the filter bed?—We clean the filter beds on an average once a week.

181. To what depth do you scrape off the surface on each occasion?—To a depth of half-an inch.

182. Is the sand again washed and used again?—It is.

183. (*Chairman.*) Can you state the total cost of the process of filtration?—I cannot, but we will supply that.

184. (*Dr. Frankland.*) I presume you go on for some months scraping off the half inch before you put on another layer of sand?—Yes; generally we put the filter beds in a proper state in the spring of the year, and we of course continue cleaning them as required until about the middle of the summer, and then we put on another layer of sand and prepare them for the winter.

185. What is the thickness of the sand before you put on an additional layer?—We reduce it about six inches from four feet.

186. Is the supply of water constant or intermittent?—Constant.

187. Are the mains always charged?—Yes.

188. Do the people use cisterns?—No, not for domestic purposes, they draw water direct from the mains.

189. How do you supply the water closets with water?—A service pipe is taken to the cistern, and the closets are supplied with double-valve cisterns.

190. Are any of the closets directly connected with your mains?—No.

191. You supply I believe about 22 gallons per head?—No, not more than 19.

192. How much of that is used for manufacturing purposes?—The quantity supplied is about 13 gallons for domestic purposes, including waterclosets and baths.

193. And about six for manufacturing purposes?—Yes.

194. Is there strict supervision exercised in order to prevent waste?—We make periodical inspections.

195. Do you find many instances of waste?—Yes; generally in waterclosets.

196. Have you formed an opinon as to the quantity of water per head necessary where a watercloset is used?—I have not.

197. Do you not charge anything extra for the water supplied to the waterclosets?—Yes.

198. How much?—The scale varies according to the rent of the house, and the number of waterclosets in the house; the charge is 1*s.* a quarter for each closet.

199. Do you consider the supply ample?—Quite ample.

200. Are there complaints made of the want of water?—No.

201. In the dryest weather is there a sufficient volume of water in the river?—There is always plenty.

202. Has the water been analysed?—Yes. (*Mr. Dodd handed in an analysis of the water.*)

203. I understood you to say that the springs flow into the river at various points above your intake?—Yes.

204. Is the volume of the springs equal to your supply?—Certainly not.

205. Would there be much difficulty in diverting these springs and conducting them into your works?—I think it would be very difficult.

206. Do you know of any better source of supply that could be obtained at a moderate outlay of capital?—I do not, in this district.

207. Are there any deep wells sunk in this watershed?—No.

208. Is there not a deep well at the county asylum?—I do not know.

209. What distance is the asylum from Durham?—About 10 miles.

210. Is there mine water of good quality pumped up?—I am not aware that there is.

211. Mine water is generally complained of as a nuisance, is it not?—It is.

212. (*Mr. Morton.*) Do you pump every day in the year?—Yes.

213. Is the water of the river never in a condition when it is not advisable to pump it?—Yes, in flood sometimes it is very muddy.

214. Do you pump it then?—Yes, at all times; we require to pump every day, and in heavy floods we only pump with one engine.

215. Are the floods very much the same now as they used to be, or are they altered in their character?—They have not occurred so frequently in the last three years.

216. When the rain does fall is the flood as long continued as it used to be, or more abrupt; we have been informed elsewhere that floods are sudden in their rise, and as rapid in their fall?—Yes, and so they are here.

217. Is land drainage carried out to any extent in the country above you?—Yes, there must have been considerable land drainage.

218. Is land drainage extending?—Yes, I should say it is.

219. Has it not produced any effect upon the river?—No.

220. Have the waters of the river been used for irrigation purposes?—Not that I am aware of. *Mr. E. Dodds.* 5 Oct. 1870.

221. (*Dr. Frankland.*) For how many days' supply can you impound water at your works?—For about three days, supposing that we ceased pumping.

The witness withdrew.

Adjourned to Darlington at 10.30 a.m. to-morrow.

The Town Hall, Darlington.

Thursday, 6th October 1870.

PRESENT:

MAJOR-GEN. SIR WILLIAM DENISON, K.C.B., IN THE CHAIR.

DR. EDWARD FRANKLAND, F.R.S. | MR. JOHN CHALMERS MORTON.

MR. S. J. SMITH, *Secretary.*

MR. STEPHEN EDWARD PIPER, F.R.C.S., examined.

Mr. S. E. Piper. 6 Oct. 1870.

222. (*Dr. Frankland.*) Are you Medical Officer of Health for Darlington?—Yes.

223. Have you been acquainted with Darlington for a great many years?—For nearly 30 years.

224. Will you describe to the Commissioners the condition of the river when you first became acquainted with it?—The river Skerne until of late years was polluted by all the sewage of Darlington, and this sewage was carried into the river Tees. There were no drains then except such as led into the bed of the river, but since that time the sewage has been intercepted and conveyed into the river about a mile below the town, by one outlet at a place called Blackwall.

225. Is the sewage still discharged into the Skerne?—Yes.

226. Consequently it is at present no nuisance to the town?—None whatever.

227. Is there a town or village below Darlington on the Skerne?—No; the Skerne flows into the Tees about three miles from the town, and carries with it the sewage of the town; the course of the Skerne is tortuous.

228. I presume that the Skerne does to some extent pollute the river Tees?—It does, undoubtedly.

229. What is the condition of the river Skerne at the present time?—The Skerne at the present moment, until it reaches the outlet where the sewage escapes, is in very fair order indeed.

230. What polluting matters enter it above Darlington?—The drainage from houses, privies, and middens above Darlington.

231. Are there any privies over the river, or private drains running into it?—As a general rule there are none.

232. Is the river polluted by slags from iron furnaces?—It is.

233. Is the drainage from such slags of a very noxious character?—It is.

234. Does it give off sulphuretted hydrogen?—It does.

235. Are you of opinion that the new sewerage works are perfectly satisfactory?—I think they are perfectly satisfactory.

236. Are the sewers well ventilated?—Yes.

237. Have you met with any cases in which the sewer gases have escaped into houses?—Not of late years; formerly it was the case.

238. Are you acquainted with the mode of ventilating the sewers?—No.

239. Do you know whether the sewers are ventilated by down spouts?—In one or two only, within my knowledge.

240. Are the gully traps on the main or branch sewers in good order generally?—Yes.

241. I see with an annual mortality of 498 the death rate is about 21·43 per 1,000?—Yes; our death rate has sunk from 68 per 1,000 to 21 per 1,000 in one district alone on the other side of the river Skerne.

242. In the year 1869 there was a sudden jump up from 468 to 603; can you account for that?—I can account for it only in this way, that we had then an epidemic of whooping cough, measles, diarrhœa, and dysentery, which I believe arose principally from the overcrowding of the people in the small houses in the neighbourhood of the town.

243. Were the diseases you have enumerated confined chiefly to one district?—Yes, they were principally, but I should mention that a great deal of rain fell at that time, and the consequence was that many of the houses to which I refer were flooded; they were not drained then, and some of them are even undrained now.

244. Was the locality where these diseases prevailed near the river?—Yes.

245. Do you attribute any of the unhealthiness of the locality to the condition of the river, either from the water being impeded in its course or from being impure?—Not now.

246. I am referring to 1869; do you attribute anything to the condition of the river at that time?—No, I think nothing arose from the river.

247. You referred to a particular locality as the seat of the diseases you mentioned in 1869?—I did, and I consider that they arose principally from the damp state of the atmosphere, and the overcrowding of the people in the small houses; the men being out of work, and the wives and children in fact starving.

248. Is it much the practice of the people to live in flats in Darlington?—No.

249. But in times of scarcity do the people crowd together very much in the houses?—They do, and unfortunately that is a matter over which the board has no control, on account of the Lodging House Act not being applicable to private dwellings

250. (*Chairman.*) What number of people have you known to be crowded together in one room?—I have known in former times, in a room 12 or 13 feet square, as many as 14 or 15 people lying on the floor, but that practice does not exist now.

251. What is the largest number you have ever known huddled together in one room?—I have not much opportunity of seeing these places, but many of the rooms at the ironworks are not more than 12 feet square, and they will often contain seven or eight people.

252. (*Dr. Frankland.*) Had you much scarlatina in Darlington last year?—Not a great deal.

Mr. S. E. Piper.

6 Oct. 1870.

253. Do you consider the quality of the water at present supplied to Darlington good?—Yes, it is most excellent. There is no better water for domestic purposes, and it is excellent water for drinking purposes, so much so that many persons who formerly drank the pump water, and complained of dyspepsia, drink the other water which is less hard.

254. Are you in favour of soft water for the supply of towns?—Yes, certainly.

255. You do not consider it necessary that there should be a large quantity of lime in it?—I do not.

256. If it were possible for sewage to obtain access into the river above the intake of the water you would, I presume, regard that as very objectionable?—Most undoubtedly.

257. And as a thing which ought to be strictly looked after?—It ought to be remedied.

258. Do you of your own knowledge know that the sewage of Barnard Castle and other places above the intake of the water supply goes into the river?—I know that it does go into the river, but I have never known any one injured by it.

259. Have you ever seen the river offensive above the point of intake?—Never; it is perfectly pure there. With regard to slag being thrown into the stream, I may say that it is not a usual thing for it to be thrown in.

260. Are these slags thrown into the river Skerne?—Yes, they are deposited on the banks and a few have rolled down into the river.

261. Do you believe that any of them get in above the point where the water supply is obtained?—No.

262. Are you aware whether any water from private wells is used in Darlington?—Yes, from a great many.

263. I suppose that some of the samples that were collected for the Local Government Act office were obtained from wells?—Yes.

264. Do you consider the water from them objectionable?—No. There is no pollution of wells now; formerly, there is no doubt, a good deal of sewage did percolate into the wells, but new system of sewerage in the town has completely remedied that.

265. What is the depth of the wells to which you refer?—I cannot say.

266. What is the character of the surface soil in Darlington, is it porous?—Yes, with a substratum of gravel.

267. And in the gravel the water lies?—Yes.

268. What is there to prevent the water flowing in the sewers from percolating through the brick sewers and so getting into the gravel?—The sewers are not of brickwork, but are formed of glazed tubular sanitary pipes.

269. Are there any middens and ashpits in Darlington?—Numbers of them.

270. What becomes of the soakage of the middens and ashpits?—Of course the soil surrounding them is more or less saturated with the soakage, but the middens are bricked, and they have been attended to very well. Where it has been found necessary they have been lined with cement.

271. But still a certain portion, small or great, would permeate through a porous soil?—It is possible, but there are no complaints of that.

272. Are there any cesspools in Darlington?—Not now.

273. Do you consider that in Darlington no complaint can be made as to the bad effects of water of any kind?—I do, certainly.

274. Neither that the drinking water is impure nor that the water flowing in the river is impure?—Certainly not.

275. And no complaint of drainage water?—No.

276. Do you know Hurworth?—Yes, very well; it is three miles from Darlington.

277. What is the state of the public health at that place?—I believe it is a very healthy village indeed.

278. Has there not been an inquiry made there in consequence of an outbreak of disease?—Yes.

279. What was the nature of the disease?—I have nothing to do with Hurworth, but I will tell you what I know about it. An epidemic of typhoid fever, diarrhœa, and dysentery broke out in that village, which was ascribed by the medical men there to the pollution of the river Tees by the Skerne, and I have no doubt that in some measure that was correct.

280. Has any report yet been made upon that case?—Yes.

281. Do you know what the nature of the report is?—No.

282. Was any stigma affixed to the shallow well water there?—I do not know.

283. Are you acquainted with the wells at Hurworth?—No.

284. Have you had lately typhoid fever in Darlington?—We have it very rarely now.

285. Any typhus fever?—Very rarely indeed.

286. Have you formed any opinion as to the causes of typhoid and typhus fever?—Of course there is no doubt that at one time typhus in Darlington was endemic. The old buildings and places were overcrowded with people, and the ground around them was saturated with filth; but since the establishment of the Local Board of Health, these things have been remedied.

287. Is it your opinion that typhus fever is more likely to be produced by atmospheric contamination, and typhoid fever by water pollution?—Certainly.

288. Had you cholera in Darlington in 1866?—There was an isolated case or two which were said to be cholera, but we never had it in an epidemic form.

289. In 1854 was there cholera in Darlington?—There was a good deal of cholera or diarrhœa, I believe, in those years.

290. There was no serious outbreak?—I believe not.

291. In 1849 was there anything serious?—Yes, there was an outbreak then, but not of cholera, it was of diarrhœa and dysentery.

292. To what do you think that was owing?—The state of the atmosphere, and also perhaps to overcrowding and certain pollutions.

293. Was the water supply the same then as it is now?—I think not, there would have been no time to distribute it.

294. You stated just now that the well waters were formerly polluted?—Yes, they were very much so indeed, chamber utensils and things of that kind were washed at the pumps, and the contents went down the gratings into the well to be pumped up again, and drunk by the people, but all that is done away with now.

295. Have you any suggestion to make to the Commission as to any further improvement of the sanitary condition of Darlington?—No, I think that everything is going on very satisfactorily, except that there are still some parts require drainage, which the Board of Health are about to carry out.

296. What is your opinion as to the comparative merits of the watercloset system and the privy and midden system as a means of disposing of the sewage?—My opinion is that where the watercloset system is carried out effectually, it is undoubtedly the best, but experience shows that in all crowded places the old plan is better, but the places require to be kept in proper order.

297. Has there been much sickness in Darlington that you can attribute to the use of waterclosets?—No.

298. Do the waterclosets sometimes get into a filthy condition?—Yes, frequently, unless a proper and regular surveillance is kept over them.

299. Do you consider it desirable, whatever method of removal is adopted, to get rid of excrementitious matters from the neighbourhood of dwellings whilst quite fresh?—Of course.

300. The danger arises from the subsequent putrefaction, does it not?—Yes.

301. (*Chairman.*) Do you consider that a watercloset is, under any circumstances, more filthy than a privy?—I have seen it so, the apparatus gets out of order, and a great deal of expense is connected with the repair of breakages; I do not mean if the excrements are effectually carried away.

Mr. S. E. Piper.

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302. Have you ever seen a watercloset out of order more filthy than a privy?—I think not.

303. (*Mr. Morton.*) You have spoken of a district where the death rate was 68 per 1,000, is that a considerable district?—It was a low-lying district on the other side of the river Skerne to the east; that was in one year when there was an epedemic there.

304. It appears that there were 774 deaths?—Yes; in 1852.

305. In one year the deaths were as many as 53 per 1,000?—But that was in an unhealthy part of the town, and all that has been remedied since.

306. What were the circumstances connected with that district which caused the death rate to be so much higher?—At that time there was no drainage scarcely, and the air was rendered impure by the filth in the neighbourhood, ditches and pigsties polluted the air, and all the exhalations from an overcrowded churchyard; but all those evils have been now remedied.

307. At that time did you attribute any disease to the condition of the river?—It was from combined causes.

308. But had the condition of the river a share in it?—Yes.

309. Are there any weirs in the river in Darlington?—No.

310. Was the district of which you have been speaking liable to be affected by floods?—Yes.

311. Was it occasionally flooded?—I think it has been flooded, but very rarely.

312. Is there a considerable Irish population in Darlington?—Yes

313. Are they located in the overcrowded places you have described?—They were then, there was a little colony of them.

314. (*Dr. Frankland.*) Have you not received an order from the Local Government Act Office in relation to the sewerage works of Darlington?—No.

315. Have you up to the present time done anything in connexion with them.

(*The Town Clerk.*) Nothing more than to direct the surveyor to prepare plans, and to make a report.

The witness withdrew.

MR. HUDSON REAH examined.

Mr. H. Reah.

316. (*Mr. Morton.*) Are you the borough surveyor?—Yes.

317. Is Darlington sewered?—Yes.

318. Are all the houses in Darlington connected with the sewers?—All the houses are connected except some of the suburban residences outside.

319. Are the privies and cesspools connected with the sewers?—All the ashpits are drained, or when I say all, the principal part of them, there are some exceptions; there are very few cesspools in the town at all.

320. Are all the waterclosets connected with the sewers?—Yes.

321. Do all the streets drain into the sewers?—Yes.

322. So that the exit water from the sewers would be the rainfall, plus all the water supply?—Yes

323. Does all the sewage of the town run out at one exit?—Yes.

324. What led you to construct such a costly conduit for so great a distance?—I suppose that was the only place they could get for the outlet, the lowest position.

325. Do you mean that you required the fall which you thereby obtained?—Yes.

326. The number of privies in Darlington is not stated in the return; can you give it?—I think there are about 3,000.

327. And 900 waterclosets?—Yes, about that number.

328. What proportion of the population in Darlington do you suppose use waterclosets?—Not one-fourth.

329. Of the other three-fourths of the population, what proportion do you suppose of the excrementitious matters reaches your sewers?—Nearly the whole of it, through percolation from the ashpits.

330. What do you take out of the privies and ashpits?—The night soil and ashes and the refuse of the house.

331. Are the ashpits all covered?—No.

332. Do you get all the washings and liquid refuse of the houses into your sewers from ashpits as well as from waterclosets?—Yes.

333. Is it your duty to direct and superintend the scavenging of Darlington?—Yes.

334. Is the work of cleaning out the privies and ashpits also done under you?—About one-fifth of them are cleansed by men employed by the board.

335. How is the cleansing of the other four-fifths of these places carried out?—It is done by farmers in the district.

336. What control do you exercise over that?—None whatever.

337. Are the inspectors of nuisances employed in this department?—Yes, and the farmers have to clean out the privies between certain hours.

338. If a nuisance is proved to exist, have you authority to enforce a penalty?—Yes.

339. Can you state what quantity of this refuse is carted out of Darlington?—I cannot.

340. Are the ashpits of which you speak large receptacles?—They are about four feet square and are generally sunk about 18 inches below the surface of ground.

341. Is the receptacle cemented inside?—It is not cemented; the walls are built of brickwork in mortar, and are nine inches in thickness.

342. What is the floor laid with?—There is generally a stratum of gravel laid, and the drain is laid underneath, and then it is paved with brick.

343. Is the stuff that comes out watery?—It is watery sometimes when the drains have got stopped up.

344. Does your inspector often report a nuisance?—Not very often.

345. Do the inhabitants of more than one house have access to a single privy?—Yes, in the old part of the town, but not in the new part.

346. Are there any public privies in Darlington?—No.

347. Or public urinals?—Yes, one or two.

348. Are there any public waterclosets?—No.

349. Is the cleansing done at night or in the day?—It is done at night time.

350. Is all the stuff carted on to land to be used for agricultural purposes?—Yes, all the refuse.

351. We found in Manchester that the contents of the ashpits were often divided into two portions, that the wet portion was carried to the land, but that the dry portion was taken to a tip to form building ground. Is the same thing done here?—No.

352. Do you flush out the ashpits and waterclosets with water when the scavenger goes round?—No.

353. Do you ever use disinfectants?—Sometimes, when they are cleansing out the ashpits, disinfectants are used.

354. Is the operation of scavenging ever complained of as a nuisance?—I think not.

355. Is there any land in the neighbourhood of Darlington to which the sewage of the town could be applied?—Yes, plenty of it.

356. Do you mean that there is land to which the sewage could be carried by natural gravitation?—No, there is none of that, it would have to be pumped.

357. Do you think you could easily command a sufficient area without having to pay much rent?—I think so.

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358. Has any plan yet been definitely arranged for that purpose?—None.

359. With regard to the grids in houses, are they all connected with the sewers?—All of them.

360. Are they properly trapped?—Yes.

361. Are the sewers ventilated?—Yes, they are ventilated by down spouts and pipes from houses, and also by some of the tall chimneys in the town.

362. Are they also ventilated by open grids in the streets?—No, all the grids in the streets are trapped.

363. (*Dr. Frankland.*) Are you acquainted with the waterworks?—No.

364. Do you know the extent to which private wells are used in Darlington?—There are a considerable number of private wells in Darlington, but I cannot tell to what extent they are used.

The witness withdrew.

MR. JOHN HORNCASTLE BOWMAN examined.

Mr. J. H. Bowman.

365. (*Dr. Frankland.*) You are I believe acquainted with the works about two miles from Darlington, where the water is abstracted from the river?—I am partially so.

366. Do you know the daily flow of the river in dry weather at that point?—No.

367. Cannot you give us the average?—It is a fluctuating river, but generally speaking the supply is abundant.

368. Do you never abstract the whole of it?—No, not even when the supply has been at the lowest. Last year, I believe, the river was lower than it had been known to be for many years, and according to the best gauge that was taken, scarcely one-third of the water then flowing was taken out.

369. Our sample was taken, I believe, in June of last year; was the river very low then?—Yes, much lower than on the average, but I think not so low as upon the other occasion you have referred to.

370. (*Chairman.*) Not so low as it is now?—No; and it is not so low now as it was a month or six weeks ago.

371. (*Dr. Frankland.*) At the time I have referred to I suppose you would not have been taking a third of the water?—I believe that never at any time has a third of it been taken.

372. Is the whole of your water supply obtained from the river?—Yes, excepting the water from a few wells, which are now much less used than they were some time ago.

373. But that is not in any sense a supply from waterworks?—No.

374. Your supply, I believe, is very ample, something like 50 gallons per head?—No; I think the consumption is not so much as that, even including what is used for manufacturing purposes.

375. You supply, I believe, about 1,000,000 gallons daily for domestic use, and 500,000 gallons for trade purposes; and taking your population at 20,000, that would give 50 gallons per head; but perhaps you supply other places?—No, not from these works, but we calculate the population to be more than 20,000; nearer 25,000.

376. In 1861 it was 15,299, but it is now estimated to be upwards of 20,000?—I think that it is as high as 24,000 or 25,000.

377. Then you do not consider that the supply of water is as much as 50 gallons per head?—No; I think that is more than is actually used.

378. Do you take care to prevent waste?—We take as much care as we can, but there is no doubt that the waste is in spite of that excessive.

379. Have you an inspector who is continually going round to look after the fittings?—There is one, but he is not entirely so employed. The plumbers are partially engaged in that work.

380. Have the plumbers no interest in preventing waste?—None whatever, except that it is their duty to do it; they are paid for doing it by the water department.

381. Then they are the real inspectors?—Yes, they are the paid inspectors.

382. Are fines inflicted upon persons who are proved to have wasted the water?—That has very rarely happened; there have been very few cases of waste.

383. Do you supply the fittings to houses, or do you allow consumers of water to procure them?—To a very small extent they are supplied now. At one time it was kept very much in the hands of the water department.

384. Do you find that by allowing free trade in fittings, good fittings are used?—That is a thing that has to be guarded against. It was for the purpose of preventing waste that the supply of the fittings was kept in the hands of the Company for a long time, but it is now thrown more open to the trade than it was.

385. Have you noticed that there has been an increase in the consumption of water since that has been the case?—I think not materially so.

386. (*Chairman.*) What do you consider to be a fair average allowance of water per head for the inhabitants of a town?—I believe that the authorities upon water supply consider something like 15 or 16 gallons per head per diem about the quantity that ought to be used, but a large quantity is used in Darlington for manufacturing purposes. The quantity of water wasted is no doubt very excessive, but I think that there is very rarely the quantity of water supplied that is represented to be supplied. That is to say, it is very seldom that the engines pump up all the water that they are represented to pump. It has been of course the great care of those interested in the water supply to get the waste diminished. They have succeeded in part, and the waste is diminished.

387. (*Dr. Frankland.*) Do you know the number of inhabitants living upon the Tees above your intake?—I do not; but we are led to believe that all, or nearly all, of the drainage of Barnard Castle goes into the river.

388. Have any complaints been made with regard to that?—I think not. We understood a short time ago that a system of drainage was to be carried out at Gainford with an outlet for the sewage into the river. We protested against it, and the scheme was not proceeded with. That place is 7 or 8 miles above Darlington.

389. Is the population of Gainford large?—No, 800 or 900.

390. Do you know what the population of Barnard Castle is?—4,000 or 5,000.

391. You intend, of course, to use your best endeavours to keep the supply of water pure?—Certainly; and I think I have given a proof of that, having taken the action that we did in reference to Gainford.

392. But you have not taken any step as against Barnard Castle?—No.

393. Have you any power to do it?—I am not aware that we have.

394. Does your Waterworks Act not give you any power?—I think not.

395. Have you any cause of complaint with regard to the pollution of the water besides the sewage above the intake?—I think not; the analysis that we have always obtained of the water has been so satisfactory that we have very little to say about it.

The witness withdrew.

MR. HUDSON REAH, Borough Surveyor, further examined.

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396. (*Mr. Morton.*) Are there considerable differences of level within the limits of the borough?—Not very considerable; perhaps not more than 40 feet.

397. What is the fall in your main exit sewer?—1 in 1,000.

398. How do you cleanse out the sewer?—We can turn the Skerne into it at a certain point, and flush it.

399. Do you do that at regular intervals?—No, we do it when it requires it.

400. What do you do in the case of the street sewers of the town?—They are flushed with the water supplied to the town.

401. Is there a considerable quantity of water used in that way?—No, not very considerable.

402. (*Chairman.*) Do the sewers get choked, and frequently require scouring out?—It happens sometimes that the small drains want scouring, but not as a rule.

The witness withdrew.

MR. HUGH DUNN (Town Clerk) examined.

Mr. H. Dunn.

403. (*Dr. Frankland.*) You have, I believe, some documents to hand in?—Yes. I have already stated in the statistical return prepared and forwarded to the Secretary to the Commission* that we received an order from the Secretary of State, under the powers of the Sanitary Act of 1866, directing us to take steps before the 31st of October next to provide a sewage outfall; and that unless we did so the Secretary of State would appoint a person to carry out the same, and charge us with the cost.

404. (*Mr. Morton.*) What steps have you taken in consequence of receiving that order?—A resolution was passed by the town council to the following effect:—"That Mr. Reah be directed to furnish the "Council with a report of the result of his investiga- "tions and visits of inspection to the various sewage "works that he has examined, with such recommen- "dations as he may deem applicable to this Borough, "particularly calling his attention to the desirability "or otherwise of diverting the great bulk of the rain- "fall, so as to send it direct into the *Skerne* without "diluting the sewage." That report has not yet been made. I will hand in newspapers containing the correspondence. (*The same was handed in.*)†

The witness withdrew.

Adjourned to Middlesbrough at 10.30 a.m. to-morrow.

The Council Chamber, Town Hall, Middlesbrough.

Friday, 7th October 1870.

PRESENT:

MAJOR-GEN. SIR WILLIAM DENISON, K.C.B., IN THE CHAIR.
DR. EDWARD FRANKLAND, F.R.S. | MR. JOHN CHALMERS MORTON.
MR. S. J. SMITH, *Secretary.*

MR. JOHN THOMAS BELK (Town Clerk and Clerk to Local Board) examined.

Mr. J. T. Belk.
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405. (*Chairman.*) I understand you have reports on the existing state of the sewerage of the borough, and proposed extension of the outfall, which you wish to bring under the notice of the Commissioners?—Yes; the Corporation of this town are very anxious that Her Majesty's Commissioners should not leave the district under the impression that the Corporation desire that the present condition of things, so far as sewerage is concerned, should continue. And to show the Commission that the Corporation are alive to the wants of the district, I have been requested to put in certain reports which have been obtained by them with the view of procuring the best information to enable them to carry out the best scheme of drainage. When the borough was much enlarged, in 1866, the surveyor to the Corporation, Mr. Dunning, was directed to prepare a comprehensive scheme by which the whole district might be drained. He turned his attention to the matter, and eight or nine months ago he prepared a plan and made a report upon it.

Shortly after that report was made the Corporation thought it advisable to obtain further information upon the subject, and they obtained the services of an eminent sanitary engineer, Mr. John Lawson, who came down to Middlesbrough and spent some time in inquiring into the wants of the district, and also the plan which had been furnished by Mr. Dunning. Mr. Lawson made a valuable report upon the subject, recommending Mr. Dunning's plan to be carried out, with certain modifications.

Mr. Dunning having retired from the Surveyorship to the Local Board, the new surveyor, Mr. Latham, was requested to furnish the Corporation with his views upon the drainage of the district. He did so in a report.

Mr. Latham's report and his plan differing considerably from the plan of Mr. Dunning, which was recommended by Mr. Lawson, the Corporation thought it advisable to obtain further advice, and they applied to the Secretary of State for an inspector of the Local Government Act Office to be sent down. And accordingly Mr. R. Morgan, C.E., one of the inspectors, came down and instituted an inquiry, and made a report upon the various plans that were submitted to him.

By that report he practically recommended that the plan suggested by Mr. Dunning should be adopted, altering, modifying, and enlarging considerably that plan. I think, therefore, the Commissioners will be of opinion that the Corporation are fully alive to the requirements of the district, and are doing their best to remedy the existing evils. I now hand in copies of the several reports I have referred to, and also a small photograph of a map of the town, showing the present outfalls of the district (*handing in the same*). Having received an intimation from your Secretary that you intended to visit Middlesbrough, the Corporation directed their surveyor to make a thorough examination of the towns on the banks of the river Tees above Middlesbrough. He made that examination, and the result is embodied in a report which I now also hand in (*handing in the same*). I will hand in

* Part I., Section 3, page 54.

† Order quashed.

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also what will be useful in perusing that report, viz., a map of the river Tees, showing the various towns alluded to therein.*

406. (*Chairman.*) The Commissioners thank you very much for the great care and trouble you have taken in procuring this information.

The witness withdrew.

Report by Mr. John Dunning, A.I.C.E., Borough Surveyor, Middlesbrough.

"Middlesbrough, March 15th, 1870.

"To the Town Council of Middlesbrough.

"GENTLEMEN,

"IN conformity with your wish I beg to lay before you my report relative to the system of new sewers which I propose to construct for the drainage of the borough, not only as it now exists, but also when more fully built upon. I may state that from time to time the levels of the various sections of the town and district were laid before the Sanitary Committee, and where alternative courses for sewers were apparent, I consulted the Committee as to which they preferred. I may also state that it was a positive instruction to me to so lay down the 'outfall' sewers that not only should that part of the borough which is now unbuilt upon be provided for, but that the present sewers could be emptied into the new outfall, by constructing an intercepting sewer for that purpose, if at any future time it was deemed best to do it, or if the legislature should force it upon the board. I was also requested to take into consideration that a boundary stream between Middlesbrough and North Ormesby was fouled, partly by sewage from the borough, and partly by sewage from North Ormesby, and to provide an outfall which would entirely divert the sewage from that stream, and also provide an outlet into which the North Ormesby Board could, if they were so minded, empty their sewage as well. Two or three times the Committee went over the ground with me and approved the lines suggested. At the meeting of the Drainage Committee held March 2nd, 1869, my plans and estimates were produced and the following Minute was made:—

"The Committee recommend the carrying out of the following part of the scheme, namely:—

"Main sewer from the outfall at the end of the Dock entrance Channel to *C*, a point on Cargo Fleet Road shown on the plan, thence across the marshes to a point near Newlands Lodge marked *D* on the plan, thence up Borough Road to a point near the Parsonage House marked *E*, along Woodlands Road to a point marked *K*, thence along the back of the Villas across Imeson and Elgee's land to a point below North Acklam marked *J*. Two branches from this point, one up to North Acklam sewer, and another to Linthorpe, marked respectively *JX* and *J* on the plan, the relaying of the Marsh Road sewer from Boundary Road up to near Fox, Head, and Company's works to a point between the letters *M* and *L* on the plan. The Committee leave the Council to decide upon the carrying out of the intercepting sewer from a point marked *C* in Cargo Fleet Road past the Chemical Works and New Engine Sheds, and the back of St. John's Schools to a point marked *T* upon the plan, for taking off the sewage of the south side of the railway at a lower level, so that at some future time the present sewers branching from Wilson Street Main may be lowered and their action quickened. Also to decide upon the question of making a branch from the last-mentioned sewer where it passes the Chemical Works under the Dock Drops to the present manhole at Bolckow, Vaughan, and Company's office, for intercepting the sewage from the north side of the town. The cost of the first part which the Committee recommend will be about 7,500*l.* The cost of the intercepting sewers for the south side will be 1,850*l.*, and the intercepting sewers from the Chemical Works to Messrs. Bolckow, Vaughan, and Company's office will be 1,500*l.* The Committee suggest that a special meeting of the Council should be called on an early day to consider the whole scheme.

This was confirmed at the following Council meeting. Mr. Lawson, C.E., was called in, carefully examined the town and district in company with the Committee, and after having made himself fully master of the whole of the levels and contours affecting the scheme, in an elaborate and exhaustive report to you, was pleased to express his approval of it.

"The total area of the borough is about 2,100 acres, and the configuration makes it convenient to divide it into five districts, having regard to the sewering of it.

"The first has an area of 168 acres, bounded by the Dock Channel, and the river on the north; by the extreme boundary line of the borough on the east, by the Redcar Railway and Cargo Fleet Road on the south, and by the dock on the west. This district will require very little in the way of main sewers, being chiefly used for manufacturing purposes, but houses may be built thereon, although at present but few exist.

"Second.—764 acres, bounded by Cargo Fleet Road and Corporation Road on the north, Linthorpe Road on the west, the southern boundary of the borough at Linthorpe Grove Hill and Longlands on the south, and by North Ormesby on the east. This district has a valley and stream up the middle.

"Third.—207 acres of that part of the town bounded by Linthorpe Road, Sussex Street, Market Place, and North Street on the west, by the river on the north, as far as the dock entrance, by the dock, and a line drawn from the south end of it to Corporation Road on the east, and by Corporation Road on the south.

"Fourth.—267 acres, bounded by the river on the north, by North Street, South Street, Sussex Street, and Linthorpe Road on the east, by the western portion of Grange Road, Fleetham Street, and Stockton Road on the south, Marsh Street and the Old Towns line on the west. To which must be added the "Iron Master's District," as it is called in your last Act of Parliament, comprising about 350 acres to the west of Old Towns line, which latter may require draining, but is not so likely as other parts of the borough.

"Fifth.—336 acres, bounded on the north and north-east by the ridge of higher land from Samuelson's new works, across to the top of Marsh Street, where it joins Stockton Road, by Stockton Road itself as far as Fleetham Street, by Fleetham Street and the western portion of Grange Road, on the east by Linthorpe Road to the southern boundary of the borough at Linthorpe, on the south by the southern boundary of the borough at Linthorpe, and on the west by the Green Lane to Ayrsome, and from Ayrsome by the boundary of the borough to the river Tees above Newport. No. 1 and 2 districts have their natural outfall at Cargo Fleet (the combined area is 932 acres), No. 3 has its present outfall at Bolckow, Vaughan, and Company's works, No. 4 has its present outfall at the Packet Wharf, and No. 5, which, as you will see is about one-sixth of the whole borough, may be said to have its natural outfall at Newport, indicated by a streamlet emptying there.

"My plans are so laid, that beginning with the main outfall, between Cochrane and Company's and Gilkes, Wilson, Pease, and Company's Works, at Cargo Fleet, in ground which will be now thoroughly consolidated by the slag which has been tipped upon it, a low level sewer can be brought to a point near the 'deodorising tanks,' with very light cutting, comparatively speaking, except through the slag bank from the river to the Redcar Railway, of which I shall speak hereafter. With this sewer and a branch carried from the point near the deodorising tanks across the marshes past North Ormesby toll bar to Newlands Lodge in very light cutting, and with a good deposit for the surplus material, I provide the outfall sewers for 932 acres out of the 2,100.

"The size of the first portion of 433 yards of this sewer from the river to Redcar Railway will be eight feet circular, and is made one foot more in diameter than would be otherwise necessary, in order to admit of the North Ormesby sewage being conveyed through it, if necessary, in which case a portion of the cost would be repaid to the borough, as might be settled by arbitration in case of difference. The North Ormesby people may possibly think Middlesbrough has no right to provide for them, but the fact is that they cannot get to the river without coming through the borough, and they cannot expect to be allowed to continue pouring their filthy sewage unto the open stream that runs for at least half a mile along the borough boundary, nor can they grumble if they are asked to pay only a portion of the cost of this outfall, which will effectually rid them of all danger for the future. No scheme of drainage for Middlesbrough is complete which does not provide for taking North Ormesby sewage along with your own out of Cargo Fleet beck. There is ample provision for adjusting and apportioning costs of such joint works in the Public Health and Local Government Acts, and to leave this

* The sewerage works are now, October 1871, being carried out.

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nuisance on the skirts of your district would be absurd, and if the North Ormesby Board did not use the means thus placed at their disposal they could not be surprised at any action that might be taken against them in the future. This provision was discussed by your sanitary Committee, and in providing for it I acted upon their instructions. The cost of that portion of outfall will be about 3,100*l.*

"The next portion of 395 yards from Cargo Fleet toll bar to the deodorising tanks is seven feet circular, and provides for all the districts numbered from two to five being concentrated at this point. The cost of this portion will be 1,620*l.* The branch from the deodorising tanks to Newlands Lodge is 844 yards in length and is six feet circular; this provides the outfall for district number 2 (764 acres), and the cost of this portion is 2,700*l.* From this point properly sized sewers of various calibres, diminishing as they approach the summit, are proposed to pass the parsonage house bending round to the bottom of the villas; from this point a branch is proposed to be carried to the Sailor's trod on the north side of the Park for the houses proposed to be built there. The *main* sewer is proposed to be carried up the bank of the villas and across by the Long Plantation and the low ground to the north of Union Street, in North Acklam, into the very heart of that portion of the Newport district number 5, which is likely to be built upon, with a branch up to Linthorpe and New cemetery. These sewers will cost 3,000*l.* Thus, for about 10,500*l.*, I provide, *first*, for the drainage of 1,268 acres out of the 2,100; *second*, an outfall for North Ormesby; *third*, an outfall sewer for the remaining area of the borough. If this work was done, and the *present sewer outfalls allowed to remain*, you have complete provision for the whole of the borough.

"But having regard to the fact that a portion of the south side of the town is liable to be flooded *if a heavy fall of rain comes when the tide is up, and the sewer valves closed*, I have provided for a main sewer to be continued from the point near the deodorising tanks up to the Chemical Works, of such a size that the whole sewage of the old town on the north side of the railway can be brought into it at this point, if necessary, comprising districts 3 and 4 (824 acres), or the sewer can be continued thence up Cargo Fleet Road, past the Engine Sheds, either in Blake or Hunter Streets to near St. John's Schools, at the west end of which the present main sewer from the south side passes, thus intercepting the whole of the sewage from this portion of the south side of the town; this sewer is here at such a depth that it will allow all the south side sewers to empty into it at the crown, or they may be deepened four or five feet if thought advisable, and made to enter with level inverts. If this be done, one half of district number 3 will be diverted into the new sewers, leaving the other half only as at present to deliver at Bolckow, Vaughan, and Company's Works. The relief to the south side will be so great that no future flooding of cellars will occur.

"This main sewer can also be extended across the Bridge Pit, the Station Yard, down Station Street to the West Bridge, and up Marsh Road to Fox, Head, and Company's works and cottages; it will intercept all the sewage from the district number 4, situate on the south side of the Dock Branch Railway, equal to about 200 acres, and the remainder of that district can deliver as at present at the Packet wharf outlet, which will be then left free to accommodate the district between Stockton Street and the Old Town's line of rails and the Ironmasters' district also, if it ever requires it hereafter. The cost of this main sewer from the deodorising tanks to Fox, Head, and Company's cottages is 4,800*l.*

"The total cost, therefore, including the provision for the districts number 1, 168 acres; number 2, 764 acres; half of number 3, about 100 acres; 200 acres of number 4; the whole, or 336 acres of number 5, will be 15,200*l.*, and all my estimates are based on tenders given or work done.

"This is all that is necessary to spend until you are compelled to divert the sewage from the present outfalls. But if you are compelled, or if you elect to divert the sewage from the present outfalls, an intercepting sewer is proposed by me, commencing at the Chemical Works, passing through the solid ground under the wood gearing of Dock drops along the western side of the Dock to Bolckow, Vaughan, and Company's office, intercepting the present sewers there, continued up the comparatively free ground in Vulcan Street to the Packet wharf outfall. The cost of this is 4,700*l.* *There is no necessity to spend this unless you like, or are forced.*

"One great advantage in this scheme is—that very few of the public streets will be cut up. The work is in easy ground, and, when carried out, will make a most complete system of sewage. It is following the natural inclination of the ground, except where, in providing for district number 5, which, as I said before, is only a sixth part of the whole borough, the sewer is carried through a little deeper cutting, and where, from the Chemical Works to St. John's School to intercept the present south side sewers, it is required to cut a little deeper also; in both these cases, however, the sewers are only of medium calibre, and the cuttings cheap and in good ground.

"The only really difficult work is the 443 yards of outfall through the slag near Cochrane and Gilkes' Works; this, however, is now so solid, that it can be cut out the exact size with no slips, the foundation is good. I propose to break the slag small that comes out by machinery, and make it with a mixture of hydraulic and common lime into a concrete for a bed for the sewer to rest on, construct the sewer itself of two five-inch rings of radiated bricks set in cement, and fill in the cutting and sides and a little above the top of sewer with slag concrete, made same as bottom bed. When this is done, I feel quite sure *that* portion will be more than strong enough for all it has to sustain. The surplus material not used in concrete and filling-in, will be easily and cheaply disposed of. There will be no difficulty as regards way-leave in the courses of the sewers proposed, most of which are in lines of future roads. All along the route there is good deposit for surplus material. No highways of any moment are interfered with, and but little traffic stopped. No streams are interfered with or diverted, so as to entail extra size of sewers for their accommodation, for such absorption or interference with streams is considered bad engineering.

"Every owner of building land in the borough requiring it is provided with a sewer, and clearly every such landowner who pays rates is entitled to this provision. The sewers can be executed either in whole or in part; each section can be constructed now or hereafter as you may deem best, and form part of one complete system, which can be perfected at such times and in such sections as you may deem right and most convenient.

"The delivery of the sewage is at a point in the river where there are no banks for it to accumulate on, to cause a nuisance by deposit, where it will be discharged clear of the town, and carried down the river with the ebb tide, mingling with at least a thousand times its own volume of water, where, from the fact of the valve closing with the flowing tide, no part, or at most a very inappreciable and harmless part, can either enter the dock entrance or flow up towards the town, and where, if you are hereafter compelled to pump, deodorise, or irrigate, land can be got for your works and for irrigation purposes within reasonable distance, if not on the absolute outfall.

"*As to ventilation*, I believe the most practicable way of dealing with sewer gases is to do as is done with foul gases in coal mines, viz., provide proper shafts in proper places as outlets, these gases being lighter than air will travel along the crown of the sewers, and ascend by any free opening they find; such openings may be quickened in their action by the draught from works or factory chimneys connected partially for the purpose; by cast-iron pipes placed where the rays of the sun beat on them, or being built in among the hot flues of tall houses, and made tight at joints, the heat will, by acting on the iron, rarefy the air and cause an upward current that will draw the gases upwards, and dispel them into the air where they can do no harm. If preferred, charcoal baskets may be used in this system, as laid out by me, as well as any other, *but the really efficient application of charcoal is attended with great expense*, which has deterred many towns from using it, besides, where charcoal baskets are used, unless extra means are provided for 'pulling' the gases through the charcoal, as by extra draught, for instance, or other means, the baskets filled with charcoal act as so many 'plugs,' as it were, and the flow of the gases is checked and rendered more sluggish.

"In London the sewers are ventilated into the middle of the streets by air grates and shafts, as the cost of charcoal, in efficient quantities, was estimated at something like 337,000*l.* per annum. In like ratio Middlesbrough will cost 3,000*l.*, less the value of residuary charcoal sold at one-half, say 1,500*l.* per annum, a sum that would in one year provide more shafts than required, if put up on purpose. Practically, charcoal is not much used in large towns on account of the expense, but, if you are so minded, there *is nothing but expense* to constitute a drawback *to a trial of it*.

"At Eastbourne the board have had to construct their own works to *make* charcoal, and there are very grave doubts entertained whether the system is at all answering the purpose intended.

"*As to Mr. Latham's Scheme.*—As you have decided that the two schemes shall go before a competent engineer, I think it would be out of place to discuss in much

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detail what may appear to me to be objections to Mr. Latham's. I may, however, perhaps be allowed to say that I entirely dissent from his arguments and conclusions as to position of outfall. He *cannot drain the north side of the town into his system as laid out*. He is not so deep with his sewers at Albert Bridge, as I am by 2 feet 6 inches. His sewers do not provide sufficient storage for flood waters. He has not provided in his plans and estimates for the drainage of the *same area* as I have by a considerable amount, and his scheme is not so comprehensive, convenient, or capable of extension for the growing wants of the borough. He carries a heavy sewer through a deep cutting, because of the unnatural position of his outfall, and I think an impartial engineer will say, upon an examination of the two schemes, that multiplying outfalls *that cannot be concentrated, if required*, in prospect of imperial legislation on this subject, is unwise, and ought to be avoided.

"Mr. Latham admits that an outfall will have to be made, where I propose mine, for that district, for it can only be properly drained in that direction, and this district contains at least 400 or 500 acres according to my estimate of its extent. I shall be prepared at the proper time to go into other matters and details, showing the superiority of what has been called the 'Dunning Lawson Scheme.' I may also state that I entirely object to Mr. Latham's figures in estimating the cost of that scheme. I think the estimate for his own may be correct (17,000*l.*), to which, if he diverts the north side sewage, he must add 4,000*l.* or 5,000*l.*, and deepen his outfall also.

"However, we shall most likely meet before your consulting engineer, and all the details can be gone into properly.

"I am, &c.
"(Signed) JOHN DUNNING,
"Assoc. Inst. C.E."

"Report on Proposed Main Sewerage Works for the Borough of Middlesbrough, by John Lawson, C.E.

"To the Chairman and Members of the Sewerage Committee.

"3, Westminster Chambers,
"Victoria Street, Westminster,
22nd July 1869.

"GENTLEMEN,

"On the 12th May last I met you by appointment at Middlesbrough, and in that and the following days, I carefully examined the plans and sections of proposed sewerage works for the borough, which had been prepared by Mr. Dunning, and inspected the town, the existing sewage outfalls, the sites of outfall proposed by Mr. Dunning, and the river to beyond the eastern boundary of the borough.

"It was at that time arranged that Mr. Dunning should complete the plans and sections, and take such additional levels as were necessary to enable me to report to you on the proposed works.

"This having been done, Mr. Dunning brought up the plans and sections to my office on the 1st inst., and gave me all the particulars I required.

"As the result of my examinations, and of the most careful consideration of the subject, I beg to submit to you the following remarks.

"The town of Middlesbrough, with the suburban portions included in the proposed sewerage scheme, is situated on a comparatively level area, varying with one slight exception, not more than about 25 feet throughout the entire borough of 2,000 acres, a great portion of the town being only a few feet above high-water mark.

"In the plan, as originally prepared by Mr. Dunning, two sites for outfall were shown into the dock entrance, and an alternative site was marked at a lower point, on the river. I do not consider it advisable to discharge the sewage into the almost stagnant water of the dock entrance, nor do I think it necessary to carry it to the lower point named by Mr. Dunning. I have therefore selected an intermediate site, pointed out by him.

"*Existing Works of Sewerage.*—Sewers have been laid in nearly all streets between the railway and the river, and in several on the south side of the railway, the sewage from the principal portion of the town being discharged into the Tees at the two points marked *O O* on the plan.

"The sewage from Southfield Villas is carried into deodorising tanks, constructed in a field adjoining Cargo Fleet Road, near the point *C*, the effluent water passing into Ormesby Beck.

"The tributary sewers, I was informed by Mr. Dunning, are, on the whole, in a satisfactory condition, and may be retained as portions of a complete system.

"*Proposed Works.—General Arrangement.*—The portion of the borough included in the plan under consideration, is proposed to be divided, for sewerage purposes, into three districts, namely:—

"DISTRICT No. 1.—Comprising the area on the north side of the railway.

"DISTRICT No. 2.—Including the portion of the town situate on the south side of the railway, and north of Grange Road and Newport Road, as far as Newport.

"DISTRICT No. 3.—The outlying portions, comprising Newlands Grove Hill, Southfield Villas, North Acklam, and Linthorpe, to the southern and western boundary of the borough.

"The main lines of sewer for these several districts will meet in one outfall sewer in Cargo Fleet Road.

"*Outfall.*—The site which I have selected as the most desirable for the outfall is marked *B* on the plan, and lies between the works of Messrs. Cochrane and those of Messrs. Gilkes & Co., the land belonging to the Middlesbrough owners. At this point the sewage of the entire town will be discharged into the river Tees; the invert of the outfall being 6 inches below Zero or low-water level. Special arrangements will be made for the sewage at all times to flow under water; and self-acting tidal valves will close the outfall whenever the water in the river is higher than that in the sewer.

"The strip of land through which the outfall sewer will be laid after crossing the railway will be available as a site for a pumping station, should it at any future time be found necessary or desirable to erect works of this character; either for the prevention of flooding on extraordinary occasions, or for the purpose of utilizing the sewage.

"The outfall sewer, for a length of 1,330 feet, from the river Tees to the middle crossing, near the toll bar in Cargo Fleet Road, will be 8 feet diameter, and thence along Cargo Fleet Road to the point *C*, near the present deodorising tanks, a distance of 1,185 feet, it will be 7 feet diameter. The sewage of North Ormesby may be carried into the outfall at the point where the sewer diminishes to 7 feet diameter.

"At *C* the main sewer for No. 3 District will join the outfall, which at this point will be reduced to 6 feet diameter, and continue of this size for a length of 1,610 feet to *S*, near the crossing of the Middlesbrough and Guisborough railway.

"*District No.* 1.—This district comprises that portion of the town lying between the railway and the river.

"The main sewer, from its junction with the outfall at *S*, will be laid under the dock platform to the junction of Dock Street with Vulcan Street, where it will be joined by the existing Dock Street sewer. From this point the sewer will be laid in Vulcan Street, the existing sewer from near the corner of Dock Street to Grey Street being taken up and re-laid at a greater depth, and a new sewer being laid to the point *V*, and thence through private property to West Street, where the existing sewer which now discharges into the river at the upper point *O* will be intercepted. The proposed sewer from *V* to its junction with the outfall will be 4 feet diameter, and will have a regular gradient of 1 in 1,500 throughout its entire length of 4,510 feet, and from *V* to West Street the sewer will be 3 ft. by 2 ft., with a similar gradient for a length of 675 feet.

"The existing sewer outlets at *O, Q*, will be discontinued, and the sewage of the entire district No. 1 will be conveyed into the proposed outfall at *S*.

"*District No.* 2.—This district comprises the southern portion of the town, extending from the railway to Grange Road and Newport Road.

"The main sewer for this area, commencing at the outfall at *S*, will be continued along Blake Street and past the engine-sheds, to a point behind St. John's Schools, and thence in front of the railway station in a direct line to Station Street, and along Station Street to the point *M* at West Bridge. This sewer will be of 4 feet diameter, laid with a gradient of 1 in a 1,000 throughout its entire length of 3,865 feet.

"From *M* to the point *L*, near the junction of Marsh Road with Marsh Street, the existing sewer will require to be taken up, and a new sewer laid at a greater depth; and from the latter point the sewer will be continued along the back street immediately east of Marsh Street, to near St. Paul's Schools, and along Newport Road as far as may be required; and from the same point, if necessary, a sewer may be laid on the S.E. side of the railway to Newport village.

"*District No.* 3.—This district comprises the area lying to the south of No. 2, and including Newlands, Southfield Villas, North Acklam, and Linthorpe, extending to the southern and western boundary of the borough.

"The main sewer for this portion of the borough, which will join the outfall at *C*, will be of 6 feet diameter for a length of 2,533 feet, and will be laid with a gradient of 1 in 1,500, across the Marshes, and under the Guisborough Railway and Ormesby Road, near the toll bar; and thence in a straight line to the point *D*, near the junction of Borough Road with Marton Road, near Newlands, at

which point the sewer will rise vertically about 7 feet. From *D* to *E* along Borough Road, the sewer will be egg-shaped, 4 ft. 6 in. by 3 ft., from *E* to *K*, along Woodlands Road, it will be 4 ft. by 2 ft. 8 in., from *K* to *J* it will be 3 ft. 9 in. by 2 ft. 6 in., and will be laid behind Southfield Villas, crossing Linthorpe Road, and be carried thence across the fields to the long plantation, where it will curve into the line of an intended street parallel to Union Street, and be continued to the point *J*, near where the 'Sailors' Trod' footpath crosses the boundary between North Acklam and Ayresome Grange Farm. The gradient from *D* to *J* will be 1 in 1,000.

"From *J*, branch sewers will be laid, one northwards to *Jr*, near St. Paul's Schools, to intercept the present North Acklam sewer, and the other in a direct line to the point *I*, near Doughty's brickyard ponds, at New Linthorpe, where the invert will be sufficiently low to drain the new cemetery.

"A branch sewer may at any time be carried from *K* to *F*, for draining the villas on the north-west, and part of the south sides of the park.

"Grove Hill may be drained into the main near the toll bar on Ormesby Road. An outlet for the drainage of the marshes west of Grove Hill and east of the park, and of the remainder of the building sites on the south side of the park, may be obtained at *D*.

"*General Remarks.*—The following table shows the lengths, dimensions, gradients, and capacities of the several main sewers, the inverts of which are less than 5 feet above low-water mark, and the crown less than 9 feet above the same level:—

	Lengths of Sewers.	Dimensions of Sewers.	Gradients of Sewers.	Capacities of Sewers.
	Feet.			Cubic feet.
B to Middle Crossing	1,330	8 ft. dia.	1 in 5,020	68,852
Middle Crossing to *C*	1,185	7 ft. dia.	1 „ 5,030	45,903
C to *S*	1,610	6 ft. dia.	1 „ 1,500	45,521
S to *V*	4,510	4 ft. dia.	1 „ 1,500	56,672
V to West Street	675	3.0×2.0	1 „ 1,500	3,097
S to *M*	3,865	4 ft. dia.	1 „ 1,000	48,547
C to *D*	2,533	6 ft. dia.	1 „ 1,500	71,698
				337,860

"As there are few, if any, cellars in the borough which are not more than 9 feet above low water, it will be seen from the foregoing table, that before flooding can occur, sewage to the extent of 337,860 cubic feet will be stored in the sewers; and with this amount of storage, the occasions on which *any* flooding will take place must be very rare indeed.

"I do not think it necessary to provide any pumping works, in the first instance, for relieving the sewers during high water; but should experience show the necessity of such works, they may be added at any *future* time, without incurring an outlay greater than would be necessary for their construction at the *present* time.

"In determining the sizes of the main sewers, I have not only made ample provision for the flow of the sewage, at all times when the water in the river is low, but have also provided such an amount of storage room as will, I have every reason to believe, prevent flooding within the town.

"Placed as the outfall will be, in deep water, and in the line of current, I do not think there will be any nuisance caused by the discharge of the sewage.

"The question of the utilization of sewage and the purification of rivers is one which has occupied a great amount of attention lately, and at the present time a Royal Commission is inquiring into the subject.

"There is little doubt that as regards *inland* rivers, stringent measures for preventing pollution of their waters by sewage will be adopted; but in such cases as Middlesbrough, even if works for the utilization of the ordinary sewage should be carried out, it would be desirable to provide proper outfalls for the discharge of storm-water; and the outfall now suggested would answer the purpose admirably.

"The gradients of the main sewers are small, but if truly laid, and occasionally flushed at low water, they may be kept in good working order. The main sewer of Bedford, which was put in under my direction, with a gradient of 1 in 3,520, works satisfactorily.

"By laying the main sewers with small gradients, as proposed, good falls may be obtained for the tributaries.

"The sewers, as designed, are intended to remove all surface water, in addition to the sewage, and the mains are of sufficient dimensions to meet the probable future requirements of the borough.

"All the main sewers described in this report should be formed of solid brickwork, in cement or hydraulic mortar; and, as far as practicable, tidal and subsoil water should be excluded from the sewers which are intended to be used for storage purposes, so as to leave the entire capacity available for sewage.

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"To facilitate the construction of the lower portion of the sewers, a stoneware pipe may, with advantage, be laid under the inverts, terminating at a temporary pumping station near the outlet, or at such other point or points as may be found advisable, during the progress of the works.

"At all main and tributary sewer junctions, a manhole should be built, having a moveable iron cover, to allow of the sewer being examined without disturbing the surface of the road.

"The springing lines of the arches of main and tributary sewers should be on the same level at their junctions.

"Ample provision for ventilation should be made on all sewers. This may be accomplished by carrying iron pipes either into or outside tall chimneys, or by affixing them to the gables of houses in such situations as will not admit of the sewer gases entering the houses; or by laying pipes and placing open gratings in unobjectionable places, as has been done in the long plantation. The greater the number of ventilators, the less will be the liability of causing a nuisance.

"Arrangements should be made for flushing the main and tributary sewers by means of flushing sluices fixed in the manholes. Screw-down sluices should also be placed at the outfall in addition to the self-closing tidal flap valves.

"With regard to the disposal of the sewage, I may remark that experience is proving, not only that irrigation is the most perfect mode of purifying sewage, but that, where circumstances are at all favourable for works of this character, profitable results may be obtained. I have recently carried out, and have in hand, works of sewage irrigation for several towns and large public establishments, and so far as these have come into operation they have been successful. In the case of Bedford, where the sewage is pumped by steam power, and applied to a limited area of land, the Corporation are so well satisfied with the returns that they have made arrangements for leasing about 150 acres more, and they are sanguine enough to believe that the profits from the works will suffice to pay the interest on the money borrowed for the construction of the whole of the sewers.

"This is a matter which, apart from any public enactments that may render compulsory the exclusion of sewage from rivers, may well deserve your careful consideration at a future time.

"Having in view the possible future utilization of the sewage, and also the probable extension of the town, I can, with confidence, recommend for your adoption the system of proposed main sewers as shown on the accompanying plan and described in this report, as being one in every respect calculated to improve the sanitary condition of your district, and at the same time, affording facilities for the profitable disposal of the sewage.

"I am, &c.
"(Signed) JOHN LAWSON."

Report by Mr. E. D. Latham, Borough Surveyor, to the Sanitary Committee on the Main Drainage of Middlesbrough, March 1st, 1870.

"GENTLEMEN,

"PURSUANT to your instructions I beg to report that I have taken steps to ascertain the practicability of providing an independent and separate system of sewers, to receive the whole of the drainage of the district situated on the south side of the railway.

"From observations I have made, and from levels I have taken, I find that an efficient and suitable outfall can be obtained, at a comparatively remote point, alongside the river, and situated between the village of Newport and the Newport Ironworks.

"It will be seen by examining the plans and sections, that the point now referred to, forms the natural outfall for the land drainage of a large proportion of the district, and on account of its low level and isolated position, is well adapted for a sewer outfall.

"Already a sewer outfall of a private description has been constructed (at a high level) in this locality, which will be no longer necessary when the proposed main drainage scheme is carried out.

"As a portion of the foreshore will intervene between the termination of the brick sewer and low-water mark, I propose to convey and discharge the sewage by means of a large iron outfall, securely imbedded in the foreshore, to

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be protected in the usual manner, and furnished with proper self-acting tidal valves.

"The scheme now submitted will utilize all the present appliances, as well as meet all present requirements, and is based on calculations that will be found sufficient for all future contingencies, assuming the town increases to double its present size and population.

"Communicating with the outfall I propose to construct two main lines of intercepting sewers, of sufficient capacity not only to act as sewers, but also to afford ample storage accommodation as temporary reservoirs.

"The principal intercepting sewer will extend from the point marked B on the plan, where it forms a junction with the outfall, to the point marked H, and will completely circumvent, and consequently afford drainage accommodation for all that portion of the town and outlying district on the south side of the railway, and which has a natural inclination in that direction.

"The greater portion of the ground traversed by this sewer is already built upon. The sewage from Grove Hill can also be introduced into it, and at a point on the Marton Road it will intercept and receive all the sewage from Newlands, as well as from the sewer that now conveys the sewage from the Villas to the deodorising tanks.

"This sewer will also furnish drainage facilities for both sides of Marton Road as far as Newlands, and may be further extended as occasion may require.

"At a point near the junction of Corporation Road with Marton Road, the sewage from houses that are either now built, or may be eventually erected in the neighbourhood of Cargo Fleet Road, can be either conveyed into this main drain, or by means of a separate sewer can be carried in an opposite direction, and discharged at the point recommended as an outfall by Mr. Dunning.

"Passing down Marton Road in front of the Exchange, in the direction of Station Street and Marsh Road, this main sewer will intercept the present outfall sewers of the town, at points near the Albert and West Railway Bridges, which are some of the lowest portions of the district.

"The inverts of these outfall sewers will be slightly above the crown of the arch of the new main sewer at the points of interception.

"Great advantage will accrue by reason of this arrangement, for in times of heavy rainfall, when the flaps of the present outfalls are closed by the lateral pressure of the tide, the storm waters, which the old sewers at such periods are found insufficient to contain, instead of inundating the low portions of the town, and flowing up the branch drains into the basement stories, will be received into the new sewer, where ample storage accommodation will be provided until the tide recedes, when the storm waters and sewage will be discharged into the river at Newport.

"This main sewer will also drain the houses and building land located between Marsh Road and the outfall.

"The other intercepting sewer comprised in this scheme extends from the point marked B to the point marked D on the plan, and being constructed in some of the lowest ground in the neighbourhood, will provide efficient drainage accommodation, not only for the village of Newport, but likewise for all future streets, which in process of time may be laid out on the sloping ground on either side of it.

"This sewer after crossing Stockton Road will intercept the drain that now discharges the sewage from the neighbourhood of North Acklam into a small open watercourse, whereby a nuisance is created.

"The termination of this intercepting sewer is at a point where it forms a junction with the Linthorpe Road, and as the ground rises for a considerable distance above this point, the old cemetery, the new cemetery, the villa sites alongside the park (except those that incline in the direction of the other sewer), together with the villages of Old and New Linthorpe, can all be effectually drained by means of tributary sewers communicating therewith.

"It will therefore be seen that these two intercepting sewers, in conjunction with the present appliances, ostensibly deal with the drainage requirements, both present and future, of the whole borough, and they can be extended whenever deemed expedient.

"This scheme possesses many important recommendations which are worthy of careful consideration. All the land traversed by these sewers will be enhanced in value, either as building land, or in an agricultural point of view.

"For a very considerable distance one of these intercepting sewers will be constructed alongside an open beck, in land belonging to Mr. Hustler, which may be filled up with the superfluous material from the excavation, and the land added to the estate.

"The physical difficulties that will have to be dealt with in connexion with this scheme are very much less than those which will have to be encountered, assuming the other scheme is carried out. The scheme recommended for your adoption simply passes under one railway (and that near the outfall), whereas, in the other plan railways will be intercepted at no less than five places. The nature of the cuttings, the storage capacity, the gradients and general contour of the sewers will all bear favourable comparison with those of the Dunning Lawson Scheme.

"Financially, a great saving will be effected, for I purpose to lay down only such sewers as are absolutely necessary to secure the annihilation of several serious nuisances, which at present are only partially modified by imperfect deodorisation; for I fail to see the policy of laying down long lengths of costly sewers in private lands before they are actually needed; for it appears to me, that by the time they become absolutely requisite, the rateable value of the houses built upon them will then tend to materially reduce the cost of the necessary structural works.

"In a sanitary point of view, I am also inclined to think the manner of discharging the sewage at Newport is the best that can be devised; for, in contradistinction to the plan for pouring out the whole of the sewage of the entire district below the dock entrance, and almost directly under the nasal organs of the individuals who frequent the works on either side, as well as immediately opposite a rapidly increasing and populated district, the iron outfall at Newport will be completely isolated, and the sewage delivered at a point where the full power of the tidal waters, both ebbing and flowing, will be exerted to prevent precipitation, and to wash away all impurities that otherwise might prove injurious.

"I am also of opinion that by causing the main lines of sewers to converge to an outfall at Newport, in the event of such a contingency arising as the Board being required by the legislature to either deodorise or utilize the contents of the sewers, better facilities will be afforded from the rural and isolated character of this locality, than at the site suggested at Cargo Fleet Road.

"If the scheme now proposed is adopted, the district will be provided with three outfalls, all in situations remote from each other, and where they will be effectually flushed; and from the fact that there being three outfalls instead of one to deliver the sewage, it may be reasonably inferred that less inconvenience is likely to arise to the town; and in a sanitary point of view the chances of polluting the river will be materially diminished.

"I have carefully estimated the cost of both the schemes now submitted for your consideration, and in arriving at the probable cost of the proposed works, I have adopted an average of the scale of charges usually paid in this neighbourhood.

"I find upon inquiry that these works will cost 50 per cent. more in this district than I have had similar work executed for in the South of England.

"I have worked out and priced the quantities of both schemes precisely in the same manner.

"I estimate the cost of the scheme recommended by Mr. Dunning at 28,000*l.*

"I estimate the cost of the scheme now suggested for utilizing the present appliances and providing an outfall at Newport at 17,000*l.* I have prepared detailed estimates, showing the cost of the different schemes.

"The above estimates include the cost of temporary pumping stations, and also certain expenses connected with the outfalls, but do not include compensation for damage done to occupiers of land by reason of the construction of the works.

"An allowance is also made for ventilating the sewers by means of patent charcoal ventilators. As this is a matter of vital importance to the public health, it may not be improper for me to state, with a view to remove misapprehension, and for the information of the committee, that I have obtained communications from eminent medical authorities connected with the local boards of the towns where this mode of ventilation has been carried out by myself, or has come under my own more immediate notice.

"All these gentlemen speak in eulogistic terms of the plan recommended for your adoption.

"To quote from the 'Transactions of the Society of Civil Engineers,' I may perhaps venture to assert that the ventilation of sewers by means of charcoal took its rise from the investigations of Dr. Stenhouse, F.R.C.S., who, in 1853, directed attention to the subject of charcoal in connexion with the ventilation of impure atmospheres. He showed that charcoal was not an antiseptic, but on the contrary was a great agent in promoting decomposition, from its capability of absorbing large quantities of gas, and retaining it within its pores until it was gradually oxidised. If charcoal is exposed to an atmosphere of pure oxygen, it quickly absorbs it, retaining in its pores a quantity equal to 9½ times its bulk. When the gas is thus condensed it acts with magnified force in effecting the oxidation of gases exposed to its influence, compared with the

oxygen absorbed from the atmosphere, which is largely diluted.

"All sewer gases are more or less combined with hydrogen, which being the lightest of all substances carries the gases into the air, and enables them to spread very quickly, and thus become active agents in the distribution of those diseases usually attributed to defective drainage; hence when sewer gases come in contact with oxygen in the condition in which it is present in the pores of the charcoal contained in the ventilator, the hydrogen becomes fixed as it combines with the oxygen, and is turned into water. After a certain time the charcoal in sewer ventilators becomes saturated with impure gases, and when its maximum absorptive capacity is reached, it ceases to exercise any purifying influence, which necessitates the charcoal being periodically changed.

"The sewers and sewer ventilators in London are found to be generally offensive, first because no means are adopted for destroying the gases, and secondly because the means of ventilation are nothing like sufficient considering the area to be ventilated.

"When my brother (Baldwin Latham) commenced to ventilate the sewers of Croydon he put in one or two charcoal ventilators, which soon became extremely offensive, and gave rise to very loud complaints on the part of the inhabitants who lived in their locality. Instead of closing them, he increased them twentyfold, and thus by diffusing the gases over a larger area he reduced the amount of nuisance to the minimum, which was followed by a diminution of the death-rate of one of the healthiest towns in the kingdom. This goes to prove that the principle of ventilating sewers by means of charcoal is good in itself, but may be rendered useless by an imperfect application.

"One of the most recent plans which has come under my notice for ventilating sewers, and one which is strongly advocated by its author, is to effect their combustion by means of shafts communicating with the street lamps, to be kept burning for that purpose. Should experience prove this to be the most economical and efficient plan, it may eventually demand your consideration.

"I am aware of the inconvenience of enunciating opinions which may appear to be opposed to those entertained by Mr. Dunning, and whilst I am the servant of the Corporation will do my best to avoid coming into unnecessary collision with that gentleman, and in reporting on the drainage question have studiously endeavoured to avoid what might be construed into ungenerous animadversion respecting the plans and proposals of my predecessor.

"In conclusion, I beg to state that whatever may be the ultimate decision of the Committee relative to this matter, upon receiving your instructions I will at once proceed to prepare the specifications and detail drawings for carrying out the works. Apologising for the attenuated character of this report,

"I am, &c.

"(Signed) E. D. Latham, M.S.C.E.

"Local Government Act, 1858.—Middlesbrough.

"*Report upon an Inquiry held at Middlesbrough, in pursuance of an Application from the Town Council of that Borough, for the Secretary of State's sanction and approval of one of two plans for the Sewerage of the District of Middlesbrough.*

"Local Government Act Office.
"Whitehall, London.
"22d September 1870.

"To The Right Hon. Henry Austin Bruce, M.P., Her Majesty's Principal Secretary of State for the Home Department.

"Sir,

"I have the honour to state that, in July 1869, the mayor, aldermen, and burgesses of the borough of Middlesbrough, in the county of York, acting as the local board of health for that district, obtained a plan and estimate for the sewerage of that borough from Mr. Dunning, their surveyor at the time. A short time after, Mr. Dunning resigned the appointment, and Mr. E. D. Latham succeeded him; he also received instructions from the local board of health, to submit to them a scheme for sewering the borough.

"Mr. Latham's scheme has been laid before the local board of health, but they refrain from deciding for themselves, as to which is the most advisable plan to adopt: and in accordance with a resolution passed at their special meeting, held on the 26th day of May last, both plans have been forwarded to this office, with a view to obtain an opinion as to which plan would be most advisable for them to carry out.

Mr. J. T. Belk.

7 Oct. 1870.

"In pursuance of the request consequent upon the resolution before alluded to, inquiry was directed, and I visited Middlesbrough on Thursday, the 4th day of August last. I inspected the existing outfalls, by which the sewage of the entire district is at present discharged into the River Tees, and the different localities proposed to be passed by Mr. Dunning and Mr. Latham, by their lines of main sewers. I have also obtained all necessary information upon the subject matter of this inquiry, the report on which I have now the honour to submit.

"The borough of Middlesbrough contains 2,100 acres, of which about 1,000 acres are built upon.

"In 1866 Middlesbrough contained 31,305 inhabitants.

"The population is now 40,000.

"The total annual value of the rateable property within the district amounts to 105,000*l.*, upon which there is at present a debt of 72,112*l.* 15*s.* 10*d.*

"The average annual increase in population is 2,174.

"The average annual increase in the rateable value of the property in the borough is 9,000*l.*

"According to the present rate of increase in the population, it is presumed that during the next 10 years, Middlesbrough will have more than doubled the number of its inhabitants. There are 7,000 houses in the borough, of which 406 only have waterclosets attached; the remaining houses are provided with covered ashpits. These are carefully inspected and cleansed, and the sale of the manure obtained therefrom forms a very considerable source of revenue to the town.

"The rate of mortality in the borough is stated to be 17·5 per 1,000.

"Middlesbrough is supplied with water by the Stockton and Middlesbrough Waterworks Company. The daily consumption of water in the borough is estimated at 24 gallons per head of the population, or equal to 960,000 gallons per day.

"The average annual rainfall in the district is 20 inches; but in 1865, 1¾ inches of rain fell in 24 hours.

"The difference between ordinary high and low water in the Tees at Middlesbrough is 14 feet, that of spring tides is about 16 feet; there is therefore a considerable current and scour in the river at low water.

"The tide flows for a distance of about 12 miles further up the river than Middlesbrough.

"Messrs. Dunning and Latham's plans and reports fully explain the method proposed by each, for dealing with the question; but it may be necessary for me to state the principal points of difference between the two plans, which are these:—

"Mr. Dunning's scheme deals with the sewerage of the entire district; it consists of three lines of main sewers, having one common outfall into the Tees, at a point below the town, between the Tees and Ormesby Ironworks, where the river is, at low water, about 800 feet in width.

"By his plan, the two existing outfalls into the river will be abandoned, and the sewage from the adjoining village of North Ormesby will be intercepted.

"Mr. Latham fixes his outfall at Newport, on the Tees, about two miles above Middlesbrough, and equally distant between that town and Stockton.

"The river here is, at low water, about 370 feet wide.

"Mr. Latham does not propose to interfere with the two existing outfalls that at present discharge into the Tees, but to rebuild them. His plan does not include the sewerage of that part of the borough that lies to the north of the railway, about one-third of the whole area, as he considers that the sewers in this part of the town are efficient in their construction, and ample for that locality.

"Mr. Latham's levels will, however, admit of this part of the town being sewered, should it be at any future time considered advisable to do so, the cost of which will be 3,170*l.* above the estimate furnished by him.

"Should it be determined upon to utilize the sewage by irrigation, there is land available for that purpose in the direction of either of the proposed outfalls; but in each case the sewage must be lifted by pumping.

"If Mr. Danning's plan be adopted, there is more than sufficient land available for the purposes of irrigation around Cargo Fleet village, or eastward along the Middlesbrough and Redcar Railway. Mr. Latham can also utilize the sewage from his outfall by placing a syphon at Newport, in the bed of the river Tees, and irrigate the Billingham Marshes on the Durham side of that river.

"Mr. Dunning estimates the cost of the works, according to his plan, to be 22,669*l.* 16*s.* 6*d.* Mr. Latham's estimate is 17,641*l.* 5*s.*; but to this sum must be added the cost of sewers in the north portion of the town, namely, 3,170*l.*, which make the total 20,811*l.* 5*s.*

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"By both schemes the outfall is provided with a tidal flap; it is projected to discharge direct into the river Tees at low water, and that sewer is of sufficient capacity to act as a covered reservoir, to store the sewage during the time that the flap is closed by the tide.

"The principle of using a main sewer for storage purposes is objectionable, and, when possible, it ought to be avoided, for even with the most careful workmanship and trapping of the sewers branching off, it will be almost impossible to prevent the gases generated in such a large receiver from permeating through the ground, or side drains, and so creating a serious and continual nuisance to the neighbouring houses. If pumping works are provided at either outfall, and a tank to contain a few hours' sewage, constructed in connexion therewith, the sewers will cease to act as receivers, and may, therefore, be formed of much less dimensions and capacity.

"Mr. Latham's plan does not include the sewerage of North Ormesby. If, therefore, the town of Middlesbrough increases in that direction, of which there seems to be every likelihood, a separate outfall, besides that which he proposes at Newport, will be necessary. North Ormesby joins the borough of Middlesbrough on the east side. It contains about 5,000 inhabitants, most of whom are engaged upon the ironworks on the river side. The population is rapidly increasing, but not in the same proportions as that of Middlesbrough. The consumption of water is estimated at 100,000 gallons per day. The sewage of this village is discharged into the Ormesby beck, in the borough of Middlesbrough, and in close proximity to the outfall proposed by Mr. Dunning; in fact, he proposes to intercept it, and convey it to his outfall.

"Mr. Latham's scheme for the sewerage of Middlesbrough has been protested against by the Corporation of Stockton; and the following resolution was passed at the meeting held in April last:—'That the town clerk be 'authorised to write to the Local Government Office, and 'state the objections of this board, on sanitary grounds, 'to the sewage of Middlesbrough being discharged into 'the river Tees at Newport, and request that, if necessary, 'they may be heard, if any local inquiry is directed to be 'made on the subject.'

"The Stockton Corporation are of opinion that if the sewage of Middlesbrough is emptied into the river Tees at Newport the health of the inhabitants not only of Stockton, but of South Stockton, must be seriously injured.

"Independently of this protest, the sewage discharging into the Tees at Newport will be objectionable to Middlesbrough itself; for by each receding tide the sewage will be taken past the town, on its way seaward, and considerable accumulation will be formed along the sides of the river, thus creating a nuisance more serious than that now caused by the existing outfalls.

"Should the utilization of the sewage by irrigation be determined upon, the syphon necessary for that object across the bed of the river at Newport will be a most costly and difficult work to accomplish, and one always liable to breakage by the shipping on the river.

"The position of Mr. Dunning's outfall is to a certain extent open to the same objection as that of Mr. Latham's with reference to the action of the tide upon the sewage discharged into the river; but with this difference: that the river at the point of outfall proposed by Mr. Dunning has nearly double the volume of tidal water passing down it that it has at Newport. It is nearer to the sea, and from Mr. Dunning's outfall being immediately below the dock entrance, the constant opening of its gates will have the effect of scouring the bed of the river opposite the outfall, and of driving the sewage matter into mid-channel.

"Considerable difficulty and opposition will be encountered in the execution of that part of Mr. Dunning's scheme, where he proposes the sewer (R.S.) to cross the dock platform. The cost of this portion of the work will in all probability far exceed the amount named in his estimate.

"Middlesbrough stands at only a few feet above the high-water level of the sea; it has been therefore impossible to obtain steep gradients for the sewers in either scheme. By both schemes it is proposed to deal with the sewage by gravitation.

"Mr. Latham has, by his plan, obtained much more favourable gradients than Mr. Dunning; he is therefore enabled to lay down smaller sewers, and thereby slightly reduce the cost of his works, but as the sewage of the town will eventually have to be raised by pumping, the gradients of Mr. Dunning's sewers can be made as favourable as those of Mr. Latham.

"Having now gone minutely into the merits of both schemes, I come to the following conclusions:—

"1. That considering the recommendations of the Rivers Pollution Commissioners in their report upon the Mersey and Ribble basins with reference to sewage irrigation, any scheme for the sewerage of the borough should be projected with that object in view, and the area of land required for the application of the sewage of the district, with its present population, will be 400 acres.

"2. That owing to Middlesbrough being at so near a level to the sea, no works of sewerage can be executed for it by gravitation, without having an outlet into the river Tees, thus creating a considerable pollution in that river.

"3. That all causes of pollution to the river Tees, either from sewers discharging into it, or from privies, &c. overhanging its sides, should be removed.

"4. That the subject of the ventilation of the sewers has not been sufficiently considered in the estimates of either scheme; nor has provision been made for sewering those parts of the town where sewers only exist in every alternate street.

"5. Greater facilities for surface drainage are much required throughout the borough.

"6. That of the two schemes before me Mr. Dunning's deals most comprehensively with the requirements of the town, and may, with certain modifications, additions, and combinations at certain points, with Mr. Latham's scheme, be adopted with advantage by the Town Council.

"7. That judging from the protest before alluded to, considerable opposition and litigation may be expected from the towns above Middlesbrough, if the sewage is discharged into the Tees at Newport.

"8. That as the estimate of the total cost of the works should include that of land for irrigation, pumping engines and carriers connected therewith, as well as considerable modifications in the selected plan, which are hereafter set forth, the estimates now before me need not be taken into consideration.

"9. That the scheme determined upon should include the interception of the sewage from North Ormesby, which should contribute its proportion of the cost of the proposed outfall irrigation works.

"10. That inquiry be at once commenced with a view to ascertain what land may be obtained for the purposes of irrigation, at the east of the town, in order to determine the amount of engine power required.

"I therefore recommend that Mr. Dunning's plan for the sewerage of Middlesbrough, with the following modifications, be adopted, namely:—

"That the position of the main outfall sewer (8 feet diameter), between the toll bar and the river Tees, be abandoned, and in lieu thereof that the sewer (7 feet diameter) along the Fleet Road, be reduced in diameter, and continued in a straight line across the strip of land between the Middlesbrough and Redcar Railway and the Ormesby Beck, where tanks may be advantageously constructed and pumping engines erected.

"That if the tanks provided for the storage of sewage matter are constructed, the main sewers will no longer be used for that purpose, and their dimensions therefore may be considerably decreased.

"That a sewer be provided for the drainage of New Linthorpe, and for those parts of the borough now inefficiently sewered, and not included in Mr. Dunning's scheme, and that street gullies be laid down to connect therewith.

"I have, &c.
"Signed ROBT. MORGAN."

"Surveyor's Report to the Drainage and Sanitary Committee, Middlesbrough, Sept. 26th, 1870.

"GENTLEMEN,

"I BEG to report that, in compliance with your instructions, I have made an exploration of the river Tees, as far as Middleton-in-Teesdale; and have examined all the important towns and villages situate on or near the banks of the Tees above Middlesbrough, for the purpose of ascertaining the number of towns and villages that discharge their drainage into the river, both above and below the waterworks, of the Stockton and Middlesbrough Water Company.

"The towns and villages that discharge drainage into the Tees above the waterworks are:—

"*Low Conisciffe*, a small village on the north, or Durham side of the river, consisting of 20 houses, and a population of about 80 persons; the drainage of this village flows into the Tees half a mile above the waterworks.

"*High Conisciffe*, a village situate four miles above the waterworks, on the Durham side of the river, consisting of 50 houses, and a population of about 200. A portion of the drainage of this village flows into a small beck which communicates with the Tees, whilst the remainder flows away in another direction, and appears to be absorbed before it reaches the river.

"*Carlbury*, a small village situate 4½ miles above the waterworks, on the Durham side of the river. There are very few houses and one mill, and the population is probably not more than 20.

"*Piercebridge*, a village containing 60 houses, and a population of about 240. It is situate about five miles above the waterworks. The majority of the houses are in the county of Durham. The drainage from a few houses on the Yorkshire side flows directly into the river, whilst those on the Durham side drain into a beck, which also communicates with the river.

"*Gainford*.—The small town of Gainford is situate in the county of Durham, close by the river side, and about 7¾ miles above the waterworks. There are 127 houses in the town, and a population of not less than 500. The drainage from the higher, or north portion of the town, is discharged into a beck, and from thence finds its way into the river; but the principal portion of the drainage is discharged directly into the Tees by means of a large main outfall sewer 18 inches in diameter, and constructed of rubble masonry. At the time I examined the outfall sewage was being discharged into the river in very considerable quantities, and of a very offensive kind. There are gasworks, several inns, and a large school, &c. at Gainford.

"*Winston*, a village containing 28 houses, and a population of upwards of 100. It is situate in the county of Durham, 10 miles above the waterworks. The drainage flows into a beck, which communicates with the river.

"*Ovington*, a village on the Yorkshire side, 11½ miles above the waterworks. The population is about 160, there being 40 houses. The drainage is discharged into a beck which communicates with the river. This village has two outfalls, and I noticed a considerable amount of sewage which was very offensive.

"*Whorlton*, a village in the county of Durham, consisting of 50 houses, and a population of about 200. It is 13¾ miles above the water supply, and drains into two open channels that communicate with a beck that enters the Tees.

"*Greta Bridge* consists of a few houses, and an inn, on the Yorkshire side of the river. It is 14¼ miles above the waterworks. The surface water drains into a large stream, which is one of the tributaries of the Tees.

"*Barnard Castle*, in the county of Durham, is situate alongside the Tees, and is the largest and most important town that discharges sewage into the river, above the source of water supply, to the towns of Stockton and Middlesbrough. It is situate about 17¾ miles above the waterworks, and has a population estimated at 5,000. There are 767 houses, or 1,080 tenements in the town. It was one of the first towns in the kingdom that availed itself of the powers and provisions of the 'Public Health Act.' The sanitary appliances are under the control of a local board of health, and the town is provided with a public water supply, and a system of drainage. The main outfall of the sewers is situate a short distance below the town, near a corn mill belonging to the Duke of Cleveland, and is so constructed that the sewage is discharged under water. The river, at the point where the sewage is discharged, is about 60 yards wide, and is somewhat shallow. There are also several old outfalls that discharge drainage into the river, at points above the outfall already referred to. All the houses have branch drains which communicate with the main sewers. The sanitary accommodation consists chiefly of waterclosets, of which there are 169 furnished with cisterns, and 141 without. The waterclosets appertaining to the cottages of the poor people are pan closets, consisting of a pan and syphon trap, and are flushed out by service pipes and taps connected with the water mains.

"The water supply at present is intermittent, and is obtained from a spring which rises in high ground several miles above the town. The maximum yield of this spring is upwards of 100 gallons per minute, but owing to insufficient storage accommodation in the reservoir in time of drought, several old pumps are resorted to by the inhabitants as auxiliary sources of supply. Taking the amount of water used by the inhabitants for domestic and sanitary purposes to be 20 gallons per head per diem, and assuming the amount of drainage that enters the sewers to be equal to the water supply (not to say anything of the surface drainage caused by rainfall), it will be seen that 100,000 gallons of sewage enter the river from Barnard Castle alone.

Seeing also, that there are more than 300 waterclosets in the town, and as there are only 400 waterclosets in Middlesbrough, it is obvious that Barnard Castle discharges nearly as much fecal matter into the river, above the source of water supply, as Middlesbrough itself does at a point 17 miles below the waterworks.

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"*Higher and Lower Startforth*, small villages close to Barnard Castle on the Yorkshire side of the river, containing in all about 50 houses, and a population of not less than 200. The drainage of these villages finds its way into the Tees.

"*Cotherstone*, a village in the county of Yorkshire, consisting of two inns, one school, three chapels, and about 90 houses. It is about 3¾ miles beyond Barnard Castle. The drainage of this village flows into two small streams, which enter the Tees about half a mile below.

"*Romaldkirk*, a village situate six miles beyond Barnard Castle. It consists of 50 houses, inclusive of four inns. There is also a church and graveyard. The drainage flows down a channel which is partly covered over, and which communicates with a small reservoir situate on some elevated land above the Tees, which is about a quarter of a mile off. The drainage of this village is utilized by being impounded and distributed over the sloping land, intervening between the reservoir and the river.

"*Eggleston*, a village in the county of Durham, 6¾ miles beyond Barnard Castle. It contains 50 houses, a church, and a school, and has a population of about 200. The drainage is discharged into a small watercourse, which divides the village into two portions, and afterwards flows through Eggleston Park into the Tees. There is also a lead mine situate a few miles above Eggleston, the washings from which flow down a beck and enter the river a short distance below the village.

"*Mickleton*, a large village on the Yorkshire side of the river, consisting of about 100 houses, and a population probably of 400. It is 8¾ miles beyond Barnard Castle, and three quarters of a mile from the Tees. The drainage flows down open channels, which communicate with the river.

"*Middleton-in-Teesdale* is a town situate near the Tees on the Durham side. It consists of 500 houses, a church, and two schools, and has a population estimated at 2,300. The poor law guardians are the sanitary authorities, and the relieving officer acts as inspector of nuisances. The town is partly supplied with water obtained from a spring, which rises in a lead mine three miles distant. The whole of the drainage is discharged into a beck, which flows directly into the Tees. The washings, or 'hush' from two lead mines, also flow into the same beck, which receives the town drainage. These lead mines belong to the London Lead Company, and are situate several miles above the town. At the time I examined the beck referred to I noticed that several million gallons, of what appeared to be dirty water, were flowing down it, and which at the outlet into the river had the effect of discolouring the Tees water for a considerable distance.

"From observations I have made I am inclined to think that the drainage of both Middleton and Barnard Castle might be utilized on land contiguous to these towns with considerable advantage.

"Summary of the towns and villages above Middlesbrough water supply:—

No.	Name of Town or Village.	Distance above Waterworks in Miles.	Population.	County.
1	Lower Conisciffe	¼	80	Durham.
2	Higher Conisciffe	4	200	"
3	Carlbury	4½	20	"
4	Piercebridge	4¾	240	" and Yorkshire.
5	Gainford	7¾	500	" "
6	Winston	10	100	" "
7	Ovington	11½	160	Yorkshire.
8	Whorlton	13¾	200	Durham.
9	Greta Bridge	14¼	30	Yorkshire.
10	Barnard Castle	17¾	5,000	Durham.
11	Higher and Lower Startforth.	17¾	200	Yorkshire.
12	Cotherstone	21	350	"
13	Romaldkirk	23	200	"
14	Eggleston	23¾	200	Durham.
15	Mickleton	25¼	400	Yorkshire.
16	Middleton-in-Teesdale	28	2,300	Durham.
			10,190	

"In ascertaining the distances and relative positions of the various towns and villages situate above the waterworks, I have allowed for the serpentine course of the river.

Mr. J. T. Belk.

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"The following is a summary of the towns and villages that drain into the Tees below the Stockton and Middlesbrough Waterworks:—

No.	Names of Towns and Villages.	Distance below the Waterworks.	County.	Population.
1	Darlington	5	Durham	30,000
2	Cleasby	4	Yorkshire	150
3	Blackwell	2½	Durham	90
4	Stapleton	2½	Yorkshire	100
5	Croft	5½	"	100
6	Dalton	6½	"	100
7	Hurworth	8½	Durham	1,000
8	Neasham	11	"	300
9	Dinsdale	13¾	"	30
10	Middleton-one Row	20	"	160
11	Worsall	23½	Yorkshire	120
12	Aislaby	27½	Durham	80
13	Yarm	25½	Yorkshire	2,200
14	Eaglescliffe	28½	Durham	300
15	Barwick	31	Yorkshire	30
16	Thornaby	31½	"	80
17	Norton	33½	Durham	3,000
18	Stockton, North	36½	"	25,000
19	" South	36	Yorkshire	5,000
20	Middlesbrough	41½	"	40,000
				107,810

"The sanitary arrangements of the country villages referred to in this report consist, for the most part, of rude cesspits, many of which are mere holes in the ground, and on account of there being no special provision made by means of pipes, the sewage flows away with the surface drainage into the nearest channel or beck, which conveys it to the river. As most of the small watercourses near the villages are dry at this particular season, the flow of sewage into them I noticed in some instances created a nuisance.

"Of the large towns below the waterworks I am of opinion that Darlington and Stockton stand in most need of sanitary reform.

"The river Skerne, which enters the Tees near the village of Croft, is so much polluted by the sewage of Darlington flowing into it, that it is little better than a large open sewer for a considerable distance below the outfall.

"The sanitary appliances of Stockton appear to be of a very imperfect and antiquated description. I counted 16 outfalls to drains and sewers on the north, and 13 on the south side of the river. The principal outfall into the Tees, on the north side of the river, is in a dilapidated condition, whilst there are other outfalls that discharge sewage alongside the quay walls in such a manner that, when the tide is out, the sewage flows down the foreshore into the main channel of the river. Many of the outfalls in the quay walls are destitute of tidal flaps, consequently, when the tide is out, afford ready ingress to the winds, which drive the sewer gases up the drains into the town, whereby the health of the inhabitants is jeopardized.

"The sewage of all the towns and villages both above and below the Stockton and Middlesbrough Waterworks flows past Middlesbrough, whilst it is almost impossible for the sewage of Middlesbrough to ever reach as far as Stockton, from the fact that the outfalls being almost level with low water, the flow of the sewage is greatly retarded, if not absolutely stopped, by every incoming tide.

"I am, &c.

"(Signed) E. D. LATHAM,
"Surveyor's Office, "Surveyor.
"Gasworks, September 1870."

MR. JOHN RICHARDSON, M.R.C.S., examined.

Mr. J. Richarson.

407. (*Dr. Frankland.*) Have you been in practice here for a considerable number of years?—Yes, nearly 24 years.

408. Have you paid constant attention to the sanitary condition of the town?—I have.

409. Do you consider that it is in a good condition now?—Yes.

410. Notwithstanding that, do not zymotic diseases sometimes prevail?—Yes, occasionally; we had an epidemic in the spring of this year of scarlet fever.

411. In the return made to the Commission, it appears from an answer to one of the queries, that between 1862 and 1863 there was a sudden rise in the rate of mortality from 14·4 per 1,000 in 1862 to 20·8 per 1,000 in 1863, can you state the cause of that?—The cause of the increase in the death rate has been the mortality among children from zymotic diseases. The population is a young one; there are a great number of young families, and a great many children, and if we have any epidemic of any kind, of a serious character, it carries off a great many.

412. Is not scarlatina sometimes held in check for a number of years, and then when it breaks out does it not seize upon a large number of children, who are susceptible of infection?—Yes.

413. Do you think that that accounts for the fluctuation perceptible in the Return?—Yes.

414. The Return for the year previous gives a rate of 14·4, would you regard that as being normally low?—Quite so.

415. In 1860 it was equally low?—Yes.

416. Have you had many cases of scarlatina in the present year?—It was during the present year that we had a very severe epidemic.

417. Did you say that in the year 1863 you had an epidemic of scarlatina?—Yes, that is the most fatal disease that we have here.

418. Under what circumstances do you consider that scarlatina can be communicated from one person to another?—I imagine that it is communicated from one person to another as soon as the eruption begins to peel off.

419. Not before the peeling of the skin?—I do not think so.

420. Have you much overcrowding in the town?—That is no doubt one of our great faults, the overcrowding, a man and his wife and his children all living in two rooms.

421. In such a case there could be no doubt that anyone susceptible of disease must take it?—No.

422. What is your opinion as to the effect of persons passing each other on a common staircase?—If the skin were desquinated, I should say they could take it; that they might breathe some of the particles of the skin, and so inhale the disease.

423. Is it not a fact that if such poisons as the poison of scarlatina be very considerably diluted by a large bulk of air, they do not take effect?—Certainly.

24. Are there not instances in which many such patients are received into a hospital, while the occupants of cottages around are not at all affected by the disease?—Yes; we have no hospital for fever, I am sorry to say, and that is one of the arguments that I have used as a reason why we should get a fever hospital established, as the neighbourhood would be disinfected by what was used in the hospital to purify the place.

425. In your opinion it would be a great advantage, where scarlatina rages, to have such an isolation of the sick?—Most certainly.

426. You have, I believe, a new water supply in Middlesbrough?—Yes.

427. Are you entirely satisfied with it?—Yes, I think it is the greatest blessing we ever had.

428. Was the water of private wells used previously?—Yes; there is only one part of the town where the spring or well water is good, and I only know of about half-a-dozen pure springs, the rest are brackish and mixed water; the pure springs are inside the town.

429. Are they much used now?—I think not. I believe that our water supply is used generally by every one, and to that I attribute a great deal of our healthiness.

430. Do you consider that it is very desirable to preserve your water supply free from poilution by excrementitious matters?—Certainly.

431. And no doubt you would be in favour of restraining people above Middlesbrough from turning their sewage into the river?—Yes.

432. Is there in Middlesbrough any cause of complaint as to the mode of dealing with excrementitious matters?—No.

433. Are there many privies in the town?—Yes.

434. What is your opinion as to the comparative merits of the privy and watercloset systems?—I have no doubt that the watercloset system is decidedly the best; and if we have anything to complain of, I think it is of the deposit of the matter taken out of ashpits in some places. I find in one part of the district a continuance of scarlatina where there has been an accumulation of offensive matter from ashpits and middens, from butchers' slaughter-houses, and those places, although attempts have been made to deodorize them.

435. How often is it that the ashpits are cleaned out?—Once a fortnight, I believe.

436. Do you consider it desirable to get rid of the excrementitious matters produced when quite fresh?—Decidedly.

437. Is not the risk which arises from them in a great measure owing to subsequent putrefaction?—Certainly.

438. Are the sewers in Middlesbrough well ventilated?—I believe not. I do not think we have any system of ventilation at all.

439. Have you heard of sewer gases escaping into the houses?—Yes.

440. Has that been followed by the ill-health of the inmates?—Yes, with a slight epidemic occasionally. It is attended to as far as we can by having the mouth of every drain trapped.

441. I suppose that when gas does escape into the houses it is owing to increased pressure in the sewer, which may force open the trap?—Yes; or carelessness on the part of the people in not putting the bell on the trap.

442. Is the river at Middlesbrough sensibly polluted?—I do not know that it is very much polluted, but it is a tidal river, and there is a great deal of deposit on the sand banks a few miles below.

443. At a considerable distance from every part of the town?—Yes, about two or three miles away.

444. I need hardly ask whether you consider that any ill-health is caused by the river itself?—I do not think it is.

445. Have you any complaint to make of floods?—We have occasionally. If there is a heavy fall of rain, and the tide meets it, we sometimes have a backwash in the drains, and a filling of the cellars, in some parts of the town.

446. But that would not be caused by any silting up of the bed of the river?—No.

447. Is there any cause of complaint made of any kind of impure water whatever in Middlesbrough?—No, I think not. The Darlington water, as it is called, is, I believe, used entirely, and there cannot be any complaint made against it.

448. Is there any complaint of the sewerage in any of its forms?—We have occasionally complaints made of drainage, because there is in some places a want of surface drainage to carry off the water, and underneath the floors there is an accumulation of water, which is sometimes the cause of disease.

449. Are there many courts or alleys in the town where surface drainage is chiefly depended on, and where the people throw their slops out into the yards?—They are not allowed to do that. Many years ago we had a great deal of surface drainage, and we suffered very severely from it. We had two epidemics of cholera, which were caused by open sewers, in 1849 and 1854.

450. Did you then have the same water supply?—No, that has been brought in since.

451. Had you any cholera at the last visitation in 1866?—No.

452. Do you consider that a supply of pure water gives to a great extent an immunity against cholera?—Certainly, and against every disease.

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453. How do you account for the comparatively low rate of mortality in Middlesbrough?—It is naturally a very healthy site; the cold north-east winds are very purifying.

454. The town is situated on flat land?—Yes.

455. Which is not very favourable to drainage?—No.

456. I believe it is only a very little elevated above the level of the sea?—Very little indeed, and the changes of atmosphere can scarcely be believed. In the morning it may be quite hot, as in summer time, and in the evening as cold as in winter.

457. Is there much poverty in Middlesbrough?—Not much. When the works are in operation the people are then well to do.

458. Do strikes occur in Middlesbrough?—Yes; and then there is plenty of poverty.

459. Does that state of things sensibly increase the rate of mortality?—Yes, certainly. I believe there was a strike in 1863, and then there was a great deal of typhus fever.

460. In ordinary times do the labourers earn good wages?—Very good wages indeed.

461. Do you consider that their occupation is a tolerably healthy one?—It is a very trying one to the constitution, most trying.

462. Is there much female labour?—None, except in a pottery.

463. (*Mr. Morton.*) I see that the mortality since 1863 has been a good deal higher than it was before that time; how do you account for that?—We attribute that to the overcrowding, and infantile deaths; there are an immense number of children in the town.

464. Although the mortality is low, yet it appears to be steadily increasing?—Yes, we are increasing in numbers every year.

465. But the rates per 1,000 stand in this way, 17, 14, 16, 14; and then from 1863, they run, 20, 17, 18, 20, 21, and upon the whole it appears to be increasing?—Yes.

466. Is there any explanation to be given of that?—The overcrowding is the cause nearly of the majority of the diseases that we have.

467. I suppose that a newly-built town, other things being equal, has a better chance than an old one?—Yes.

468. The ground is fresh and clean?—Yes.

469. Where the midden system exists, is that liable gradually to foul the land on which the town is built?—I should say not in our case.

470. Are the privies and cesspools actually water-tight receptacles?—I believe that they are all drained and cemented.

471. Do you happen to know whether the mouths of the sewers discharge themselves below high-water mark?—Yes, they do.

472. Does the tide force its way up the sewers?—To a certain extent every tide does.

473. Will not that have the effect of causing a rush of sewer air or gas backwards, and by forcing the traps give access to the sewer gas into houses?—I never heard of such an instance.

474. Do you consider that the condition of the river does not affect the health of the people injuriously?—Not our portion of the river.

475. (*Chairman.*) What is the nature of the soil?—Very hard clay.

476. Even supposing that the cesspools are not water-tight the fluid parts of the excrementitious matters would probably not permeate through the clay?—No; it is water-tight clay, I believe.

The witness withdrew.

MR. EDWIN DAVENPORT LATHAM, C.E., examined.

477. (*Mr. Morton.*) Are you the borough engineer?—I am.

478. Has the sewerage of the town been carried out under your directions?—No; I have only been a resident here about 11 months.

479. Are you thoroughly acquainted with the sewerage?—Yes.

480. By how many exits does the drainage of the town find its way into the river?—At two general outfalls.

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481. Are they both beneath high-water mark?—Yes, both of them; but not below low-water mark.

482. Does the tide enter the sewers as it rises?—It does partially.

483. Is that owing to the imperfect state of the outfall?—Yes. The principal outfall is in a very defective state, and we have not thought proper to incur any outlay in improving it, because the Town Council have at present under consideration a very improved system of drainage.

484. Do those two exits deliver the rainfall of the district which is drained, plus the water supply spoiled?—Yes, they do, and that is all.

485. Does no spring water find its way into them?—Not that I am aware of.

486. Are the sewers of the town ventilated?—No, with one exception, and that is a sewer draining a district consisting of villas, and on that sewer there is one open shaft.

487. Is there no connexion between the sewers and the down spouts of houses?—Not that I am aware of.

488. Are there plenty of street grids?—No; the town is only partially drained. Many of the streets are without sewers, from the fact that the drainage in many instances is taken to the rear of the houses which stand parallel to each other, and the drainage from both sides is taken into one general sewer.

489. Do all the waterclosets drain into sewers?—They do, with two exceptions.

490. Are there any public waterclosets?—None.

491. Are there any tank closets?—There are two, I believe, in connexion with the works.

492. Are all the privies drained into sewers?—They are, and the fluid portion of the excrements flow from thence into the sewers.

493. Are there many instances in which the ashpit and the privy are under the same roof as the house?—There are not many instances of that kind.

494. Do you know of any cases in which the cesspool abuts upon the wall of a house?—Very few.

495. Are there many manufactories, the drainage from which enters the sewers?—Probably from 10 to a dozen.

496. Is the drainage from the chemical works in any way connected with the sewers?—Yes, we have some chemical works here which are a great nuisance to the town, and the waste water from them finds its way into a tank, where it undergoes partial deodorization, and thence it has a communication with the river by a beck.

497. Then it does not enter your system of sewers?—Yes, to a certain extent it does.

498. Have you gauged at the outfalls of your sewers the quantity of water that escapes at those two exits?—I have not.

499. Can you at all estimate the quantity?—Yes, I have done so. It would be the rainfall, plus the water supply.

500. Is there any difficulty in the way of utilizing the drainage water of Middlesbrough by irrigation?—There is really no practical difficulty; but there might be a financial one. We have no ground within the district available for irrigation, and we should therefore have to go out of our district to ground upon which the sewage would have to be pumped, which is in a comparatively high state of cultivation, consequently the land would be rather more expensive to obtain. The outfalls are almost at low-water mark, and there is not more than 33 feet difference of elevation in the whole district.

501. How far should you have to go to find a porous open soil for the application of the sewage?—I am afraid we could not find that. We should have to irrigate clay land. I do not know that that would be any objection.

502. Of the two sewers you have spoken of, which would represent the watercloset sewage and which the privy sewage; or is there any difference?—There is none; the discharge from them combines both. There are not more than 406 waterclosets in this town, 30 of which are in the principal building, the Exchange.

503. There appear to be in Middlesbrough upwards of 7,000 privies?—Yes.

504. So that in any case the sewage would be the sewage of a district in which the waterclosets are to the privies as 400 to 7,000?—Yes. We make a considerable sale of the fœcal matter and ashes, and gained thereby 1,700*l.* last year.

505. How often are the ashpits cleaned out?—On an average once a fortnight. The Corporation employ from 13 to 14 scavengers, whose business it is to visit these places, and remove the fœcal matter and ashes. The ashes are turned in to keep it dry, and the ashes to a certain extent deodorize it. The contents are removed at an early hour, causing as little nuisance as possible; and at the same time we use disinfectants to prevent any temporary offensiveness that may be occasioned by the operation.

506. Is the stuff so taken out carried to a manure depôt?—Yes, and we employ from eight to ten carts to take it away.

507. Is the whole of it used for the land?—Yes, and it is sent by railway to different parts of the country.

508. Is no part of the ashes considered to be dry and carried to a depôt?—Not that I am aware of.

509. Are the ashpits perfectly water-tight?—No; but they are constructed upon an almost water-tight stratum, clay.

510. Is the construction of these ashpits in any way superintended by you?—Yes; that is to say, every plan is carefully investigated by myself and others, who are practical men.

511. Is there any difficulty in the way of extending the watercloset system by you or by the Corporation?—I am not aware that there is, except a financial one. There would be this difficulty, that our sewers are scarcely adapted to receive fœcal matter; they are more adapted for surface water drains, from the fact that our district is so flat, and the gradients of sewers consequently flat, and we send down comparatively nothing more than surface water, with the exception of the drainage from the waterclosets and ashpits. We find that in many parts of the town they get choked up, which is owing to the small incline, and the imperfect character of the drains.

512. Do you flush the sewers?—Yes, from the town main, by a hose and stand pipe.

513. (*Dr. Frankland.*) What is the supply of water per head in Middlesbrough?—It is calculated at 24 gallons per head per diem.

514. Is that an ample supply?—Yes, it is too much, if anything.

515. You exercise, I believe, very strict supervision over the fittings?—We do not, but the water company do.

516. What quantity of water do you use for flushing the sewers?—About 50,000 gallons a day during four months in the year, from the month of May.

517. Do the Company treat you liberally with regard to the charge they make?—We think they do.

518. From which of the sewers would you recommend us to take a sample in order to ascertain the average composition of your sewage?—From the larger of the two, the main outfall.

519. Where is that situated?—It is a large sewer which goes through Bolckow and Vaughan's yard; it is an egg-shaped sewer.

520. Do you think that that represents fairly the sewage of a considerable district?—Yes; I believe it is the oldest main outfall of the town.

521. Is there any considerable quantity of manufacturing liquid of any kind discharged into it?—I do not think there is, because most of the large works are built almost alongside the river, and I think that the principal part of their drainage will find its way directly into the river.

522. Should you consider it almost entirely domestic sewage?—Yes, but of course we do not consider that we have much in the shape of fœcal matter, because we remove it, but it contains soapsuds and the washings generally of the yards, debris, and that kind of thing.

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523. (*Mr. Morton.*) Are you flushing the sewers in that district to-day?—No.

524. Would a fair sample be procured to-day?—Yes.

525. Does the quantity or the quality of the sewage vary from hour to hour during the day?—When we have a thunderstorm, that makes a vast difference.

526. You have spoken of a financial difficulty existing in the way of an extension of the watercloset system; did you refer to any extra charge that would be made for the water?—No; but with regard to the extra expense to be incurred in laying down a more efficient system of main sewers.

427. Do you think that the whole sewerage system of the town must be altered?—Yes, to a very great extent, or we shall be periodically choked up.

528. Are they not building houses at the rate of 1,000 per annum?—Yes.

529. Will not that necessarily lead to an alteration?—We have that question under consideration now, an enlargement of the sewers, and extension of them.

530. (*Chairman.*) At the different works a quantity of ashes and slag is produced, what becomes of that?—Both the slag and the ashes are utilized, more or less, in the shape of being placed along the river banks to form quays upon an area which would otherwise not be available.

531. Are you not filling up the river to a certain extent, straightening the banks, and making walls with the slag?—Yes, the slag is used solely for that purpose, and there is no discharge of ashes into the river; they are kept away from it.

532. (*Mr. Morton.*) What do you obtain per ton for the stuff collected by the scavengers?—We removed 9,000 tons last year, and we sold it for about 1,700*l.*

The witness withdrew.

Joseph Dodds, Esq., M.P. (chief clerk to the Tees Conservancy Commissioners), stated that he had not originally intended making any observations at this sitting of the Commission, but finding that Her Majesty's Commissioners were invited to accompany the Corporation down the river he had prepared a short statement of the constitution and purpose of the Tees Conservancy Commission, together with a plan showing the whole of the tidal limits of the Tees, and these, together with a statement by Mr. Fowler, the engineer, of the quantity, and the cost of dredging, and other acts, papers, and reports, he would hand in at the sitting of the court at Stockton to-morrow.

The witness withdrew.

Adjourned to Stockton, at 10 a.m. to-morrow.

The Council Chambers, Town Hall, Stockton-on-Tees.

Saturday, 8th October 1870.

PRESENT:

MAJOR-GEN. SIR WILLIAM DENISON, K.C.B., IN THE CHAIR.

DR. EDWARD FRANKLAND, F.R.S. | MR. JOHN CHALMERS MORTON.

MR. S. J. SMITH, *Secretary.*

MR. ARTHUR E. H. TROTTER examined.

Mr. A. E. H. Trotter.
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533. (*Dr. Frankland.*) Are you medical officer for the borough of Stockton-on-Tees?—I am.

534. How long have you been acquainted with the borough?—I was born in the town, and have more or less lived here. I have only held the appointment of medical officer for three years.

535. Are you able to explain the return of the rate of mortality which has been forwarded to the Commission, of the number of deaths from 1859 to 1869, before the time of your appointment?—I am not.

536. In 1867 I perceive that the mortality was 26·19 per 1,000?—Yes.

537. Is not that rather high for a town of the size of Stockton?—Yes, but I believe a good deal of that was owing to the subsoil, clay, on which the town is built, and to pulmonary disease. There is also a very large infant mortality, in some months amounting almost to half the whole mortality.

538. To what do you attribute the infant mortality?—There is a good deal of strumous and pulmonary affections.

539. Is that in any way connected with neglect of infants by the mothers?—Not that I am aware of.

540. Is there much female labour in Stockton?—I believe not.

541. As compared with a cotton factory district I suppose the demand for female labour is not very large?—Very little indeed.

542. What are the principal forms of epidemic disease in Stockton?—At the present time scarlatina is the principal disease. Last year we had typhus fever and also typhoid fever.

543. What do you consider is the chief cause of typhus fever?—I believe that in Stockton it is principally owing to overcrowding, the habits of the people, and want of ventilation.

544. Is it your opinion that typhus fever is contracted in a great measure from an impure atmosphere, and typhoid fever partly from the same cause?—I believe typhus fever to arise from overcrowding and consequent foulness of atmosphere; and typhoid fever from drinking impure water.

545. Is there much typhus fever in Stockton?—Not much; occasionally we have had a good deal of typhoid fever, but as a rule there has lately been more typhus.

546. Is there much overcrowding in Stockton?—Yes, a good deal.

547. Is the population rapidly increasing?—Yes.

548. Does not building increase in the same ratio?—Building is going on very rapidly, but I doubt whether it is in a sufficient degree for the increase of the population.

549. Why should there be so much overcrowding in Stockton; do not the people receive good wages?—Yes, they do, but I believe that the Irish and Welsh population are fond of living close together.

550. In colonies together?—Yes.

551. Is it a fact that in some cases a whole family lives in a single room?—Yes, that is so frequently.

552. Are there several rooms in the same house each containing one family?—Yes.

553. What is the average number of persons in one house?—I cannot tell, but I have found in cases of typhus fever that in one room there has been a family of six, all down with typhus at the same time.

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554. Are there no means at present to enable you to prevent this overcrowding?—I believe not.

555. Have you noticed any escape of gases from sewers into houses, where fever has prevailed?—Yes, when the stench traps have been taken up, which occasionally they have been by the tenants.

556. Do you think that that is at all a serious cause of disease?—Very serious indeed.

557. Does it occur so often that that in itself would cause a considerable increase of mortality?—I have very frequently found the grids without the stench traps. I went all round the town for the purpose of making an inspection some two or three years ago, and stench traps were ordered to be put into every house; they were put in, but still afterwards it was found that the inhabitants themselves, in several instances, had removed them.

558. Can you compel the landlords to put stench traps into the houses?—I believe so.

559. Has it always been done?—Yes, in every house in the borough; at the time to which I have referred it was owing to the fault of the tenants.

560. Do you know whether the sewers are well ventilated?—I do not.

561. Have you found in your practice any particular parts of the town more unhealthy than others?—Yes, I think that the newly built parts of the town are the worst.

562. How do you account for that?—From the population. I think the houses are more thickly inhabited by the newly imported population.

563. Do you find that the newly imported population suffer more from zymotic diseases than the older inhabitants?—Yes.

564. They would appear not to be inured to the place?—I think it begins in their part of the town.

565. Do you mean that they bring infection with them, or that they catch it here?—I believe that the infection is propagated in the dwellings, but that it is produced by the impure atmosphere which they themselves create.

566. What is the principal mode adopted in Stockton for removing excrementitious matters?—The privies are cleaned out by contractors who contract for the manure and carry it away. The contents of the waterclosets, of course, go down the sewers.

567. What proportion of the population use waterclosets compared with those who use privies?—The number who use privies is immensely greater.

568. Are those privies immediately contiguous to dwelling-houses?—Not usually; but in those cases where so situated, or in a very confined yard, they have been ordered to be altered.

569. Do you think that there are no cases where a midden or ash-pit attached to a privy abuts upon the wall of a house?—I think not.

570. Are there any privies within dwelling-houses in Stockton?—I think not; there are some box privies which still exist, I believe, within the houses in certain parts of the town.

571. Do you consider that any unhealthiness arises from the use of these privies?—I think not.

572. Do you think that they promote health?—I think they do.

573. What is your opinion with regard to the comparative desirableness in a sanitary point of view of the watercloset system and the privy system?—I prefer the privy system.

574. On what ground do you prefer the privy system?—On account of the easy removal of the excrementitious matters, and, as there is a good system of sewerage in the town, all the liquid part drains away, and is very easily disposed of.

575. You say that the liquid part is very easily disposed of, do you mean that it goes into the river?—Yes; but I am of opinion that as little as possible liquid should go into the sewers from the ashpits, but as far as practicable be absorbed by ashes, sawdust, or other absorbing agent, and that the ashpits should be connected with the sewers as a safeguard in case a sufficiency of absorbing material was not thrown in.

576. Is it not the fact that the liquid refuse is by far the most polluting?—Yes, but it goes here into a tidal river.

577. Do your neighbours below not complain of it?—I do not know that they do.

578. In the case of other towns, situated higher up the river, is that a desirable mode of dealing with the sewage?—In a tidal river I think it would not be a source of any great inconvenience.

579. But supposing it were a non-tidal river, and especially a small one, what should you say?—In those cases the water would generally be used below, and excrementitious matters would pass into the water which would be used for household and drinking purposes, and that would not be desirable.

580. Do you not consider that it is a very unsatisfactory state of matters that the people of one town should be drinking the sewage of another town above?—Certainly.

581. Do you complain of the sewage of Darlington here?—I never heard it complained of. Of course I am of opinion that if you could prevent any sewage at all going into the river, it would be much better to do so.

582. If it be the fact that liquid excrements produce sewage which is as deleterious in every respect as the sewage obtained from both liquid and solid excrements, should you still think it would be better to throw the liquids down the sewers and retain the solids?—Certainly not.

583. Do you think it is desirable to remove the solid excrementitious matters from the neighbourhood of dwelling-houses while still fresh?—I think they should be properly mixed with a sufficient quantity of ashes, and that they should be removed very often.

584. How frequently do you think they ought to be removed?—I believe that if the contents of an ashpit, if kept perfectly dry, were not removed for a fortnight or even three weeks, they would not be productive of harm; but that, as the most favourable conditions could not always be insured, they should be cleared away at least once a week.

585. Do you believe that solid excrements mixed with ashes would not enter into putrefaction before the lapse of a fortnight or three weeks in summer?—I think not, if dry. If they were kept moist, with heat in addition, putrefactive changes would go on more rapidly: but if the place were properly drained, and ashes in sufficient quantity were used at the same time, I think a fortnight would not be too long for them to remain.

586. The drainage must always go into the sewers?—Yes.

587. Do you think that the danger from an accumulation of excrementitious matters near dwellings arises from their entering into putrefaction?—Yes.

588. So long as they are fresh are they comparatively innocuous?—Yes.

589. Is any considerable portion of Stockton situated immediately on the river?—Not immediately on the river.

590. Do you think that any effect is produced upon the health of the inhabitants of those houses situate nearest to the river from the polluted state of it?—No.

591. Have you not traced any disease in Stockton to polluted water of any kind?—No; excepting in South Stockton. They had cholera there, which I believe arose from their drinking the water taken from the river at low-water, cholera being in Yarm at the same time.

592. When was that?—In 1866 or 1867.

593. Was that a severe outbreak of cholera?—No, not very severe.

594. At this time do they not drink the water taken from the same point in the river?—I believe they now have the Darlington water.

595. Did they take the water from the river just above South Stockton?—Yes.

596. Was it filtered before it was used?—I believe not. Men took it out themselves; there was no proper supply; they took it out as they wanted it.

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597. Can you account for the great difference there is between the mortality of Stockton and that at Middlesbrough?—I cannot. I have been in practice in both towns. I really did not notice any particular difference.

598. In Middlesbrough the death rate is 21 per 1,000; here it is on the average 27 per 1,000?—I believe for 11 years the death rate has been 25·38.

599. Is there anything that you have observed that would lead you to consider Middlesbrough a more healthy town than Stockton?—Nothing.

600. The mere fact of a town being built upon clay does not render it for that reason unhealthy?—I believe that it is not so easily drained, and I should think the people would be more liable to pulmonary affections by being situated on a clay soil.

601. Do you consider that gravel is a more healthy soil than clay?—I believe it is.

602. What is your opinion of the water supply to Stockton?—I believe that at present there is a sufficient quantity of it, but I do not think it is good water.

603. In what respect should you complain of the quality of the water supplied?—My complaint would be that it has organic matter in it.

604. But all organic matter is not objectionable?—Yes, but then there is a considerable quantity of it, and of course if it is kept for any length of time it begins to putrefy, and then of course it becomes objectionable.

605. Have you observed yourself that when this water has been kept for some days it gets putrid?—I have not.

606. Is the water always delivered in a clear and transparent condition?—No, it is sometimes milky, but it is clear.

607. That is an evidence of imperfect filtration, is it not?—Yes.

608. Do you consider that water which is subject to sewage contamination ought to be very carefully filtered?—Certainly.

609. Is there not more risk of injury if it is in a milky condition than if perfectly clear?—I do not know that there is any more risk, but it is no doubt probable that it contains more sewage if it is in that condition, and therefore it is more liable to contain certain infectious properties.

610. Do you consider that the sewerage works in Stockton are satisfactory in every respect at the present time?—I do.

611. Is it much the practice to live in flats in this town, or do the people generally dwell in cottages?—In certain parts of the town some families occupy single rooms in houses, while in other parts of the town they have perhaps two rooms.

612. What number of stories are there usually in the houses occupied by the labouring classes?—Only two.

613. So that the mode of dwelling at Stockton is very different from that which obtains in Edinburgh and Glasgow?—Yes.

614. Do many of the inhabitants derive their water supply from public wells?—I believe they usually use the Darlington water; but there are both public wells and private wells, which are used by certain of the inhabitants.

615. Are you acquainted with the quality of the water obtained from these wells?—Yes; we sent samples of the water to Newcastle to be analysed, and the report that was returned was that the sample of the Darlington water which was sent was better than the sample of the well water, and contained less organic matter.

616. Are you also medical officer for South Stockton?—Not now, I was for a short time.

617. Can you explain to the Commissioners this table of mortality of South Stockton, which, if it be correct, seems to be a most extraordinary one (*handing the same to the witness*)?—I think there must be some mistake in that return.

618. (*Mr. Morton.*) In your opinion is the health of Stockton at all injuriously affected by the proximity of the river?—No, I believe not.

619. Not by its occasionally overflowing?—No, I do not think there is often a flood which gets into the houses.

620. Did I rightly understand you to say that you approved of the privy system only when the ashpits had direct communication with the sewers?—Yes.

621. You approve then of the privy system within a town only when they drain into a sewer?—Yes.

The witness withdrew.

Mr. Henry G. Faber (Town Clerk) examined.

Mr. H. G. Faber.

622. (*Dr. Frankland.*) In addition to the written evidence and statistics which you have forwarded to the Commission, do you wish to hand in other documents?—Yes, certain byelaws which we have made under the sanitary Act of 1866, for regulating houses occupied by more than one family, not being common lodging-houses. We have also byelaws under that same Act of Parliament, but those relate to cases of overcrowding where people let their houses, taking in two or more families.

623. Do these byelaws enable you to put a stop to overcrowding?—They do. Our difficulty is to obtain information as to all the cases, but as soon as we do hear of a case when it is reported by the inspector, we require the parties immediately to register the houses, and then we require them to provide a certain amount of air space for each individual.

624. Is that rule pretty nearly effectively carried out?—We have very great difficulty in finding out all the cases; for instance, people may come and take a house, and then in the following week they may take in one or two families. Mr. Trotter was quite right in saying that overcrowding constantly takes place, but when we find it out we deal with it under these byelaws.

The witness withdrew.

Mr. George Edwards examined.

Mr. G. Edwards.

625. (*Mr. Morton.*) Are you the borough surveyor of Stockton?—Yes.

626. Is the town of Stockton thoroughly sewered?—Yes.

627. Is there a sewer in every street?—Yes, in every street.

628. By how many outlets do those sewers deliver their contents into the river?—There are two outlets.

629. Is all the drainage of the town discharged through those two exits?—Yes.

630. Have you gauged the flow at those exits?—No, I have only calculated it by the water supplied to the inhabitants, that is, 20 gallons per head, plus the rainfall.

631. You assume that the whole of the water supplied to the town drains through the sewers?—Just so.

632. Are you sure that you are right in that assumption, is there no loss in any way?—I am not aware of it.

633. Is the town built upon clay?—Yes, and of considerable thickness.

634. Is there no escape from the drains into the subsoil?—Certainly not.

635. Nor is there any access from the subsoil into the drains?—I should think not, through clay.

636. In making the sewers do you know whether any springs were tapped?—The sewers were made before I came, 15 years ago, but I have carried out extensions of those sewers; I know the subsoil well,

Mr. G. Edwards.
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and I know that there are no springs whatever until you get down 90 feet deep.

637. Have the two exits you have mentioned proper valves for preventing the entrance of the tide?—They are above the tidal flow. I may state that they were fixed there at the suggestion of the late Mr. Ranger, superintending inspector to the General Board of Health; they were fixed at high-water mark. There is a third outfall northward which discharges into a tank; that is for a very small portion of the town, and the overflowings from that tank pass into a beck, called Ruston Beck. That too was put down with the sanction of the General Board of Health, but it was only put down temporarily until houses and buildings were erected in that part of the district.

638. What portion of Stockton is drained into that tank?—I can hardly tell that; probably the drainage from 2,000 people. There is no doubt that there is a sufficient quantity of drainage to cause a nuisance in the beck, especially in dry weather.

639. Is there a complete connexion between the houses and the sewers throughout the town?—Yes.

640. So that every house is drained into a sewer?—Yes.

641. Are these connexions properly trapped?—They are, but they sometimes go wrong. Some of the houses in the old part of the town are furnished with bell traps that I do not consider suitable, and are liable to get out of order; the servants also take off the grating and bell and leave them open, and then the gases escape from sewer into the houses.

642. Are complaints occasionally made to you of offensive smells in the houses?—Yes, occasionally, especially where a house has a sink to it inside; but the small houses and cottages, as a rule, have no sink inside. The grid is in the yard; it is trapped, and they throw the slops in there.

643. Are all the privies connected with the sewers?—No, they are not.

644. Is there a large proportion of the privies which are not connected with the sewers?—Yes. I should say that all the privies to the newly-built houses have no connexions with the sewers.

645. Have you no power to insist upon some arrangement being made in that respect when new houses are being built?—Yes, we could have them drained if the Corporation thought fit, but I consider that they had better not do so. The contents are removed very frequently, once a week, and is mixed with ashes, and I do not consider that it is any nuisance.

646. With regard to what is taken out of the pits, is that removed by the Corporation?—The Corporation let it. The town is divided into six districts, and it is let by tender every year. The Corporation take care that one man does not tender for two districts, and they receive 105*l.* a year for it.

647. Then are there six contractors for the six districts?—Yes.

648. What is the nature of the stuff that the contractor removes?—The excreta and ashes.

649. Can it be lifted out with a spade, or does a man use a scoop?—He uses a shovel.

650. What becomes of the water?—The ashes soak a great part of it up.

651. Is not the quantity of water that passes into a privy from an ordinary household in excess of what the ashes from the fires of that house will soak up?—Not as a rule.

652. Where do the inmates throw their chamber slops?—Through the gratings in the yards; they are prohibited from throwing them into the ashpits.

653. Is there no waste water in those ashpits?—I think not.

654. How are they constructed?—In the ordinary form with bricks and mortar, there is no cesspit; generally they have it a little below the level of the yard.

655. When one of these places has been emptied have you examined it the first or second day afterwards to see what kinds of stuff is in it, and whether water had not filtered back into it?—In some cases I have seen the water filtered back in them.

656. In those cases when you have seen the water in the pits, immediately after they have been emptied, were you driven to the conclusion that the water had been lodging in the soil round about?—Yes.

657. Is not the soil round these pits to some extent fouled by this system of privy accommodation?—Certainly it is, but not to so great an extent where the subsoil is clay instead of gravel.

658. Do you know of any instances in which the cesspools are close by the houses?—No, not very close, especially in the newly-built districts. The board require a certain area for the yard, and the privy built on a site they fix.

659. May not there be an ashpit or privy abutting on the wall of a house?—Not in any case, because the board fix upon the spot where the privy and ashpit are to be built, and a place is fixed upon as far off the house as the area of the yard will admit of: the contents are sold to farmers.

660. What quantities are taken out?—I do not know that.

661. Is the drainage water from Stockton very offensive?—I think not, it is like the drainage water of other towns.

662. Is either of the two sewers in Stockton exclusively the sewer of a privy district, or do both of them receive sewage from watercloscts?—Both of them contain watercloset sewage.

663. The two sewers are alike in that respect?—Yes, as near as I can tell.

664. Does the quality of the sewage vary from hour to hour in the day?—I have never tested it.

665. If a sample were taken from either of the sewers at any hour, it would represent the ordinary drainage of a town supplied with privies?—Yes, except when it was raining.

666. Do the districts drained by the two sewers differ as to the number of ashpits or privies which are connected with the sewers?—Yes, the sewer with the outfall at the east end of the town drains the district in which the privies and ashpits connect directly with the sewers.

667. Are those sewers formed of brickwork or of sanitary pipes?—There are both sorts. The main sewers are of brick, and the branch sewers are pipes.

668. Are they square or circular in form?—The brick sewers are egg-shaped.

669. How are they ventilated?—There is no regular system of ventilation; the sewers are connected principally with the rain waterspouts.

670. Are the grids in the streets trapped?—Yes.

671. Are the sewers flushed occasionally?—Yes.

672. What quantity of water is used in that way?—I cannot exactly say, but my men have been flushing for the past three weeks.

673. (*Dr. Frankland.*) You have stated that the sewage of Stockton enters the river through two outfalls?—Yes.

674. Are there not some private houses that drain directly into the river?—Very few indeed. The whole of the houses that could be cut off were cut off, all that could be drained into the new system of sewerage.

675. Do you think that that would not account for the 16 outfalls which are mentioned in the report of Mr. Latham, borough surveyor of Middlesbrough (*see pp.* 263)?—If there are as many they were there before the system of sewerage was adopted. Three of them are used now as storm water overflows from the main sewers; the rest may drain a little surface water; there is an odd house or so by the river side that still drains into the river.

676. (*Mr. Morton.*) With regard to the possible application of the sewage to irrigation, should you in that case have to pump it?—Yes, and the two outfalls will have to be brought to one along the quay side, it is on a sliding bank, and it would be a very costly job. There is not an insurmountable engineering difficulty, but it will be a costly job.

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677. Can you say how many feet you will have to pump it up?—I cannot say.

678. As much as 20 feet?—Yes, and more.

679. What will be the quality of the land?—There is nothing but clay round here, rather stiffish clay.

680. (*Dr. Frankland.*) Is the quantity of the water supplied to Stockton ample for all your purposes?—Yes; certainly it has been so.

681. Can you tell us whether cisterns are generally used; or are the houses supplied direct from the mains?—They are supplied direct from the mains.

682. In the case of a watercloset, what is the nature of the connexion between the watercloset and the main?—A small cistern, too small to contain sufficient water for flushing the closet.

683. Are there any cases in which the pan of the watercloset is directly connected with the water main by a pipe without the intervention of a cistern?—I think not; I believe that all of them have cisterns.

684. Do you not consider that that is a very important matter?—No doubt.

685. In a case where a pipe goes directly from the pan of the watercloset to the main, if the watercloset is out of order, the pan being full of liquid, and the water turned off from the main, a partial vacuum or rarefaction will be produced, and the liquid out of the closet-pan be drawn back into the main?—That would be so if such were the state of things, but I am not aware of any such cases as that.

686. Is that kind of connexion expressly prohibited?—I do not know whether the Company have to do with regulating that; the Corporation have not.

687. (*Mr. Morton.*) Are there many manufactories, mills, or works in the town, the drainage from which passes into your sewers?—Whatever manufactories, mills, or works there are, the drainage goes into the river.

688. Are there chemical works in the town?—No.

The witness withdrew.

MR. CHARLES TROTTER, F.R.C.S., examined.

Mr. C. Trotter, F.R.C.S.

689. (*Dr. Frankland.*) Are you acquainted with the mode of dealing with excrementitious matters in Stockton?—Yes.

690. And also in other towns?—I cannot say that I am very much.

691. With regard to Stockton have you formed any opinion as to the comparative merits of the watercloset system and the privy system for dealing with the excrements?—Yes, and I very much prefer the privy system.

692. On what grounds do you prefer it?—My experience is that very few watercloscts indeed are kept in such order as not to be offensive. I scarcely ever go into a house in which I could not walk pretty straight to the watercloset.

693. Would not the same remark also apply to a privy?—I believe not.

694. Would you recommend any particular treatment of privies so as to prevent any nuisance arising from them?—My observations have been made among the poorer classes, but what I have said would apply equally to other classes; it is the same in my own house, and I should simply have a place sufficient for a week's refuse. I should have it cemented at the bottom, and the excrements and the urine from chamber utensils would be entirely absorbed by the ashes that are made in the house. I should have it cleaned out invariably once a week, and the contents would come out then nearly as solid matter.

695. The urine and chamber slops are generally removed from houses by female servants; do you think you could depend upon their putting them in the right place?—I have no difficulty about that in my own establishment.

696. Would they not be very apt in some places to throw them down the nearest gully-hole instead of taking them to the ash-pit?—So far as that goes, that practice is now very extensively carried out at the back of every street where there are traps, and which I have protested against for many years past. The tenants of the houses throw all the filth down those places, excrements and all, very often, and the traps are thereby choked.

697. If you could rely upon all the excrementitious matters, both solid and liquid, being soaked up by the ashes and removed every week, the privy system might be a very good one?—Yes, I really do not think anything is better; after each removal some fresh sawdust, which is very comeatable, should be put at the bottom of a pit.

698. Would you have these pits connected with sewers?—Certainly not.

699. Would you have them entirely cut off from the sewers?—Yes.

700. Do you think it is possible in all kinds of soil to make these pits perfectly water-tight?—I should fancy that there could be no difficulty in doing that if they are bricked round and properly cemented.

701. But there is such a thing as settlement, is there not?—Yes.

702. Did you not state that in all cases where you have known watercloscts used, an offensive smell proceeded from them?—Not in all cases. I know a great many persons whose houses have watercloscts and they are kept perfectly sweet.

703. Have you known any cases in which disease has been produced by them?—Unquestionably; in one of the largest houses in the district a person had fever from lodging next door to a watercloset, and I think, after a good deal of practice in fever cases, that it invariably arises from defective sanitary conditions.

704. What should you say of the sanitary condition of a large house in which there was a watercloset in every bedroom?—That it would be kept sweet.

705. Do you know anything of the return made from South Stockton?—I practice very much there, and I am quite sure that their death rate per 1,000 is not less than that of Stockton.

706. (*Mr. Morton.*) I understood you to say that it is quite possible to keep a watercloset clean?—Yes.

707. It is also possible to keep a privy clean?—Quite so.

708. In which case is there the greater chance of either getting out of order?—There is 50 per cent. more chance in the case of the watercloset amongst the multitude.

709. As a matter of fact is the watercloset system extending in Stockton?—I think not.

710. Is there anything in the condition of the two towns of Stockton and South Stockton to explain the difference in the death rate?—Certainly not, except that we are very much better drained than South Stockton is.

711. With the same class of inhabitants?—Yes, quite so, except that we have a rather more respectable class; in South Stockton they are more of the working class. If there are any of the better class, or manufacturers, they come here to live.

712. The probabilities of the case are, that South Stockton would have a higher death rate than Stockton?—I believe so.

713. Do you think there is anything in the extension of the watercloset system, or the adoption of the privy system, to account for the difference?—No, I do not.

714. As a rule is there a privy to each house in this town?—I think there is a privy to every dwelling. There are very few cases in which more than one family use the same privy.

715. Are there any public privies in the town?—No.

716. Are any complaints made of any nuisance or any injury arising from the cleansing of the privies?—Occasionally I have heard the inhabitants complain that their privy has remained too long without the contents being carted away.

717. Are disinfectants used in cleansing the privies?—I do not believe they are.

718. (*Dr. Frankland.*) Is it in your opinion desirable, apart from the mode of doing it, that excre-

Mr. C. Trotter, F.R.C.S.
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mentitious matters should be removed from the neighbourhood of dwelling houses while still fresh?—I do not know that I have really ever found any nuisance arising from them; they are removed very early in the morning. The regulations here is, that all the carts which take away the privy refuse are to be out of the town by 8 o'clock.

719. Do you not consider that putrefactive excrementitious matters lying in a mass near to dwellings must be deleterious to health? — Certainly, but they cannot lie in a mass if they only lie for a week.

720. Do you not consider it is desirable to remove them before putrefaction sets in?—Certainly, every week; I consider that most important.

721. Do you consider that the best mode of doing it is by the dry method as distinguished from the wet method?—Yes, with a certain class of people, the lower class particularly.

722. You would approve of the higher class having waterclosets in their houses?—They choose for themselves; if they can manage the waterclosets and keep them clean, I should approve of it.

723. You would not object to waterclosets if kept clean and in good order?—Certainly not.

724. (*Mr. Morton.*) Is a population asleep or a population awake most liable to suffer from any mischievous influences that might arise from the operation of scavenging?—I could not undertake to say positively, but I should suppose that a population asleep would be shut up in their rooms, and therefore isolated very much from the smell; they would not come in contact so much with the effluvia as others outside would. I may mention that a case has occurred very recently which is very instructive and very interesting. A sewer was opened which had not been opened for many years, and the man who opened that sewer within 48 hours died of as pure a case of blue cholera as anyone ever witnessed. Another man who was by him at the same time had a violent attack of diarrhœa, which was treated successfully. I believe that a person may be poisoned and knocked down at once straight off.

725. Was this a sewer that was not ventilated?—I do not know.

(*Mr. Edwards.*) It was an old cesspool in a cellar, and not a sewer?

(*Witness.*) I can give you a case most instructive as to the progress of fever in one of the best houses in the town. Every fresh servant that the occupant of that house had into it for eight years was taken ill with typhoid fever, and I told him over and over again, for there was only himself, one daughter, and two or three servants in the house, that I was sure the cause was local, and arose in the house. At last they found that the sink stone was choked, and on opening it it turned out that the sink stone had only been draining through some broken sanitary pipes, and all the solid matter was left at that place and had been so for years. After it was removed the evil was corrected. I have attended the inhabitants of that house ever since, and there has never been a case of fever in it since.

The witness withdrew.

Mr. Henry G. Faber (Town Clerk) further examined.

Mr. H. G. Faber.

726. (*Dr. Frankland.*) Have you some additional papers to hand in?—Yes, I have a short report to hand in which I have prepared respecting the water supply and the drainage, to which I have appended a report made to the Council in April 1869, by our surveyor as to the pollution of the river higher up the stream, above the point where the water is taken. I can hand in also a copy of the analysis of certain waters that we sent to Messrs. Richardson and Marreco of Newcastle, to be analysed: the well water, the Darlington water, and the spring water that we have at St. John's well. (*The witness handed in the report and results of analysis, which will be found printed at the end of his evidence*).

727. Is the water of that well much used?—Not so much as it used to be. There used to be seven or eight carts going about the town with that water.

728. What is the deepest well you have in the town?

(*The Surveyor.*) About 90 feet is the depth; that depth has to be dug down to before they can get spring water.

729. What is the water bearing stratum at that depth?—I believe red sandstone.

730. Can you point out to us a well at that depth where we may obtain a sample?—Yes.

"*To the Commissioners appointed to inquire into the Pollution of Rivers.*

"Gentlemen,

"I have already returned answers to numerous questions which were sent to me by the Secretary to the Commission respecting the pollution of the river, the sewerage, and the water supply of the town, and as those answers were sent to London for your use I need not now take up your time in re-stating them. I will therefore very briefly touch upon the two points which affect or may affect the health of the inhabitants in this borough.

"The first is the drainage of the town. This I believe to be good; one portion of the town on the Yarm Road is not yet so good as it might be; the majority of the houses are newly built, and they had no communication with the main sewers, but were drained into cesspools. A new sewer, or rather an extension of the existing main sewer, is being made and is nearly completed; when this is finished this portion of the town will be as well drained as any other.

"The sewage of the borough is carried into the River Tees, but the river is not, in my opinion, affected thereby to any appreciable extent, and no nuisance arises from it.

"The next point to which I would beg leave to call your attention is the quality of the water supplied to the town for domestic use, and the quantity abstracted from the river, in both of which respects I consider that the inhabitants of Stockton have just cause of complaint. Water is supplied to Stockton by a company, the Stockton and Middlesboro' Waterworks Company, who draw their supplies from the River Tees, a short distance above Darlington, at a place called Tees Cottage. The river from which it is drawn is largely polluted by lead washings and refuse from the lead works in Teesdale, and lower down, but above the place where the water is taken by the company, it receives the whole of the sewage of several towns and villages on or near its banks. Last year an attempt, which had to be eventually abandoned, was made to obtain an Act of Parliament to enable the Corporation of Stockton to supply the town with pure water, and during the proceedings Mr. Edwards, the borough surveyor, was directed to inspect and report upon the several pollutions affecting our only present drinking water; a copy of his report I beg leave to append to this statement.

"The last point on which I shall touch is as to the quantity of water taken out of the river. The water company by their Acts of Parliament have power to take out 60 million gallons weekly, but no means are provided for ascertaining that this quantity is not exceeded; at present, I believe, the supply is rather more than 30 million gallons per week, and yet though little more than half the authorised quantity is taken, the effect on the river is injurious. In addition to this quantity, the corporation of Darlington have separate waterworks of their own for the supply of that town. The water is also taken from the river above Darlington to the extent of nearly nine million gallons per week. There is no statutory limit to the quantity that the Darlington corporation may take. In summer time the bed of the river between Hurworth and Neasham is nearly dry, little or no water coming down the river, all being intercepted at Tees Cottage. In consequence of this want of fresh water the sewage is not swept away either so quickly or so far down the river, but is carried up by the tidal water. The navigation of the Tees is damaged through the loss of the natural scouring power of the river, and the very valuable salmon fisheries of the river are deleteriously affected.

"Stockton-on-Tees,

"8th October 1870."

"*To the Parliamentary Committee of the Corporation of Stockton-on-Tees.*

"Gentlemen,

"According to your instructions, I proceeded to Barnard Castle to ascertain the extent to which the River Tees was polluted by the sewage from that town as well as from other sources, and I beg to report as follows:—

"I first made an inspection of that part of the town which abuts immediately upon the river, and which is the most densely populated; the main street at this point runs parallel with the river. Yards similar to Stokes' yard and Snowdon's yard branch from the street to the river's edge, the surface of the ground having a considerable inclination from the street to the river, so that the whole of the liquid and the greater part of the solid filth from this locality passes directly into the river. All the mills and principal manufactories and dye works where chemicals are used, all the refuse from which flows direct into the river; I also noticed a fellmonger's premises (which was formerly a tannery) and the process of skin washing was being vigorously proceeded with in the river; I also counted 11 open privies from which the soil drops direct into the river, each privy being used in common by the occupants of several tenements and common lodging houses. I also noticed numerous other openings in the wall from which filth was pouring out.

"The town contains 5,000 inhabitants, and in the year 1852 a combined system of sewerage and house drainage, together with a water-supply from a spring near Bowes, five miles distant, was designed by and carried out under the superintendence of the late Wm. Ranger, C.E. A considerable number of waterclosets being in connexion with the drainage which, independent of the above sources of pollution, discharges into the river about half a mile below the town at the rate of at least 100,000 gallons daily, which is equal to 36,500,000 gallons per annum.

"The river is also polluted from the town of Staindrop, and the village of Gainford, and the numerous other villages on its banks; indeed, the whole of the tributaries to the river below Barnard Castle on the Durham side of the river contribute their quota of pollution, and I have frequently seen the river quite muddy in the summer time with the lead washings not many miles above the company's works.

"I am, &c.

"(Signed) Geo. Edwards."

"6th April 1869."

Results of analysis of samples of water from certain wells in Stockton-on-Tees.

Mr. H. G. Faber.
8 Oct. 1870.

Laboratory, Newcastle College of Medicine, July 4th, 1867.

We have to report as follows on the result of our examination of the samples of water 1–9 forwarded by you.

We may observe in the first place that in none of them have we found anything absolutely to prove dangerous contaminations, although we cannot say that they constitute a good water supply.

They may be classed as follows, A., Nos. 1, 4, 7, 9. These four samples resemble each other very much; they contain a large quantity of solid matter in solution, ranging from 110 to 150 grains per gallon, and the quantity of this is in all four cases such as to suggest the possibility of their neighbourhood being more or less exposed to infiltration from a drain. Further the quantity of earthy salts present makes them undesirably "hard" (28 to 54 degrees).

No. 5.—In several respects this resembles the last group, containing 122 grains solids per gallon, and being extremely hard, but the suspicious character of its constituents is not quite so marked.

Nos. 2, 3, and 6—These form also a sort of group. Their total solids are more moderate (58 to 67 grains), but still in excess of what is desirable, and very "hard." They do not seem to be contaminated.

No. 8.—With one exception, this seems to us the best sample sent. It contains only 11·2 grains of total solids, its hardness is very moderate (six degrees), and were it not slightly coloured by vegetable organic matter its composition would leave nothing to be desired. Possibly this may not always be the case, and if so, or if any treatment can be adopted to remove the colour, we should have no hesitation in preferring it to any of the other samples.

We are, &c.

(Signed) Richardson & Marreco.

No. 1.—Pump, Byers, Thistle Green.
No. 2.—Armoury pump.
No. 3.—Mr. Clephans, Norton Road.
No. 4.—Lawson and Charge, Castlegate.
No. 5.—Town pump, North.
No. 6.—St. John's well.
No. 7.—Town pump, South.
No. 8.—Stockton and Darlington Water Company.
No. 9.—Vane Arm's pump.

The witness withdrew.

South Stockton.

Mr. William J. Watson (Deputy Clerk to the South Stockton Local Board) examined.

Mr. W. J. Watson.

731. (*Dr. Frankland.*) Did you prepare the table of mortality in the return made from South Stockton?—I did, in conjunction with the surveyor to the district.

732. How was the calculation made?—Upon the estimated population.

733. Have you estimated a yearly increase of 400?—Yes.

734. Does the rate of mortality given include any country district, or merely the town itself?—Simply the district set apart under the Local Government Act.

735. I suppose there is a registrar residing in the district?—Not in the district.

736. Where did you obtain a return of the total deaths?—From the surveyor, who is also superintendent of the cemetery under the Thornaby Burial Board.

737. Do you give the number of burials in the cemetery?—Yes, and the deaths; they are all buried there; they are not brought over to this side to be buried.

738. Do you believe that this is a true and correct return of the mortality in South Stockton?—Yes, as far as we know how to make it; the low death rate is to be attributed very largely to the fact, that there are very few old people in comparison with other places, living in the district, but there are a good many young men, lodgers, in the place, who are employed in the works.

739. What certainty is there that you have really given the total number of deaths in the return furnished?—We know of none who are buried out of the district.

740. Is South Stockton supplied with water from the same source as Stockton?—Yes.

741. Are you satisfied with the water-supply?—We have had no complaints at South Stockton.

742. Is the supply ample?—Yes; sometimes I think there is not quite sufficient pressure.

743. Is the water usually drawn direct from the mains?—Yes.

744. Are there many waterclosets in South Stockton?—Not very many.

745. Do you know how they are supplied with water?—Not exactly.

746. (*Mr. Morton.*) Are the working classes in South Stockton in very good circumstances?—Yes, generally; they get good wages as a rule.

747. Are they well lodged as well as well fed?—There is a little overcrowding in some parts of the district.

748. Is there any difference in these respects between North and South Stockton that would account for the immense difference in the mortality?—Nothing but what I have said. Stockton has a more settled population, with a considerably larger number of old people in proportion, whereas in South Stockton there are many unmarried men, and of course also a smaller proportion of children.

749. There is a larger influx in proportion to the number of adults of unmarried men?—Yes, of working men.

750. Do you think that that is sufficient to account for the difference in the mortality between the two towns?—I think it is.

The witness withdrew.

Mr. J. Spicer.

8 Oct. 1870.

MR. JOSEPH SPICER (Surveyor to Local Board of Health of South Stockton) examined.

751. (*Mr. Morton.*) There are some queries which have not been fully answered in the return made. It is stated that the borough was incorporated on the 5th of August 1853, do you know whether that was under the Public Health Act or the Local Government Act?—The Local Government Act.

752. Is the town properly sewered?—Yes.

753. Has it been recently sewered?—Yes.

754. Does it drain down to the river by more than one exit?—Yes, by four.

755. Are the contents discharged above high-water mark?—No.

756. Are they supplied with valves?—No.

757. Does the tide flow into your sewers?—Yes.

758. Is there any instance in which it has had the effect of forcing the sewer gases into the houses?—We have about 20 houses where it does, that are close by the river side.

759. Are the drains properly trapped?—Yes.

760. In spite of that the sewer gases are forced into the houses?—Yes, by the back water.

761. Are all the houses connected with the sewers?—Yes.

762. Is it generally a privy system or a water-closet system in South Stockton?—A privy system.

763. In answer to the query as to the number of privies, middens, and ashpits, you have furnished the Commission with no information?—There is a privy to every house.

764. Are there any public privies?—No.

765. Do all the cesspits or ashpits connected with the privies drain into the sewers?—The ashpits are drained, and they have a connexion with the sewers.

766. Is the soil clay on the South Stockton side of the river?—Yes.

767. Do you direct the cleansing of the town?—No, it is let to a contractor who takes the refuse out.

768. What are the terms of the contract?—He pays 50*l.* a year, and does the cleansing.

769. Is it done at regular intervals?—Yes.

770. Is he paid by the quantity of stuff that he removes?—No, it is just a contract to clear out the stuff.

771. And it is worth his while to pay you 50*l.* a year for the quantity of stuff he removes?—Yes.

772. Do you know what he obtains for it?—About 2*s.* a load.

773. Is that a ton?—About that.

774. What is the size of the ashpits?—The largest that are built have 15 square feet in them.

775. What is the depth?—They are chiefly on the level of the yard, and about two feet deep.

776. Do you take pains to have them properly cemented?—They are cemented, and they are drained.

777. Has any proposal been made to provide works for irrigation purposes?—I believe not.

778. Would there be any difficulty in doing it?—None whatever.

779. Would the sewage have to be pumped?—Yes.

780. Is there any possibility of obtaining porous soil on which to pour it?—There is plenty of land to do it upon.

781. Of what kind?—Not clay; towards Middlesbrough and Newport the land is porous.

782. What is the water supply of South Stockton?—It is supplied from Darlington.

783. Do you know what quantity is consumed in the town?—No; but I know that the supply is quite sufficient.

784. You have quite as much as you want?—Yes.

785. Do you know the volume of sewage that flows from the town?—No, I have never gauged it.

786. Are the sewers flushed?—No, they have a good gradient.

787. Are the sewers ventilated?—No.

788. Are the streets grids trapped?—Yes, all of them.

The witness withdrew.

JOSEPH DODDS, Esq., M.P., addressing the Commissioners, said:—

Dodds, Esq.

"I appear on behalf of the Tees Conservancy Commissioners, and also on behalf of the Conservators of the Tees Fishery District, and I have now the pleasure of handing in a statement on behalf of the Tees Conservancy Commissioners, together with an account of dredging in the river Tees for the year ending 31st of October 1870. Also statements on behalf of the Conservators of the Tees Fishery District, and of the district of South Stockton; and further, copies of the Stockton and Middlesborough Water Works Act, 1864, and the Hartlepool Gas and Water Works Act. (*Handing in the same, and they will be found printed at the end of the evidence of the witness.*)

789. (*Mr. Morton to Mr. Joseph Dodds,* M.P.) What population drains into tanks at Norton?—The population is between 2,000 and 3,000, but a large part of the houses have private drains into the sewers.

790. What proportion do you suppose have private drains?—I cannot say.

791. What has driven them to make an attempt to deal with their sewage?—It was discharged into a Beck higher up above the bridge, going to Norton, and it was such a horrible nuisance that they were driven to take it further down.

792. Because it was a nuisance to themselves?—It was a nuisance to everybody and to Stockton.

793. What means have they taken to abate the nuisance?—They have merely drained the town, and carried the drainage further down the Beck to the low side of the road, where it discharges into an open tank, and from thence overflows into the Beck.

794. Then it is a mere subsiding tank?—That is all at present; it has been in operation for 12 months.

795. Has the nuisance been abated?—Yes, as far as the public is concerned above, but the nuisance is as bad as ever below.

796. The nuisance, as I understand you, has been carried only so much further down the stream?—That is so.

797. The nuisance has not been abated?—No.

798. Has the formation of the tank at all tended to diminish the nuisance?—Certainly not, it is open; it certainly stops the solid matter from going direct into the Beck, but the liquid water is quite as bad as before.

799. Is it immediately offensive or does it require some little time to make it so?—It is immediately filthy. There are two breweries which discharge into it, and the sewage ferments.

800. Is the tank cleansed out at intervals. It has not been long enough in existence.

801. Has it been cleansed out within the last 12 months?—No.

802. Is it full?—Yes, and it is a very large tank.

803. What are the dimensions of it?—Between 50 and 60 feet, by 35 feet wide; it is divided into compartments, made I suppose, with an ultimate intention to deodorize, but nothing has been done yet.

804. The intention being, I suppose, to employ some precipitate?—I think so.

805. Which has not been used yet?—No.

"*Rivers Pollution Commissson.*

"*Statement on behalf of the Tees Conservancy Commissioners.*

"The Tees Conservancy Commissioners were incorporated by the Tees Conservancy and Stockton Dock Act, 1852. They succeeded the Tees Navigation Company, who were incorporated by the 48 Geo. III., cap. 48, and empowered to execute certain works for the improvement of the navigation of the River Tees, the principal of which was the construction of a navigable channel or cut of 220 yards in length, marked upon the accompanying plan as the cut of 1808.

"The powers of this company were extended by the 9th Geo. IV., chapter 97, under which they were authorised to execute further works for the improvement of the navigation, the chief of these being the construction of another navigable channel or cut of 1,100 yards in length, marked on the accompanying plan as the cut of 1828.

"Under the Tees Conservancy Act of 1852, five persons appointed by the Stockton town council, five by the Middlesbrough town council, and two elected by the ratepayers of Yarm, are the 'Tees Conservancy Commissioners,' power being given to the Admiralty to appoint any number of persons, not exceeding three, to act with and in addition to the Commissioners.

"The Act of 1852 has been amended, and the powers of the Commissioners extended by the Conservancy Acts, 1854, 1858, 1863, and 1867, a copy of each of which is presented herewith.

"The jurisdiction of the Tees Conservancy Commissioners comprises the whole of the tidal limits extending from High Ford, near Worsall, unto the German Ocean beyond the mouth of the river, where the depth of the sea is less than 10 fathoms, a distance of about 27 miles.

"Under the provisions of their several Acts the Commissioners have power to execute certain specified works, and general powers to widen, deepen, straighten, dredge, and otherwise improve the bed, channel, and banks of the river, and to prevent and remove any obstructions to the navigation, and all encroachments therein, and to prevent the erection of piers, quays, jetties, wharfs, and other works in the Tees.

"They are also charged with the duty of providing and maintaining buoys, beacons, &c. &c.

"Under special powers conferred by some of their Acts, the Commissioners are constructing an embankment or breakwater, called the South Gare Embankment, situate near the entrance to the estuary, and a similar work is contemplated on the northern side of the river.

"These works have already had very considerable effect in deepening the water across the bar, and generally in improving the navigation, and it is anticipated that they will eventually render the river a safe and commodious harbour of refuge.

"The Commissioners are also carrying out a very extensive system of training walls with the view of straightening and deepening the navigable channel. These walls consist of high-water training walls which form the new line of high-water mark, and are of a sufficient height to exclude the tidal water; and (2) of half-tide training walls near the low-water line, which are submerged at high-water.

"Above the new high-water line of waterside works very considerable reclamations of foreshore are being effected under powers conferred upon the Commissioners for that purpose by their Act of 1858, and by subsequent Acts.

"The proceeds arising from the sale of the foreshore thus reclaimed are divided into four parts, two of which are received by the Tees Conservancy Commissioners, one by the Office of Woods, representing Her Majesty as owner of the bed and soil of the river, and one by the owner of the adjacent land, who is known by the name of the frontager.

"The general operations of the Tees Conservancy Commissioners have already had the effect of deepening the channel of the Tees to such an extent that vessels can now reach Middlesbrough and Stockton of a much larger class than could do so before 1852.

"The Tees Conservancy Commissioners are desirous of directing your attention to so much of the second of the heads upon which you are instructed to inquire as relates to the discharge of sewage from the various towns upon the banks of the river in connexion with deposits which already take place near the outfalls at Stockton and Middlesbrough, and which it is apprehended may be increased to a large extent, and so occasion shoals similar to those in the Thames at Barking; and also as to the abstraction of water from the river for supplying the towns and populous places in the district in so far as this abstraction diminishes the scouring power of the river.

"As to the sewage, the Commissioners desire me to draw your attention to the fact that the whole of the sewage of Yarm, Stockton, South Stockton, Norton, and Middlesbrough is now discharged into the river Tees within the limits of their jurisdiction, the inevitable consequence of which is to occasion shoaling to a greater or less extent.

"This tendency to occasion shoaling will doubtless increase in the same ratio as the population, which is now increasing most rapidly, and is likely to continue to do so, for many years to come.

"With regard to the drainage of Middlesbrough, a copy of the recent report of Mr. Morgan, one of the Government Inspectors, upon the rival schemes submitted to him by the Town Council of that borough, is submitted herewith, and the Commissioners merely desire to urge that in connexion with any system that may hereafter be adopted, such precautions may be taken as will prevent injury to the navigation.

"In addition to the places already mentioned, the sewage of two rapidly increasing places near Eston, called Tees Tilery, and South Bank, is now discharged through two sewers upon the foreshore of the river Tees.

"That portion of the foreshore where the discharge takes place being now in course of reclamation the tidal water is excluded, and the serious effect produced by the sewage in question is distinctly manifest. A seething mass of corruption marks the position of each discharge in its course across the foreshore to the new high-water embankment, and any more striking proof of the mischief resulting from the present system can scarcely be afforded.

"It is hoped that you may be able to inspect the outfall of these sewers.

"The village of Norton, which is situate two miles north of Stockton-on-Tees, has lately been sewered.

"This appears to have been done upon a system already condemned in many other places, and an inspection of the outflow from the principal sewer, which is situate at a distance of about one mile from Stockton, is invited.

"Next, as to the abstraction of water by the water companies. By the Stockton and Middlesbrough Waterworks Company's Act, 1864, and the Acts incorporated therewith, the Stockton and Middlesbrough Waterworks Company are empowered to supply the towns of Stockton, South Stockton, Middlesbrough, and many other towns and places enumerated in the Act extending to East Coatham, adjacent to the town of Redcar, a distance of nearly 30 miles from the source whence the supply is drawn from the river Tees.

"The 9th section of the Act authorises the company to divert, take, and use water from the river Tees at or near 'Broken Scar,' in the parish of Darlington, and to supply the districts therein enumerated, but at the instance of the writer, who appeared before the Select Committee of the House of Commons to which the Bill was referred, a proviso was added, which is in these words: 'Provided always, 'that the quantity of water so to be taken from the river 'Tees shall not exceed 60 million gallons in any one week, 'reckoned from 12 o'clock at noon on one Saturday to '12 o'clock at noon on the following Saturday.'

"It was at the same time sought to obtain the insertion in the Act of provisions for gauging and ascertaining the quantity of water taken, similar to those introduced into the Act of the Aberdeen Waterworks Company, who derive their supply of water from the river Dee; but this the Committee did not sanction.

"Since the passing of the Act of 1864 the quantity of water taken from the river Tees at the point in question has been multiplied several times, and is now stated to be upwards of 30 millions of gallons weekly, in addition to which about 10 millions of gallons weekly are taken for the supply of Darlington; increasing rapidly as the consumption of water in the district is, the maximum prescribed by the Act will undoubtedly soon be reached.

"In 1867 the Hartlepool Gas and Water Company obtained powers to draw a supply of water from the river Skerne, a tributary of the river Tees, at a point called 'Hurworth Burn.'

"By this Act no limit is prescribed to the quantity of water to be abstracted; and it is to be observed that the water taken from the river by this company is never returned to it, but is entirely diverted from the district.

"The operations of the Tees Conservancy Commissioners are mainly directed, as already mentioned, to the deepening and straightening of the navigable channel of the river Tees. This is accomplished first by the construction of the training walls, already referred to, by means of which the force of the current is utilized; and next, to dredging operations, in connexion with which the Tees Conservancy Commissioners have two very powerful dredgers, capable of raising 550,000 tons per annum, and a third capable of raising an additional 500,000 tons per annum, with the needful hopper barges, has been contracted for, and is now being constructed at a cost of nearly 25,000*l.*

"These operations are materially promoted, and when completed are rendered more effectual by the scouring occasioned by the influx and reflux of the tidal water, and of the natural scouring occasioned by the current of fresh water flowing down to the sea.

"The total abstraction of this fresh water would change the character of the navigable part of the river and convert it into a mere tidal basin, diminish its power of scouring and cleansing itself, and the sewage would float up and down with the tide, and have a much greater tendency to cause shoals

"It is computed, that in a few years and during certain seasons of the year, the whole volume of the Tees will be required for the supply of Darlington and of the Stockton and Middlesbrough Waterworks Company, and that even a limited abstraction diminishes in a material degree the scouring power of the natural flow of the river, and has a

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tendency to produce silting, and thereby counteract in some degree the operations of the Commissioners.

"The importance of the company's supply of water to the inhabitants and trading interests of the district is undoubted, but it is suggested that the company should be required to provide in suitable situations near the source of the river, and where the water is comparatively unpolluted, reservoirs of large capacity which could be filled at periods of the year when there is a large surplus supply of water, and the mischief resulting from drawing large supplies at periods of the year when the volume of water is comparatively small would thus be avoided.

(Signed) "JOSEPH DODDS.
"Chief Clerk."

"Stockton.
"6 October 1870."

Account of Dredging in the River Tees, between the Years 1854 and 16th September 1870.

River Tees.

Account of Dredging.

		Tons.
Dredger No. 1, 1854 to 31st Oct. 1867	- -	541,182
" 1st Nov. 1867 to 31st Oct. 1868	-	115,205
Total	- -	656,387

Cost during year ending 31st Oct. 1868, 1,526*l.* 5*s.* 8*d.*

Dredger No. 2, 1866 to 31st Oct. 1867	- -	255,900
" 1st Nov. 1867 to 31st Oct. 1868	-	307,275
Total	- -	563,175

Cost during year ending 31st Oct. 1868, 4,269*l.* 15*s.* 11*d.*

Total quantity raised during year ending 31st Oct. 1868, 422,480 tons, equal to 3·23*d.* per ton.

From 1st November 1869 to 16th September 1870.

				£	s.	d.
Dredger No. 1	-	124,000	tons cost -	2,396	4	8
" 2	-	375,850	" -	5,163	5	4
		499,850		7,559	10	0

Total quantity raised by both dredgers between the year 1854 and 16th Sept. 1870, 2,244,266 tons.

Tees Conservancy, Engineer's Office, JOHN FOWLER.
8th October 1870.

Account of Dredging in the River Tees, for year ending 31st October 1870.

	Tons.
Dredger No. 1, Stockton to Blue House Point	58,371
" " Billingham Reach - - -	104,283
Total - -	162,654
Dredger No. 2, Billingham Reach - - -	156,000
" " 9th Buoy Shoal - - -	206,200
Total -	362,200

	—			Average on per ton dredged.
Dredger No. 1.	£	s.	d.	d.
Wages, crew of dredger and hoppermen.	1,011	5	11	1·48
Oil and tallow - - - -	14	16	2	·02
Coals - - - - -	117	17	0	·18
Timber and ironwork, and carpenters' repairs.	595	4	1	·89
Damages and sundries - -	20	1	6	·03
Ropes - - - - -	59	16	8	·09
Towing - - - - -	906	10	0	1·33
	2,725	11	4	4·02
Dredger No. 2.				
Wages, crew of dredger and hoppermen.	1,802	15	5	1·19
Oil and tallow - - -	34	8	10	·03
Coals - - - - -	271	6	9	·18
Timber and ironwork, and carpenters' repairs.	1,059	9	9	·70
Damages and sundries - -	44	11	11	·03
Ropes - - - - -	170	18	10	·11
Towing - - - - -	1,587	17	0	1·05
	4,971	8	6	3·29

Total quantity raised, 524,854 tons, equal to 3·37*d.* per ton.

Tees Conservancy Office,
October 1870.

River Tees.

Drainage and Tidal Statement, &c.

Length of river course - -	100 miles.
Area of basin - - - -	744 square miles.
Tidal development - - -	27 miles.

	Rise of Spring tides.	Rise of Neap tides.
	Ft. ins.	Ft. ins.
On the bar - -	16 0 -	12 0
Middlesbro' - -	14 0 -	10 6
Stockton - - -	12 0 -	8 6
Yarm - - -	7 6 -	4 0
Worsal - - -	6 6 -	3 0

Capacity of tidal basin, 230,000,000 gallons.

Average discharge of land water, 240,000,000 gallons.

Flood discharge, 11,648,000,000 gallons, greatest noted summer; discharge after a long drought, 240,000,000 gallons.

Greater floods increase the average discharge 26 times; after long drought the discharge decreases to one-tenth of the average discharge.

(Signed) JOHN FOWLER.
Tees Conservancy. Engineer.
Engineer's Office.

"Rivers Pollution Commission.

"Statement on behalf of the Conservators of the Tees "Fishery District.

"The river Tees has its source in the mountains of Westmoreland and Cumberland, and after flowing through a moorland district for about 20 miles, passes through a highly cultivated agricultural district for a further distance of about 60 miles, and for the last 15 miles of its course bounds the iron manufacturing district of Cleveland, and finally discharges itself into the German Ocean.

"For the greater part of its course the river forms the boundary between the counties of York and Durham.

"Its total length is about 95 miles, and its catchment basin comprises an area of about 744 square miles.

"The bed of the river, for its whole course above the tidal limits, is either rock or gravel, principally the latter, streams and pools alternating, which are in all respects most suitable for the breeding and propagation of fish.

"The principal source of the river is at an elevation of about 1,600 feet above the level of the sea. The fall from the head of the Wheal, situate at a short distance below the source of the river, is as follows:—

	Distance.	Fall in feet.
	miles. fur.	
To the foot of the High Force -	9 0	546
To Middleton Bridge - -	5 4	336
To Gainford - - -	19 3	461
To Croft Bridge - - -	13 4	150
To the foot of Dinsdale Dam -	12 1	80
To limit of tidal flow - -	5 2	8
To Tees mouth - - -	25 0	16½
Total miles - -	89 6	1,597½

"The river has several tributary streams. The principal of these on the Yorkshire side are the Lune (12¼ miles), Balder, Deepdale Beck (10¾ miles), Greta (16 miles), Clowbeck and Leven (23 miles). On the Durham side the principal tributaries are Maize Beck, Harwood Burn, Ettersgill Beck, Bow Beck, Newbiggen Beck, Hudshope Beck, Eggleston Burn, Staindrop or Alwent, or Grand Beck (11 miles), Skerne (30¾ miles), Lustrum Beck, Billingham Beck, and Greatham Beck.

"The High Force is a cataract of about 70 feet in height, situate about 15 miles from the source of the river, and about 80 miles from its mouth, and the river is of comparatively little value for fishing above that barrier.

"A Landowners Fishery Association was formed some years ago, and, under the supervision and care of that body, the salmon fisheries of the river were considerably improved.

"Upon the passing of the Salmon Fishery Act, 1865, a fishery board was formed and conservators appointed, and the management of the salmon fisheries of the river is now vested in that body.

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"The present statement is prepared at their request and on their behalf. They are desirous of drawing attention to two points which appear to them of considerable importance as affecting the salmon fisheries of the river.

"The necessity for this course is enhanced by the fact that the Select Committee of the House of Commons on Salmon Fisheries have, in the course of their inquiry, during the past two sessions, abstained from any inquiry into the pollution of rivers, on the ground that the recommendations of this Commission would assist the fisheries in proportion as they tend to the purification of the rivers.

"The points which the Tees Fishery Board are desirous of bringing under your attention are:—

"1st. As to the pollution of the river; and,

"2ndly. As to the abstraction of water by water companies.

"The pollutions affecting the river Tees may be divided into three principal classes:—

"1st. Those arising from lead mines in Upper Teesdale.

"2ndly. From town sewage; and,

"3rdly. From manufactories, gasworks, &c.

"The pollutions from the lead mines in Upper Teesdale, and especially upon the tributaries of the Tees, are of a very extensive and injurious character, and have frequently been brought under the notice of Parliament in various reports of the inspectors of salmon fisheries.

"The subject of the poisoning of rivers by mines was also very fully dealt with by Sir William Jardine, the late Mr. Ffennell, and Mr. Rickards, the Royal Commissioners appointed to inquire into the salmon fisheries of England and Wales.

"In their report of 1861 they state that the most striking case of contamination of waters by the efflux of lead mines was in two small Welsh rivers, the Ystwith and Reidol, in the latter of which a total extinction of animal life had taken place in its waters in consequence of the refuse from the lead mines, and that the Ystwith had been similarly affected by other lead works. They add that the most distinct evidence was given to them as to the destruction of salmon and other fish from that cause, and they add:—

"'Furthermore, it was proved beyond doubt that not 'only the fish in these rivers, but animals grazing on 'their banks, cows, horses, pigs, and poultry, had been 'poisoned, not so much by drinking the water as by eating 'the grass, which in time of floods had been covered by 'the infected waters.

"'These statements were attested by the facts that the 'mine owners had in several instances received, and after 'due inquiry paid claims for compensation for loss of 'cattle. That the occupiers of land near the rivers had 'been obliged to give up keeping poultry; that the rent 'of land in the vicinity had been reduced, and even, as we 'were told, on the authority of a gentleman who is himself, to a large extent, both a land owner and mine 'owner, acres upon acres of land had been made waste 'and useless.

"'No other case of destruction so complete as the above 'was brought under our notice, but there were others in 'which the noxious effect of mine water, in more or less 'degree, in killing or driving away the fish, had been experienced, which, if continued without any means being 'employed to counteract it, must ultimately prove fatal to 'the fisheries.'

"The extent to which the fisheries of the Tees are injured by the hush from the lead mines is a subject of much controversy. There can be no doubt that when it is in the water the fish will not take a bait, and angling is for the time destroyed.

"Mr. Ffennell, in his first report as inspector of salmon fisheries of England and Wales, states that many of the brooks which run into the Tees act merely as drains from the mines, and he describes them as 'Brooks which run 'white with hush six days in the week.'

"He especially mentions Ecclesburn, Hudshope, Newbiggen, and Bowelees as brooks examined by him upon his visit to the river Tees, and that in Bowelees no fish were found within two miles of the mine."

"Mr. Ffennell further states that:—'In July 1861 a 'dam burst at Hudshope and Newbiggen, carrying with it 'eight cwt. of 'bowse' as the unwashed ore is called, and 'numbers of trout; and salmon of three or four lbs. 'weight were picked up dead. From the evidence it appears that the poison here was not sufficiently diluted, 'and all fish were killed.'

"Mr. Ffennell further sets forth the result of his experience in these words:—'The amount of injury done by 'mines is to a certain extent speculative. If it be the ore 'itself which is injurious to the fish, it is clear that they 'are poisoned at the cost of the mine owner, and we should be led to the conclusion that the works on the South 'Tyne and Tees are infinitely better conducted than on the 'Rheidol and Istwith, which rivers compared with such 'brooks as Bowelees are of very large size.'

"'If on the other hand the poison is contained, as we 'believe, in the refuse accompanying the ore, the effects of 'the mine waters upon those rivers are accounted for, and 'the fact that there are mines on a river is not to be accepted as a reason for the absence of salmon, and should 'not deter efforts to increase the stock where it still 'exists.'

"In the second report of Messrs. Ffennell and Eden, the Inspectors of Salmon Fisheries, dated March 1863, they make the following suggestions:—

"'We suggest then that catchpits should be made to 'receive the water from the washing floors of all mines, 'and that they should be constructed in such numbers, 'that when the water passes out of the last, it shall do so 'in a condition that will not poison or kill fish. The pits 'should be deep, and the exit as shallow as possible, so 'that only the surface, and therefore purer, water should 'escape from one into the other. They should be constructed in duplicate, so that when set No. 1 is full the 'mine water may be diverted to set No. 2, and No. 1 be 'left until the slime hardens, when it will be more easily 'dealt with. When it has hardened it should be taken 'out, and care taken to deposit it out of the reach of any 'flood. It will be found useful to keep the poisoned 'water separate from such other streams as may be used for 'turning wheels, &c., until it has passed through the 'filtering pits.'

"They add, 'We do not set up the fisheries against the 'mines, nor, as it will have been seen, do we propose that 'any regulations should be imposed upon the miners which 'will interfere with their profits and so restrain their enterprise; but we venture to urge that, if it can be shown that 'the mines can be worked without injury to the property 'of others, it is not too much to expect and require 'that the means necessary for that purpose should be 'adopted.'

"The mines upon the tributaries of the river Tees are principally the property of the Duke of Cleveland and other proprietors, and a large proportion are leased by the London Lead Mining Company.

"The agent of the Duke of Cleveland and the lessees represented by their agent R. W. Bainbridge, Esq., of Middleton House, have, following the excellent example set by W. B. Beaumont, Esq., M.P., upon the Wear and Tyne, on all occasions expressed their anxiety to meet the wishes of the fishery proprietors by diminishing the amount of hush as far as practicable.

"In 1867 some of the principal lead mines upon the tributaries of the Tees were visited by Messrs. Buckland and Walpole, the present inspectors of salmon fisheries, and by several members of the Board of Conservators.

"The proprietors and agents of all the mines visited gave every facility to their visitors to examine them, and expressed their desire to render the existing catchpits as adequate as possible, and to provide others where needful.

"The result of this visit will be found fully set forth at pages 46, 47, and 48 of Mr. Buckland's Report presented to Parliament in March 1868, from which it also appears that the subject has already been brought under the consideration of Dr. Frankland by Mr. Buckland, and it is doubtless familiar to the other members of the Commission.

"In his third Report Mr. Buckland points out that the pollutions from mines act injuriously in three ways:—

"'First, they prevent the fish ascending rivers, the 'respiratory organs being exceedingly sensitive to any 'poisonous matter, either in chemical or mechanical solutions.

"'Secondly, the debris from the mines covers up the 'gravel in which the fish deposit their eggs, and even if 'they find a clean place, it is very possible that the mud 'may come down and destroy the eggs or the fish, as 'they are hatching out.

"'Thirdly, mine polutions act injuriously in a way which 'I think has not yet been sufficiently recognised; it is 'this, the mud and other washings from mines choke up 'the aquatic vegetation in the bed of the river, the consequence being that insect life suffers, even if it be not 'utterly destroyed; the fry of salmonidæ are therefore 'deprived of their natural food; and are more or less 'starved.'

"It cannot be doubted that in most instances the mischief arising from the pollution of rivers by lead mines is capable of easy remedy, and it is the general impression that lead mines, if worked with care, may be rendered almost innocuous. The ore and matrix in which it is imbedded are crushed by machinery, and in order to separate the ore from the refuse, the slime is exposed to

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the action of the water, the ore falling to the bottom, whilst the earthy matter is carried onwards by the current.

"In the washing operation the slime passes through a succession of catch pits, and the refuse is at length permitted to escape into the neighbouring stream.

"In Derbyshire it is stated that numerous additional catch pits are constructed, through which the refuse water is slowly passed before it is suffered to leave the mining works.

"The only other mining operations upon the river Tees and its tributaries are those connected with a recently opened copper mine at Merrybent, but from which no pollution has yet proceeded.

"*Sewage.*—With regard to the second head of pollution, namely, that arising from town sewage, the River Tees suffers most seriously, the entire sewage of the whole catchment basin of 744 square miles being poured into it in one form or another,

"No system of sewerage exists at Middleton in Teesdale, the first principal town upon the river from its source, the drainage being discharged directly into the river.

"The sewage of Barnard Castle, a town containing about 5,000 or 6,000 inhabitants, is discharged in like manner.

"That of Darlington is discharged into the river Skerne, and thence into the Tees where, owing, to the abstraction of water by the Stockton and Middlesbro' Waterworks Company, the volume of water is frequently very inconsiderable during the summer, and the nuisance becomes so great to the inhabitants upon the banks of the river, that complaints were made to the Home Secretary, and a Government Inspector has recently reported on the subject.

"This report was brought under your notice at Darlington, and a copy is presented herewith.

"The sewage of Hurworth has also formed the subject of recent inquiry by the Government Inspector, whose report condemns the existing system.

"All the foregoing places are above the tidal flow.

"The town of Yarm drains directly into the river within the tidal limits.

"At Stockton a system of sewerage was carried out a few years ago, in connexion with which there are two principal outfalls into the river, one near the south-western, and the other at the eastern extremity of the town. The precise situation is defined upon the plan of the River Tees accompanying the statement of the Tees Conservancy Commissioners.

"South Stockton, in like manner, also discharges its sewage directly into the river at the points also indicated upon the accompanying plan.

"A system of sewerage has lately been laid out and executed for the village of Norton, containing between 2,000 and 3,000 inhabitants.

"The outfall is situated within one mile from Stockton, and a visit and inspection of its condition, as well as that of the adjacent stream, called Lustrum Beck, into which sewage is discharged to a large extent, and which is frequently in a most foul and offensive condition, is suggested.

"The existing drainage at Middlesbrough discharges itself into the River Tees by main sewers, the positions of which are also indicated upon the Tees Conservancy plan.

"The rival schemes for an extended system of drainage there have lately been submitted to the Local Government Office, and reported upon by Mr. Morgan, C.E., whose report will doubtless be brought under your consideration.

"The sewage of Haverton Hill and Port Clarence is likewise discharged directly into the river; and at Tees Tilery and South Bank two sewers exist, the effect of which can now be distinctly traced, in consequence of the exclusion of the tidal water, by the works of the Tees Conservancy Commissioners, and the consequent formation of most offensive deposits, to which your attention is particularly requested.

"Under the third head of pollutions, the following, amongst other sources, may be particularly referred to, namely:—

"1. Chemical works at Black Banks upon the river Skerne between Darlington and Croft.

"2. The paper mill at Yarm.

"3. Gas works at the same place, and at Barnard Castle.

"4. Manufactories at Barnard Castle. In addition to which there are several others of a minor character at various points.

"The abstraction of the water by the Stockton and Middlesbrough Waterworks Company and the Hartlepool Gas and Water Company has been fully referred to in the statement of the Tees Conservancy Commissioners, and permission is requested to refer to that statement on behalf of the Conservators of the Tees fishery district also.

"As affecting the salmon fisheries of the river, the abstraction of water presents another important feature, namely, that of enhancing, in a very marked degree, the effect of severe droughts during which salmon remain near the entrance to the estuary, and will not run to the upper portion of the river; indeed it not unfrequently happens that the volume of water between the tidal limits, and the point at which the Stockton and Middlesboro' Waterworks Company obtain their supply, is so much reduced as to leave scarcely sufficient for a good sized salmon to make its way to the upper waters at all.

(Signed) "JOSEPH DODDS,"
"Stockton, "Hon. Sec."
"5th October 1870."

"RIVERS POLLUTION COMMISSION.

"*Statement on behalf of the District of South Stockton.*

"The district of South Stockton is situate in the township and parish of Thornaby in the North Riding of the county of York, and contains in the whole about 291 acres.

"It was set out and formed into a Local Government Board District in August 1863, and its local management is vested in a Local Board consisting of 12 members elected in the usual manner.

"In 1861 the population of the district was 5,067; it is now estimated at nearly 9,000, being an increase of about 80 per cent.

"The present number of houses in the district is 1,154, and the annual increase, according to the average of late years, is computed at 60.

"The present rateable value is 14,790*l.* 16*s.*

"Nearly the whole of the ground within the district available for building is already laid out for that purpose, and a considerable tract outside the district in the township of Thornaby has also been laid out for the same purpose and partly built upon, and it is most probable that the district will require to be considerably extended at a very early period.

"Iron ship-building yards, blast furnaces, rolling mills, iron works, timber yards, guano manufactories, breweries, earthenware manufactories, glass and bottle works, and other extensive works of various descriptions are established in the district capable of employing about 3,000 persons.

"A considerable number of owners of works in South Stockton and of workmen employed therein reside in Stockton and vice versâ.

"The workmen pass between the two towns in great numbers, not only by the bridge across the river Tees, but also by means of two ferries established in suitable places adjoining the towns

"The river Tees flows past the town, and separates it from the town of Stockton, the southern side to midstream being in the district of South Stockton, and the northern side to midstream in the borough of Stockton.

"Merely the ordinary powers of the Local Government Acts upon the river are vested in the Local Board, the entire management of the river being vested in the Tees Conservancy Commissioners.

"The sewage from the district of South Stockton flows into the river by four main drains constructed before the formation of the Local Board; but they do not cause any pollution calling for particular observation.

"Part of the property in the district is subject to floods at times of high spring tides; but this is not caused by obstruction in the river, but solely by the low level of the property so flooded.

"No comprehensive system of public sewerage has been carried out by the Board. The partial system in operation at its establishment has merely been increased from time to time as occasion needed, and the cost defrayed principally by property owners in the streets where new drains have been laid down. In some few cases the Board has contributed a portion of the cost.

"No sewage works exist in the district, nor has any irrigation of land with sewage been hitherto contemplated by the Board; but a large extent of agricultural land exists immediately contiguous to the district which might be available for sewage irrigation, if necessary.

"The privies, middens, and ashpits of the district are regularly cleansed by a contractor with whom the Board contracts for this purpose, under the 32nd section of the Local Government Act.

"The contract is let annually to the highest bidder, and the amount offered for the present year and already paid is 50*l.* This amount is clear of all expense attending the removal of the refuse, which is defrayed entirely by the contractor.

"About 1,250 tons of refuse will have been removed during the year expiring 30th November next. This is taken and disposed of to adjoining farmers for agricultural purposes, and meets with a very ready sale.

"The water supply of the district is obtained from the river Tees by the Stockton and Middlesbro' Water Company, which also supplies the adjacent towns of Stockton, Middlesbro', and Yarm.

"These works were established in 1858 under powers conferred by Act of Parliament.

"The pumping stations are situate at Tees Cottage near Darlington, and there is a reservoir near Fighting Cocks, about midway between Darlington and Stockton.

"These works supply the district with nearly all the water used for domestic and manufacturing purposes.

(Signed) "JOSH. DODDS,
"South Stockton, "Clerk to the Local Board."
"5 October 1870."

J. Dodds, Esq

8 Oct. 1870.

The witness withdrew.

Adjourned sine die.

No. 1, Park Prospect, Great Queen Street, Westminster.

Monday, 19th December 1870.

PRESENT:

LIEUTENANT-GENERAL SIR WILLIAM DENISON, K.C.B., F.R.S., IN THE CHAIR.
DR. EDWARD FRANKLAND, F.R.S. | MR. JOHN CHALMERS MORTON.
MR. S. J. SMITH, *Secretary.*

MR. J. BAILEY DENTON, C.E., examined.

Mr. J. B. Denton, C.E.

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806. (*Mr. Morton.*) You have had large experience I believe as an agricultural engineer all over the country?—I have.

807. And you have especially directed your attention to land drainage in all kinds of soils, and in almost every climate in England?—I have reported on upwards of half a million of acres in the United Kingdom.

808. Your long experience has led you to form opinions with respect to the relations of land and water in agriculture, whether the water be the rainfall distributed naturally, or spring water distributed artificially, or the dirty water of town drainage?—Yes.

809. On the last subject, I understand that you have some special information to give the Commissioners, which we should be glad to hear?—You are probably well acquainted with all I might say, but I think there has been an absence up to this moment of a proper consideration of land engineering,—engineering. I mean, *quâ* land, specially. I believe that what we engineers have aimed at has been to throw sewage upon land, without having that regard to the nature of the land upon which we apply it which we ought to have. There are only two points upon which I wish to trouble you. The first is the necessity of draining lands to which sewage is applied on the surface, and the next is the advantage of requiring that no water should pass from the surface of irrigated lands directly into streams. One is almost a natural sequence of the other, as drained land will absorb and filter as much sewage as it requires. Very little need be said upon the second point beyond pointing out the fact that all sewage irrigation so conducted becomes as it ought invariably to be the best, because a productive system of intermittent downward filtration.

810. The relation of your evidence to the subject of sewage is included within these two points?—Exactly so.

811. The first being the need of land drainage?—Under drainage.

812. And the second that no water shall run off the surface direct into streams?—Yes.

813. With regard to the former, the necessity of land drainage clearly exists where there is no natural sinking of water through the land?—Of course, and there are few lands that do not require the aid of artificial drains to relieve the subsoil when copiously charged with liquid from above. To approach at once the points upon which I invite your special attention I cannot do better than refer to my Italian investigations. I should mention to the commission that as far back as the year 1842 I was requested by the late Lord Spencer, and the late Mr. Phillip Pusey, to investigate Lombardian irrigation with a view to write an essay upon that subject for the Royal Agricultural Society's Journal, having in view a wider introduction of irrigation into England than then prevailed, and I visited Lombardy for the purpose. Since then, in the year 1865, I have been requested by certain capitalists in Manchester and Liverpool to examine the marshes of South Italy with a view to growing cotton there. In pursuance of those objects I examined, as carefully as I was capable of doing it, the effect of irrigation in Italy, and applying the observations I made on both occasions to the novel practice of sewage irrigation into which we in England are rushing, I am convinced that we are following in this country the example of Italy, and creating abuses here that exist there, as well as the advantages, by disregarding under-draining which they have ignored from simple ignorance of its benefits.

814. (*Chairman.*) The object in Italy is entirely an agricultural one, is it not. I mean it is for the purpose of increasing the produce of the soil, and not with the least reference to cleansing or purifying the water?—Speaking generally, it is so, though incidentally at Milan the liquid refuse of that city is conveyed to the plains by the Canal Veltabbia and mixed with the water of the springs, and certainly very extraordinary results have followed its use. But what I wanted to impress upon the Commissioners was this,—that the reason that injurious results in the shape of malaria, which has characterised several districts, have not followed generally the irrigation of Lombardy, is that the soil for much the wider part is naturally a free soil, a self drained soil; and so free is it that the water is used several times before it gets to its lowest discharge. It will be spread over the surface, and a large proportion will sink into the subsoil and come out again, and be re-applied on a lower surface. Of course having almost an unlimited supply, they do not pay very great regard to the quantity of water that may be used. By sinking what are called *fontanelli*,—the native word for fountains,—they get down to the subsoil, and by the pressure of the water from the higher ground it rises again, and is re-applied on the surface, and so it goes from terrace to terrace over a very wide district. The fall of the lands there is naturally considerable, although they are called plains. It is somewhere from five to fifteen feet per mile, ten feet per mile will be perhaps about the average. That is a considerable inclination for the flow of water. In observing the irrigated lands of Italy you will find that although the inclination is what I have stated, and the quantity of water which they apply upon this free soil is so great,—being about four inches deep for a dressing,—they expect to lose half by absorption, and carry only half on. The effect of irrigating the land in this copious way, even where it is very free in character, has certainly a tendency to render the air injurious to health, although I am glad to say that in searching through the statistics of the death rate it did not appear to be so in all parts alike; in fact I believe that in some of the irrigated parts of Lombardy, where the soil is very free, the health of the district is better than in other parts where there is no irrigation. But you may trace almost to a line where the soil is not of a perfectly free character by the health of the district. The rice-grounds, for instance, are all upon either marsh lands,

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deserving only the name of swamps, or clay lands without drainage, and miasma is localized there. There may appear some inconsistency in my drawing attention to the copious flow of the water over a free soil, implying that I object to it. Allow me to explain that if by the constant application of water to the surface you bring land of any description to a constant state of saturation, it then partakes of the character of a swamp, and I should object to it; but if there exists as there does in Lombardy a free discharge from the subsoil, and the application to the surface is intermittent, then natural drainage will have all the effect one would desire, and the result is not to be improved.

815. (*Mr. Morton.*) It has been shown by experiments carried out in the laboratory of this Commission, that a properly conducted system of intermittent filtration will cleanse town sewage sufficiently to enable it to be used for all but domestic purposes. Are you of opinion that it is desirable to adopt that system?—Yes. Professor Frankland has shown chemically the advantages of it; and in Lombardy they generally, in what is called the summer irrigation, apply the dressing of about four inches once a week for about seven or eight hours. This is the best because the most practical form of intermittent application, and with under drainage it can be universally adopted in English sewage irrigation.

816. The system which they adopt in Italy is, I presume, suitable to the crop that they grow: it is in fact imposed upon them by the character of the produce?—Yes, perhaps so.

817. (*Chairman.*) What crop is it?—Chiefly grass, but they grow a variety of crops. In the rice districts they keep the land under water, and positively create malaria for the sake of the produce as we shall do in England if sewage is applied to undrained land. Let me call your attention to a series of experiments made at Holmfield, which I hand in. You can see by the following tables what the difference of evaporation is, first, from a water surface, next from a saturated one of soil, and last from a drained surface; there is a difference of nine inches in the evaporation from a saturated surface compared with a drained surface. Now as evaporation certainly does affect health, whether or not it be associated with gases from putrescible organic matter, I submit that the less we have of saturation in this country the better. These experiments extended over five years, and the results I have handed in were extracted from the Journal of the Royal Agricultural Society, Vol. X., part II., page 516. They give AN ACCOUNT of OBSERVATIONS made, through a series of Five Years, at Holmfield House, near Ferrybridge, in the county of York, by Charles Charnock, Esq., with a view to determine the amount of Evaporation and Filtration under the several circumstances on the Magnesian Limestone Soil.

Months.	Rain.	Evaporation.				Filtration.
	1	2	3	4	5	6
		From Water.		From Soil.		
	On the Surface.	Exposed both Sun and Wind.	Shaded from Sun, but exposed to Wind.	When drained.	When saturated.	Through the Soil from the Drain, 3 feet deep.
1842.						
January -	2·70	1·69	1·13	1·66	1·59	1·04
February -	0·76	1·23	0·81	0·68	1·04	0·08
March - -	3·48	1·92	1·28	2·40	2·52	1·08
April - -	1·51	2·98	1·99	1·11	2·31	0·40
May - -	2·98	4·14	2·76	2·89	3·82	0·09
June - -	1·94	4·18	2·79	1·94	4·27	—
July - -	3·74	4·16	2·73	3·26	3·89	0·48
August - -	1·49	3·36	2·24	1·37	2·39	0·12
September -	2·44	2·69	1·74	2·24	2·88	0·20
October -	1·12	2·00	1·37	0·92	1·99	0·20
November -	3·19	2·26	1·50	2·49	1·83	0·70
December -	0·76	3·00	2·14	0·60	1·49	0·16
Totals -	26·11	33·61	22·48	21·56	30·02	4·55
1843.						
January -	1·48	2·57	1·71	0·69	1·87	0·79
February -	3·25	2·65	1·10	2·29	2·78	0·96
March - -	0·95	3·05	2·03	0·72	2·43	0·23
April - -	2·19	3·22	2·05	1·84	2·39	0·25
May - -	2·81	2·91	1·94	2·47	2·65	0·34
June - -	2·31	5·12	3·41	2·10	4·86	0·21
July - -	2·70	3·76	2·56	2·55	3·49	0·15
August - -	3·99	3·71	2·57	3·77	3·74	0·22
September -	1·07	2·06	1·34	0·90	2·18	0·17
October -	1·10	1·80	1·20	0·82	1·93	0·28
November -	2·36	1·64	1·09	1·69	1·48	0·67
December -	0·28	1·68	1·78	0·27	1·39	0·01
Totals -	24·49	34·17	22·72	20·11	31·19	4·28
1844.						
January -	1·31	1·61	1·08	0·85	1·50	0·46
February -	2·22	1·31	0·88	1·66	1·11	0·56
March - -	2·27	2·13	1·42	1·58	1·50	0·69
April - -	0·27	3·83	2·55	0·27	3·42	—
May - -	0·42	5·77	3·85	0·42	4·86	—
June - -	1·24	5·31	3·58	1·20	4·95	0·04
July - -	2·76	4·17	2·78	2·43	4·28	0·33
August - -	2·85	4·70	3·14	2·44	4·63	0·41
September -	1·92	4·91	3·28	1·62	3·96	0·30
October -	1·41	2·79	1·86	1·17	2·93	0·24
November -	1·98	2·84	1·80	1·47	2·78	0·51
December -	0·35	0·79	0·53	0·29	0·93	0·06
Totals -	19·00	40·16	26·75	15·40	37·85	3·60
1845.						
January -	1·74	1·53	1·02	1·28	1·49	0·46
February -	0·73	0·71	0·47	0·43	0·94	0·30
March - -	1·88	2·91	1·94	1·33	2·89	0·55
April - -	1·54	4·79	3·19	1·05	4·06	0·49
May - -	2·24	2·84	1·99	1·97	3·26	0·27
June - -	3·18	3·10	2·06	2·93	2·98	0·25
July - -	3·49	2·86	1·89	3·30	2·79	0·19
August - -	4·61	2·56	1·70	4·24	2·43	0·37
September -	1·36	2·79	1·86	0·95	2·29	0·41
October -	3·36	2·77	1·84	2·69	2·89	0·67
November -	1·01	2·13	1·41	0·73	2·20	0·28
December -	3·04	3·57	2·38	2·36	2·87	0·68
Totals -	28·18	32·56	21·75	23·26	31·09	4·92
1846.						
January -	2·18	2·07	1·58	1·22	1·94	0·96
February -	0·47	2·59	1·69	0·44	2·09	0·03
March - -	0·93	2·56	1·55	0·86	2·16	0·07
April - -	5·97	1·91	1·27	2·98	1·49	2·99
May - -	0·82	4·52	3·02	0·73	3·89	0·09
June - -	1·65	4·88	3·25	1·58	4·73	0·07
July - -	2·90	4·44	2·96	2·74	4·39	0·16
August - -	2·65	3·08	2·05	2·46	3·28	0·19
September -	1·07	2·99	1·99	1·00	3·14	0·07
October -	4·09	2·23	1·49	2·40	2·76	1·69
November -	1·15	1·63	1·09	0·88	1·74	0·17
December -	1·36	1·79	1·10	1·09	1·67	0·27
Totals -	25·24	34·69	23·04	18·38	33·28	6·76

EXPLANATION.—Column 1.—Shows the depth of rain fallen, as registered by the ordinary rain-gauge.

Column 2.—Is the amount of evaporation from a surface of water fully exposed to both sun and wind.

Column 3.—Is the evaporation from water shaded from the sun, but exposed to the wind.

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Column 4.—Is the evaporation from what represented drained or dry land.

Column 5.—Is the evaporation from the same when saturated.

Column 6.—Is the amount of water which filtered through the soil.

Into a leaden vessel, of a foot square and three feet deep, was put two feet of gravel and calcareous sand, so as to represent the substratum of the farm, and the remainder filled up, to within an inch of the top, with an average quality of soil. At the bottom a pipe was inserted which conveyed all the water that was filtered through into a bottle, which was regularly emptied and registered. The vessel was inserted in the ground to within an inch of the surface, keeping the level of the soil, inside and outside, alike, with an inch of the vessel above, to prevent any communication of water from without. The soil was kept free from weeds, and occasionally stirred, that it might not be more than ordinarily compact.

To determine the evaporation from *saturated* soil, a leaden vessel of thirteen inches deep, and a foot square, was filled to within an inch of the top with soil and placed in the ground in the same manner as the previous vessel, with a pipe level with the surface of the soil to carry off the excess of top-water into a receiver. The same quantity of water was then daily supplied to this soil as the evaporating dish of Column 2 showed was evaporated. The soil was stirred as in the former case, and thus represented wet and undrained land.

In a paper which I read before the Institution of Civil Engineers in 1864, I sum up these figures thus:—"If these figures can be relied upon they show "that in those cases where a district is maintained "in a state of saturation similar to the soil experi"mented upon by Mr. Charnock, all other things "being equal, an amount of evaporation of eight "inches more than the rainfall may be expected, "whereas on the same land underdrained, the amount "of evaporation would be reduced to five inches less "than the rainfall, making a difference of 13 inches."

818. Is that in any given time?—This was the average annual result from 1842 to 1846 inclusive: the mean rainfall was 24·6 inches; the evaporation from the saturated surface was 32·68 inches, and from a drained surface 19·74 inches: these were the means of five years.

819. (*Mr. Morton.*) That result was obtained from a surface saturated continuously for 365 days?—Yes.

820. But in irrigation, when flooding or saturation takes place, it is only for two or three hours at a time?—Yes; of course that is a very different thing; but not so different as one would suppose, for if sewage is applied frequently to the surface of an undrained soil, the land becomes saturated with this sewage, which must be evaporated to be got rid of at all. And although you may in practice apply your sewage intermittently, still the saturation would be so nearly approaching that of complete saturation, that I think it would be very deleterious to health.

821. It does not seem to me that the case you suppose—I mean that of water poured on and saturating, as you imagine, an undrained clay soil—is quite in point. Sewage applied intermittently is not got rid of simply by evaporation; it rolls over the surface, and is cleansed not only by that act, but by feeding the plants growing on that surface?—I am speaking only of the health of a district as affected by the saturation of the soil with sewage, that is, water with putrescible organic matter in it. I do not now refer to any cleansing resulting from the action,—that is quite another matter. I merely wish to convey this, that if by the repeated application of sewage to the surface we keep land in a state of saturation, or in a state bordering on saturation, we do bring it to a condition something like that of Mr. Charnock's experiments, when he showed that there was an excess of evaporation over the rainfall of eight inches. I think that is a reason (and I submit it to you as one) why all land that is of a nature to become saturated, and upon which water or sewage is poured, should be under-drained as an imperative necessity. And I wish to repeat, before leaving the question of Italian irrigation, that in my investigation of the marshes of Italy, it was remarkable how defined was the constant unhealthiness of certain districts. The limits of malaria were defined by the constant existence of water in the soil, and of vegetable and insect matter washed down from the mountains and higher grounds upon the saturated surface. It was quite remarkable to observe how malaria was associated with that state of things. There being only a maximum difference of tide in the Mediterranean Sea of 18 inches between high and low water the sea-board marshes are practically on a level with the sea. The flood water rushes down from the Apennines on to these flats, and brings with it a great deal of vegetable matter that rests to be evaporated and exhaled by the sun, and malaria is the consequence. It is only now, at this era, if I may so term it, when united Italy has made Rome its capital, that the Italians have determined to investigate the propositions which I laid before them some years back for the drainage of those marshes. A commission has been appointed to inquire into the whole subject, with a view to improve the health of Rome and the Campagna, which cannot be effectually drained without draining also the Pontine marshes. That commission I hope will realise, for the first time, the necessity of underdrainage to secure the proper percolation of water from the surface to the subsoil, with a discharge from the subsoil to the outlet, which, in the case of these marshes, can only be provided by steam power.

822. Would you apply the experience of Italy to the case of our English towns, situated as they may be in clay land districts?—Yes, certainly, to the extent of avoiding defects which have resulted in localizing miasma. I mentioned that my first reason for troubling you with these remarks was the impression I had so forcibly upon my mind that the cause of malaria in Italy, so deadly in its effects, was the absence of under-drainage, and I hope that your Commission will positively state that all sewage-irrigated land should be under-drained if not naturally dry. I will now put before you my reasons for considering clay, or rather a certain proportion of clay, very desirable in all soils to which sewage is applied. Clays, although popularly considered very difficult to manage, may with proper treatment become as good, if not better filters than sands and gravels. I believe, after a long and careful examination of them, that they become so finely disintegrated by the action of air and water passing through them, that they may be made mechanically perfect filters. My observations lead me to believe, too, that clays are more suitable than free soils, chemically, for cleansing sewage. I know I am speaking in the presence of a chemist, and that my opinion will be taken only for what it is worth, but I believe that clays have the power of retaining fertilizing matter superior to that of any other soil. Moreover, clays themselves are more productive than gravels and sands. I think everybody would admit that; therefore they require less sewage to bring out a certain result, and consequently economy would lead to the adoption of clays. In recommending clays, I am not assuming that bare clays would be used. I should abstain, as far as possible, from the use of bare clays, and should adopt those which are of a loamy character.

823. (*Chairman.*) Soils which you call loam?—Yes; a clayey loam. One of the operations in preparing land for sewage irrigation should be to stir the soil to a considerable depth, by doing which we should cover the main body of clay, which would crack under direct atmospheric influence, with a depth of pulverized soil which would reduce to a minimum the chance of cracking. I do not say that we can avoid it altogether, but we can very materially reduce it in the same way as a brickmaker does. If he does not want his bricks to crack he covers them with straw, and if straw will not do he gets some planks, and so he prevents the sun striking them and the wind tearing them. In the same way I believe, as we are now gradually appreciating the value of deep steam cultivation, it is not necessary to say much to induce all persons in preparing land for sewage irrigation to deeply cultivate it to the extent of from 12 to 18 inches, and thus to obtain the brickmakers' covering.

824. (*Mr. Morton.*) Do you not know of instances in which after deep cultivation dressings of sewage

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have had the effect of running the clay particles together again and bringing them back into their original condition?—No, I do not; though doubtless there would be a tendency to that effect; but our experience in sewage irrigation is so limited, and the pre-conceived notions of people that it was only necessary to run sewage over the surface without underdraining the soil have had such unfortunate influence that we really have not ascertained what the soil itself will do. I have no doubt whatever myself that clay may be ameliorated by deep cultivation; that although after sowing crops it would be necessary to roll and harrow and press the surface, it still would be percolatory, in fact that it would be impossible to prevent a very rapid absorption. Of course we must assert the inclination of the surface to the quantity of sewage that we wish to apply, and the stiffer the land over which it is applied the flatter must be the inclination.

825. You propose to run it over the surface?—Of course I contemplate nothing else. I am quite prepared for the objection that pouring sewage upon clayey soils that have been left in a rough state by the steam plough will gradually smooth it down: that the fine particles of which clay consists will get into the pores of the soil, and that the sewage will pass over them. All I can say is that the necessary hoeing and disturbing the surface to keep down weeds will keep the soil open, and that it will pay well to do this effectually I have not the least doubt.

826. You propose to grow crops that will permit of surface tillage during this process?—The farmer will grow the most profitable crops that he can. I think that experience has already gone far to show that those crops that are quickly removed from the surface are those which best suit irrigation. I believe that the days of the pre-eminence of Italian rye grass are numbered, and that in a few years we shall see the irrigation of perennial grasses regarded as altogether wrong. Italian rye grass I am afraid will continue for a time, because it is a devouring crop, and we must take advantage of that specialty until we have learnt the true economy of sewage farming; but that we shall not grow Italian rye grass as it is now grown for many years I feel assured. With mangolds and other roots there is a roughness incident to the cultivation which will allow of the permeation of the sewage quickly. Let me say in repetition, that I consider that the works essential to the proper preparation of clayey loams are two, that is, such a perfect system of under-drainage as will allow of a sufficiently rapid discharge of the sewage from out the subsoil, and such surface treatment as shall secure absorption. The drains will keep down at a sufficient depth from the surface that line of saturation which rises above the drains. This line of saturation is due to the water rising by what is called capillary attraction or suction. The drainage must therefore be so perfect in its character as to allow of the rapid discharge of the sewage through the soil, and the maintenance of such a depth of percolatory matter above this line of saturation as will produce that aeration, and oxidation as a consequence, which has been so admirably enunciated by this Commission.

827. Can you give us that idea quantitatively; can you state a case in which a certain kind of soil receives a certain quantity of sewage during the year; how deep must the drains be, and how frequently must the sewage be applied to bring out a result which would be satisfactory to you. Take for instance London clay?—No, I cannot on the London clay. There is no case on record, though I hope to show you presently that London clay is of all clays, that which is most susceptible of contraction and expansion, and that it may therefore become a capital filtering material.

828. The difficulty seems to me to be this, that what you cover the clay with is clay; if you had sand then you could avoid the cracks. In the case of the Harrow irrigation field there is nothing but London clay, and we find that if we dig it and dig it, and then pour the sewage over it, it runs together again?—Allow me to say, after 25 years study of clay soils, that if you can put upon a clay subsoil, which you really can by the adoption of steam power, a stratum of pulverized earth, you will effectually overcome the cracking property of the stiffest clay.

829. (*Chairman.*) What soil do you mean?—I mentioned before that I should avoid taking bare clays. They are not so common in England as people expect. There is generally a top layer of soil, sometimes very thin, two or three inches, but elsewhere 10 inches or a foot of soil above the clay. This top layer may be ameliorated clay, if I may term it so, which has had the benefit of air, water, and manure; that will be quite a sufficient covering if properly stirred to prevent the atmosphere from acting suddenly and partially upon the substratum which is to form your filter. London clay, as I show in a table which I have here, and beg to bring under your notice, will add by absorption about 50 per cent. to its own weight when dry, and this capability is the measure of its mechanical properties as a filtering material as it is also the measure of its power to crack. The table I have handed in gives the results of a series of experiments I carried out some years ago to ascertain the extent of air and water space in different clays.

Geological Description of Soil.	Locality.	Weight of Sample dried by Exposure to Air and Sun.	Weight after four Days' Absorption of Water placed within Reach of Surface, Sept. 5th, 1864.	Addition to Weight by Water drawn up.	Proportion gained by Absorption, nearly.	Weight after maximum Pressure of 72 lbs. per Inch, Sept. 5th, 1864.	Weight after Exposure to Air and Sun, Oct. 7, 1864.	Loss of Weight by Evaporation.	Proportion of Weight lost by Evaporation, nearly.	Measure after Pressure, Sept. 5th, 1864.	Measure after Exposure to Air and Sun, Oct. 7, 1864.	Analysis by Professor Way. (In 100 Parts.) Organic Matter and combined Water.	Sand.	Clay.	Lime.
Warp Clay - - -	Portbury, Somersetshire -	12	16·00	4·00	1-3	14·96	11·96	3·60	1-5	4·283	4·068	—	—	—	—
London Clay - - -	Regent's Park, Middlesex -	12	17·50	5·50	1-2	15·20	12·00	3·20	1-5	4·667	4·133	5·47	12·35	79·39	2·79
Wealden Clay - - -	Maresfield, Sussex - -	12	15·57	3·57	1-3	14·20	11·95	2·25	1-6	4·470	4·050	—	—	—	—
Drift Chalk on Kimmeridge Clay, called "White Clay."	Near Horncastle, Lincolnshire.	12	14·75	2·75	1-4	14·60	11·98	2·62	1-7	4·300	4·066	1·46	10·07	14·57	73·90
Boulder Clay on Oxford Clay.	Haddon, near Peterborough	12	17·06	5·06	2-5	15·85	12·00	3·85	1-4	4·680	4·080	4·81	6·92	79·41	8·86
Oxford Clay - - -	Orton, near Peterborough -	12	15·42	3·42	1-3	14·17	11·97	2·20	1-7	4·400	4·060	2·05	36·52	56·74	4·69
Lias Clay - - -	Vale of Belvoir, Lincolnshire	12	15·62	3·62	1-3	15·35	11·95	3·40	1-5	4·570	4·180	4·70	6·80	84·34	4·16
Red Sandstone from very stiff clay bed.	Near Warwick - - -	12	17·20	5·20	2-5	16·75	12·00	4·75	2-7	4·650	4·220	2·60	11·12	84·03	2·25

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The figures show that while one clay will absorb two-fifths of a given quantity of water, it will expand to one-fifth of a given space, and another clay absorbing rather more than half the same quantity of water will expand to half the given space. The differences indicate at once the filtering capabilities of the clays brought into comparison. Allow me here to quote an expression which I cannot improve from a well known writer, which describes the condition of clays when thoroughly drained. He says in Arthur Young's Calendar, page 9, "if water found its way through "cracks and fissures to the drains, it would have "comparatively little fertilizing influence. What we "want is, that the water passing through our soil shall "wrap round every particle, and not wash merely "the cracks and fissures in its passage. These fis-"sures have not been seen, they have been merely "fancied; but water has been *seen* oozing from a

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"surface at every pore. And that clays are porous is "proved by the fact that they are wet." That expression is as sound as possible, and there is not the least doubt that the effect of draining clays, properly draining them, and covering them in the way I speak of with 18 inches of pulverized soil would make any clay a homogeneous filter. I have observed in my practice that clays have uniformly altered in character and in colour after drainage. They have changed in colour to a depth of three and four feet.

830. (*Dr. Frankland.*) Of course you would not contemplate applying so large a proportion of sewage per acre in the case of these clay-drained lands as we applied in our experiments upon pure and simple filtration where we put the sewage of 3,000 people upon an acre of land?—Certainly not, if you are speaking of irrigation for profit. Economy I consider would suggest the quantity of sewage to be applied to every part of a sewage farm. You would apply it so that it should saturate the land and no more where you are looking to profit.

831. So that probably this super-saturation, even of stiffish clay, with sewage would not in your case take place?—Never. I believe the point to aim at is simply to saturate the soil and no more, of course I am not speaking of filtration but of irrigation. I have to add one observation which I will make with the view of being thoroughly understood by the Commission with regard to what I consider should be a guide to the quantity of sewage applied to land. Hitherto the intention has been to get rid of the sewage, looking to its purification by vegetation as it passed over the land. I believe that the farmer will take much more care of his sewage than has hitherto been done, and that he will allow of no waste, and repletion is waste. He will therefore stop just short of repletion.

832. How can you ascertain when the land has received a sufficient quantity of sewage: by the eye?—None should run off at the surface. I would run it on till it began to run off, and directly that happens then is the time to stop.

833. (*Chairman.*) I think it is stated that an acre will cleanse the sewage of 100 people?—Yes, it has generally been so stated.

834. By a more economical application of the sewage would you diminish the amount; that is to say, could you make use of the sewage of 100 people, or are you disposed to say that you might use that sewage two or three times over, so that the sewage of 100 people would irrigate with satisfactory results more than one acre?—No. I believe that as the sewage question is pressed upon our attention we shall every day learn our lesson better, and we shall look to the sewage of 100 persons as sufficient to satisfy two or three or even more than three acres. But I do not mean by this that the same sewage should ever be reapplied where it can be avoided. There is one point in practice upon which I would say this. In free soils the drains should be so arranged as not to allow of a direct downward passage of the sewage from the surface to the drain; that is to say, that every drain should be so placed that there should be no sewage put on to the surface immediately above it, and that is easily done by small banks or paths or roads, or some mode of appropriating the land so that no sewage should pass on to the surface immediately above.

835. (*Dr. Frankland.*) Would that not involve a waste of land?—No, because the number of drains would be very few comparatively. The natural partition of the land for cultivation and cropping would allow of that being done very economically. In clay soils you cannot carry out that system; all you can do then is to avoid having the drains under hollows where the sewage might collect. The work must be done most carefully and with proper filling material.

836. Do you know Breton's farm?—Yes, very well.

837. Is that precaution being observed there?—No, not completely; the drainage there was carried out in the first place without regard to the mode in which the land would be subdivided on the surface, and the consequence is the drains are immediately under the application of the sewage, and being a free soil that ought not to be. In order to make myself understood upon that point, I may refer to a small case at Walton, on the South Western Railway, where I have carried out the principle which I say is right. I have made paths for the use of the occupiers immediately over the drains. Dr. Odling has said that the water passing from the outlet is unexceptionally pure water. I only refer to this case for the purpose of showing that you may avoid applying the sewage to the surface immediately above the drains in free soils, though you cannot do so in clays.

838. Should you anticipate imperfect results in the cleansing of the sewage on Breton's farm?—I should, as far as the drainage is concerned, and I stated so at the meeting of the British Association.

839. (*Mr. Morton.*) Is that injury to which you have alluded a permanent one; does not the loose soil with which a drain is filled gradually condense together?—I do not think so. Let me illustrate my view by another case. I was desired by the Lords Justices to advise as to what should be done at Merthyr Tydfil in South Wales in order to purify the sewage while the permanent works for irrigation were being carried out. There was an application for sequestration which was stayed until my report was prepared, and I advised in that case that the whole of the sewage of a population of 50,000 people should be run on to 20 acres of land divided by slight banks into four portions of five acres each, and that the sewage should be run for the first six hours of the day on the first five acres, and for the second six hours on to the second five acres, and so on for the 24 hours, coming round to the first after the end of the day. I recommended that on two grounds, first as a means of immediate purification, and second as a part of the proper organization of a sewage farm in which I contend that permanent filtration arrangements should necessarily form a part. The recommendation was sent by the court to the Board of Health. They demurred to the interruption which would be caused to the permanent works of irrigation by carrying out these temporary ones, as they were pleased to call them, and they did not act upon the suggestion in its integrity. But it was again brought before the court about a fortnight ago, and a promise was made by the Board of Health to carry my system out. They were asked if they had any objection to the scheme and they said no, it was practicable and they intended to carry it out. They are now I believe on the point of doing so. At any rate it will be a test of the power of natural filtration, for the drains there are seven feet deep, and although the work may not be done quite as I should like to see it done I hope we shall profit in some way by the proceeding. There my intention is not to allow any sewage to pass from the surface direct to the drains beneath.

840. (*Dr. Frankland.*) Can you obtain a good sample of the effluent water flowing from those drains?—The work is not completed yet.

841. Will it be completed?—Yes; and then it will be possible.

842. (*Mr. Morton.*) Is the subsoil porous?—It is porous. There is a very small proportion of clay, but it is very wet.

843. (*Dr. Frankland.*) Is that in the first valley, just below the sewage outfall?—Yes. I have only now to trouble the Commissioners with an extract from one of my short lectures at Cirencester Agricultural College. It is called, "The Theory of Underdrainage, as accepted by a Practical Man." It bears upon the point I have laid so much stress upon, the passage or filtration of water or clarified sewage through clays comparatively with other soils:—

"All water absorbed, and which percolates a free soil of even texture so regularly, finds a check in clays which are not broken up by deep cultivation; and were it not the fact that there are few clays that

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are not threaded with natural sand and gravel veins, more or less minute, and that there are none which do not crack as they contract, the believers in impermeability would gain ground. No water can be taken away from clay soils by drainage or evaporation without contraction, and there can be no contraction laterally without cracks. The space the water has occupied in the soil is then claimed by the atmosphere, and drainage by underground conduits converts those cracks into continuous and constant channels, fixed and secured by the minute particles of soil and manurial matter which descends with the rain, and prevents the re-adhesion of their sides. The greedy capacity which enables clay soils to absorb from 40 to 70 per cent. of their weight of water is thus counterbalanced by the natural law which obliges them to give it up again to drainage and the atmosphere. Each year after drainage makes the disintegration more perfect, and the ramification of the cracks and fissures becomes more and more minute, and more susceptible to the influences of gravitation downwards to the drains, and capillary attraction upwards to the surface. The best evidence of this gradual amelioration of clay subsoils is to be gained by the microscope, by which it will be seen that both their texture and colour undergo decided change in the course of a few years.

"It is difficult to demonstrate a theory relating to the soil on which we tread, and which our eyes do not penetrate; and the mechanical effects of draining must, therefore, remain subject to some doubts. All the prettily drawn cracks radiating from the under-drains, which you see in books, are pure fancy. Doubtless, there are in all clays the fissures, cracks, root veins, and sand galls which we have described. They do not, however, influence under-drainage as beneficially as some people suppose. On the contrary, they interfere with that general permeation which is the object aimed at.

"It is hardly necessary to point out to you the ignorance of supposing that water enters a connected system of under drains from the tops of the pipes. In free soils, and in clays when the under drains by 'reciprocal effect' have produced pulverisation, the rain entering the soil passes perpendicularly down, and having reached the standing level of the water in the soil, raises that level and flows off by the pipes. It thus necessarily enters at the bottom of the pipe and not at the top."

844. From what you have read there as to the mode in which a field is drained, and the mode in which the water reaches the drain, I need not ask you whether water can have a horizontal movement underground. I mean, may water falling on one portion of a field in this underground reservoir, move away till it gets beneath another part of the field?—Yes, no doubt. There are two actions in water; one is vertical, and the other is lateral. In land which has been emptied of water, if I may use the expression, the rain descends vertically through the soil down to the water level maintained by the drains, and at the same time naturally finds its way laterally when it reaches that level towards the outcrop more or less actively as the subsoil is free or tenacious.

845. You spoke of springs being supplied from land at a distance, and in that way sometimes of drains running from spring water coming into them?—Yes, drains, by tapping an underground reservoir, often become perennial springs. In reading this short lecture you will see that I separate the clay lands from the free soils. All drainage may be divided into three classes; that is, first, clay land drainage; next, that of free soils saturated to the brim by water coming in from the surrounding ground; and the drainage of peaty or bog lands.

846. Does the remark about the water rising to the level of the drain before the drain begins to run refer exclusively to clay lands?—No; the same principle affects free soils. According to the quantity of water passing out laterally from the outcrop of a free soil bed, and the amount taken up by evaporation, so will be the depth of the soil beneath the drain that has to be filled up before the drain can run.

847. Suppose a field of free soil 15 feet deep to begin with, that is, all through, and there is a comparatively retentive stratum at the bottom that the rain fills, and there are drains five feet from that surface, when will the drain pipes begin to run?—When the soil beneath the five feet is filled with water, not before.

848. You spoke of water being held by attraction in the pores of the soil, do you consider that much of that water, or any of it, gets into the drain pipes?—That water which is upheld by attraction, upon the rain coming down to it from above, is driven out by the down-coming water which takes its place.

849. (*Mr. Morton.*) I understand that even after the water has filled the subsoil up to the level of the drain, there will be no running out of the drain until a certain portion of land between two drains is also filled with water, the portion varying in amount with the tenacity of the subsoil?—The body of soil which soaks up the water from below will be greater midway between the drains than nearer the drains, because gravity is fighting with capillary attraction and beats it the nearer it is to the drain.

850. So that rain falling on to this surface will not fall upon the floor as it were, and simply roll over it to any hole in it, but it will be retained by the subsoil by which this floor is covered to some extent, until a certain steepness of angle is attained?—I heard Sir William Denison and you speaking about a block of wet soil between drains having a certain inclination, and I did not like to contradict what you said, but my own opinion is this, that the level of the dead water is straight from drain to drain, but that the power of capillary attraction or suction is greater midway between the drains than at the drains themselves, and that the only difference is that this line of saturation will wave according to the distance between the drains.

851. (*Dr. Frankland.*) Have you any details showing the proportion of sewage evaporated from the surface of sewage land?—No.

852. In your paper you speak of considerable evaporation from the surface?—Yes. I base my observations very materially upon Mr. Charnock's experiments. The loss in Lombardy in the winter in the irrigation there, is one-seventh, how that has been ascertained I cannot say.

853. (*Chairman.*) Suppose that 10 inches of rain falls upon a given area, have you any data as to the quantity that will go off. I mean the proportion of rain that will go off at the outfall according to the quality of the soil and the slope of the land, can you give me the limits?—It will, of course, vary considerably. From clay lands from two and a half to three inches annually.

854. Out of what rainfall?—I am speaking of the average of England now, taking 25 inches as the average rainfall.

855. What quantity will come off?—Three inches will be the outside perennial supply furnished by clays. This quantity will be made more certain by under-drainage than before.

856. That will be only an eighth after all?—Yes.

857. (*Dr. Frankland.*) Is that spring water or from clay?—It is the water of drainage and partakes of the nature of spring water when it is discharged from the subsoil by the drains.

858. (*Mr. Morton.*) Not more than three inches?—I am speaking of course of the perennial supply, not flood water; that which might with certainty help to maintain the rivers in their summer flow if properly stored when discharged from the drains.

859. That is the minimum, is it not?—I do not say that it is the minimum; you may have rather less in one year and more in another.

860. (*Dr. Frankland.*) Have you some data with reference to chalk?—No, not with me.

861. Do you consider that the evaporation from a porous drained surface to be much less than from an undrained wet surface?—Yes, necessarily, as shown by Mr. Charnock, from the circumstance that the water having passed off by the drains during the winter, there is so much less to pass off from evaporation during the summer.

862. But supposing that you have 25 inches of rain upon a chalk surface and the same upon a clay surface, I understand you to say that you would expect more evaporation from the clay surface and more loss from evaporation?—Yes, because the water level would be nearer the surface. If you had a box of sand and a box of clay, and you kept pouring water, as Mr. Charnock did, into those boxes, you would have a greater evaporation from the sand than from the clay. Mr. Milne Home, President of the Meteorological Society of Scotland, made a very interesting experiment on that point, and he showed that the temperature was lower in sands, and the evaporation therefore greater, than in clays, but I do not think that that experiment is worth much. It may answer your question nevertheless, though, practically, I do not think there was much in the experiment.

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The witness withdrew.

PART IV.

Pollution of the River Wear and its tributaries.

Letter from WILLIAM HENDERSON, Esq., to the Secretary to the Commission.

Pollution of the River Wear and its tributaries.

South Bailey, Durham,
Sept. 21, 1870.

In accordance with your request I forward to you, for the information of Her Majesty's Commissioners, some particulars of the pollution of the river *Wear*.

The hills immediately surrounding the source of the *Wear*, and extending for upwards of 20 miles eastward, are rich in mineral deposits, more particularly lead and iron; these have been worked with great success for a long period of years, and so numerous are the respective workings that scarce a tributary exists in the above-mentioned distance that is not more or less seriously fouled by mining operations.

The nature of the pollutions from mines are two-fold—liquid and solid.

Liquid Pollution.—This is caused by permitting the water used in the process of washing lead ore to flow into the river strongly impregnated with poisonous matter, and locally termed "hush," which has the effect of converting the otherwise clear streams into the appearance of a greyish pea-soup of some consistency. The "hush" flows in for eight months in the year or more, and its effect on the streams of the *Wear* are experienced to a serious extent even some miles east of Bishop Auckland.

It has been given in evidence that canary birds whose cages have been strewed with sand taken from the river affected by "hush" have always died; that geese feeding in the river also frequently die; and even plants where the soil is mixed with river sand will not thrive.

Solids.—Perhaps a greater injury results to the river *Wear* from the mode of disposing of the solid refuse matter from these mines, both in the form of large masses of stone which are themselves unproductive of ore, but which are necessarily removed in excavations to reach the ore (locally termed "deads"), and also from the crushed stone from which the ore has been extracted, this forms a small gravel of nearly an uniform size (and locally known by the term "cuttings").

I may mention that the usual method of working these lead mines is by driving long tunnels or "levels" into the hill sides from the lowest available point, hence generally the bed of the river or tributary is selected, and nearly all the matter removed from the tunnel in course of excavation, is placed in heaps by the margin of, and within reach of the wash of the stream; these heaps are allowed to accumulate till a winter flood of sufficient force sweeps them away, only to make room for a fresh accumulation, indeed in some cases they are at once "tipped" into the river without further ceremony.

When it is considered that these tunnels or "levels" often exceed *a mile* or even *two miles* in length, an estimate of the amount of débris removed from them may be formed, and which finds a ready deposit in the *Wear*.

Memo.—A level one mile long, 6 feet × 4 feet, contains 4,697 cubic yards of earth; a cubic yard weighs from a ton to 36 cwt. according to density.

These large masses of stone carried down into the bed of the *Wear* fill up the natural channel, and cause the stream to exert its force on the more yielding alluvial soil, thus extending the width of the channel by raising the bed, and much valuable land is periodically swept away and carried in suspension in the form of sand, mud, to be deposited in the lower reaches of the river, or to be swept into the estuary itself.

The introduction of this foreign matter has also the effect of forming an artificial bed to the stream, covering the ancient gravels to a considerable depth, and forming a hard and compact pavement, as the smaller or crushed stone (cuttings) fills up the interstices of the larger rugged blocks, thus effectually resisting the operations of spawning salmon, and driving them to seek the tributaries when no better fortune awaits them, and they are exposed to the unceasing attacks of the poacher.

The visits of Mr. Fennell in 1866 and of Messrs. Buckland and Walpole in 1867 have been attended with excellent results, but their time being limited they had little opportunity of arriving at a proper estimate of the magnitude of the evils resulting from the pollutions (liquid and solid) from lead mines. I would suggest for your consideration the importance of visiting these districts; as from the same range of hills, and but a few miles apart, issue four very considerable rivers, viz., *Wear*, *Tees*, *South Tyne*, and *Derwent* (the largest tributary of *Tyne*), these streams flowing from the most extensive lead mining district in England are all more or less suffering from mining pollutions similar to the *Wear*, and each and all require careful and searching investigation.

Messrs. Buckland and Walpole, on their visit in 1867, were met by Mr. Sopwith, on the part of W. B. Beaumont, Esq., M.P., and by Mr. Bainbridge, on the part of the London Lead Mining Company; and both, in the best spirit, undertook to carry out experiments for the purpose of ascertaining how far the ill-effects of the "hush" could be obviated. I understand that Mr. Beaumont has spent 1,200*l.*, and the London Lead Mining Company a larger sum, in forming lengthened catch pits and other expedients, which in the mines so dealt with have done much good; but I fear that nothing like a perfect result will be obtained until at the end of these catch-pits large filtering ponds are established. Now, as the situation of the mines is almost always favourable for the erection of such ponds, and as the materials needed are furnished by the refuse from the mines, it follows that the cost would not be excessive; and I trust that the proprietors will see the importance of adopting this simple remedy. Of course these filter ponds could not be maintained in good working

Letter from WILLIAM HENDERSON, Esq., to the Secretary to the Commission—*cont.*

Pollution of the River Wear and its tributaries.

order without occasionally removing the old gravel and replacing with new, an expense which should not be a heavy tax on these large and profitable establishments. In the *Bedburn* tributary all the fish of the salmon kind about four years since were destroyed by water from a lead mine; one pool was literally strewn with dead fish. The great destruction of fish in the spawning season from this cause cannot be estimated.

At Bishop Auckland the sewage of the town is cast into the river, and the water after flowing a dozen miles becomes the drinking water of the inhabitants of the city of Durham.

The sewage also from the city of Durham, and several populous pit villages westward of the city, flows into the main stream, whilst irruptions of gas water into the same are of frequent occurrence.

The Gaunless, at Bishop Auckland, which a few years ago was a beautiful trouting stream, now trails its course in appearance as a black snake. A few miles to the east of this the brook entering the river at Croxdale has for years presented the red appearance of rusted iron. This arises from the water pumped from a colliery, which is so thick and foul as to destroy all animal life. Cattle will not drink its water; and this once beautiful stream is quite useless to the country it passes through. The same remark applies to the considerable stream which enters the river at Chester-le-street, although a few years ago this last stream used to abound with fish of the salmon kind.

The Browney (which in its upper stretches is still a lovely stream) is so polluted by refuse from paper mills for about four miles before it joins the *Wear* that it is not only ruined as a fishing stream but also seriously contributes to injure the *Wear* itself. For the last few years a practice has existed in this country of washing small coal intended to be burnt in ovens for coke. It was the practice to pour the water used back into the river, and this blackened the whole stream, besides depositing a sediment of fine dust coal on the river bed. Science has found that the same water may be used continuously for washing coal, and hence it is not necessary to pour any of it back into the stream. This discovery has freed the river above the city of Durham from one great cause of pollution; or rather I should say does free it when the agents insist on the workmen attending to the machinery; but some collieries further eastward still continue unnecessarily to desecrate the stream.

The pollution by solids is more easily dealt with by prohibiting the deposit of stone or rubbish from the mines within certain distances of the extreme reach of the winter floods.

At Durham the inhabitants make the river banks the depository for a large portion of their building rubbish, and many families cast their ashes into the stream. Indeed the practice of using the river as an economical scavenger seems also to be extensively practised by persons both above and below the city. Chemical works also add their refuse to poison the water. One establishment has erected a culvert for the purpose of conveying this from their works to the river, their intention being to let the noxious matter flow when the tide was high. Whatever may be their intentions, the result is that vast quantities of fish of the salmon kind have been poisoned; and poachers, aware of this fact, await the opening of the sluice, and reap a rich harvest by easily capturing the poisoned fish floating on the surface of the stream. On one occasion 17 fish were so taken by poachers.

In conclusion, I would beg to draw your attention to a system for filtering the liquids used by dyers, which has been adopted by my partners and self at our carpet works at Durham. The dyeworks are extensive, and situated close to the river's edge, and as buildings surround them on every side no contiguous filtering apparatus could be applied. In this difficulty the firm determined to erect filter ponds on the nearest available site; this was about 300 yards distant, and a few feet from the river's edge. A difficulty presented itself in the thickness or solidity of the dye-water which had to be dealt with; indeed the quantity of dyewood held in suspension was so serious that it could not pass through an ordinary force-pump. To obviate this, a brick cistern was made beneath the dyehouse floor, in dimension 10½ feet long, 6 feet wide, 7 feet deep; into this the thickened dyewater was run from the several vats, and the solid matter soon subsiding allowed a force pump to urge the more fluid portion through a pipe 300 yards in length to the filtering tanks. The ground chosen for these tanks was a kind of rubbish heap, and was excavated to a depth of 5 feet above the ordinary surface of the river. On this was placed nearly a foot of coarse gravel. The walls of the tanks were built of brick, lime being placed only between every fifth course. The tanks are in size each 32 feet long, 12 feet wide, 7 feet deep, and are separated by a wall, 20 inches thick, of solid masonry. The cost of the entire work is 200*l.*, and the expense of cleaning the dyehouse cistern 3*s.* 6*d.* per week.

The apparatus was put in operation in June 1868, and has continued to work fairly well. The porous character of the ground on which the tanks were built has materially tended to a successful result. All the dyewater passes into the ground, and is filtered before entering the river.

I am, &c.
WILLIAM HENDERSON.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

Pollution of the River Wear and its tributaries.

Letter from WILLIAM HENDERSON, Esq., to the Secretary to the Commission—*cont.*

Memo.—Tributaries at source of *Wear*, and flowing into *Wear* 20 miles east from source:—

Kellhope-burn	Very much polluted with "hush."
Wellhope-burn	
Sedlin-burn	
Burnhope-burn	
Ireshope-burn	
Harthope-burn	
Dadree-burn	
Middehope-burn	
Swinhope-burn	
Westenhope-burn	
Rookhope-burn	Very bad—lead and iron.
Stanhope-burn	
Little Skittlehope-burn	Pure.
Bollehope burn	Very bad—lead and iron.
Waskerley-burn	Pure.
Bradley-burn.	
Bedlum-burn	Very bad—lead and iron.

Durham, Oct. 1, 1870.

Report by GEORGE EDWARD CRAWHALL, Esq., on the Pollution of the river *Wear*.

In accordance with a request from the Mayor of Durham, I forward the following report on some causes of pollution of the river *Wear*, more particularly referring to the upper portions of the river as affected by lead mining.

The upper waters of the river *Wear* for a distance of some 20 miles flow eastward through the great lead-bearing strata of the north of England, and operations for raising this valuable mineral have been successfully carried on for a long series of years. The lead mines in Weardale are so numerous that scarce a tributary of the *Wear* or the river itself in the distance above mentioned is not laid under contribution for water necessary for carrying on working or washing operations at the various mines, indeed, out of some 10 or 12 of the more important tributaries of the *Wear* west of the village of Witton-le-Wear, there is but one (the *Waskerley*) unaffected more or less by pollutions from mines.

The system pursued in searching for lead ore in this district is by driving levels or adits into the hill sides, from the lowest available point (generally the margin of the river or brook is selected as affording the lowest level), so as to intersect the mineral veins that traverse the mountains, the water met with in the prosecution of these levels or adits flowing back to the river or tributary, thus freeing the work from water as it progresses, and the solid matter extracted in excavation is heaped up at the entrance of the adit, within reach of the river or stream, or in many cases thrown bodily into the stream itself, where, after accumulating from time to time during summer months, it is swept away by the winter floods, only to make room for a fresh deposit the ensuing year; thus the troublesome and expensive process of removing the useless rubbish by cart or tramway is avoided, a matter of no small consideration in mining economy. When it is taken into consideration that these levels or adits often extend to a distance of one or two miles into the hills, some idea may be formed of the amount of solid matter removed, and which would otherwise accumulate, were it not carried away by the timely aid of winter floods. To this must be added the *debris* removed from the mines in the actual working of lead ore (no small item), and an item that exists as long as the mine continues in active work.

The evil effects of all this solid matter finding its way into the river is manifest by the widening of the channel, raising the natural bed of the stream, and so scouring away the light alluvial soil on the low lying haughs and banks. Such effects may be particularly observed in many parts of the river's course between Witton-le-Wear and Stanhope, more particularly from Wolsingham westwards. Some little distance above Wolsingham Bridge the river, or rather channel, extends to a width of upwards of 150 yards, while the volume of water flowing through might readily be contained in a much more insignificant space.

The heavy blocks of solid matter, and stone, the refuse from the mines, filling up the natural channel, the river extends laterally, and many acres of valuable land are destroyed and converted into useless wastes of gravel, while the soil which originally occupied these wastes is swept down with the flood to the lowest reaches of the river, or even to the estuary, there to form banks and shoals injurious to the navigable portions of the river, and the cause of considerable expense and outlay in removal by dredging.

Again, in the process of extracting the lead ore from the matrix of rock or spar in which it is found, the blocks are subjected to powerful crushing mills and reduced to a small gravel of nearly an uniform size. This gravel after the extraction of the ore is cast aside, and in many cases finds its way into that universal receptacle, the river. The small gravel mixing with the large blocks already existing in the bed of the stream forms a hard and compact mass, so hard as to effectually defy the efforts of salmon or trout to remove it for spawning purposes. So long have these abuses been carried on in the west, that the whole bed of the river *Wear* is abnormal and artificial, the ancient gravel having been carried away, or buried in the immense mass of foreign matter annually cast into the stream near its source.

These causes of pollution, from solid matter, might in a great measure be obviated by preventing the deposit of excavated matter from mines being "tipped" or thrown down within reach of the maximum height of the winter floods.

Pollution of the River Wear and its tributaries.

Report by GEORGE EDWARD CRAWHALL, Esq., on the Pollution of the river *Wear*—*cont.*

Another cause of pollution, perhaps more important as affecting the river in a sanitary point of view, arises from the objectionable system of washing or cleansing the lead ore raised at these mines, whereby the water diverted from the river or tributary is passed over the washing floors, and permitted to flow back to the parent stream, impregnated with poisonous matter and mud, rendering the stream for the greater portion of the year an opaque puddle, dangerous to animal life, and useless to the inhabitants on the banks of the stream for domestic purposes. The presence of this impure water may readily be detected even beyond the city of Durham; indeed, the river *Wear* is seldom sufficiently clear to permit stones and gravel at the bottom to be observed at a depth of one or two feet, with perhaps the exception of early on Monday morning, when the washing operations having been suspended during the Sunday, time is allowed for the subsidence of the mud and impurities. This fact goes far to prove that much of the impurity suspended in the water may be got rid, if time were permitted, and proper catch pits and filtering ponds were erected where the process of lead ore washing is carried on. I am not aware how far this suggestion may be practically carried out, without seriously interfering with the industry and enterprise of the extensive mining district under notice, but a series of experiments (I trust attended with success) have been carried on at the mines of W. B. Beaumont, Esq., in Weardale, as also at those of the London Lead Company, situated in Bollihope.

At Frosterley, about midway between Stanhope and Wolsingham, limestone is most extensively wrought, and immense quarries are opened on both sides of the river *Wear*, also at Bishopley, about a mile above the junction of the *Bollihope Burn* with the *Wear*. These works have been, and are at present, a most prolific source of pollution by solid matter, frequently blocking up the bed of the *Bollihope Burn*, and diverting its course.

Eastward of Witton-le-Wear the coal measures come in, and a large colliery population has sprung up, pollutions of a different nature arising from sewage, from coal mines, and coal washing. These sources of pollution will be treated on below by the Rev. Mr. Greenwell.

I am, &c.

Durham, October 1, 1870. (Signed) GEO. EDW. CRAWHALL.

Durham, Oct. 1, 1870.

Report by the Rev. WILLIAM GREENWELL, on the Pollution of the river *Wear*.

There are two sources of pollution from which the river *Wear* and its tributaries are affected.

The first arising from the operations of mining and manufacturing. The second from the sewage of the various towns and villages on the banks of the respective streams.

My acquaintance with the *Wear* itself extends to that part from Witton Park Ironworks to below the city of Durham. I am also acquainted with most of the tributaries which enter the *Wear* within that space.

The principal sources of pollution arising from the first cause (mines and manufactures) are—

The *Gaunless* which joins the *Wear* at Bishop Auckland. This stream is polluted to a very considerable extent by coal washing, for the purpose of separating the pyrites and shale from the coal. The bed of the *Gaunless* is a black mass of coal dust, and the stream itself, when the water from the "settling tubs" is discharged into it, is an inky coloured liquid highly charged with particles of coal.

The next source of pollution is *Croxdale Beck*, which flows into the *Wear*, about four miles above Durham. This small stream is habitually filled with ochrey water of a yellowish red colour, from the pumping of a coal mine. The bed is thickly coated with a deposit of the same colour and origin. The fish in the Beck have been entirely destroyed by this foreign matter, and farmers have been put to great inconvenience and expense in consequence of their cattle having refused to drink the water.

The *Browney* which runs into the *Wear*, a short distance below *Croxdale Beck*, but from another direction, is perhaps the most fruitful source of pollution of any tributary within the district under consideration. There are two paper mills at work upon its course, Relly and Langley. From these are poured into the stream, not one, but several distinct kinds of polluting matter; one day the *Browney* is white, another red, a third black, as the various dyes and chemical agents employed in the manufacture of paper are in use, the effect of the whole being to totally destroy all life in the water, to make it impossible for cattle to drink of, and to poison the air for a long distance with offensive and probably noxious odours.

Old *Durham Beck* which joins the *Wear*, about half a mile above the city of Durham, was at one time so much polluted by coal washing that the fish were destroyed in it, while in colour and the relative proportion of coal dust to water it was in a much worse condition than the *Gaunless*. This condition was much, in fact almost entirely, changed by the making of settling ponds at the Old Durham Colliery, and for some time after that was done the water became pure, and fish again throve in it. The ponds have not been cleared out lately, and the old and foul state of the Beck is again becoming the normal one. The example of this stream is a valuable one for it shows with what a small amount of labour and expense the evils arising from coal washing may be remedied.

In Durham itself there are three sources of pollution from manufactories, one from certain grease works, which pour in a foul mass of matter, most offensive to eye and nose, and which is so small in quantity, though so noxious in quality, that it cannot require any great expenditure of money or labour to cause it to be got rid of without its being poured into the river.

Pollution of the River Wear and its tributaries.

Report by the Rev. WILLIAM GREENWELL, on the Pollution of the river *Wear—cont.*

The second source is from gas works. The third source is from the carpet manufactory of Messrs. Henderson & Co., and arises principally, if not altogether, from the dye used in the works. Ponds have been constructed for filtering the water charged with these dyes, but they are either not used habitually, or are imperfect in their operations, for I have seen a stream of coloured water very frequently of late discharging itself into the river, which tinged it of a deep colour, over a very large space.

Below Durham there is a small stream running from Framwell Gate Moor Colliery, which without ceasing pours in a mixture, dark in colour and thick in substance, the produce of the coal washings. Still lower down the river are two other streams, almost equally polluting, and both carrying into the *Wear* water charged with coal dust. The one is from Brasside, the other from Kepier.

The second great element in the pollution of the river *Wear* arising from sewage of the large population on its banks, and on those of its tributaries, may be said to be in operation throughout almost the whole length of river. The populous district about Witton Park Iron Works, Etherley, West Auckland, Bishop Auckland, and other large places, discharges the whole of its sewage into the river itself, or into the *Gaunless*. Crook, a very extensive coal mining locality with a large population, gets rid of its sewage down the *Bitchburn*, which empties itself into the *Wear* above Bishop Auckland. Below that place the large towns of Wellington on the one bank, and of Spennymoor and Gudhoe on the other, with several minor places, all empty their sewage ultimately into the *Wear*. Without more than alluding to Shincliffe and Haughall collieries, with considerable populations as sources of pollution, the next offender is the city of Durham itself, whose whole sewage is cast into the river; a great part of it above the city, and where from the occurrence of dams there is no opportunity of its being carried at once away, but where it remains a festering mass of loathsome unwholesomeness, removed indeed from sight, unless when the river is very low, but none the less offensive to the smell and noxious in its consequences. The effect of these various polluting elements is to cause the water of the river *Wear* at Durham to be very highly charged with matter foreign to what it naturally would contain; its clearness is quite destroyed, and it has a blackish yellow or milky grey coloured appearance, as the different kinds of polluting matter predominate. It is only on rare occasions that the bottom can be seen, at a depth of two feet, and the smell which arises from it is at times offensive and sickening.

(Signed) W. GREENWELL.

Oct. 1, 1870.

Letter from the Rev. J. BARMBY, M.A., Principal of Hatfield Hall, University of Durham, to the Secretary to the Commission.

Hatfield Hall, Durham,
Sept. 23, 1870.

The Mayor of Durham has sent me a copy of the circular addressed to him with reference to the intended inspection of the rivers *Wear* and *Tees*, with a request to me to address to you any observations I may have to make.

The only point referred to in the circular on which I am anxious or feel competent to express a view is, "the effect on health and comfort of the existing system of sewerage."

Living in a house that overlooks the river, where it is rather stagnant, and opposite two sewer pipes, as well as several privies which empty themselves into the river, I am personally cognizant of the defects of the present state of things, more than many other inhabitants. Not only is the appearance of the water offensive to the eye, the sight of pipes and orifices of privies disgustingly suggestive, but the smell is often exceedingly bad, especially in warm weather and in the evening. It is not unfrequently necessary to close the windows of my house towards evening in order in some degree to keep out the unclean odour. I need not say that such an atmosphere cannot but be unfavourable to health as well as offensive.

I have more than once pointed out the state of the river and its opposite bank to my medical man and also to the inspector of nuisances, and both have fully admitted the justice of my complaints. Not very long ago the Senate of the University of Durham addressed a representation on the subject to the Local Board of Health. The existence of the evils complained of was not denied, but they have not since been remedied.

I may add that other occupants of houses situated like my own feel with me as to the evil of the present state of things, and are with me anxious for some remedy, and further, that I being principal of a hall of the university, the inmates of which suffer from the state of the river in common with myself, my responsibility for their health and comfort as well as for my own and that of my own family, justifies me in representing the case strongly and urgently.

I am, &c.
(Signed) J. BARMBY,
Principal of Bishop Hatfield Hall,
in the University of Durham.

S. J. Smith, Esq., Secretary,
Her Majesty's Rivers Pollution Commission,
Westminster, S.W.

Letter from the Rev. H. E. OAKELEY, M.A., late Fellow and Lecturer of Jesus College, Cambridge, to the Secretary to the Commission.

The Bailey, Durham, Oct. 6, 1870.

I have the honour to state that I received a copy of your letter to the Mayor of Durham, and was at the same time invited to write to you, if I could give any information as to the pollution of the river *Wear*.

Thinking that many others, qualified to give more detailed and technical evidence, would come forward, I remained silent, but having read the account of the visit of the Commissioners to Durham yesterday, I venture to make a few general remarks on the subject. The Commissioners will not have failed to observe that the various dams in the river at Durham convert it practically, except during and after rain, into a series of nearly stagnant ponds. Into these is poured the sewage of the town. The mere

Pollution of the River Wear and its tributaries.

Letter from the Rev. H. E. OAKELEY, M.A., late Fellow and Lecturer of Jesus College, Cambridge, to the Secretary to the Commission—*cont.*

statement of these two facts is quite enough; it is only marvellous that in the 19th century such a state of things should be permitted. From its position on a hill overhanging the river, Durham is probably one of the easiest places to drain properly in the kingdom, yet we find the primitive and nasty process of pouring the sewage into the water under our very noses. Frequently in summer when the river is low there is a bad smell perceptible at a considerable distance. If your Commission can persuade Parliament to resort to compulsion so as to effect a radical change here, a good work will be done. I may mention that I have resided at Durham during at least six months of every year since 1864, when I was appointed Her Majesty's Inspector of Schools in the North.

I have, &c.
(Signed) H. E. OAKLEY, M.A.,
H.M. Inspector of Schools,
Late Fellow and Lecturer of Jes. Coll., Cambridge.

S. J. Smith, Esq.,
Secretary, &c. &c.

Aykleyheads, Durham,
4th Oct. 1870.

Letter from F. D. JOHNSON, Esq., to the Secretary to the Commission.

I am sorry it will not be in my power to meet the Commissioners to-morrow.

As an owner and occupier of land immediately adjoining the city of Durham, I venture to point out the serious loss of fertilizing matter caused by the present system of discharging its sewage into the river.

Also, that were the present pipes cut off from the river near its edge by two receiving sewers and at each side of the stream, that on the northern side being connected across the bed of the river, after receiving the last tributary at the east end of Sidegate, with that on the south side, the whole sewage matter might be discharged somewhere on the sands, and manufactured into portable manure by the most approved method.

Thus the water of the river would be freed from pollution and much valuable manure be obtained.

There does not appear to be any great engineering difficulty opposing itself to the above.

I am, &c.
(Signed) F. D. JOHNSON.

S. J. Smith, Esq., Secretary, &c., &c.

Durham, Sept. 21, 1870.

Letter from E. C. JEPSON, Esq., F.R.C.S., Durham, to the Secretary to the Commission.

The river *Wear* at Durham is simply a gigantic cesspool receiving the sewage of the whole town, and in summer emitting a stench vile enough to generate a pestilence, especially when it is disturbed by boats. This deplorable state of things, bad as it is, is from time to time greatly aggravated by running the water off for repair of masonry, the summer months always being chosen for this purpose, on these occasions the bed of the river, with all its filth, is to a considerable extent exposed to the sun's rays, and that frequently for days together, thus jeopardising the health and very seriously endangering the lives of the inhabitants.

I am, &c.
(Signed) E. C. JEPSON, F.R.C.S.

Hermitage, Chester-le-Street, Sept. 30, 1870.

Letter of Rev. E. H. SHIPPERDSON, to the Secretary to the Commission.

I regret that a road meeting of an important character is fixed for the 5th October next, which will preclude my attending the meeting in Durham of that day in the Mayor's Chamber on the subject of the pollution of the *Wear* and *Tees*, and their tributaries. Below my house and passing through my property runs the *South Chester Burn*, finding its way into the *Wear* about a mile above Chester-le-Street. Twenty-five years ago trout were regularly caught in this stream. Fifteen years ago the water was used for washing purposes. In 1859 and 1860 the water was much discoloured. In 1861 I took proceedings against the (Nettleworth?) Swaiston? Companies. At this time the fish perished. The colour of the stream was, for several days in the week, of yellow ochre. The rocks and stones and sides of the stream were dyed this colour. I use an hydraulic ram to throw up water for the purposes of the house. Clothes, the seams of harness, leather, the paint of carriages were mad ‹ rotten, and destroyed and injured. The use of the water was discontinued. The water was made better, and the action was abandoned. In 1865–67, Mr. Carr, the tenant of a neighbouring farm, lost many of his cattle, and brought an action and obtained damages. Since then the water has been purer. The beginning of this year and end of last, it was frequently of a dark black colour. I commenced taking notes of the bad days. It has for some months been much better. It seems to me most important that we should enjoy the use of pure water, and that impure and affected water should not be allowed to mingle with that which confers blessings all around it. Nor that the general population should be deprived of the advantages of this gift of providence.

I am, &c.
(Signed) EDMD. H. SHIPPERDSON.

Pollution of the *Cove*, or *Chester Burn*, a tributary of the River *Wear*.

Letter from A. STORY, Esq., to the Secretary to the Commission.

Chester-le-Street, Fence Houses,
September 21st, 1870.

A rivulet called the *Cove*, or *Chester Burn*, rises 12 or 14 miles westward, and thence runs through the north end of this village, to its junction with the river *Wear*. It was till recently a pure stream, and of the utmost value, not only to the

Pollution of the River Wear and its tributaries.

Letter from A. Story, Esq., to the Secretary to the Commission—*cont.*

inhabitants and manufactures of this village, but to the dense population resident along its banks.

Several coal mines have been opened out within the last 20 years, and the owners of same pump and run the water from their collieries into this rivulet, and such water being strongly impregnated with iron makes the water of the rivulet totally unfit for any purpose whatsoever.

This water for centuries abundantly supplied the inhabitants of this village and its vicinity, as well as all persons resident along its course. The loss of this hitherto pure and valuable stream is incalculable, and most injurious to the health of the public.

Through its entire course the stream is now always red and thick, as if mixed with ochre, and the bed of the stream is several inches thick with the deposit arising from same. The junction of this rivulet with the river *Wear* is at a short distance east of this village, and six miles north of the city of Durham.

I venture to bring this subject under the serious consideration of your Commissioners, when they attend at Durham on the 5th of next month.

I am, &c.
(Signed) A. Story.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

Letter from Geo. H. Reynard Cookson, Esq., to the Secretary to the Commission.

White Hill Park, Chester-le-Street,
Nov. 1st, 1870.

I am desirous of calling the attention of the Rivers Pollution Commissioners to the filthy state of the *Bourne*, flowing from the Edmondsley Colliery through the town of Chester-le-Street, where it empties itself into the *Wear*. At times it is as yellow as ochre, and as thick as glue, and a grave matter for the Commissioners' report. It passes all through my grounds and is an abominable nuisance.

I am, &c.
(Signed) Geo. H. Reynard Cookson.

Letter from R. Duncombe Shafto, Esq., to the Secretary to the Commission.

Whitworth Park, Ferry Hill, Sept. 26.

Unfortunately I am obliged to leave the North tomorrow, and consequently am unable to attend the Commission to be opened at Durham on the 5th of October for inquiring into the best means of remedying the pollution of rivers, and, therefore, any statement I might make, as it would be unsupported by *personal* evidence, I suppose would be valueless.

Under other circumstances I should have drawn the attention of the Commissioners to *Spennymore* and *Tudhoe Beck*, which, I believe, does as much harm to the *Wear* as any small stream in the county of Durham.

The sewage matter from houses containing, on the Spennymore side, nearly 5,000 inhabitants, is all poured into it by the present system of drainage, and in a very short time double the number of houses will be relieved of their filth by the same outlet, as all the Mount Pleasant and the houses near the iron works will be drained into it. The water now is as black as ink, and so offensive that a mile and a quarter below Spennymoor, where it enters the *Wear*, it is an annoyance to have to cross the brook.

No one in Spennymoor will say a word. They prefer being poisoned to the chance of having a rate to pay for the improvement of the drainage of the district; and I fear the medical men, who are painfully aware of the fatal character of the effluvium arising from this Stygian stream, would probably be afraid of giving offence in certain quarters by giving evidence.

If the Commissioners intend to inspect the tributaries of the *Wear*, a very short time will suffice to show them the character of *Tudhoe Beck*, and I am sure that if they once *smell* it they will not remain long in the neighbourhood. I believe a very small sum would be sufficient to distribute the sewage over the adjoining land with infinite benefit to the farmers, and little or no expense to the ratepayers of Spennymoor.

Believe me, &c.
(Signed) R. Duncombe Shafto.

Letter from Gerard Salvin, Esq., to the Secretary to the Commission.

Croxdale Wood House, near Durham,
Sept. 20, 1870.

I beg to call your attention to the state of *Croxdale Beck*, in which every species of fish, even the eels, have been destroyed by the water pumped up out of colliery workings at Coxhoe and Kello. When there is no pumping the water becomes quite clear, the sediment remaining on the stones, and of a bright orange colour. It strikes me that if this water was pumped into a reservoir it would there deposit the sediment that kills the fish. I have likewise to complain that the water pumped out of Tudhoe coal-pit into a stream called the *Gerard Burn Beck*, separating Croxdale from Tudhoe estates, it was full of fine trout last year, but since they began to pump they have been by dozens laying dead.

I am, &c.
(Signed) Gerard Salvin.

Letter from M. C. Salvin, Esq., to the Secretary to the Commission.

Burn Hall, Durham, November 21, 1870.

I beg to call the attention of the Commissioners to the state of the *Browney*, a tributary of the *Wear* situated to the south of the city of Durham, from which river the Durham Water Company draw their supply. For some years the paper makers at Stone Bridge and Reiley Mills, have introduced chemicals in the manufacture of their paper; since which, year by year, the water of the *Browney* has been polluted

Pollution of the River Wear and its tributaries.

Letter from M. C. Salvin, Esq., to the Secretary to the Commission.—*cont.*

to a grave extent, destroying the fish and making the water unfit for use, and dangerous to the health of man and animals. The stench during the last two years has been at times so offensive as to cause sickness to persons living in the immediate neighbourhood. I have confirmed this by my own experience. The *Browney* divides my property from that of Lord Boyne, and flows through my land and pleasure grounds for more than two miles, poisoning the air and leaving a greasy sludge on the stones at the sides of the river. This summer I rode to Reiley Mills and found little or no water in the river channel, nearly the whole of it being dammed back for the use of the mill, and above and below Stone Bridge the river was in a most disgusting and filthy state; this is not the condition of the river above the mills, for in that portion there is good trout fishing, below the mills the fishing is destroyed. There is no reason why this stream should not be a good salmon stream.

I am, &c.
(Signed) M. C. Salvin.

Letter from J. S. Robinson, Esq., Clerk to the River *Wear* Commissioners, Sunderland, to the Secretary to the Rivers Pollution Commission.

River Wear Commission, Clerk's Office,
Sunderland, 3rd October 1870.

I am requested by the River *Wear* Commissioners to represent to Her Majesty's Commissioners for inquiring into the best means of remedying the pollution of rivers, that a gross injury is caused to the River *Wear* by the constant practice exercised at Durham and other places on the banks of that river, of casting all the rubbish, ashes, and other refuse of each town within the flow of the water, as the first flood washes the whole of this into the lower portions of the river, to its great injury, and to the serious obstruction of its navigation.

The river is also made the receptacle of the sewage from Sunderland, Durham, Bishop Auckland, and other towns, to the manifest injury of the public health; and the River *Wear* Commissioners are put to great extra expense in dredging every year, by reason of the deposits caused by these practices, all of which they respectfully submit should be put a stop to by legal enactment.

A small deputation from the *Wear* Commissioners purpose waiting upon the Royal Commissioners at Durham, and will there take the opportunity of inviting their personal inspection of the ballast and other matter which will be found cast within reach of the waters of the river at that place.

I am, &c.
(Signed) Jas. S. Robinson.

S. J. Smith, Esq., Secretary,
Rivers Pollution Commission,
Westminster, S.W.

River Wear Commission.
River Dredging, 1864 *to* 1869.

Year.	Tons raised.	Amount expended. £ s. d.
1864	125,439	4,259 13 10
1865	271,435	4,185 3 9
1866	472,540	6,297 13 2
1867	244,630	5,261 19 0
1868	174,355	2,097 15 11
1869	190,670	2,006 0 9

Pollution of the Rivers Aire and Calder and their tributaries.

Pollution of the Rivers Aire and Calder and their tributaries.

Report by Mr. W. T. McGowen, Solicitor and Town Clerk of Bradford, on behalf of the Corporation.

The Bradford Corporation are ready to incur the expense of works required to purify the sewage of the borough if the proper means can be determined upon, but the ratepayers think they have a right to ask that their money is not wasted upon schemes which may be disapproved of by the government after being executed.

Since the former commission (1865) sat at Bradford the sewage question has assumed a very serious aspect. Last year Mr. Stansfield, the owner of property some seven miles off, filed a bill in Chancery against the Corporation, and obtained an ex parte injunction restraining them from sending any additional sewage down the river *Aire*. Immediately after being served with notice of this proceeding I wrote to the secretary of the Rivers Commission apprising him of the fact, asking for assistance, and inquiring whether any scheme had been agreed upon by the former or present Commission respecting the water-shed of this district. To that letter I received a courteous reply to the effect that at a future day the Commissioners would complete the inquiry as to the valley of the *Aire* and *Calder*, and that they hoped the recommendations they would be prepared to offer would be the means of assisting corporate bodies in their endeavours to provide an effectual remedy. Acting upon this assurance the Corporation got the injunction dissolved upon an undertaking to take steps on or before the 11th day of January 1872 to defecate the sewage matter taken into their sewers.

I ventured to urge on the former Commission that the most effectual course that could be adopted is for the government to deal with this sewage business upon a comprehensive principle, as an imperial question, to construct arterial works for carrying the sewage of inland districts away to sea, at suitable places on the coast, where no nuisance would arise, but so arranged that the sewage could be taken at any point on the line for use by those who might wish to apply it to irrigating or fertilizing purposes. To that opinion I still adhere. It would seem.

Pollution of the Rivers Aire and Calder and their tributaries.

Report by Mr. W. T. McGowen, Solicitor and Town Clerk of Bradford, on behalf of the Corporation—*continued.*

however, that my views are not likely to be adopted, and that a system of local irrigation finds most favour.

I therefore address myself to that more limited question, and submit that very serious difficulties arise in the case of Bradford.

The sewers of the town are carried to the bottom of the valley, and discharged at the boundary of the borough. There is, therefore, no land in the borough available for sewage irrigation; all the surrounding district is of considerable height, varying to 700 feet above the valley. To raise the sewage by pumping is impossible on account of the cost. When raised there is no guarantee that anybody would accept it, even as a gift; and were any land in the neighbourhood purchased or leased not only would the expense be ruinous, on account of the value of property, but being more or less occupied for dwelling purposes, the sewage would create a nuisance to the inhabitants, and would form the subject of fresh injunctions. In short the remedy would be much worse in every way than the disease.

If the government will not undertake the remedy and prefer to cast the duty upon local authorities the proper plan would be for Parliament to pass some measure enabling given areas to be grouped together under a Conservancy Board to establish works for precipitating or purifying the sewage, or using it for irrigation, if they can, which I doubt, submitting its proceedings to a central power, such as the Home Office, with authority on default for government to enforce the establishment of a board, and to give the requisite means for carrying out the work properly.

Among the points to which attention should be directed in framing any such scheme are the following:—

1. The incidence of the rate to defray expenses should be far wider than at present. The contiguity of large manufacturing towns to agricultural districts greatly increases the value of the latter; but at the same time, no doubt, fouling the streams. The landowners want these streams rendered pure for the further advantage of their property. I submit they ought not to expect all the benefits and none of the drawbacks, and that they ought to contribute to the expense of the requisite works for securing to them untainted water. This could be done by spreading the rate over the whole district benefited by the operation, and power should therefore be given to the Home Office, when settling what the works are to be, to define the area for rateable purposes.

These considerations are entitled to additional weight in reference to Bradford and places similarly situated, because the pollution of the *Beck*, which discharges into the *Aire*, is of old standing. The mere defaecation of the sewage will not produce any perceptible improvement, as there will remain the refuse from manufactories, and they are practically beyond the reach of the law at present. Most of the fabrics of the district are subject to keen competition abroad, where restraints on the manufacturer are unknown, or comparatively trifling, and every fresh weight thrown on the home manufacturer is equivalent to a premium to the foreigner. The landowners around the home manufactories are almost as much interested in their success as the manufacturers themselves, inasmuch as rents of land would fall if the manufactories failed, and the landowner cannot fairly ask to have his increased income maintained, and yet be free from the incidental inconveniences, unless he lends his aid in the steps necessary for the latter object.

2. New powers are necessary as to acquiring land and easements. When a suitable site is found for the irrigating or precipitating operation, it can only be taken by consent under the existing law, and the owner will be sure to find, as owners always do, that what is wanted is the most valuable spot in the country. Unless he gets a fancy price he will not sell. Power should therefore be given to the Conservancy Board to take compulsorily under provisional order subject to Government sanction such lands as are required without having to go for separate parliamentary powers.

Culverts would have to be constructed underground from the point where the sewage is intercepted to the site for dealing with it. They would have frequently to be carried through private property, and there again the owner would interpose his difficulties, and he would claim for the easement nearly as much as if the land were purchased absolutely. These cases would be equitably met by empowering the Conservancy authority under Government sanction as above, to take the easement, making full compensation for all damage actually done, and reserving to the owner the right at any time afterwards, if he could show further damage, to have further compensation; as for instance, in case of not being able to build over the culvert. Easements of this kind frequently benefit the land by draining it, and yet they are made the subject of exorbitant demands.

3. Some machinery should be provided for guarding against the enormous cost of ascertaining the compensation to be paid, both where the land is taken, and where only an easement is required. The power which the owner now has of compelling the purchasers to go before arbitrators and umpire is unjust. The process is very expensive, and the knowledge of the fact is often used by the vendors as a means of extortion. The appointment of a Government valuer would be a great boon, and in cases of compensation for mere easement, the magistrates might safely be entrusted with summary jurisdiction.

4. Above all things provision should be made to shield local authorities from oppressive proceedings in Chancery. At one period the Court, in dealing with suits for nuisance, paid some regard to the exigencies of the case, as for instance in the case of brickmaking. All is now changed. In the matter of sewage nuisances the Court refuses to inquire into the difficulties in which the town is placed, the necessities of manufacturers, the effect of interfering with trade, or even whether the complainant is a nuisance maker himself. Substantially, it permits only one issue. Are the Board causing a nuisance to the property of the complainant? If so, although the Board is

Report by Mr. W. T. McGowen, Solicitor and Town Clerk of Bradford, on behalf of the Corporation—*cont.*

Pollution of the Rivers Aire and Calder and their tributaries.

executing an Act of Parliament, although its plans have been sanctioned by Government, although the stream has been long polluted, although the town would become poisonous, and the manufactories would have to be closed, if the sewage were shut up from its outfall, the Court will yet grant injunction, and this notwithstanding the fact that the value of the plaintiff's property is enhanced tenfold by its proximity to the town whence the sewage comes. Nor is this all. The Court is unable to deal with the case completely. It can restrain, but it will not be bound to any proposed remedy. Readiness and willingness are nothing; actual outlay nothing. Boards of Health are placed in a cleft stick. As servants of the public, they are bound to administer a law which compels them to drain the town in the manner to be approved of by Government agents, and then to obey the order of the Court of Chancery which prohibits them from carrying out this law, and to suffer a punishment in costs for having done their duty thereunder. In the result the injunction is to a great extent vexatious. After all, as at Birmingham, the plaintiff and defendant have to agree what shall be done, and to ignore the Court. This state of things is a public scandal. If the Court of Chancery were competent to deal with the whole question, that would be another thing; but it is not; it has no machinery for the purpose. A very effectual remedy could be devised to meet the difficulty by calling in the aid of the Home Office. That department of the State is the controlling authority in charge of the public health; it can command the first professional skill; and in the event of proceedings in Equity being threatened or taken against Local Boards it could constitute immediate inquiry, and on being satisfied that all is being done that can be done, or that immediate steps to that end will be taken, and that time is necessary for remedial works, the Home Secretary should be empowered to issue a certificate to that effect, and that protection ought to be granted to the Board for a given time, which certificate might be made pleadable in bar to further proceedings in the meantime. The certificate would not be given without due inquiry—even bankrupts get protection—and no body of gentlemen fairly discharging a public duty ought to be placed between cross fires, as they now are.

Report from the General Purposes Committee of the Corporation of Halifax. To Her Majesty's Commissioners for inquiring into the Pollution of Rivers.

Town Hall, Halifax, 23rd September 1869.

In anticipation of your visit to Halifax, to inquire into the condition of the river *Calder* and its tributaries, I beg to state that since the lengthened inquiry that took place in November 1866, by the late Commission, proceedings have been instituted by the Attorney-General and Messrs. John Holdsworth and Company, as relators and plaintiffs against the Corporation of Halifax, to restrain the outpouring of the town's sewage water into the *Hebble* brook, which interserts the borough.

On the 8th of July last an injunction was granted by Vice-Chancellor Sir William Milbourne James, of which the following is a copy:—

"That an injunction should be awarded against you, the defendants, the Mayor, aldermen, and burgesses of the borough of Halifax, to restrain you, the said defendants, your servants, and agents from causing or permitting any new outfall into the *Hebble* brook, or any new sewer communicating with any outfall into such brook, or any drain or other communication with any such sewer, whereby any sewage water may pass into the *Hebble* brook. And it was ordered that an injunction should be also awarded against you the defendants the Mayor, aldermen, and burgesses of the borough of Halifax, to restrain you the said defendants, your servants, and agents from and after the first day of June, one thousand eight hundred and seventy, from causing or permitting the sewage of the borough of Halifax to flow or pass through outfall sewer A. or outfall sewer B. in the information and bill mentioned, or any new outfall in the said brook, unless and until the same should be sufficiently purified and deodorized."

By the terms of the above order it will be seen that the corporation, acting as the Local Board of Health for the borough and district, are forbidden to make any new sewers into the *Hebble*, the result being that at the present time the erection of new buildings is virtually stopped, and the ordinary drainage works in connection with existing house and mill premises suspended in many instances, creating grievous nuisances, highly injurious to the health of the town, and especially to those immediately affected by want of such drainage.

After the 1st of June 1870, the entire drainage of the town is to be taken out of the *Hebble*, and means adopted for purifying and deodorizing the sewage water before it can be allowed to gravitate either into the brook or the river *Calder*.

To meet this injunction, the Corporation have proceeded without loss of time to construct a large intercepting sewer in extension of the present outfall sewers into the *Hebble*, by which the entire drainage of the district will be carried out of the brook to the lowest level available into lands situate at Salterhebble, some 25½ feet above the confluence of the *Hebble* with the river *Calder*.

In these lands it is proposed to deal with the town's sewage in such a manner as may be found best suited to the necessities of the case.

Great differences of opinion exist as to whether it would be better to intercept the solid matters in suspension, and treat them chemically, with a view to the manufacture of a dry manure, or, after the ordinary separation of the solids, to apply the effluent waters to the irrigation of land.

In a populated district like that of the valley of the *Calder*, upon the banks of which are situate villages and towns containing populations varying from 8,000 to 50,000 inhabitants, it is difficult to select lands for irrigation without encroaching upon the territories of other sanitary authorities. Again, the value of land if obtained in a limited quantity is such as to render any scheme of irrigation highly expensive and almost entirely unremunerative.

This is in fact the chief difficulty of the situation. It is easy to construct works for removing the foul and offensive sewage of towns to some other place remote from the

Pollution of the Rivers Aire and Calder and their tributaries.

Report from the General Purposes Committee of the Corporation of Halifax—*continued.*

inhabitants who create it; but having done so, what then is to be done with it? In these days of scientific research and discovery, the utilization of the fertilizing properties of town's refuse ought not to involve the certainty of waste either in expenditure of money or in the results to be obtained by such expenditure; yet the problem remains to be solved.

The Corporation of Halifax trust therefore that as little delay as possible may take place in the publication of your report, so that they may speedily adopt your recommendations; or, if the Government shall not be in possession of the required information to enable them to legislate in the next session of Parliament, the authorities of Halifax may not be prevented from seeking Parliamentary powers to meet the difficulties with which they are surrounded.

I am not aware that any further evidence of a useful character can be supplemented to that obtained in 1866 beyond the accompanying analysis made this year by Dr. Letheby of the waters of the *Hebble*, taken both above and below the outfall sewers of the town.

These waters it will be seen are heavily impregnated with the refuse of dyewares and cinders, and therefore the fertilising properties of the sewage are greatly impaired, if not rendered comparatively valueless.

Any information which you may be pleased to impart during your visit to Halifax upon the subject, to aid the authorities in the discharge of a most anxious and important duty, will be most valuable to them, the more so since they are at present bound to the rigid observance of a mandatory injunction.

I have, &c.
(Signed) J. E. Norris, Town Clerk.

Dr. H. Letheby's Analysis.

Constituents per imperial gallon of the sewage from the town sewers and of the water from the Hebble Brook.

Date and where taken.	Matter in Solution.					Matters in Suspension.		
	Total.	Organic.	Mineral.	Ammonia.	Common salt.	Total.	Organic.	Mineral.
Friday, 21st May 1869:	grs.	grs.	grs.	grs.	grs.	grs.	grs.	grs.
Sewage from the Trafalgar sewer when flowing 4,038 gallons per hour. 2.20 p.m.	24·56	3·20	21·36	0·353	3·84	1·86	0·45	1·41
Sunday, 23rd May 1869: Sewage water taken from the town sewer outfall when flowing 74,527 gallons per hour. 4.30 p.m. - -	18·88	3·47	15·41	0·706	4·56	3 61	2·29	1·22
Tuesday, 25th May 1869: Water from the *Hebble Brook* above the town outfall sewer when flowing 150,255 gallons per hour. 3.0 p.m. -	25·64	5·80	19·84	0·415	2·59	4·61	2·15	2·46
Tuesday, 25th May 1869: Sewage water from the town outfall sewer when flowing 107,008 gallons per hour. 3.0 p.m. - - -	48·64	10·47	38·17	1·121	7·68	29·58	12·79	16·79
Tuesday, 25th May 1869: Sewage water from the outfall of Trafalgar sewer when flowing 2,889 gallons per hour. 3.10 p.m. - -	28·04	5·39	22·65	0·249	4·27	3·98	2·35	1·63
Tuesday, 25th May 1869: Water from *Hebble Brook* just above Messrs. Holdsworth's weir. 3.20 p.m. - -	32·84	8·89	23·95	0·623	4·32	17·26	11·98	5·28
Tuesday, 25th May 1869: Water from the *Hebble Brook* immediately south of Messrs. Holdsworth's cottages when flowing 681 gallons per hour. 3.30 p.m. - - -	41·48	7·47	34·01	1·121	5·28	2·41	1·59	0·82
Tuesday, 25th May 1869: Water from the *Hebble Brook* just above Bottom's Hall weir. 4.0 p.m. - -	29·40	6·87	22·53	0·457	4·32	8·02	3·23	4·79
Average London sewage -	55·74	15·08	40·66	6·60	17·69	38·15	16·11	22·04

Report by Mr. J. E. Norris, Town Clerk of Halifax, on the character of the measures to remedy the grievances arising from the pollution of rivers, and the form of the Governing Body. To Her Majesty's Commissioners for inquiring into the Pollution of Rivers.

Town Hall, Halifax,
28th September 1869.

During your official visit to Halifax you desired me to state my views upon two most important features of your inquiry:—

1. As to the character of the measure to remedy the grievances arising from the pollution of our rivers.

2. What form the Governing Body should assume, *i.e.*, whether the authority should be central or local in its constitution?

In venturing an opinion upon this difficult question, I do so as an individual, and in no way as binding upon or representing the views of the council of Halifax, though much of my information is derived from my intimate connexion with the proceedings of that body.

Pollution of the Rivers Aire and Calder and their tributaries.

First then as to the character of the measure—

The pollution of our rivers arises, as is well known, from two causes—the discharge of towns' sewage, and the refuse of mills and manufactories; evils, which if not speedily arrested, will become serious hindrances both to the health and posperity of the populations inhabiting the districts situate upon the banks of our rivers.

The fundamental agent to be dealt with is of course *water*. As first given to us, it is pure, sparkling, and unpolluted. By its use either for domestic or manufacturing purposes, it becomes defiled in a greater or less degree. As the populations grow, the use and pollutions increase, and unless means are adopted to economise its consumption, and insure a pure, constant, and abundant supply, every drop will become gradually absorbed, and stagnation in the growth of our populations must follow. To devise means for the regulation and control of the use of the water of our streams and rivers from their source to their outfall into the ocean, is the subject you have to consider, and a very wide and interesting subject it is. My humble opinion is:—

(1.) That whatever law be framed, it should be *general* and universal and not be applied to special localities or to the exclusion of others.

(2.) All the natural sources of water supply should be held sacred for the use of the localities through which they flow, or in other words, the basin or water shed of every principal river should be secured for the use of the populations within its own area.

(3.) Every facility should be rendered to these populations to enable them to construct works for impounding and storing the flood waters and springs at points above contamination by man, so as to secure a pure and constant supply to the towns and villages situate below such works.

(4.) Stringent powers should be given to the Local Authorities having the management of the works to prevent the fouling, waste, or nuisance of the water so stored, and in its distribution within the area of supply.

(5.) Provisions should be framed to prevent the return of polluted water into any natural streams or watercourses, or into any public sewer after it has been used either for domestic, sanitary, or manufacturing purposes, unless previously filtered or clarified: the outpourings of some processes of a poisonous character should be absolutely excluded from the sewers and streams.

(6.) No public body or Local Authority should be allowed under any pretence whatever to draw its water supply from a stream or river tainted by the discharge of water previously used for any of the above purposes.

This of course does not apply to any unoccupied or unappropriated stream, but to the main river or its appropriated tributaries. *Care should be taken to protect all existing waterworks undertakings, whether vested in corporations or companies.*

(7.) Any violation of the above provisions should be punishable by law, if by a public body by sequestration, if by an individual by fine to be summarily enforced before justices.

(8.) Every Local Authority should be compelled to enforce the law, and to appoint inspectors for the purpose.

(9.) Any person aggrieved who (after notice to and neglect by the Local Authority to obey the law or enforce its provisions) should have power to appeal to the Home Secretary at a central office in London, who shall have power to send down a Government Inspector to inquire and report, and if such report be against the Local Authority to do and execute what may be required at the cost of the offending or neglectful district.

(10.) Public Bodies and Local Authorities should be enabled to join in the execution of drainage or irrigation works, having a common object; and in case of refusal by one or more, the Home Office should be empowered to inquire and compel such combined action, if needful.

(11.) Local Authorities should be empowered to take lands compulsorily for sewerage and irrigation works.

(12.) When the Local Authority executes public works, no person participating in the common benefit should be enabled to take legal or equitable proceedings against such body, but should go to the Home Office, whose duty should be to inquire and remedy.

(13.) All orders of the Home Secretary should be annually reported to Parliament for confirmation by a short Act.

By the above sketch it will be seen that every Local Authority is to be charged with the duty of enforcing the law, and therefore no conservancy district or boards are needed.

In case of difference between the Local Authorities affected by this general law relating to the pollution of rivers, such differences should be determined by an officer specially appointed by the Home Office.

I think the machinery of "the Local Government Act Office," as defined by the Public Health Acts, a very efficient and excellent model to adopt, and a "Rivers Pollution and Water Supply Office," under the control of the Home [illegible] could answer every purpose in aid of the existing Local Authorities.

I have, &c.
(Signed) J. E. Norris.

Letter from William Lipscomb, Esq. to the Secretary to the Commission.

Lees House, Thornhill, near Dewsbury,
21st September 1869.

As representing the principal riparian ownership on the Calder, that of the Savile estates of which I have charge, I wish to testify how imperative it has become to

Pollution of the Rivers Aire and Calder and their tributaries.

Letter from WILLIAM LIPSCOMB, Esq. the Secretary to the Commission—*cont.*

establish some authority by which the pollution of streams may be summarily checked. I happened to be out of the country when the commissioners visited the Calder Valley in 1866, and I was therefore unable to appear before them. I may mention that the Savile property extends with intervals from the sources of the Calder down to Horbury Bridge, three miles from Wakefield. In this particular district, the whole of the township of Soothill Upper which drains into Batley Beck, and the whole of that part of the parish of Thornhill lying between the high road to Wakefield and the Calder, is the property of Mr. Savile.

Your inquiry at Halifax has almost equal importance with relation to this property, as all the river frontage in Elland, just below the junction of the Hebble, is Mr. Savile's, and nearly all the catch ground of the new scheme of waterworks for which the Halifax Corporation obtained an Act of Parliament in 1868, forms part of the same property.

The township of Hunsworth, and part of Cleckheaton, draining into the Heckmondwike *Beck*, and a large portion of Golcar above Huddersfield, are also comprised in it; and as I have done my utmost in these districts to check the evil you are now inquiring into, I shall be happy to aid that inquiry.

I am convinced that the greatest part of the present pollution might be avoided, if rendered obligatory, almost immediately. The history of the Smoke Prevention Act shows, however, conclusively, that remedial measures will never be adopted generally if the authority be vested solely in local boards. I have taken as much trouble in bringing the additional enactment of 1866 into force as any one, and I enclose a circular to show how I have tried to make it effective by means of an association.

Having seen where the Sanitary Amendment Act of 1866 fails in achieving its object, I think a lesson may be learnt therefrom in providing against the pollution of rivers.

I am, &c.
(Signed) WM. LIPSCOMB.

"WEST RIDING ASSOCIATION for the SUPPRESSION of the SMOKE NUISANCE.

"*President*:—WM. LIPSCOMB, Esq.

"In the Session of 1866, Government determined to remedy the negligence of local authorities who failed to use the powers entrusted to them for the suppression of nuisances. This was subsequent to a debate in the House of Commons, in which many members, themselves in trade, stated how great a saving they had effected by the adoption of self-feeding furnaces, from which no smoke was emitted.

"In August 1866, an Act was passed, called the Sanitary Amendment Act. Black smoke is therein declared to be a nuisance, and magistrates are fully empowered to deal with cases brought before them by any complainant. An appeal is also allowed to the Secretary of State, who, if satisfied that the nuisance authority has made default in doing its duty, may empower the chief officer of police within that place to institute proceedings in their stead.

"This Association has been formed to insure the suppression of this nuisance without the necessity of personal intervention; for, in default of action on the part of the public local authority, it would often become an invidious proceeding for a private resident to institute proceedings, however much deserved. It is therefore proposed to appoint in each district an inspector, paid by the association, whose duty it will be to lay informations, or to appeal to the Secretary of State, as may be according to local circumstances advisable. He will be authorised to solicit subscriptions from all persons desirous of promoting the objects of the association; their names will not be published, but any person subscribing 10*s.* will be entitled to the inspector's special attention, on complaint being made to him.

"If the public support the association, the smoke nuisance will ere long be practically suppressed. From the results afforded by all who have adopted mechanical feeders, black smoke has been long condemned by public opinion, as unnecessary and wasteful, besides being injurious to health and cleanliness, and destructive to vegetation. It is nevertheless hopeless to expect any general adoption of such remedial measures until legal penalties are brought into operation.

"A case has been laid before eminent counsel, and his opinion (given below) will conclusively show that the law, as it now exists, is quite sufficient, by means of such an association, to remedy the evil by summary legal process.

1. "'The Nuisance Removal Acts (18 and 19 Vict., c. 121; 23 and 24 Vict., c. 77) are to be read, together with the second part of The Sanitary Act, 1866, as if they formed but one Act (see s. 14 of the last cited Act). The 13th Section of the Statute of 1860 must, therefore, be incorporated with the last Statute (part 2), and the sections of such second part of the last Statute are cumulative, not repealing, nor taking the place of the sections in the former statutes. I am therefore of opinion that an inspector appointed by the association may lay informations under the said 13th Section, and act independently of the 'Local Authority' in prosecuting persons guilty of an offence, under s. 19 of the Act of 1866.
2. "'The information must be laid by an inhabitant of the parish or place where the alleged nuisance exists, but it may be supported by the evidence of the inspector, although he may reside in another parish.

"'HENRY MACNAMARA,
"'Temple, December 31, 1867.'"

Pollution of the Rivers Aire and Calder and their tributaries.

1866 TO 1868.—STATEMENT OF DREDGING ON THE RIVERS AIRE AND CALDER AND GOOLE CANAL.

RIVER AIRE.

Date.	Leeds Pond.	Foundry Shoal.	Flyboat Basin.	Leeds Cut.	New Basin.	Knostrop Pond.	Knostrop Cut.	Hunslet Pond.	Leeds Canal.	Methley Pond.	Castleford Junction.	Castleford Pond.	Total.	Amount. Dredging.	Amount. Boating.	Amount. Hauling.	Amount. Total.
	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1866	3,117	613	622	959	419	5,354	—	503	4,675	1,849	2,359	—	21,696	243 13 10	727 4 2	113 0 0	1,083 18 0
1867	3,738	832	—	1,302	—	3,244	—	777	2,511	—	—	1,963 1,757 13,660	31,274	221 3 8	475 3 11	162 17 8	859 5 3
1868	2,667	3,526	—	1,923	330	793	567	762	1,281	—	1,936	1,311 451	11,921	79 3 7	176 14 2	62 1 9	317 19 6

RIVER CALDER.

Date.	Foundry Shoal.	Pontefract Railway Bridge.	Potter Hill.	Calder Cut.	Methley Pond.	Total.	Amount. Dredging.	Amount. Boating.	Amount. Hauling.	Amount. Total.
	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1866	613	1,695	2,087	—	360	5,449	38 17 0	122 17 2	22 14 1	184 3 3
1867	832	1,962	1,028	—	—	10,299	72 14 0	184 1 0	42 18 3	299 13 3
1868	3,526	838	—	1,462	—	28,471	186 12 3	443 17 7	118 12 7	749 2 5

GOOLE CANAL.

Date.	Knottingley Junction.	Knottingley Cut.	River at Bottom Boat.	Stanley Basin.	Fairweather Basin.	Fairweather New River.	Goole Canal.	Total.	Amount. Dredging.	Amount. Boating.	Amount. Hauling.	Amount. Total.
	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	C. Yds.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1866	—	3,030	—	—	784	—	3,446	13,548	83 19 2	222 3 11	56 9 0	362 12 1
1867	—	—	—	1,004	594	3,427	621	2,107	11 4 8	33 19 5	8 15 7	53 19 8
1868	—	—	5,569	—	446	4,945	4,370	7,580	48 4 6	123 10 8	31 11 8	203 6 10
		3,030	5,569	1,004	1,824	8,372	8,437					

(Signed) W. H. BARTHOLOMEW, M.I.C.E.,
Engineer.

Aire and Calder Navigation, Engineer's Office,
Leeds, 6th October 1869.

Pollution of the River Mersey and its tributaries.

Letter from FEREDAY SMITH, Esq., to the Secretary to the Commission.

Mersey, &c. Protection Act: Cases at Buxton.

Bridgewater Offices, Manchester,
June 13, 1870.

MY DEAR SIR,

PERHAPS the enclosed copy letter from Messrs. Brett, Hankinson, & Co. to myself dated the 23rd ult. may be of some interest to the Rivers Pollution Commissioners.

It gives a specimen of the difficulties which we have to contend with in endeavouring to carry out the provisions of the Act.

I am, &c.
(Signed) F. SMITH.

S. J. Smith, Esq., Secretary,
&c. &c.

Copy letter from Messrs Brett, Hankinson, and Co., to Fereday Smith, Esq.

Mersey, &c. Protection Act.

Cases at Buxton Petty Sessions against Ann Hudson (Hayfield), throwing domestic ashes, &c. into river; Sarah Beard (New Mills), throwing domestic ashes, &c. into river; John Burlsford and Henry Fidler, throwing cinders from works into river.

62a, Lower King Street, Manchester,
May 23rd, 1870.

SIR,

THESE cases were heard at the Buxton Petty Sessions on Saturday, when Mr. Brett attended to prosecute.

The cases against the two women were heard first, and it was with great difficulty that the justices could be induced to inflict any fine at all, although each case was clearly proved, and it was only under extreme pressure and a suggestion about a mandamus that they ultimately inflicted the nominal fine of 1s. each, and even then one of the justices said that he should pay the fines out of his own pocket, and in neither of these cases did they give costs.

With respect to the other two cases, one was for throwing cinders from the gasworks at New Mills, and the other for throwing cinders from the paper mill of Mr. Slack of Bugsworth. In each of them Mr. Brett urged upon the justices that these cases differed materially from the cases of the women and pressed for a substantial penalty, but in neither case (although in each it was proved that there was a large accumulation of several tons weight of cinders, constituting an embankment in the river,) would the justices inflict more than the nominal penalty of 1s., but in these cases they gave costs.

Mr. Brett never met with justices who took so strong a view in favour of the practice of casting refuse into the river, and who seemed more desirous of serving the parties offending against the provisions of the Act than of enforcing the observance of the Act.

Mr. Broom of the Buxton Lime Works, who said he knew you, acted quite as a partizan in favour of the practice, and but for the interference of the clerk to the justices, the justices would have bowled out all the cases in default of specific proof of service of notice of the provisions of the Act upon the particular parties charged prior to the time of the commission of the offence, which Mr. Brett assured them was altogether unnecessary and that the parties were bound by the provisions of the Public Act.

With a view of meeting the prejudice which exists in the minds of justices, the proceedings at Buxton on Saturday would seem to suggest that it might be desirable to more extensively placard and distribute the notices, and to send a few copies to the clerk to the justices and the police authorities in each petty sessional division within the limits of your inspectors' operations, and ask to have them distributed.

Mr. Slack was in court watching the cases, and after they were over, he told Mr. Brett that he did not know what he was to do with his cinders in future, and that he would give 20*l.* to have those removed which had already accumulated upon his premises.

We are, &c.
(Signed) BRETT, HANKINSON, & Co.

Fereday Smith, Esq.

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