

# METROPOLITAN WATER BOARD.



## LONDON'S WATER SUPPLY.

THREE LECTURES TO THE MEMBERS OF THE BOARD  
BY  
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*19th February, 1943* - THE COMING OF THE COMPANIES.

*26th February, 1943* - TRANSITION.

*5th March, 1943* - EARLY DAYS OF THE BOARD.

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# LONDON'S WATER SUPPLY.

## THE COMING OF THE COMPANIES.

" But London, London, London ! I have come back to thee  
From the magic of the moonlight, and the mystery of the sea.  
There is a spell thou wieldest—a charm thou hast for me—  
'Tis the throbbing of the pulses on the heart of things that be."

ALIC MACKAY.

In these days, when speaking of London, one of several areas may be in the mind of the speaker, for there are several " Londons." Their number is apt to be confusing, and it seems to be a pity that some simplification cannot be made, although this will doubtless come in due course.

The administrative County of London, over which the London County Council presides for major purposes, has an area of approximately 117 square miles and a population of just under  $4\frac{1}{2}$  millions. This area includes the City of London and the 28 Metropolitan Boroughs.

Each of these Boroughs has its own Mayor and Council and possess administrative powers of its own, some of which are independent of the L.C.C., some dependent upon that body, and some coincident with the powers possessed by the L.C.C. They range in area from Wandsworth, with 9,107 acres and Woolwich, with 8,282 acres, down to Holborn, with 406 acres. The populations (Census 1931) range from that of Wandsworth with 353,110 to that of Holborn with 38,860. One of the boroughs—Westminster—has been dignified with the title of " City."

Another " London " is " Police London," with an area of 693 square miles and a population of  $8\frac{1}{4}$  millions. Included in these figures is the City, which has its own police force, the rest of the area coming within the purview of the Metropolitan Police. The largest " London " is that of " Transport London," or the area of the London Passenger Transport Board, with 1,986 square miles; next in size comes " Traffic London," with 1,820 square miles; " Telephone London," with 1,200 square miles; " Postal London," with 234 square miles. There are several other " Londons," but enough has been said here to indicate the many areas bearing the historic name.

One other must be mentioned, the oldest and most historic of all—The City of London with an area of approximately one square mile. The City has its own governing body composed of the Lord Mayor, Sheriffs, Aldermen and Councillors, forming the Corporation. Its powers are peculiar to itself and are greater than those of any Metropolitan Borough Council; its wealth, although not its rateable value, greater, its position more influential, than any of the Metropolitan Boroughs. To the City, London as a whole owes much, although it is apt to forget benefits conferred when thinking of any

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grievances it may have against the City. The preservation of Epping Forest as an open space for all time is only one of the debts the present and future generations owe to its public spirit. Had the City not been in existence it is doubtful if it would be created as a separate entity to-day. With its great traditions and long history it is equally doubtful whether it will ever be swept away.

The "London" which inspires this volume is "Water London," constituted as one entity for the purpose of water supply by the Metropolis Water Act of 1902, and slightly modified by subsequent Acts. It extends North to South a distance of 42½ miles from Ware in Hertfordshire to Winkhurst Green in Kent, and East to West a distance of 34½ miles from Southfleet in Kent to Sunbury in Middlesex. Its area is 576 square miles and its population just over 7 millions.

The London which the Normans inherited from their Saxon predecessors was roughly equivalent to the City of to-day. Complaints with regard to water do not appear to have been made in Saxon times, nor were Norman Londoners very vocal on the subject. The latter state of affairs may have been due to the fact that our Norman kings had a short sharp way with any who differed from either their rule or administration. In this year of grace the *de facto* rulers in several European states seem to suffer from the same touchiness on this matter as did the Normans.

Complaints regarding the adequacy and purity of the supply first appeared during the Plantagenet period. In 1236 Henry III complied with the request of Gilbert de Sanford for facilities to be granted to enable water to be brought into London from Tybourne. The modern location of this place is near Stratford Place, Oxford Street. Lead pipes were used for the purpose.

While not connected with London, it is not without interest to remember that four years after this—in 1240—the then Countess of Devon gave Tiverton a similar water supply from a source five miles distant from that town.

About 1255-58 the White Conduit was set up (near what is now Chapel St., Lambs Conduit Street, Bloomsbury) for the purpose of supplying the Grey Friars Monastery with water. In 1285 the Great Conduit was established in West Cheap, this being the first example of a cistern or reservoir of lead, castellated with stone, to be established in the City. About 1306 the Devil's Conduit (sometimes called the Chimney Conduit) was established to augment the supply from the White Conduit. The distance between the two was about a quarter of a mile, the Devil's Conduit being located in what is now Queen's Square, Bloomsbury.

In 1307 Hugh, Earl of Lincoln, complained in Parliament that the Old Bourne had become polluted on account of the filth poured into it from tanneries on the banks of that stream. Rivers pollution by industrial effluents would appear to be by no means a modern invention, but to have a long and dishonourable history.

Records of the Corporation of the City show that in 1329 money was paid for cleaning and repairing the great Conduit in Chepe, and also for cleansing Tybourn springs. Part of this money apparently went to provide beer for those engaged on the work.

The practice of obtaining water in unauthorised fashion apparently is not a new one for, in 1337, measures were taken by the Corporation to prevent brewers taking tubs of water for ale-making without payment. This action was taken by the City as the Brewers were openly defying an order of 1312 which enacted that brewers, cooks and fishmongers were to pay for water used for business purposes.

Further records of the City indicate that in mediaeval times they, by curious ways, "made the punishment fit the crime." William Campion, of Fleet Street, was found guilty, on 12th November, 1478, of illegally abstracting water by tapping a conduit where it passed his house, and turning the water into his own well. The record adds "thereby occasioning a lack of water to the inhabitants." As a punishment he was placed on horseback with a conical shaped vessel on his head. Water from this vessel ran down small pipes and drenched him as he was driven round to all the City Conduits. As it ran away the water was constantly replenished, and his crime was made public by proclamation at each conduit. He returned home well soaked, doubtless sick and sorry for himself and, it is hoped, a better and more public-minded citizen.

In 1390 application was made by some of the citizens of West Chepe for permission to erect a conduit adjacent to the Church of St. Michael-le-Quern. It was proposed to supply this conduit by means of pipes from the conduit opposite the Church of St. Thomas Acon. Tybourne springs eventually proved to be insufficient to supply enough water, and in 1438 the Corporation arranged with the Abbot of Westminster for water to be brought from his Manor of Paddington. The acknowledgment paid to the Abbot took the form of two peppercorns yearly.

The first Act of Parliament in relation to London water supply was passed in 1543-44 (The London Conduit Act, 35 Henry Eighth : cap. 10). By this Act the Lord Mayor and Corporation were empowered to bring spring water from Hampstead and the neighbourhood to the City. A conduit of Thames water was established at Dowgate in 1568.

The great religious orders have all appreciated the advantages of a good water supply, both for drinking and other purposes. A favourite penance was standing immersed in water up to the neck, the Devil being supposed to have a pet aversion to religious persons in such a situation. The conduit to the Grey Friars Monastery has already been mentioned, and two other orders brought conduits to their houses; the Carmelites to their monastery at White Friars—the place name arising from the white habits of the order—and the Dominicans to their monastery at Blackfriars—this place name also arising from the black habits of the order.

The Thames remained a salmon river and fairly pure until quite a late period; it is on record that London apprentices petitioned against being given salmon as an article of diet on more than two days per week. The minor streams, however, became fouled, and the conduit supply becoming insufficient, it became necessary to turn to other supplies.

The first considerable attempt to supply London with water by mechanical means owes its origin to Peter Morice, whose name is variously spelled, and whose nationality was either Dutch or German. From his capability as a water engineer it seems likely that Holland was his native land. In 1581 he undertook to give the City a supply of Thames water pumped from the river. His pumping mechanism was actuated by two large water wheels, driven by the force of the tide and attached to the first arch of London Bridge on the northern side. History does not state how Morice became a Freeman of the City, but having the Freedom was of service to him in getting his concession.

The water was to be supplied in leaden pipes to houses in Grass Street, New Fish Hill, Thames Street and as far as Leadenhall. The pressure, for those days, was quite good and, at the first attempt, Morice was able to throw his water over the steeple of St. Magnus Church. History does not relate whether the Lord Mayor, the Corporation and others who had assembled to see the sights received a free bath, but if they did—well, it was all part of the day's fun, and doubtless someone said a few words appropriate to the occasion. Work was completed on Christmas Eve of 1582, but the supply did not long satisfy those whom it served.

For a very minute account of the once greatly admired London Bridge water works the public are indebted to Mr. Beighton, an engineer, who carefully described them, and accompanied his detail with an engraving, which had proper references for its elucidation. It appeared in the Philosophical Transactions for the year 1731; but whether, at that time, all the works were precisely the same in form and action as those first constructed, or any improvement had occasionally been introduced, is not stated. The following summary contains the purport of Mr. Beighton's description; and it may be right to premise that the water-wheels and machinery, being fixed in strong frames of oak, they gradually rose and fell with the tides.

When Mr. Beighton wrote his description of the machinery at London Bridge there were three water-wheels, of the respective diameters of nineteen and twenty feet, having axles of three feet diameter, and twenty-six float boards, fourteen feet long by eighteen inches wide. The pumps employed had cylinders, with a length of four feet nine inches, and an interior diameter of seven inches above and nine inches below the valve. The cylinders of the pumps were fixed to the top of an inclosed square iron cistern, which had appropriate apertures with valves, just below the places where they were attached. To one end of this cistern was also affixed a pipe, having a grating at the end, to prevent weeds or other things from entering

it; and it extended into the bed of the river, for the purpose of supplying water to the pumps—these being worked by cranks, which the revolving of the water-wheels kept in constant motion whenever the tides were flowing either up or down the river. One wheel communicated motion to sixteen pumps, and their cranks were arranged for four of them to work alternately, so that each set might draw its supply of water from the cistern in succession. Thus a comparatively small quantity of water only was conveyed into another inclosed square cistern, placed above the valves, and nearly parallel with the tops of the cylinders, and likewise connected with the pumps by bent pipes, having flanches; therefore, whenever the pistons of the pumps ascended, the water was forced along the bent pipes into the upper cistern, from which a large pipe conducted it to supply the houses. The latter pipe had an horizontal direction for some length, and then another was fixed to it, having a slight ascent, so as to form a very small angle; and these were fitted with valves to prevent the return of the water. One turn of all the wheels occasioned the whole of the pumps to make 114 strokes, and when the tide flowed quickly, it produced six revolutions in one minute, thus the total number of strokes in that short time amounted to 684, which raised 1,954 hogsheads of water in one hour. Mr. Beighton suggested some improvements, and stated that such was the power of the machinery that it would enable an ordinary man to raise fifty tons weight.

Besides the project of Peter Morice, as already noticed, another remarkable one appeared at that epoch. "An Italian, named Frederick Genebelli, also propounded an invention to the Lord Burghleigh for waterworks for London, Anno, 1591, which should benefit the City two ways. First to cleanse the filthy ditches round about the City, such as Houndsditch, Fleetditch, &c. and to bring in the room of this filth, plenty of wholesome clear water, for the use of the inhabitants. Secondly, to be an expedient for the speedier, and more effectual quenching of houses on fire, whereby twenty-five or thirty persons should do more than three hundred otherwise. And this Italian prayed the Lord Burghleigh to make known to the Queen on his behalf." Though such obvious advantages were stated to be the result of this project if it should be realised, yet no particular description of it remains to show by what means the various purposes would be effected.

There is a vital connection between Peter Morice and Water London of to-day. The first arch of London Bridge was leased for a period of 500 years from 1581, and the second arch for a similar period from 1583. Leases were subsequently granted for three additional arches. To-day London still has the doubtful pleasure of paying for the work of Morice and his successors, the payment taking the form of London Bridge Water Works Annuities. The accounts of the Metropolitan Water Board reveal that a more or less grateful London—it would be less rather than more, if it knew about it—still pays these annuities to the tune of £3,750, and will do so until the year 2082. It matters little that Morice's water wheels



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and their successors have long since disappeared, or that the bridge to which they were attached has also gone, London still has to pay.

As an engineer, I am glad that for once an engineer made a good bargain. Generally speaking, engineers do the work of the world while other people reap the financial kudos. As a public representative I denounce the bargain on all scores.

In 1594 a large horse engine was erected at Broken Wharf, Blackfriars, to supply the west end of the City with water. As this did not prove to be successful, its originator was not able to drive a bargain similar to that of Morice.

In the early days of the reign of James I the City Corporation promoted a Bill in Parliament to enable a new and purer supply of drinking water to be brought into the City. This Bill received the Royal Assent in 1606, and a subsequent Act was passed in 1607. It is a matter of conjecture how far the Corporation was influenced in this matter by the example of Plymouth, whose citizens had a supply brought from Sheeps Tor, on Dartmoor. The author of the Plymouth enterprise was Sir Francis Drake, and, presumably, this act of civic piety on his part can be regarded as an offset to his many acts of piracy. The distance from Sheeps Tor to Plymouth is only seven miles as the crow flies, but owing to the nature of the ground, the channel—known as the Leet—was a winding one and was twenty-four miles long.

History has a knack of repeating itself in respect to municipal enterprises as in other directions. The London County Council had the right to take over the London Electricity Supply Companies in 1931, but voluntarily allowed them another forty years of life until 1971, thereby leaving the larger part of London to the tender mercies of these companies. The Corporation of the City acted in a similar manner in the reign of James I, and thereby lost a wonderful opportunity of initiating a Jacobean Municipal Water Supply. The rights of the Corporation were passed to Hugh Myddelton, a Welsh goldsmith in business in London.

Myddelton, like many other Welshmen, had come to London and done very well in business, serving, among others, King James I. He lived in Bassishaw Street, which is the modern Basinghall Street, combining, as was the then custom, the business of banking with that of a goldsmith. His father was Governor of Denbigh Castle, Hugh being the sixth son. Several of his brothers obtained distinction in greater or less degree, one becoming Lord Mayor. In 1603 Hugh Myddelton was elected Member of Parliament for Denbigh and, with another brother—Robert—was a member of the Parliamentary Committee which considered the petition of the City Corporation, out of which came the Act of 1606. There is a tradition that Myddelton died a poor man, but this, like many another tradition, is not true. What did happen was that at one time the New River brought Myddelton into financial difficulties, but at the time of his death in 1631 he was found to be in comparative affluence.

#### THE COMING OF THE COMPANIES

The scheme which Myddelton took over from the City Corporation was to bring drinking water from springs at Chadwell and Amwell, in Hertfordshire, to the City. The Act under which the necessary authority was granted gave powers for taking land required, the owners receiving compensation, which compensation was to be to the satisfaction of commissioners appointed for the purpose.

As is usual when anything is projected for the public weal, there seems to have been a good deal of agitation against the New River, as it afterwards came to be called. In 1610 a Bill was presented to Parliament to repeal the Act authorising the New River, but Parliament was prorogued by James I, and as it did not meet again until 1614 the work went merrily on.

Dutch water engineers were employed to carry out the scheme, as they were then the most successful water engineers in Europe, centuries of warfare to retain their own land against the onslaughts of the ocean having given them the pre-eminence.

To use a modern phrase, Myddelton apparently had "bitten off more than he could chew," and by the time the excavations reached Enfield he found his resources badly strained. In his need he turned to King James I for a grant to enable the work to be finished. He must have been very glad of his previous service to his king, as this emboldened him to make his application with a fair chance of success. In view of the usual character applied to this monarch, and almost any folly—or worse—was possible with the "Wiseest fool in Christendom," it is good to be able to say a good word for him. Without the aid he gave the completion of the New River would have been impossible. This assistance may be regarded as an offset to the many cowardly and foolish actions of James I, included in the latter being the ridiculous royal pamphlet entitled "Counterblast to the Vile and Stinking habit of smoking Tobacco."

Like a good Scot, James I made a good bargain, for while Myddelton was to have the worry of running the undertaking the King was to receive one-half the profits. Still, beggars cannot be choosers, and Myddelton was glad to have the assistance. The royal favour had a further aspect, and that was to kill another scheme for supplying London with water from the Lee at Hackney. This stream was a very different one from that to be seen at Hackney to-day, but the projected enterprise could only have been a temporary one. As it was, it was still-born.

The City Corporation, which had been deaf to Myddelton's earlier appeals for help and his offer to the Corporation of half the shares, reacted more favourably when he had royal patronage and, in 1614, granted him a loan of £3,000. This loan was not repaid until 1634, after his death, and the Corporation then made a grant of £1,000 to his widow.

The terminus of the New River was the Round Pond at Clerkenwell, on the site of which the present Water Board building is

erected. On Michaelmas Day, 1613, the official opening ceremony was performed, this event afterwards being called "Myddelton's Glory." The Lord Mayor, Sheriffs, Aldermen and Councillors and a very large company were present, including Sir Thomas Myddelton, who had been elected Lord Mayor for the ensuing year. The water flowed into the pond, and wine flowed to its usual destination, accompanied by the floods of oratory—real or alleged—that to this day still mark occasions of greater or less importance.

Here it is fitting to pay tribute to Sir Hugh Myddelton. The work that he undertook was of a two-fold nature. While on the one side there can be little doubt that he hoped to make money for himself and his fellow-adventurers, one can also visualise him as a public-minded citizen, seeking to confer benefits on his fellow citizens. The work was a huge gamble; on it he staked his all, and at one time it seemed as if he might lose all. Thanks to the help received from his king a splendid success was snatched from the lap of failure.

Many have conferred benefits on London in one direction or another, but none has conferred a greater benefit on the London of his own and succeeding days than did Sir Hugh Myddelton. While monuments have been erected to his memory—one stands on Islington Green—and while a school bears his name, his best monument is not in carved stone, or limned by skilful painters on canvas, but is the New River itself. Splendid in its conception, it was still more splendidly turned into actual fact. What he did is best summed up in the words found on the memorial stone at Amwell "An immortal work, since men cannot more nearly imitate the Deity, than in bestowing health." Myddelton himself was the first Governor of the New River Company.

Jacobean Londoners had a characteristic which has marked some of their present-day successors—a rooted objection to paying for their water—and this led to Myddelton's venture not becoming an immediate financial success.

In 1619 the New River Company was incorporated by Royal Charter, and the Founder was appointed the first Governor.

Originally the New River was about 40 miles long, but several loops have been short-circuited since. Its width varied from 25 feet to 10 feet, and the depth at the centre from 4 to 6 feet. The fall averaged three inches per mile.

As business increased it was found that the supply afforded by the New River was insufficient, and recourse was made to the River Lee, this being legalised by Act of Parliament in 1738. A condition of the abstraction was that an annual payment should be made, this being devoted to a fund for the improvement of Lee Navigation. This payment continues to this day. The original intake from the Lee was near Hertford, but in later years water was also taken at Tottenham.

The New River Company took over by purchase London Bridge Water Works, Hampstead Water Works, York Buildings Water Works and the North Middlesex Water Works. Its area of supply was bounded on the east by the district of the Tottenham Board and the East London Water Works; its western boundary was the area supplied by the Chelsea, Grand Junction, and West Middlesex Water Companies, while its southern boundary was the Thames. Included in its area of supply were the City, Central London and the Northern Suburbs.

As historical interest clusters round some of the water works taken over by the New River Company, a word or two will now be devoted to them.

In 1544 the City Corporation obtained an Act of Parliament to enable water to be brought to London from Hampstead Heath, Marylebone, Hackney, Muswell Hill and various other places "within fyve miles of the saide Citie." Masterly inactivity prevailed until the year 1589, but in that year the Hampstead reservoirs were formed on the line of the Hole Bourne in the valley between White Stone Pond and where the Hampstead Heath Station of the North London Railway now is.

In 1692 a company was formed and obtained these reservoirs from the City Corporation, who apparently wanted to divest themselves of the responsibility. Highgate Ponds were formed by the company who, in 1777, made the pond in the Vale of Health, at Hampstead. These ponds were fed by the Ken or the Hole Bourne. The Company was bought by the New River Company in 1855.

Like his grandfather, Charles II was very fond of granting patents or monopolies—generally to his immediate circle of friends—and one of these patents was granted to a group for supplying water to the west end of London. The undertaking was designated at first "York Waterworks," but afterwards came to be called "York Building Waterworks." In 1691 an Act of Parliament was obtained which incorporated the group under the title of "The Governor and Company of Undertakers for Raising Thames Water in York Buildings." The "York" part of the title was taken from York House, and the waterworks were situated at York Gate, at the bottom of Villiers Street, under which the chief reservoir was situated.

For a time the company did rather well, by buying the forfeited estates of Jacobites—Scottish and others—but failure to live up to their water obligations—the prime business, after all, of a water undertaking—caused them to lose their customers to the New River Company, the Chelsea Company and Grand Junction Company. While in existence the area supplied was Whitehall, Covent Garden and Piccadilly.

The Company's mains were leased to the New River Company, and the undertaking came completely under that Company in 1818. There is a perpetual reminder of the York Buildings Waterworks in the fact that "York Buildings Perpetual Rent Charge" of £251 still appears in the annual accounts of the Metropolitan Water Board.

Until the Board had reorganised distribution it seemed to have been the fate of East London to be the Cinderella of London from the point of view of water supply. The earliest organised supplies were given by the New River Company, the Shadwell Company and the West Ham Company. It must be confessed, however, that these proved to be hopelessly inadequate, and many of those supposed to be so served were compelled to get what water they could, as they could. Not exactly an ideal water supply.

The Shadwell Company had its origin in the Shadwell works laid down by Thomas Neale on land leased from the Dean of St. Paul's. A pump worked by four horses (literally, 4 horse-power) was used in the first instance, and in 1679 another of these was added to cope with the growing demand. A Charter was granted to Neale in 1687, and a company was formed which, in 1691, became incorporated under letters patent. Horse engines were used until 1750, when a steam engine was installed, which proved inadequate, and in 1774 was augmented by a Boulton & Watt engine having a pumping capacity of 1,300,000 gallons per day. This engine enabled the company's business to expand, the area served being bounded west to east by the Tower of London and Limehouse Bridge, and north to south by Whitechapel and the Thames.

The year of the second Jacobite rebellion (1745) saw the formation of the West Ham Water Company to supply water to Stepney, Bethnal Green, Bow, Stratford, Bromley and part of Whitechapel. Water was pumped by means of a water wheel and a steam engine, and a reservoir was constructed at Mile End for storage purposes.

This water undertaking and that of the Shadwell Company were purchased by the London Dock Company in 1807, and later passed into the hands of the East London Waterworks Company, which was founded in 1807 for the purpose, and which also aimed at supplying the whole of the East End of London. The first Chairman of the East London Waterworks Company was John Ord.

Old Ford, just over three miles from the Thames, was chosen as a pumping station site, and two reservoirs were constructed 10 feet deep with their bottoms level with the bed of the River Lee. Two others were made on the opposite bank of the Lee with bottoms 5 feet 6 inches lower, the four being connected by an underground aqueduct. In 1815 lines of demarcation of areas of supply were arranged with the New River Company with reservation of the right of each company to supply in the area of the other in case of failure or refusal to supply. The year 1820 saw the purchase of Hackney Waterworks and Lee Bridge Mills, and in the same year an Act of Parliament was obtained for the removal of the intake from Old Ford to Lee Bridge Mills and the construction of an aqueduct from intake to the Old Ford reservoirs.

The daily amount supplied in 1828 was 5,900,000 gallons, while the engines had a daily pumping capacity of 8,000,000 gallons. A new pumping engine was laid down in this year which added

3,000,000 gallons to the capacity. Expanding business and the need for prevention of sewage pollution resulted in other applications to Parliament, which were crowned with success in 1852. Under the provisions of the 1852 Act an intercepting drain was constructed from Tottenham to just below Ponders End for the purpose of preventing sewage reaching the Lee near the intake. Reservoirs at Walthamstow, and Filter Beds at Lee Bridge, were also constructed. Additions to these reservoirs and filter beds were authorised under one of the Acts of 1867.

This year saw a new departure on the part of the company for Parliamentary powers were obtained whereby the construction of works at Sunbury was authorised. This meant the reinforcement of the Lee supply with Thames water to the tune of 10,000,000 gallons per day, except in time of flood. The construction of a reservoir at Hornsey (Finsbury Park) was authorised.

The Acts of 1867 are examples of being wise after the event, as they were consequent to the great cholera epidemic of 1866. The Company were compelled to discontinue the use of Old Ford reservoirs and to fill them up; at the same time the aqueduct from Lee Bridge to Old Ford was put out of action permanently. Sir John Simon reporting on the epidemic said: "The area affected was almost exactly the area of this particular water supply, and nearly, if not absolutely filling it, and scarcely, if at all, passing beyond it." The Old Ford works were finally closed down in 1892.

In 1886 the Company obtained further powers to extend the sewage interception works to prevent sewage reaching the Lee above their intakes. They were also authorised to sink wells at various places in their area. Under these powers a well was sunk and a station built at Waltham Abbey, but other wells and stations were built at Rammey Marsh, Ponders End, Barking and Ferry Lane.

Further reservoirs were constructed at Tottenham, Edmonton, Walthamstow and Chingford under the Act of 1897, the total additional capacity being 1,200 million gallons.

At the end of its career the area supplied by the East London Company included Waltham Abbey, Waltham Holy Cross, Chingford, Walthamstow, Loughton, East Ham, West Ham, North Woolwich, Limehouse, Old Ford, Stepney, Stratford, Whitechapel, Aldgate—in fact, East London generally.

In 1701, letters patent were granted conferring the sole right for 500 years to take water from the Ravensbourne to supply the inhabitants of Sayes Court and East Greenwich. Under these rights waterworks were established at Ravensbourne. When the Kent Water Works Company was established it came into conflict with those rights and, in 1809, the company was prohibited by Act of Parliament from supplying water in such a way as to affect the rights of the patentees without their previous consent, or until their water works were bought. The Kent Company took the easy way out of the difficulty, and took over all the rights and privileges of the



patentees by purchase. In 1809 the authorised limits of supply were Deptford, Greenwich, Lee, Lewisham and Rotherhithe. The first chairman of the Kent Water Works Company was Sir William Rawlins, and Charles Alexander Weir was appointed the first Engineer in 1810.

The Town Commissioners of Woolwich obtained powers in 1808 to supply that district with water, but in 1811 the transfer of these powers to the Kent Company was confirmed by Act of Parliament. Arrangements were also made whereby the various Government factories and barracks, as well as the Royal Dockyard were to be supplied. To these were added the Royal Victualling Yard at Deptford and the Royal Observatory and Royal Hospital at Greenwich.

Competition arose in the year 1853 in the shape of the Plumstead, Woolwich and Charlton Consumers Pure Water Co., but although this company sank a well and installed plant, bankruptcy overtook it, and the plant was bought by the Kent Company.

The formation of the North Kent Company occurred in 1861. The area of this company was to include Erith, Eltham, Crayford, Dartford, Bexley, Wickham, Bromley and Chislehurst, but the threatened invasion of the area—potential or actual—of the Kent Company was averted by the purchase of the undertaking by the Kent Company in 1863.

The area of the Kent Company was still further increased in 1868 by the purchase of the waterworks of the Dartford Local Board of Health. In 1877, following a request from the Bromley Rural Sanitary Authority and the Dartford Rural Sanitary Authority the Kent Water Works Act was passed, and the area of the company was extended to 120 square miles. Among the added districts were Swanscombe, Farningham, Eynsford, the Crays, Orpington, Farnborough, West Wickham, Hayes and Keston.

By arrangement with the Bromley & Sevenoaks Sanitary Authorities an Act of Parliament was obtained in 1888 which extended the area eastwards to Southfleet and southwards to Westerham and Cudham. This gave the company an area of 178 square miles, of which approximately 30 square miles were found to be in the administrative County of London when that county was defined in 1888.

As has already been mentioned, the original works were situated on the banks of the Ravensbourne, water being distributed through wooden pipes. The first engines were by Smeaton but, later, engines were installed by Boulton & Watt, and it is only within the last few years that the last-named engines have ceased to be used. Up to the year 1844 unfiltered Ravensbourne water was supplied, but in that year the first filter bed was constructed by the company. In 1850 further filter beds and a subsidence reservoir were brought into being.

With the waters of the Ravensbourne proving to be insufficient for the demand, the first deep well at Deptford was sunk in the chalk in 1857, and with the sinking of two other wells at that station the use of the river was discontinued. Reference is made in another chapter to the other wells in the Kent District, but it can here be stated that water supplied by the Kent Company in the latter years of its life was among the purest water supplied by any of the London companies, and had a character all its own. Hard it might be, but pure and delicious to drink it certainly was.

The Rivers Pollution Commission of 1869 stated, in reference to water supplied by the Kent Company: "The supply of such water, either softened or unsoftened, to the Metropolis generally, would be a priceless boon, and would at once confer upon it absolute immunity from the epidemics of cholera." They further stated that increase of capital should only be granted to existing companies on condition that it was expended on work necessary for the supply of this palatable and perfectly wholesome beverage. In other words, water supplied by the Kent wells was held up as a standard to which others should strive to attain.

*Chelsea.*—Commissioners and Trustees were appointed under the provisions of an Act of Parliament of 1722 for the purpose of securing a good supply of water to Westminster and its environs. Among their duties were the construction of conduits from the Thames, from which conduits water could be lifted into reservoirs in the neighbourhood of Hyde Park. Forming themselves into a corporation with the title of "The Governor and Company of Chelsea Water Works," they obtained a Royal Charter in 1723. This enabled them to obtain the capital necessary for their work. By 1726 conduits from the Thames supplied reservoirs in St. James Park, and water was supplied to a 1,350,000 gallon reservoir in Hyde Park.

Sir Thomas Hewett was the first chairman, but he was speedily succeeded by Colonel Francis Negus. A note on Colonel Negus might be added.

*Col. Francis Negus* (died 1732).—Reputed inventor of Negus. From 1685 to 1688 Secretary to Duke of Norfolk. Served in French Wars under Marlborough. In 1705 appointed Joint Commissioner and on the 27th June, 1717 sole Commissioner for executing the office of Master of the Horse, which office he held until the death of George I. He was appointed Avener and Clerk-martial to George II on 20th June, 1727, and Master of His Majesty's Buckhounds on 19th July in the same year. He represented Ipswich in Parliament from 1717 until his death at his seat at Dallinghoo, Suffolk, on 9th September, 1732. On his death a copy of verses appeared in the "*Ipswich Gazette*" commencing "Is Negus gone? Ah! Ipswich, weep and mourn." He was also Ranger of Swinley Chase, Lieutenant and Deputy Warden of Windsor Forest, and one of the Commissioners of the Lieutenancy of Middlesex and liberty of Westminster.



It is reported that Negus, during a discussion when the wine was circulating freely, averted a fracas by recommending the dilution of the wine with hot water and sugar. Attention was averted from the point at issue to a discussion on the merits of wine and water, which ended in the compound being named "Negus." The name was first applied exclusively to a concoction made with port wine, and hence the ingenious but improbable suggestion made by Dr. Fennell that the name may have a punning connection with the line in "Paradise Lost": "Th' Empire of Negus to his utmost port."

While the very hard winter of 1739/40 nearly put the Company out of business—a few weeks' frost deprived its customers of their normal supply—it would appear that by 1767 the daily supply was 784,000 gallons, rising to 1,456,000 gallons in 1809.

A few years subsequent to this, subsiding reservoirs were introduced, which assisted in the work of purification, and this work was aided still further by the Company's Engineer, Mr. James Simpson, introducing his filter bed. He had given quite a number of years to the study of this subject, and the outcome—the introduction of the modern slow sand filter—was of a revolutionary nature.

By the Chelsea Water Works Act of 1852 the Company was empowered to construct its station at Seething Wells, Kingston-on-Thames. Intake, filter beds, pumping plant and all the other works were completed by 1856, and water was pumped to reservoirs at Putney Heath for distribution by gravitation.

The intake at Seething Wells did not prove to be too satisfactory, and another Act was obtained, in 1875, which enabled the West Molesey station to be erected.

The supply area of the Chelsea Company included Buckingham Palace, Westminster, Kensington, Chelsea and Fulham, although parts of these areas were also supplied by other companies.

*Southwark and Vauxhall.*—The district south of London Bridge was, for centuries, regarded as a "poor relation" by the City of London, and treated accordingly. Hence it was not until the year 1767 that the lease of the second arch of London Bridge from the south side (fifth from the north) was granted to the London Bridge Water Works Company for the purpose of supplying water to Southwark and South London generally, a water wheel being used for actuating the pumps. Southwark was also supplied with water from the pond of St. Mary Overie, and rivalry ran high between those owning the respective sources of supply.

In 1820 the water rights originating from St. Mary Overie were purchased by a Mr. Edwards who, in 1822, bought the south side rights of the London Bridge Water Works Company from the New River Company. Uniting the two under the name of Southwark Waterworks, he laid down steam pumping engines and replaced the wooden mains by iron. The daily pumping capacity of the plant was 4 million gallons, but the daily demand was only 1½ million gallons, and this was confined to two miles from the works.

The South London Company was formed in the year 1805 and obtained Parliamentary powers in July of that year. Trouble was soon experienced due to lack of capital, and this was sought to be remedied under the powers of a further Act, obtained in 1813. Shortness of cash seemed to follow the company for years and the trouble was accentuated by the shortsighted adoption of wooden pipes which, soon afterwards, were replaced by iron.

In 1822 a 45 h.p. engine was installed at the principal pumping station of the Company, situated on the south side of Kennington Common, near Vauxhall, and another engine was installed at Cumberland Gardens, near Vauxhall Bridge. The Kennington Common station had an area of 5 acres, and had two reservoirs into which Thames water flowed, the joint capacity being a little under 4 million gallons. A third reservoir was added, making the capacity 6 million gallons.

Keen rivalry and somewhat unfair competition were experienced from the Lambeth Company, but both were put on the same legal footing under Act of Parliament in the year 1834. Union was effected between the South London Company, then known as the "Vauxhall Waterworks Company," and the Southwark Company in 1845, under the title of Southwark and Vauxhall Water Works Company, and a pumping station was erected at Battersea.

Sir William Clay was the first chairman of the joint Southwark & Vauxhall Company. A note on Sir William Clay might be added.

*Sir William Clay, Bart., M.P.* (1791-1869).—Politician, born in London in 1791, son of George Clay, eminent merchant. In 1832 elected M.P. in the Liberal interest, with the newly-created Tower Hamlets constituency. He occupied the seat until 1857. Appointed Secretary to the Board of Control in 1839 under Lord Melbourne's Ministry, which office he held until the retirement of his party in 1841, when he was created a baronet. Magistrate for Middlesex and Westminster and also Chairman of the Grand Junction and Southwark Waterworks. He died at Cadogan Place, Chelsea, on 13th March, 1869. He published the following pamphlets, viz.: Speech at the Meeting of the Electors of the Tower Hamlets, 1834; Speech Moving for a Committee to enquire into the Act permitting the Establishment of Joint Stock Banks; Remarks on the Expediency of Restricting the Issue of Promissory Notes to a Single Issuing Body, 1844; Remarks on the Water Supply of London, replied to by T. Coats in "Statement of the Plan of Supplying London with Water, proposed in the Metropolitan Waterworks Bill, 1850."; Speech on Moving the Second Reading of the Church Rate Abolition Bill, 1856.

A decision to remove to Hampton was made in 1851 and an Act was obtained for the purpose in 1852; additional pumps were installed at Battersea in 1856-58, and further extensions were made at Hampton in the years 1862-67. Four covered reservoirs, with necessary pumping plant, were commenced at the Peckham station in 1871, while 1881 saw the beginning of a new well at Streatham.

Hampton was the scene of extensions in 1884 and 1886, and in the latter year an Act of Parliament was obtained to enable a main to be laid from Hampton to Nunhead, and a reservoir to be made at Forest Hill. Wandsworth pumping station was erected in 1891 for the supply of Forest Hill and district, and was subsequently closed down in 1924.

Towards the end of the Company's career wells were sunk at Merton and at Honor Oak. Further extensions were also made to the filter beds at Hampton.

The area supplied by the Company included Southwark, Barnes, Kew, Wimbledon, Wandsworth, Mortlake, Kennington, Newington, Lambeth, Clapham, Bermondsey, Battersea. Some of the places here mentioned were shared with other companies—Lambeth and Kent.

*Lambeth.*—Lambeth Water Works Company appears to have been founded by men who had plenty of what in modern parlance is called "push and go." The first meeting of the Company was held in April, 1785, and yet by 9th July of the same year the Royal Assent had been obtained to their Act of Incorporation.

The first pumping station was adjacent to the site of the southern end of the present Hungerford Bridge—and was nearly opposite Hungerford Market. The engine was a small one and the highest pumping service obtainable was 42 feet above Thames high water mark. Distribution was served by wooden pipes.

Demands from Lambeth and district caused an expansion in the business, even though many tried to get water without payment. In fact, a most progressive policy for those days was adopted by the Company, and in 1802 it was decided to lay down a certain number of 10-inch pipes each year. In 1816 wooden pipes were abandoned in favour of iron.

The year 1805 saw a new 24 h.p. pumping engine installed at the station, and the same year saw the beginning of relations with the South London Company which, though friendly at first, became embittered as the years went on.

A decision to buy land at Streatham Hill and to instal "a filtering apparatus" was made in 1831, while two years later the site of the present Brixton pumping station was purchased and a new main laid to the reservoirs constructed there. Increase of capital to £134,800 was sanctioned by the Act of 1834.

In pursuance of the Company's progressive policy it was decided in 1847 to construct new works at Ditton, and Parliamentary sanction was obtained for this in the Act of 1848, which also sanctioned re-incorporation. The new works were opened in 1851, and their opening marked an era in the history of London's water supply for this was the first attempt to get water above the tideway. The same year Parliament made it obligatory on other companies to do the same—remove all intakes above the tideway. Experience showed that Ditton was not an ideal spot, as the water here was found

to be discoloured when the rivers Mole and Emmett were in flood, and a further Act, obtained in 1871, enabled a move to be made to West Molesey.

The principal stations of the Company were Molesey, Ditton, Brixton Hill, Coombe reservoir, Streatham Hill, Norwood reservoir, Selhurst reservoir, Rock Hill reservoir. The districts served included Beckenham, East and West Molesey, Kingston, Esher, Malden, Merton, Morden, Mitcham, Croydon, Lambeth, Clapham, Camberwell, Battersea, Bermondsey, Streatham, Tooting, Wandsworth, Southwark, etc., etc. In some of these districts other companies held coincident powers.

*Grand Junction.*—The Grand Junction Water Works Company was an offshoot of the Grand Junction Canal Company, and its original purpose was to supply water from that canal to Paddington and its environs by Parliamentary sanction obtained in 1798. Little was done until the years 1810-11, when further Parliamentary powers were obtained to enable the Water Works Company to function separately from the Canal Company. The first chairman of the Grand Junction Company was Samuel Hill, who was appointed early in June, 1811, but he was speedily succeeded on 27th June, 1811, by Major-Gen. Churchill.

Acting under the advice of their Engineer, Mr. Rennie, the Water Works Company at first used stone pipes for distribution purposes, but after a short experiment in which a considerable amount of money was lost, the use of stoneware was abandoned and recourse was made to cast-iron pipes.

The original design for using canal water was found to be undesirable, and land was obtained at Chelsea adjacent to the Thames for a supply of water from that river. In 1835 Parliamentary powers were obtained, under which Kew Bridge Water Works were established, but in 1852 a decision was made to remove the intake to Hampton, consequent on the prohibition of all intakes on the tideway. The Hampton station was the Company's principal source for its water, and before the end of last century about 20 million gallons per day were abstracted, 14 millions of which were pumped to Kew Bridge for further distribution.

At Hanger Hill, Ealing, storage and service reservoirs were provided, and at Campden Hill, adjacent to the reservoir of the West Middlesex Company, three covered reservoirs and a pumping station were located.

The area of supply of the Grand Junction Company included most of the outer western suburbs of London, *inter alia*, Isleworth, Brentford, Hounslow, Acton, Hampton, Ealing, Teddington, Twickenham, parts of Hammersmith, Kensington, Paddington, St. Marylebone and Westminster.

*West Middlesex.*—The genesis of the West Middlesex Water Works Company was contained in a scheme to supply water to the west end of London. The projected area included Paddington, part of St. Marylebone, Kensington and Hammersmith. Parlia-

mentary powers were obtained in 1806, but dissensions between the governors and Mr. Dodd, the Engineer, held matters up for some little time. These settled, works were constructed at Hammersmith in 1807, wooden pipes being used initially for distribution purposes. These were soon discarded and stoneware pipes substituted, but towards the end of 1808 cast-iron pipes were adopted.

Various directors who presided at the early meetings of the West Middlesex Company included James Watts, Thomas Lewis and George Watts. From 28th December, 1809, Thomas Lumley occupied the chair regularly. From August, 1806, Robert Dodd acted as Engineer to the Company.

A reservoir capable of holding  $3\frac{1}{2}$  million gallons was constructed at Campden Hill in 1809, and another, with  $4\frac{3}{4}$  million gallons capacity, at Barrow Hill, near Primrose Hill, in 1825, supply being afforded from the Hammersmith pumping station. In 1838, subsiding reservoirs were constructed at Barnes. The enterprise of the proceedings for those days was illustrated by the fact that Hammersmith pumping station was fed by means of a sub-river pipe from Barnes.

The next important development was the construction of the Hampton Works, which took place in 1855, consequent on the decision to prohibit intakes on the tideway. Water was pumped from Hampton to the Barnes reservoirs. In 1866 further powers were obtained to enable supplies to be given to Willesden, Hampstead Hendon and part of Acton. A reservoir was constructed at Finchley in 1868, and in 1871 a further 36-inch pipe was laid under the Thames from Barnes to Hammersmith. In 1896 two reservoirs were opened at Barn Elms and two others in the following year.

The area supplied by the Company included Hammersmith, Earls Court, Regents Park, Kilburn, Willesden, and extended as far north as Hendon. It was bounded by the New River area on the east, Grand Junction area on the west, partly by the Chelsea area and partly by the Thames on the south.

*Staines Reservoirs Joint Committee.*—An important step forward was taken in 1896 when the Grand Junction, New River and West Middlesex Companies took joint action to obtain an Act of Parliament authorising the construction of two Staines storage reservoirs.

The work was commenced in 1898 and water was first taken from the reservoirs on 28th December, 1904.

In this lecture the development of the water supply to Water London has been traced, but reference has not been made to the forces that impinged on the companies, nor to the fights that took place for the unification, simplification and betterment of the supply. These are reserved for a separate lecture, under the heading of "Transition." For the water companies it can be said that they had their day and ceased to be. Under their regime London was being prepared on the anvil of practical experience of better things to follow, the better things that Water London of the twentieth century enjoys.

## TRANSITION.

"For I doubt not through the ages  
One unceasing purpose runs,  
And the thoughts of men are widened  
As the processes of the suns."

TENNYSON.

While the title of this lecture is given as transition I have chosen it not merely to cover the actual changeover of the Companies to the Board but rather to cover the period of the transition in the public outlook on London's water supply. Up to the early days of the nineteenth century the rule of the Companies had been accepted as something that just had to be and indeed it ought not to be forgotten that they did render a very useful service in giving London, or rather parts of London, an organised water supply where previously there had been none. True, it was incomplete, but it was certainly better than the condition that had preceded it.

The major portion of the nineteenth century, however, was a period of "Sturm und Drang" with regard to the water supply of London. There was much heartburning and dissatisfaction in regard to the quality and quantity of water and with regard to the services rendered by the Water Companies, and much ink was spilled by those who were critical of the manner in which their powers were exercised. Nor were the Companies and their apologists idle, for no matter how badly any vested interest behaves, defenders will always be found. In the eyes of some people a badly managed private concern is better than the best public service administered by a municipality.

In these days one can take a somewhat dispassionate view of the controversies over this matter that disturbed the various London public authorities and Parliament, but the fact that emerges from the controversy is that there was good ground for the dissatisfaction displayed.

The granting of powers to a number of Companies, in many cases with boundaries ill-defined, hardly defined at all, or positively conflicting, was no doubt due to the desire to provoke a healthy competition among the various Companies, and render the supply of the first necessity of life abundant and cheap. It was with this view, too, that Parliament, when giving powers to the West Middlesex Waterworks Company, for example, to extend their district, inserted a clause preventing them from selling or disposing to any other water company the right of supplying the parishes mentioned in the Act. And for a time the policy was successful, and fierce competition raged. But this state of things did not last long. Amalgamation and agreement were the two weapons used to thwart the intentions of Parliament. Districts which were legally within the limits of two or more companies were arbitrarily divided by the Companies between themselves, and before long the supply of water in London had practically become a monopoly.



In 1821 a Select Committee of Parliament reported that competition between the Companies had broken down and recommended, *inter alia*, a delimitation of areas and statutory control of charges. In 1828 a Royal Commission reported that the quantity and quality of water left much to be desired, and recommended change of the sources of supply. That little or nothing was done as a result of the Select Committee, supported the view that is sometimes expressed that the best way to shelve a matter is to appoint a Royal Commission to deal with it.

Again nothing was done, and in 1828 a Select Committee of the House of Commons was appointed "to inquire into the present system of supplying water to the Metropolis . . . and into the amount of the rates paid by the inhabitants." The Committee expressed the opinion that the water supply should be derived from a purer source than was the case, and recommended that Mr. Telford should be instructed to report a practicable and efficacious plan of supplying the whole of the Metropolis with pure and wholesome water. Their recommendation was adopted. Mr. Telford, in March, 1834 presented a report, which was referred to a Select Committee. In the meantime public attention to the quality of the water supplied had again been awakened by the ravages of cholera. The Committee merely received evidence, and recommended the renewal of the Committee in the following session. No action in this direction, however, was taken. Another Committee appointed in 1840 by the House of Lords to take into consideration the present supply of water to the Metropolis was equally barren of result.

The year 1849 saw a bad outbreak of cholera, directly attributable to bad water, and having most serious results. Discontent again became very vocal and the Press took a hand in voicing it. "*Punch*" appeared with a cartoon showing a turncock at work and two children watching him. Quoth one child to the other: "I say, Tommy, I'm blow'd if there isn't a man a-turning on the cholera." The same journal came out with verses that are both bitter and true. These verses, I think, are worth quoting. It will be noted that they proceed along the same lines as the "House that Jack Built."

"This is the water that John drinks.

This is the Thames with its cento of stink,  
That supplies the water that John drinks.

These are the fish that float in the ink-  
-y stream of the Thames with its cento of stink,  
That supplies the water that John drinks.

This is the sewer, from cesspool and sink,  
That feeds the fish that float in the ink-  
-y stream of the Thames with its cento of stink,  
That supplies the water that John drinks.

These are vested int'rests, that fill to the brink,  
The network of sewers from cesspool and sink,  
That feed the fish that float in the ink-  
-y stream of the Thames, with its cento of stink,  
That supplies the water that John drinks.

This is the price that we pay to wink  
At the vested int'rests that fill to the brink  
The network of sewers from cesspool and sink,  
That feed the fish that float in the ink-  
-y stream of the Thames with its cento of stink,  
That supplies the water that John drinks."

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A study of the history of these companies had led a writer in "*The Edinburgh Review*," in 1850, to the conclusion that "two principles were firmly established. First, that the principle of trade applied under the most favourable circumstances has failed to supply London with water as it ought to be supplied, and has failed most where most required, viz., in the poor and densely populated districts; second, it is vain to hope for anything better for the future from the companies themselves through any pressure, legislative or other, which can be brought to bear against them. The conclusion is inevitable that a definite principle must be adopted. If there must be a monopoly let it be in the hands of the Government, or some public body responsible to the consumers."

In 1850 the General Board of Health, which had recently been constituted, reported on the subject of London's water supply and recommended that the Thames should be abandoned as a source. The Board also expressed the opinion that one combined management for the whole of the Companies should be substituted. At that time there was no body exercising power over the whole London area or the Board would have recommended the transfer of the water supply to that body. The then Home Secretary, Sir George Grey, referred to a commission of three scientists this report of the General Board of Health, together with evidence taken before a Select Committee of the House of Commons during the session of 1850 on the River Lee Trust Bill, the questions he raised with them being mainly of a chemical character. Subsequently, as a result of these reports, he introduced a bill in 1851 to amalgamate the Companies and place the work done by them in the hands of a specially appointed Board.

This bill is of historical interest, as it was the first attempt since early Jacobean days to introduce municipal legislation in connection with the water supply of London. The bill passed its second reading by a small majority and was referred to a Committee of the House presided over by Sir James Graham. While this Committee received a good deal of evidence it did not issue a report, and the bill was dead.

Next session, however, a bill which left the Companies practically untouched was brought forward by Lord Seymour, the then First Commissioner of Works, and passed into law as the Metropolis Water Act, 1852. Some of its provisions were interesting. All water drawn from the Thames for Metropolis water supply was to be taken above Teddington Lock, and if the water of any of the Thames tributaries was used it was not to be taken from anywhere below where the tide flowed. All water for domestic use was to be effect-

ively filtered except such as was drawn from deep wells. All the filtered water reservoirs within five miles radius of St. Paul's were to be covered over, and no water was to be conveyed except through pipes or covered aqueducts unless it was filtered before distribution. No water should be taken from any new source except on the approval of the Board of Trade. These were the main provisions, and as a result of the steps taken in compliance with the Act a purer water supply was secured. Credit should be given to the Lambeth Waterworks Company, which had removed its intake above the tideway prior to the report of the Chemical Commission being issued.

A Governmental inquiry in 1856 issued a report which commented favourably on the results of the Act of 1852.

Some years later suspicion of pollution through the discharge of sewage into the upper waters of the Thames led to the appointment, in 1865, of the first Royal Commission on the pollution of rivers.

The Act of 1852 apparently failed to remove the chief causes of discontent with regard to London's water supply, the chief of these being that the provisions in the Act as to constant supply were practically valueless. In 1866 another Royal Commission known as the Duke of Richmond's Commission, was appointed to ascertain "what supply of unpolluted and wholesome water can be obtained by collecting and storing water in the high grounds of England and Wales, either by the aid of natural lakes or by artificial reservoirs, at a sufficient elevation for the supply of large towns; and to report, firstly, which of such sources are best suited for the supply of the metropolis and its suburbs; and, secondly, how the supply from the remaining sources may be most beneficially distributed among the principal towns." This reference was subsequently extended "to enquire into the present water supply to the metropolis, and whether there are other districts, in addition to the high districts of England and Wales, from which a good supply of unpolluted and wholesome water can be obtained." In the course of their inquiry the Commissioners had submitted to them several schemes for the supply of London with water. Among these may be mentioned (1) Mr. J. F. Bateman's scheme for the utilisation of the water of the sources of the Severn; (2) Messrs. Hemans and Hassard's scheme in connection with the Cumberland and Westmoreland lakes; (3) Mr. Hamilton Fulton's scheme for utilising the waters of the Wye and its head tributaries; (4) Mr. Remington's scheme for bringing water from the hills of Derbyshire; (5) Mr. McLean's scheme for utilising the Thames watershed; (6) Mr. Bailey Denton's plan for utilising the waters of the Thames basin; (7) Mr. Mylne's plan for utilising the water of the Lea basin; (8) Mr. Telford McNeil's scheme for the interception of the water of the Thames at Teddington and conveying it to and filtering it through Bagshot sands.

The Commissioners reported in 1869, and their conclusions may be summarised as follows:—

1st. That Mr. Bateman's scheme to bring water from Wales was feasible and practicable, and that by it a large supply of water might be obtainable for the metropolis.

2nd. That the existing sources of supply available from the Thames basis were ample for all the wants of any possible increase of the metropolitan population.

3rd. That there was no evidence to lead the Commission to believe that the quality of the water then supplied was not generally good and wholesome, and that when efficient measures were adopted for excluding sewage and other pollutions from the Thames and the Lea and their tributaries, and for ensuring perfect filtration, water taken from the present sources would be perfectly wholesome and of suitable quality for the supply of the metropolis.

4th. That a probable increase of population to 4,500,000 or 5,000,000 might at some very remote period have to be provided for, and that 200 million gallons per day was the "highest demand" that need be reasonably looked forward to for the metropolitan supply.

5th. That a constant supply of water ought to be promptly introduced, but that this system could not be effectually carried out in the hands of private companies.

6th. That the general control of the water supply should be entrusted to a responsible public body, with powers conferred on them for the purchase and extension of existing works, and with powers for levying the necessary rates.

The conclusions of the Commission relating to the general control of the water supply were as follows:—

"That it is a matter of vital importance that an abundant supply of water should be provided for all classes of the population, as well as for general public purposes, street watering and cleansing, public fountains, and extinguishing fires.

That for these purposes there should be a power of levying, as at Manchester, Glasgow, and elsewhere, two rates, one a special or domestic rate on all dwelling-houses, the other a public or general rate upon all rateable property.

That no trading company could be permitted to levy or expend such compulsory rates, and that therefore the future control of the water supply should be entrusted to a responsible public body, with powers conferred on them for the purchase and extension of existing works, and for levying the rates referred to.

That this plan offers the only feasible means of introducing efficiently the system of constant supply, and for securing a compulsory supply to the poor. We believe that it would tend to economy, to the improvement of the quality of the water, and to ensure the proper provision for public objects and for extinguishing fires; and that it would increase the probability of beneficial results from the purification of the Thames."

It will be noted that the 6th conclusion of this Royal Commission was that the general control of the water supply should be in the hands of a responsible public body. The Commission did have some result in that the Metropolis Water Act, 1871, was passed. This Act contained provisions for extending constant supply with requirements as to proper fittings, etc., for the appointment of a water examiner to see that filtration of domestic supply was properly worked, and for the auditing of the companies' accounts. Some of the weightiest of the recommendations, however, were ignored and there was no attempt to carry these into effect until 1878, when the Metropolitan Board of Works introduced two bills. One based upon the dual system referred to by the Commission, sought

authority to provide a new constant high-pressure service for drinking and cooking, and for extinction of fires (a matter which had previously received the attention of Committees of Parliament), while not interfering with existing supplies for ordinary household purposes; the other sought powers to purchase the companies' undertakings. The bills met with strong opposition, and were withdrawn. Considerable expenditure, however, had been incurred, which would have been sanctioned by the costs clauses if the bills had passed, but as it was the auditor disallowed the expenses because they had been incurred without proper authority. A relief Act (Metropolitan Board of Works Indemnity Act, 1879) was, with difficulty, passed to relieve members of the Board from liability.

In 1880 the then Government introduced a bill for the purchase of the Water Undertakings of London, which proposed transfer by agreement with the Companies, and this bill got as far as the committee stage when there was a change of government. The bill, however, was referred to a Select Committee presided over by Sir William Harcourt. Although that Committee re-affirmed the principle of public control, it reported against the terms of purchase and the bill was quietly dropped.

The Metropolitan Board of Works, in 1884, 1885 and 1886, tried to obtain powers which would enable it to prepare schemes for the water supply of London, but had no success.

The year 1889 saw the coming of the London County Council, and that body at once recognised that the question of London's water supply was one of major importance. It appointed a Water Committee to look into the matter, but found for a start that the Council laboured under the same disability as the Metropolitan Board of Works with regard to the expenditure of money for the enquiries necessary. As a result the Council, in its General Powers Bill, 1890, obtained power to spend £5,000 in prosecuting enquiries and conducting negotiations with regard to water supply.

The year 1891 saw two bills introduced: one by the Corporation of the City of London, proposing a Commission with power to introduce bills into Parliament for objects which included the acquisition of existing and the construction of new waterworks and the supply of water. The Commission was to have been of a very widespread character, including the Lord Mayor, the Chairman of the London County Council, nominees of Government departments, the City Corporation, the London County Council, the County Councils of Middlesex, Surrey, Essex, Hertfordshire, Buckinghamshire, Berkshire and Oxfordshire and one each by the Corporations of the Boroughs of West Ham, Richmond, Kingston, Windsor, Reading, Abingdon and Oxford. The total membership was to be 51, but provision was made for additional members to be nominated from time to time by certain other bodies, including the two Conservancies. The second bill was promoted by certain London vestries, with the object of creating a trust to be popularly elected. This trust was to acquire the companies' undertakings by agreement or on arbitration

terms. Both bills met the usual fate and were lost. How far the division between London's rulers contributed to the fate which awaited the bills is difficult to say, but a Select Committee, presided over by Sir Matthew White Ridley, recommended that the bill should be suspended and further enquiries made into the whole matter. In the meantime the London County Council and the City Corporation came to an agreement for joint working in connection with water.

The terms of this agreement were very interesting as they contained the genesis of a public water authority for London. They were as follows:—

- (1) Appoint a Water Committee as hereinafter defined, viz., seven-eighths to be appointed periodically by, and to be members of, the London County Council, and one-eighth fit and proper persons by the Corporation; to be a statutory committee, and a committee of the London County Council.
- (2) Power to the committee to promote bills which may be approved by the London County Council for (a) a new supply of water, (b) purchase and (c) or both.
- (3) To take a limit of time if forced to do so.
- (4) Charge the costs of Act and administration of committee, and of promotion, on general county rate.
- (5) To legislate as to committee this year, if possible.
- (6) If impossible, Corporation and London County Council to promote bills next year on these lines, the expense of such bills to be borne by the Corporation in case bills do not pass.
- (7) The supply of water in each district in the metropolitan water area, outside the boundary of the County of London, to be as far as practicable in the hands of the local authority of each district, and within the County of London in the hands of said statutory committee.
- (8) The committee to have full power over details; but questions of principle and policy to be reserved to the London County Council.

Sir Matthew White Ridley's Select Committee, as a result of their further enquiries, recommended (1) that powers should be granted to the London County Council to expend further sums for exploration purposes; (2) that the London County Council should have power to promote a bill or bills in Parliament for the purpose of constituting themselves the responsible authority for London acting through a statutory committee along the lines of the agreement with the City Corporation; (3) that the London County Council, if constituted the water authority, should be required to purchase either alone or in conjunction with such of the authorities of the outside areas as may be arranged, the undertakings of the eight water companies (except, possibly, certain lands of the New River Company); (4) that subject to such arrangements the new water authority should take over the duties and obligations of the companies in the districts outside the boundaries of the County of London; (5) that the new authority should settle matters of detail arising from distribution in the area of Local Authorities; (6) that authorities like Croydon, Richmond and Tottenham, then independent water supply authorities, should be guaranteed their independence.



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The London County Council discussed the report and recommendations of the Select Committee and passed resolutions as follows :—

(1) While welcoming the recommendations 1, 2, 4 and 5 of the Select Committee, they felt themselves unable to be required to purchase the undertakings of the 8 water companies within a fixed period.

(2) That the Council agreed that it would be desirable to acquire the existing undertakings if the same could be obtained on fair and reasonable terms.

(3) That the price should depend not on past dividends or Stock Exchange values, but on the true values of the undertakings.

(4) That to arrive at a satisfactory conclusion concerning the value all liabilities to capital expenditure should be properly ascertained.

As stated, however, the bills on which this report was based were dropped.

The L.C.C. and the City Corporation promoted a yet further bill, in 1892, to constitute, *inter alia*, a new water authority, but this had little result for the Select Committee of the House of Commons struck out those portions of the bill constituting a new water authority. The remainder of the bill did, in fact, become law and the two outstanding points were that the powers of the Council to expend money in making enquiries were enlarged and the Council was, in fact, enabled to pay the expenses necessary for the introduction or promotion of the bills on the water question.

As a result of the attempts of 1891 and 1892 yet another Royal Commission was appointed in 1892, with Lord Balfour of Burleigh as chairman. It reported, in 1893, to the effect that the population in 1931 might be expected to be  $11\frac{1}{4}$  millions, with an average daily demand of 391,717,690 gallons, and a maximum daily demand of 415,219,752 gallons. The meticulous exactitude of the latter figure would have made Professor John Perry, the father of Practical Mathematics, smile, for what are 752 gallons compared with 415 millions.

The Royal Commission reported further that to cover this amount 420 million gallons per day might be expected to be obtainable from the Rivers Thames and Lee, and from the wells in the area. Prophecy is notoriously dangerous, nor could the Royal Commission be expected to see the trend of birth limitation in the twentieth century. Instead of the population being  $11\frac{1}{4}$  millions in 1931 it was approximately 7 millions, nor were the Royal Commission more correct with regard to the expectation of consumption. During the immediate pre-war years the figure of 392 million gallons average per day had not been attained, but the daily demand during the drought of 1933-34 exceeded 350 million gallons on 16 days. The

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forecast maximum daily supply of 415 million gallons was not reached during the pre-war years, the nearest being 410.6 million gallons in June, 1939. In addition to the change of habits with regard to the number of births, a habit that one hopes will be changed once again should the Beveridge Report be implemented, there is the further change of habit with regard to the greater user of water. While during the war every effort for the sake of fuel economy has to be made to cut down water consumption, it still is true in normal times that the use of water is the index of civilization, and after the war one must expect that the *per capita* consumption must increase, nor need this be surprising seeing that in all post-war housing ample provision must be made for copious supplies of both hot and cold water for bathing and other domestic purposes.

When the Balfour Report was considered by the London County Council that body passed a resolution which affirmed, among other things, that the true solution of the London Water problem was the introduction of water from a purer source. The Water Committee was instructed to proceed with the preparation of a scheme embodying this, which, after consideration by the Council, was to be presented to Parliament for the necessary powers to be granted.

The L.C.C. would appear to have been animated by several considerations. It wished to ensure an ample supply of water for London; it aimed at being the water authority for London; and, in the beginning, at any rate, it did not desire to pay the price the Water Companies were asking for their undertakings. In the light of subsequent events there is much to be said for the point of view then expressed.

The Water Committee of the L.C.C. was, however, empowered to negotiate with the Companies for the purchase of their undertakings at a fair and reasonable price on the basis of willing buyer, willing seller, but there was little or no reciprocation from the Companies, and eight bills were prepared for submission to Parliament embodying the Council's decision on this matter. Owing to the magnitude of the question and the time that would necessarily be taken in the consideration of these bills they were dealt with separately, those dealing with Lambeth and Southwark & Vauxhall Companies being the first to be considered, and these were to be regarded as a test case. A second reading was obtained and they were referred to a Committee of the House of Commons presided over by Lord Rathmore (then Mr. Plunket), but the dissolution of Parliament before the end of the committee stage resulted in the bills being suspended. The bills were ultimately rejected by the succeeding House of Commons.

It was at this time that the L.C.C. turned its serious attention towards a purer source of supply than the Thames or the Lee, and Wales was the country whence it was proposed that supply should come.

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The first L.C.C. Welsh water scheme proposed to take water from the watersheds of the Usk, Wye and Towy, which were estimated to yield an average supply of 415 million gallons per day. These streams suffered from the same complaint as did many other streams in this country—a liability to cease their flow entirely in times of drought—and to meet this situation large impounding reservoirs were to be arranged. The largest of these was to have a capacity of 38,000 million gallons, and was to be situated on the Llangorse. The next largest was to have a capacity of 31,000 gallons and to be located on the Yrfron. Reservoirs on the Upper Wye, Tithon and Edw were designed with capacities of 10,500, 9,000, 4,400 million gallons respectively. The sum total capacity of all these reservoirs would have been 92,900 million gallons or, approximately, a seven months' supply. In addition, three compensation reservoirs were to be provided for restoring water to the streams during times of drought.

Water was to be brought from the impounding reservoirs to London in two aqueducts. One from the upper reaches of the Usk was to finish at Elstree, where pumping stations and filter beds were to be situated; the other was to come from the head waters of the Wye to Banstead, where similar works to those at Elstree were to be erected. Each of these aqueducts were to be capable of carrying a quantity equal to half the daily supply required. From Banstead and Elstree water was to be conveyed in mains to connect up with the London area, the water thus being carried over 160 miles. The estimated cost was thirty-nine million pounds, and fifteen years would have been required to carry out the work.

It is a very moot question as to whether the Welsh supply would have been the best that could have been obtained. True, it would have eliminated many of the problems that arose to the use of Thames water. The raw material would certainly have been of purer quality, but there would have been the question of the maintenance of long aqueducts to be considered. While these need not necessarily have given London more trouble than do similar aqueducts for the water supplies of Glasgow and Manchester, I am bound to confess to a feeling of relief that during the war London has not had the possibility of sabotage of a one hundred mile long aqueduct in connection with its water supply. True, we are not always at war. True, too, that many of us hope that war and the dread of war, will be vanished for many years to come, if not entirely, but the possibilities of war may remain as long as fallen humanity is still fallen. The fate of the water supplies of Singapore and Hong-Kong is too much before one's eyes for a similar fate to be even contemplated for London and its water supply.

The year 1895 saw the historic great frost, when the Thames was frozen over and water distribution became a nightmare to all water engineers. East London, in particular, suffered very badly indeed as a result of this frost, and there was yet another outcry on the water question from both press and public. The L.C.C. then

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came to an arrangement with the City Corporation whereby legislation should be promoted for the purchase of the undertakings of the eight companies. One of these was introduced to the House of Commons in March, 1897—that for the Chelsea Company, but it was opposed by the then President of the Local Government Board, Mr. Henry Chaplin, who stated that a Royal Commission should be appointed to settle the whole matter. As a consequence the Bill was defeated and the other seven bills were dropped.

On 1st May, 1897, the Commission, with Lord Llandaff as chairman, was appointed and was charged with the duty of a complete survey of the London water situation, taking into account charges and all other methods of co-ordinating the London water supply. The enquiry proved to be a very long one and did not finish until 23rd March 1899. Its first report was issued in that year, but the final report did not emerge until 1900.

While the Commission was sitting, yet another water famine occurred in London in 1898, East London once again being the greatest sufferer, and in 1899 the L.C.C. presented two bills for the purchase of the undertaking and for additional supply from Wales.

This scheme would have necessitated the construction of one aqueduct only from the head waters of the Wye, and, in addition, the impounding reservoirs would have been on a smaller scale. The cost of the modified scheme would have been 16½ million pounds. This bill met with no better fate than its predecessors and was rejected, although in the same year Parliament passed a bill promoted jointly by the Water Companies to facilitate inter-communication between their various systems.

The report of the Llandaff Commission gave many people "furiously to think"—among them the members of the L.C.C. Regarding the year 1941 as the latest to which regard should be paid, the Commission considered that the population of Water London would then be 12 millions, with a total daily consumption of 423 million gallons—roughly 35 gallons per head. As, however, Water London might have been somewhat extended by that time, they calculated the population of the greater area as 13,231,216 persons and the average daily quantity of water required as upwards of 463 million gallons.

The Report did not agree that the L.C.C. should be the authority nor did it agree that it was necessary to go farther afield than the Thames and Lee for the source of supply.

Although the L.C.C.'s bills were reintroduced, after deputations to the responsible Minister, no better fate awaited them, as the Government had practically decided to adopt the idea of an *ad hoc* authority to take over the water undertakings.

In 1902 the century-old struggle came to an end, and on 30th January of that year Mr. Walter Long (afterwards Lord Long of Wraxall), then President of the Local Government Board, introduced

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the Metropolis Water Bill. After many vicissitudes in Parliament and in Committee the bill became law under the title of the Metropolis Water Act, 1902.

This Act provided for the establishment of a Board to be called "The Metropolitan Water Board," to take over the undertakings of the water companies on terms to be settled—if necessary, by arbitration—and generally for the purpose of supplying water within an area that differed in some respects from that within the limits of the actual and potential supply of the companies.

The effect of this Act was that for the future the administration of the water supply of London was to be run in the interests of the whole of the citizens of London. In other words, that which the Corporation of the City of London had declined to do in 1607—institute a municipal water supply—was done on a larger scale by the Metropolis Water Act of nearly three centuries later.

One is saddened by the contemplation of the struggle that went on during last century between the advocates of private interests and public welfare. Whether a government of this country ought to stand aside while such a battle is being fought is a matter on which there are differing opinions, but in all such battles that which should be the prime concern of all parties is the public weal and all other interests ought to be made subservient thereto.

What London had suffered due to the action of the City in Jacobean times in refusing to do its obvious duty passes imagination, although there may be some excuse in the fact that people then could not be expected to have the vision of Victorian or Edwardian Londoners. While one bears in mind the many public-spirited actions of the City in other directions, in the respect now under review it is another illustration of Whittier's words: "The saddest thing in tongue or pen is this sad thing—it might have been." If other words be sought, then possibly Bret Harte's words could be used and Whittier's varied to read: "It is, but ought never to have been."

From 24th June, 1904 onwards, for good or ill, Water London has been under the control of the Metropolitan Water Board, with the result that to-day, Water London—when it thinks about the matter at all—rejoices in a better, purer and more abundant water supply than it had ever possessed before throughout its long history.

#### EARLY DAYS OF THE BOARD.

Under the provisions of the Metropolis Water Act, 1902, the membership of the Metropolitan Water Board was fixed at sixty-six, which is still the number, composed as follows:—14 members appointed by the London County Council, one member appointed by each of the County Councils of Essex, Hertfordshire, Kent, Middlesex and Surrey, two each by the Councils of the Cities of London and Westminster, and the County Borough of West Ham, one by each of the remaining 27 Metropolitan Borough Councils, one each by the Thames and Lee Conservancy Boards, one each from certain groups of authorities outside the County of London—seven groups in all, and one each from the Urban District Councils (now Boroughs) of East Ham, Leyton, Walthamstow, Tottenham and Willesden. The Chairman and Vice-Chairman may be chosen from the 66 appointed members, or persons other than these may be selected for these posts.

It is interesting to compare this constitution with that proposed under the bill promoted by the City Corporation in the year 1891, to which reference has already been made. The commission then proposed was to have consisted of the Lord Mayor, the Chairman of the London County Council, nominees of Government departments, the City Corporation, the London County Council, the County Councils of Middlesex, Surrey, Essex, Hertfordshire, Buckinghamshire, Berkshire, and Oxfordshire, and one each by the Corporations of the Boroughs of West Ham, Richmond, Kingston, Windsor, Reading, Abingdon, and Oxford. The total membership was to be 51, but provision was made for additional members to be nominated from time to time by certain other bodies, including the two Conservancies.

The first meeting was held in the Council Chamber of the Privy Council on 2nd April, 1903, when Mr. (later Sir) Almeric W. FitzRoy, the then Clerk to the Privy Council, opened the proceedings by welcoming the members. Sir James Thomson Ritchie was appointed "Temporary Chairman." The second meeting was held at Caxton Hall, Westminster, under the chairmanship of Sir James Ritchie. This meeting and the succeeding one were regarded as adjourned meetings of the first. At the third meeting Mr. (afterwards Sir) Melvill Beachcroft was appointed Chairman of the Board, this meeting being held at the Offices of the Metropolitan Asylums Board, where the meetings continued to be held until 15th March, 1918.

The Apocrypha gives us the wholesome injunction "Let us now praise famous men and our fathers that begat us." Acting under this injunction, I think it well to give the names of the members of the first Board. The views many of these held are not my views. Their outlook on life was altogether different to mine, but they and their immediate successors laid the foundations of London's water system as we know it to-day. It is easy for persons in 1943 to point out the mistakes of their predecessors and to pride themselves on being so much wiser than they. Such an attitude, however, is



comparable to a small boy standing on his father's shoulders and saying, "Look how much bigger I am than Daddy." If each generation is served by its chosen administrators according to the light that is vouchsafed to them and according to their best abilities, more cannot be asked. It is only to be expected that knowledge shall grow from more to more, but it is well that with the growth of knowledge more reverence for our predecessors should in us dwell.

Following are the original members of the Board:—

#### ORIGINAL MEMBERS OF THE BOARD.

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|--|--|
| AVERN, ERNEST (Fulham B.C.).   | LAYMAN, ARTHUR (Bermondsey B.C.).  |
| BAKER, C. E. (Beckenham, Bromley, Chislehurst, Penge, Bexley, Dartford, Erith & Footscray Urban District Councils).    | LEA-SMITH, JOHN (St. Marylebone B.C.).   |
| BARNARD, E. B. (Hertfordshire C.C.). (Afterwards Sir EDMUND BARNARD).  | LIDIARD, JOHN (Wandsworth B.C.).   |
| BEACHCROFT, R. MELVILL (L.C.C.). (Afterwards Sir MELVILL BEACHCROFT).  | LYNE, THOMAS, J.P. (Kingston & Wimbledon B.C.'s & East & West Molesey, Esher & The Dittons, Ham, Surbiton, Barnes & The Maldens & Coombe U.D. Councils). |
| BENN, I. H. (Greenwich Met. B.C.). (Afterwards Sir ION HAMILTON BENN).   | LYON, ROBERT, J.P. (Camberwell B.C.).  |
| BRADFORD, H. W., J.P. (Westminster City Council).  | MALONE, P. B., J.P. (Tottenham U.D.C.). (Afterwards Sir PATRICK MALONE).   |
| BRASS, J. H. (Chelsea B.C.).   | MANN, Sir EDWARD, Bart., J.P. (Stepney B.C.).  |
| BURNS, JOHN, M.P. (L.C.C.).  | MCDUGALL, Sir JOHN (L.C.C.).   |
| BURRELL, WM. (Lewisham B.C.).  | MORGAN, D. J. (Essex C.C.).  |
| BURT, CHARLES, J.P. (Surrey County Council). (Afterwards Sir CHARLES BURT).  | MUSGRAVE, C. G., J.P. (Leyton U.D.C.). (Afterwards Sir CHRISTOPHER MUSGRAVE.)  |
| BURT, HENRY, J.P. (Hornsey Borough & Wood Green U.D.C.).   | PICKERSGILL, E. H., M.P. (Bethnal Green B.C.).   |
| BUTTER, H. J. (Woolwich B.C.).   | PINKHAM, CHAS., J.P. (Willesden U.D.C.).   |
| CHAMBERLEN, THOS., J.P. (Hammer-smith B.C.).   | PRITCHARD, C. F. (Hampstead B.C.).   |
| CLARKE, HENRY, J.P. (L.C.C.).  | PROBYN, Lt.-Col. C., J.P. (Westminster City Council).  |
| COLVILLE, Lt.-Col. C. F. (Royal Borough of Kensington).  | RADFORD, G. H. (L.C.C.).   |
| CORNWALL, E. A. (L.C.C.). (Afterwards Sir EDWIN CORNWALL).   | RICHARDS, T. M., LL.B. (Lambeth B.C.).   |
| COURTHOPE, G. J. (Kent County Council).  | RITCHIE, Sir J. THOMSON (Common Council of City of London).  |
| CROFT, R. B. (Lee Conservancy Board.).   | RUSSELL, H. W. (Thames Conservancy).   |
| DAWES, J. A. (Southwark B.C.).   | SANDERS, J. H. (Edmonton, Enfield & Southgate U.D.C.'s).   |
| DICKINSON, W. H., D.L., J.P. (L.C.C.). (Afterwards Lord DICKINSON).  | SANDHURST, LORD, G.C.S.I., G.C.I.E. (L.C.C.).  |
| DOLL, C. FITZROY, F.R.I.B.A. (Holborn B.C.).   | SAWELL, H. T. (Shoreditch B.C.).   |
| ELLIOTT, G. S. (Islington B.C.). (Afterwards Lt.-Col. Sir GEORGE ELLIOTT).   | SMITH, W. R. (Deptford B.C.).  |
| GLASS, JOHN (Stoke Newington B.C.).  | SPRATT, L. W., J.P. (West Ham County B.C.).  |
| HARRIS, C. T., J.P. (Common Council of City of London).  | THORNLEY, J., J.P. (St. Pancras B.C.).   |
| HARRIS, H. P. (L.C.C.).  | TOZER, A. H. (Buckhurst Hill, Chingford, Loughton, Waltham Holy Cross, Wanstead & Woodford U.D. Councils).   |
| HOWES, ENOS, J.P. (Finsbury B.C.).   | WARD, HENRY (L.C.C.).  |
| HUGGETT, E. P., J.P. (Middlesex C.C.).   | WATTS, WILLIAM (Battersea B.C.).   |
| IDRIS, T. H. W., J.P. (L.C.C.).  | WELBY, LORD, G.C.B. (L.C.C.).  |
| KARSLAKE, J. B. P. (Paddington B.C.). (Afterwards Lieut.-Col.).  | WHITE, EDWARD, J.P. (L.C.C.). (Afterwards Sir EDWARD WHITE.)   |
| KETTLE, JOHN, J.P. (West Ham County B.C.).   | WHITE, P. A. (Poplar B.C.).  |
| KING, A. W. W., J.P. (Ealing B.C. & Acton & Chiswick U.D. Councils).   | WHITER, J. W. (Hackney B.C.).  |
| KNIGHT, T. L. (East Ham B.C.).   | WILKINSON, C. T. (Walthamstow U.D.C.).   |
| LAWTON, J. H. S. (Hampton, Hampton Wick, Hanwell, Heston & Isleworth, Sunbury, Teddington & Twickenham U.D. Councils). | WOOD, T. MCKINNON, LL.D., D.L. (L.C.C.).   |

Most of those who constituted the first Board have passed away and none of them are now members of the Board. The recent decease of the sole surviving serving original member, Colonel Karlake, closed a long chapter of unbroken service in which he had the honour of being Chairman of the Board from 1920-22, as well as serving the Board with distinction in other directions.

The only original member of the Board who still survives in the white winter of his age is Capt. Sir Ion Hamilton Benn, who represented the Greenwich Borough Council from 1903-06, and still serves on the Thames Conservancy.

The original members of the Board with whom I have served since I joined in 1923 are Sir Edmund Barnard, Sir R. Melvill Beachcroft, Mr. C. FitzRoy Doll, Colonel Karlake, Sir Patrick Malone, Sir Christopher Musgrave, and Mr. Henry Ward. I have a number of memories concerning these venerable members. Mr. Henry Ward brought with him reminiscences of the London County Council Water Committee and was a strong advocate of a Welsh supply even when the Board came to the decision to build the three new reservoirs at Chingford, Staines and Walton. Colonel Karlake's membership, too, was too recently broken for him to be forgotten. Shy, reserved to a fault, he nevertheless rendered tremendously good service to the Board. Sir Christopher Musgrave was one of the "old school," with all the prejudices of that school. During his six years' chairmanship great work was done for the modernisation of the Board's supply. Sir Patrick Malone, typical son of the Emerald Isle, both in his virtues and failings, died, as he would have wished, in harness in the Board's work. Mr. C. FitzRoy Doll had a wealth of antiquarian knowledge, and this, together with his knowledge of London, was of great value to the Board in earlier days.

As I mentioned when pronouncing the valedictory on Mr. John Burns, the Board and London generally are indebted to Mr. FitzRoy Doll and Mr. John Burns for the fact that on at least one occasion they combined together for a common object. Knowing both of them I can easily imagine that the occasions of their combination were somewhat rare, but on the particular occasion to which I refer the result was the acquisition of the Oak Room with all its marvellous Grinling Gibbons' carvings as a permanent possession for London for all time. The price paid was £2,000. There is not enough money in the whole of the United States to buy it to-day.

Sir Edmund Barnard, second Chairman of the Board, bluff and downright, fighting to the end to what he believed to be right, had a variety of interests, some of which hardly reconciled themselves with one another, but he was a worthy man, and a worthy old-time member of the Board. Sir Melvill Beachcroft, whom I knew personally only when he was in the absolute sere and yellow leaf of his life, had, during his period of office as first Chairman of the Board, done yeoman work in guiding the Board during that difficult period. It was a sign of changing times that when he felt compelled to resign from the General Purposes Committee as representative

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hereon of the Water Examination Committee I should have been the one chosen to succeed him.

Once appointed, members of the Board are loath to sever their connection therewith, and this tendency is marked by the years of service certain members have given. The father of the Board is Mr. E. G. Simmonds, J.P., representing Deptford, who was appointed in 1911. Other long service members are the Marquis of Aberdeen, O.B.E., H.M.L., D.L., J.P. (London County Council), appointed in 1913; Mr. John Fettes, J.P. (St. Marylebone), appointed in 1916; Colonel Sir William Prescott, Bart., C.B.E., D.L. (Middlesex County Council), appointed in 1919; and Lieut.-Col. Sir George Handover, O.B.E., D.L., J.P. (London County Council), appointed in 1922. Personally, I shall attain the honourable length of twenty years' service this year. During the past year or two long-service members who have passed away are:—Mr. W. D. Cornish, with an equal length of service to Mr. Simmonds, albeit broken into two parts; Mr. R. W. James; Mr. Ilsley; and Mr. Beavis.

The first Board charged with the duty of taking over the Water Undertakings of London started without a home, without a penny piece, and, incidentally, without a cheque book. Starting with such strawless bricks the public utility since erected, whose foundations it laid, is not unworthy of the name it bears.

It is well to look at the task that confronted the first Board. Not only had they to take over the Undertakings of the eight Companies, but they had to take these eight independent systems and weld them into one whole. True, there had been a certain amount of intercommunication between the Companies, but this was of a very limited extent. As frequently happens when organisations have been working along independent lines, their points of contact are far different from what they would have been had they been organised *ab initio* as one whole. An example of this is provided at the present day. Whatever may be the ultimate fate of the organisation of the water supply to the Greater Metropolis, it certainly is well that there shall be proper intercommunication between the present separate and independent Water Authorities. Such intercommunication has been effected to a certain degree under the stress of war and is one of the happy outcomes of the way in which the Water Undertakings in the London Civil Defence Region have worked together under the aegis of the War Emergency Water Committee. This intercommunication, however, is a poor substitute for the arrangements that would have been made had there been large-scale water planning, and an awful example of what ought not to be is provided by the fact that where the mains of the Board and the South Essex Water Company adjoin, such mains are at their smallest instead of being approximately of the largest size. Something similar to this was the state of affairs that presented itself to the first Board, and it is from that state of affairs that evolution has proceeded ever since.

#### EARLY DAYS OF THE BOARD

I well remember the task that confronted the London County Council in 1930 onward when, under the Local Government Act of 1929, the hospitals previously under the control of the Metropolitan Asylums Board and the various Boards of Guardians and the institutions (formerly workhouses), also formerly under the control of the Boards of Guardians, came under the control of the London County Council. Each of these services had to be welded into a unified whole. Great progress has been made over the years, but, in the very nature of things, the work even now is not entirely complete. Equally as great, or even more difficult, was the task that confronted the first and successive Boards. To-day we can claim to have a unified system, but it is a system far different from that which would have been the case had the water supply for our area been properly planned.

The area itself that was given to the Board again was by no means an ideal one. The Borough of Richmond is an autonomous enclave within the area, albeit having its own supply, augmented by bulk supplies from the Board. Part of the Board's own territory is arranged so that other Water Authorities have concurrent rights of supply. The Borough of Croydon was excluded from the Board's area. The Hoddesdon district again is an area where another authority has concurrent rights of supply. To sum up: the Board's present area, like the area which was taken over by the Board in 1904, is one that has little to justify its present limits, and is one that could with advantage to all concerned have its boundaries readjusted by the inclusion of other territory. Still, it was the area with which the first Board had to deal, and in spite of all manifest disadvantages and drawbacks, it was the area that that Board had to weld into one harmonious whole and an area to which it had to give what that area had never completely had before, a full and sufficient water supply.

The Board did not start under any too happy auspices. The London County Council was naturally not pleased that the Board and not the Council was to be the Water Authority. To the credit of the Council, however, it must be said that it placed at the disposal of the Board every facility for which the Board asked. Other people were not pleased. Many friends of the Companies thought they had had a raw deal given them. Among the general public some thought of the Water Board as of a certain animal concerning which the remark has been passed that it is without pride of ancestry or hope of posterity. The Board's unpopularity was enhanced when, in 1907, it sought to straighten out the muddle of water charges, and non-public-minded persons in the City and West End, rather than pay their proper water rate contributions, sunk wells to avoid the payment, totally ignoring the fact that the Board's mains and the Board's supply afforded them protection from fire, to which, incidentally, they were not contributing one penny in water rate. It is only in recent years that the unpopularity of the Board has decreased to any marked extent, and one good effect of the war has been the way in which the public of London has responded to

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the appeals for co-operation that have been made. To-day it may be fairly said that the Board enjoys more popularity than was ever the case previously in its career.

For the purposes of clarity I would remark that the move towards greater popularity has been going on steadily throughout the last decade but, naturally, the Board's performance of its duties during the war has accentuated it.

While on this question it is not without interest to note that in the issue of *The Times* for 26th January, 1943, the A.C. Sphinx Sparking Plug Co. Ltd., wishing to quote a standard of reliability for their productions, said: "A thousand, ten thousand times the tap is turned and every time there is water, dependable as to-morrow's daylight. If it were not so, what a tanglewood tale of confusion would follow in the home. . . ." I thought it was well that an acknowledgment of this tribute should be sent to the Company both in the name of the Board and of British Water Undertakings generally, to which I received the following reply:—

"It was a kind thought which prompted you to write me your note of the 28th January with reference to our having directed attention, in a recent sparking plug advertisement in *The Times*, to the high standard of reliability set by the Water Supply Authorities of this country.

If I may say so, such reliability is proverbial, while we also feel that the manner in which the various Water Supply Authorities have coped with the serious situations arising out of air-blitz conditions, has merely served to strengthen a fine reputation."

It is good to feel that our efforts, in common with those of our colleagues in other British Water Undertakings, receive acknowledgment if only in an implied character.

On the other hand, the Board is criticised from time to time, and the following verses are a type of the criticism. They were written in connection with restrictions which the Board had imposed on 19th July, 1929 on watering sports grounds and gardens by means of hose and the use of hose for washing motor-cars. The restrictions were removed, as far as motor-cars were concerned, on 2nd August, 1929, and the rest removed on 7th October, 1929.

PUNCH—1st JANUARY, 1930.

"THOUGHTS FROM A FLOODED AREA."

"Come, let us praise with one accord  
The Metropolitan Water Board,  
Which with discriminating eye  
Deals with the question of supply,  
And in the late most grievous drought  
Forbade us bring our hosepipes out.

In the grim crisis of that time  
It seemed the meanest sort of crime  
Even to wash our hands and faces,  
So stringent were its stern ukases;  
And he who dared to swill his car  
Was rightly treated on a par  
With wicked men who stay out late  
And buy tobacco after eight.

#### EARLY DAYS OF THE BOARD

If then we felt disposed to grouse  
To-day we must applaud the nous  
That moved our thoughtful Water Board  
To guard so well its dwindling hoard;  
For, had we been allowed to spout  
And splash the precious stuff about,  
We might not now be in the mood  
To relish such a plenitude.

Even the wretch who rose ere dawn  
To spray by stealth his arid lawn  
And souse his seedlings 'neath the moon,  
Little as he deserved this boon,  
May joy to see the affluent flood,  
Rich with alluvial ooze and mud,  
Depositing its gracious store  
Upon his very kitchen floor.

Since everything has ended well,  
Now let our thankful voices swell  
And magnify in sweet accord  
The Metropolitan Water Board."

(Reproduced by permission of the Proprietors of "PUNCH.")

The Board's offices were originally located at Caxton Hall, and the original arrangements made for these at the Board meeting held on 8th May, 1903, were as follows:—

- "(1) The exclusive use of six offices and a typist's room on the ground floor and a strong room in the basement, including lighting, heating and cleansing, at a rent at the rate of £500 a year, on a tenancy determinable by three months' notice on either side at the end of six months from the date of its commencement, or at any subsequent period;
- (2) The use of such Committee Rooms as the Board by due notice may require, preferably Nos. 13, 18 and 15, for £1 1s. 0d. per room for each day used;
- (3) The use of the Council Chamber, if required, for £3 3s. 0d. for each occasion used."

The Board meetings were, however, held at the offices of the Metropolitan Asylums Board, and the meetings continued to take place there until the 15th March, 1918.

Until a Clerk of the Board was appointed, Mr. Aubrey V. Symonds, of the Local Government Board, served as Acting Clerk, and it is interesting to note that from the Board Minutes of 10th July, 1903, the two following resolutions were passed:—

"That this Board desire to express their acknowledgment of the service rendered by the Local Government Board in according the assistance of one of their staff to serve as Acting Clerk pending the appointment of a permanent officer, the position of Acting Clerk of a newly formed public body such as the Water Board, whose duties had to be defined and organisation initiated, being one which demanded special capacity as well as acquaintance with the subjects to be dealt with, and Mr. Aubrey V. Symonds having shown both this capacity and knowledge in so marked a degree as to emphasise the obligation the Water Board are under to the Local Government Board for having made so happy a selection."

"That the Chairman of the Board be requested to transmit the foregoing Resolution to the President of the Local Government Board."



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The appointment of the first Clerk of the Board was not without its troubles. The then General Purposes Committee submitted three names : Mr. George W. Clarke, Town Clerk of Stepney, Mr. Albert B. Pilling, Town Clerk of Devonport, and Mr. William Terrey, General Manager of the Sheffield Corporation Water Works, Mr. Terrey being appointed, but at the meeting held on 29th May it was reported that Mr. Terrey had withdrawn his name, and Mr. Clarke having withdrawn his name, Mr. Pilling was the only one left, and the Board decided to re-advertise the post. Three candidates who appeared at the second trial of strength were : Mr. A. B. Bryceson, then Town Clerk of Woolwich, Mr. F. W. Craies, and Mr. Albert B. Pilling, and on an exhaustive vote Mr. Pilling was chosen. As a matter of interest there is a doubt as to whether the Board has any real legal authority to appoint a Clerk at all, this officer not being mentioned in the Board's Act. It may, however, be assumed that where the law is silent common sense reigns supreme.

The history of the Board in the first year is very largely made up of the work of the Special Arbitration Committee, which was presided over by the then Chairman of the Board, Mr. Melvill Beachcroft, and a very highly responsible task that Committee and the then Board had, for not only did claims of the Companies have to be considered, but claims against the Boroughs of Richmond and Croydon also had to be made and the claims of other authorities like Tottenham, Enfield, etc. had to be handled.

The Arbitration Tribunal established under the Metropolis Water Act, 1902, consisted of the Rt. Hon. Sir Edward Fry, F.R.S., Sir Hugh Owen, G.C.B., and Sir John Wolfe Barry, K.C.B.

An indication of their remuneration is contained in a letter from the Local Government Board dated 20th May, 1903 :—

LOCAL GOVERNMENT BOARD,  
WHITEHALL, S.W.  
20th May, 1903.

SIR,

I am directed by the Local Government Board to advert to your letter of the 4th instant and to state that, in pursuance of the provisions of Section 23 (4) of the Metropolis Water Act, 1902, they have decided that the remuneration to be assigned to each of the Commissioners who form the Court of Arbitration under the Act shall be as follows, viz. :—

At the rate of £500 a year from the date of the Commissioners' first private meeting—held on the 21st January last—to the date on which the Court hold their first sitting for the actual hearing of a claim under the Act and at the rate of £5,000 a year, for a period of twelve months, from the last-mentioned date.

The Board accordingly hereby assign to each of the Commissioners remuneration at the foregoing rates.

I am to add that if the work of the Court be not concluded at the end of the above-mentioned period, the question of the remuneration of the Commissioners during any subsequent period will be further considered by the Board.

I am, Sir,

Your obedient Servant,

(Signed) JOHN LITHIBY,  
Assistant Secretary.

The RT. HON. SIR EDWARD FRY, F.R.S.

#### EARLY DAYS OF THE BOARD

With the wealth of talent that the Companies had at their disposal, for all the Chief Officers of the Companies were retained in their service until the actual transfer, the Board had to seek help elsewhere for the presentation and backing of its case before the Arbitration Tribunal. Mr. H. L. Cripps, of the firm of Dyson & Co. (now Dyson Bell & Co.), which firm have been retained by the Board on many occasions since, was engaged to advise the Board generally on the conduct of the case.

The following are extracts from the Minutes of the Board meeting held 12th June, 1903, on the report of the Special Arbitration Committee :—

" Acting upon our instructions Messrs. Linklater, the Solicitors, have retained for the purposes of the Arbitrations the following Counsel : Mr. Fletcher Moulton, K.C., The Honourable J. D. FitzGerald, K.C., Mr. Freeman, K.C., Mr. Honoratus Lloyd, and Mr. A. B. Shaw.

The following Engineers have been retained to advise the Board in respect of the Arbitration Proceedings : Sir Alexander Binnie, Mr. G. F. Deacon, and Mr. E. Brough Taylor.

We have retained the following firms of Accountants to investigate the accounts and books of the various Companies and Local Authorities whose undertakings are to be purchased, namely :—

Messrs. Deloitte, Dever, Griffiths & Co.  
Messrs. John Annan, Dexter & Co.  
Messrs. Woodthorpe, Bevan & Co.

It is proposed that these firms should act jointly and also act in concert with Mr. John G. Griffiths, who was recently head of the firm of Deloitte, Dever, Griffiths & Co., and who will give his aid and assistance in arranging to what points investigation is to be directed, and will also join the three firms mentioned in giving evidence before the Court when required."

The public-minded character of the members of the Court of Arbitration is shown by the two following letters, which I think it well to set out *in extenso* :—

FAILAND HOUSE,  
FAILAND, NEAR BRISTOL.  
30th December, 1905.

SIR,

Now that the Court of Arbitration under the Metropolis Water Act, 1902, have concluded their labours, I address you on a matter personal to myself.

For the year of our chief labours—29th October, 1903 to 29th October, 1904—I have received as remuneration a sum of £5,000, for the intervals before and after that period much smaller sums.

I do not desire to retain for my personal use in respect of my services in any year a larger sum than £1,500, the difference between the salary I received as a Lord Justice of Appeal (£5,000) and the pension which I receive as a retired Lord Justice (£3,500).

From the £3,500 thus set apart I deduct £168 9s. 8d. for the Income Tax I have paid on that amount and a sum of £250 which I have presented to the Institute of Mechanical Engineers in recognition of their courtesy and in addition to the sum voted by your Board, and for the balance £3,081 10s. 4d. I now enclose my cheque, and beg its acceptance by your board.

I am, Sir,

Your obedient Servant,

EDWARD FRY.

SIR R. M. BEACHCROFT,  
Chairman, Metropolitan Water Board.

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VOEL,  
SOUTH GROVE,  
HIGHGATE.  
3rd February, 1906.

DEAR SIR MELVILL BEACHCROFT,

In the past week I have received the cheque for the final payment to me as one of the Arbitrators under the Metropolis Water Act. During the year in respect of which the fee was sanctioned by the Local Government Board I have received my Pension from the State amounting to £1,200, and I propose that my remuneration, as Arbitrator, should be reduced by that sum, less the Income Tax, which has been paid by me. I accordingly enclose a cheque for £1,140.

Yours faithfully,  
(Signed) HUGH OWEN.

Sir R. MELVILL BEACHCROFT.

On the 31st December, 1903, the paid-up capital of the  
31st March, 1904,  
Companies amounted to £22,156,297, viz. :—

	£
Ordinary Share capital ... ..	10,324,706
Preference capital ... ..	799,843
Loans ... ..	42,000
Irredeemable Debenture Stock ...	4,365,110
Redeemable Debenture Stock ...	6,624,638
<b>TOTAL :</b>	<b>£22,156,297</b>

The capital expenditure of the Companies, including that of the Staines Reservoirs Joint Committee, amounted at 31st December, 1903, to £22,837,449.  
31st March, 1904,

The net profits of the Companies for the year ending 31st December, 1903, after paying interest on debenture stock, 31st March, 1904,  
amounted to £1,119,730, made up as follows :—

	£
Chelsea ... ..	107,574
East London ... ..	146,764
Grand Junction ... ..	107,760
Kent ... ..	128,237
Lambeth ... ..	156,755
New River ... ..	245,736
Southwark and Vauxhall ... ..	95,879
West Middlesex ... ..	131,025
<b>TOTAL :</b>	<b>£1,119,730</b>

These net profits represented over 10 per cent. on the aggregate paid-up ordinary and preference capitals of the Companies.

# EARLY DAYS OF THE BOARD

From these net profits had to be deducted the amounts payable to the Chamberlain of the City of London in respect of the sinking fund. These payments for the last year were :—

	£
Chelsea ... ..	2,134
East London ... ..	5,543
Grand Junction ... ..	—
Kent ... ..	1,150
Lambeth ... ..	9,404
New River ... ..	9,430
Southwark & Vauxhall ... ..	2,721
West Middlesex ... ..	10,270
<b>TOTAL :</b>	<b>£40,652</b>

The amount for the previous year was £28,132 only. The growth in the amount payable by the Companies had they continued to exist would have been very great in the next few years.

The claims of the Companies, as deposited with the Court of Arbitration, amounted to £49,145,624. In addition, the Companies, except the New River Company, who were to receive payment in new Water Stock, claimed an allowance of 5 per cent. on these figures to cover the cost of re-investment and loss of interest pending re-investment. The costs of the Companies in connection with proceedings under the Act both before the Court of Arbitration and for winding up the Companies were also claimed as well as costs incurred in opposing the bill for purchase. The last-named were not, however, allowed.

These claims were irrespective of the liabilities of the Companies in respect of the debenture stocks and mortgage loans charged upon the several undertakings and which, by virtue of the Act of 1902, had to be taken over by the Water Board on the appointed day. These liabilities, including the Staines Reservoirs debenture stock, amounted at the date of transfer to £4,365,110 of irredeemable debenture stock, £7,217,838 of redeemable debenture stock, and £42,000 of mortgage loans, or a total of £11,624,948, the market value of which was £12,243,774.

Under Section 4 of the Metropolis Water Act, 1902, the above debenture stocks were transferred to the Water Board, and charged on the Water Fund, thus giving the holders, in place of the security of the revenue of a single undertaking, the security of the combined undertakings, together with that of the local rates of the water area. In this case Parliament compulsorily divided the consideration for the transfer, and itself in effect assessed the value of the interest of the debenture stockholders in the concerns, leaving the Court of Arbitration to deal only with the interest of the ordinary and preference stockholders.

Adding the market value of the loan debt to the total amounts claimed by the Companies in respect of the ordinary and preference

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stocks, a total of £61,389,398 is reached, apart from costs. This enormous aggregate claim was in respect of undertakings upon which a total of £22,837,449 only had been expended on capital account at 31st December, 1903.

31st March, 1904.

All the Companies (with the exception of the Southwark & Vauxhall, which claimed nearly forty years purchase) claimed 36·36 years purchase of their existing income or of their maximum dividends, and also the present value of any back dividends. In other words, they all claimed to be purchased on the  $2\frac{3}{4}$  per cent. table.

It cannot be said that the claims of the Companies for their Water Undertakings were marked by undue modesty, as the total was no less than £50,939,898, with claims by the Directors for loss of office for £316,726. I have vivid recollections of losing one or two quite good posts in my own time, but nobody as yet has offered to compensate me for loss of office. It may well be that I chose the wrong posts and therefore, should be more careful in the future. Certain properties of the New River Company were not affected and remained the property of the Company.

It is a pity that the whole of the properties of this Company were not included in the transaction, for many of these have had considerable accretion in value since 1903, and this addition would have been very useful as an offset to the high cost of acquiring Water Undertakings. Compared with the total cost it would have been small but useful, nevertheless.

The awards of the Arbitrators were for £30,662,323 for the Undertakings and £219,287 to the Directors for loss of office. In addition to these amounts, loan capital to the amount of £11,624,948 was taken over by the Board.

In the light of subsequent events the awards were very much on the high side, and taking the sum total of these amounts and thinking of their present right to supply themselves with water through the Board, well might the citizens of Water London exclaim "With a great price obtained we this freedom."

The interest paid by the Board during the year 1938-39 on Stocks and Loans was £1,726,471, which, together with Annuities and Rent Charges, amounted to £1,734,954.

The net water rental during the year 1938-39 was £5,417,555, of which approximately £3,600,000 was derived from domestic water charges.

It can therefore be said that of the £1,734,954 paid by the Board in respect of interest and annuities, £1,152,888 was derived from domestic water charges or, in other words, approximately  $1\frac{3}{4}$  per cent. of the domestic water rate of  $5\frac{3}{4}$  per cent. went in Interest and Annuities, which left 4 per cent. towards the rest of the expenditure of the Board. It is not proposed to discuss here the economics or morality of interest *qua* interest, but to let the facts speak for themselves.

#### EARLY DAYS OF THE BOARD

When the Board commenced its operations it continued the scales of water charges inherited from the Companies, these varying from 3 to  $7\frac{1}{2}$  per cent. on the net annual value, with various additions. Under the Metropolitan Water Board (Charges) Act of 1907 the rate was fixed at 5 per cent. over the whole area, with the right conferred on the Board to levy the various rating authorities within its area to make good any deficiency that might arise. Starting with a deficiency of £25,279 in 1908-09, the year 1921-22 saw the startling deficiency of £1,925,338, with the result that rating authorities were in revolt against the necessary precept levied upon them. This state of affairs was remedied by the Metropolitan Water Board (Charges) Act of 1921, under the provisions of which the Board was given the right to increase its charges up to 10 per cent., subject to the consent of the Minister of Health. In 1922-23 8 per cent. was charged, and at different periods was reduced until, in 1939-40 it was  $5\frac{3}{4}$  per cent. Since that period the charges have risen to  $8\frac{1}{2}$  per cent., the maximum that can be charged without the consent of the Minister of Health, and it has required special efforts to maintain it at this figure.

The Board is also under obligation to pay certain annuities and rent charges, viz., London Bridge Waterworks Annuities—1,500 Annuities at £2 10s. 0d. each, terminating October, 2082, totalling £3,750; York Buildings Water Works Perpetual Rent Charges—£251; Hampstead Waterworks Perpetual Rent Charge—£3,500; and Crown Clog—£400; Unredeemed Land Tax on New River Shares—£407; Annuities in lieu of redeemed Land Tax on New River Shares—£175. The whole of these annual charges total £8,483.

All kinds of curious survivals were found by the Board in connection with the staffs taken over. For instance, in the Board Minutes of 28th October, 1904, the following is found:—

"We have had under consideration an application from the New River District Office for an allowance in respect of the Annual General Court Dinner, the New River Company in the past having made an allowance to officers and servants for the purpose, and by a Minute of 8th November, 1820, this allowance was fixed at 10s. 6d. for each officer and pensioned officer, and 5s. for each foreman, turncock, etc. It appears that the custom has been observed for very many years, and, in fact, has almost come to be regarded by the Staff in the nature of an emolument. We have given careful consideration to the matter, and have come to the conclusion that the practice should be continued by the Board on the understanding that only those officers who enjoyed the privilege before the appointed day should be allowed to participate in any future annual dinners.

We find that similar practices have been in operation in the majority of the other Companies, and, of course, the same privilege should be extended in those cases on the understanding above mentioned.

The opinion of Counsel was taken some time ago on the question as to whether the Board have authority to expend money on dinners, banquets, and the like, and Counsel in their opinion stated that they thought the Board had authority to spend money in the direction referred to.

We have been informed that the total amount paid by the New River Company last year amounted to £77 4s. 0d. and we now ask the Board to authorise the expenditure of a sum not exceeding £80.



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We have forwarded to the Finance Committee an estimate for the sum of £80, and recommend—

(a) That the estimate of £80 to be submitted by the Finance Committee be approved as an estimate of costs, debt or liability, under Section 20 (3) of the Metropolis Water Act, 1902, and that the expenditure of a sum not exceeding that amount be authorised in respect of allowances to officers and servants of the New River District and pensioned officers of the New River Company in connection with the Annual General Court Dinner.

(b) That the practice of the Metropolitan Water Companies in providing Annual Dinners for their staff be continued, on the understanding that only those members of the staff participate who have enjoyed that privilege prior to the appointed day."

Both motions were referred back for further consideration and report, but no further action was taken.

The following table shows some of the privileges enjoyed by officers and servants of the various Companies :—

RETURN SHOWING CERTAIN EMOLUMENTS, PRIVILEGES, ETC.  
ENJOYED BY OFFICERS AND SERVANTS TRANSFERRED FROM THE  
METROPOLITAN WATER COMPANIES.

Company	CHRISTMAS BONUSES, ETC.		Annual Dinners to Staff, and Beanfeasts to Servants.
	Officers	Servants	
Chelsea .. ..	3% of salary paid at Christmas.	£3 paid at Christmas to each workman of over one year's service. 3s. to each man under one year's service.	Staff had a dinner or summer outing. Servants had 3s. each twice a year in lieu of beanfeast.
East London ..	—	Messenger £5 at Christmas.	Servants had beanfeast in sections, paying their own expenses.
Grand Junction	—	Christmas gratuities— Office-keeper £1 Messenger £1 Hallporter 10s.	—
Kent .. ..	Christmas turkey, £1 1s. 0d.	Christmas beef 10/6 (Practice of 40 years' standing.)	—
Lambeth .. ..	—	—	Annual dinner was provided by the Company. Servants had annual beanfeast.
New River .. ..	—	—	Annual Court dinner, estimated value 10/6 per head.
Southwark & Vauxhall	—	—	Servants had annual beanfeast.
West Middlesex	5% of salary paid at Christmas.	£3 paid at Christmas to each servant.	Annual dinner provided for Officers at £1 2s. each.

# EARLY DAYS OF THE BOARD

Reference has already been made to the appointment of the first Clerk of the Board in the person of Mr. Pilling, and there is no doubt that the choice was a wise one. Equally happy was the choice of Mr. W. B. Bryan as Chief Engineer, although the appointment was not without a certain amount of difficulty. When the transfer was finally made the Board found itself with a plethora of engineering talent. All the Chief Engineers to the former companies were transferred, together with their staffs. The salaries paid to these Chief Engineers were of varying characters and it may be of interest if they are now given :—

Water Undertaking	Engineers	Salary and Emoluments		
		£	s.	d.
Chelsea Company .. ..	A. A. Gill .. ..	1,047	0	0
East London Company .. ..	W. B. Bryan .. ..	2,850	0	0
Grand Junction Company .. ..	Walter Hunter .. ..	1,716	9	7
Kent Company .. ..	W. Morris .. ..	1,906	0	0
Lambeth Company .. ..	T. F. Parkes .. ..	1,000	0	0
New River Company .. ..	E. Collins (Distributing) .. ..	1,200	0	0
	J. Francis (Supply) .. ..	1,200	0	0
	E. L. Morris (Pumping) .. ..	1,337	0	0
Southwark & Vauxhall Company .. ..	J. W. Restler .. ..	4,856	16	5
West Middlesex Company .. ..	H. F. Rutter .. ..	950	0	0

It cannot be said that the salaries paid constituted any proper reflection of the abilities of the men concerned. Three candidates were submitted by the appropriate Committee to the Board for its choice. These were :—Mr. W. B. Bryan, Chief Engineer of the East London Waterworks Company, Mr. Ernest Collins, Distribution Engineer of the New River Company, and Mr. H. F. Rutter, Engineer of the West Middlesex Waterworks Company. Mr. Bryan was appointed, and the resolution appointing him is as follows :—

" That Mr. William Booth Bryan, lately Chief Engineer of the East London Water Works Company, be and is hereby appointed as Chief Engineer to the Board at a salary of £2,500 per annum; that the appointment be held during the pleasure of the Board; that he do receive whilst in the Board's employ, in addition to the salary before mentioned, such further sum in lieu of pension during the term of his service with the Board as will, with the £2,500, make an annual sum payable to him of £3,750; that with the exception of the completion of the matters referred to in the letter accompanying his application, Mr. Bryan be not permitted to take any private practice or other paid employment; that his rights under the Metropolis Water Act, 1902, be preserved, and so that, on the happening of any of the contingencies mentioned in that Act, he shall be entitled to such pension or compensation as he is now entitled to thereunder, and that it be referred to the Works and Stores Committee to draw up the necessary agreement with Mr. Bryan to give effect to the foregoing conditions of his appointment."

The matters referred to in Mr. Bryan's letter are contained in the following statement :—

" In applying for the above post I am prepared to accept the proposed salary, and to give up private practice, subject as follows :—

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- (1) That whilst in your employ I receive, in addition to the salary of £2,500 per annum, such part of my pension or compensation under the Metropolis Water Act, 1902, as will, with the £2,500, make an annual sum payable to me of £3,750.
- (2) That I be permitted to retain my post of consulting water engineer to the City of Nottingham until the now authorised works are completed.
- (3) That I be allowed a reasonable time, say until the end of year, to clear off and wind up the various works I am engaged upon for different water authorities or clients.
- (4) That all my rights, etc., under the Metropolis Water Act of 1902 be fully preserved and so that, on the happening of any of the contingencies mentioned in that Act, I shall be entitled to such pension or compensation as I am now entitled to thereunder."

In reply to an inquiry as to how the proposed sum of £3,750 was arrived at, Mr. Bryan stated that the sum was calculated on his salary of £2,500 a year (which was paid free of income tax, and was therefore really £125 more at the time), and the loss which he would sustain by giving up the salary and fees he received from private practice, excluding those received from the City of Nottingham. Mr. Bryan added that he would have to give up, should he be appointed by the Board, £40,000 worth of work for one authority alone.

The first Accountant to the Board was Mr. Frederick Ernest Harris, who was so appointed on 22nd January, 1904, at a commencing salary of £1,000 per annum. His competitors were Messrs. M. Hayes and F. W. Mackinney. Mr. Mackinney afterwards became Chief Stores Officer to the London County Council.

Prior to 1912 no attempt had been made to organize and bring together the representatives of the Water Undertakings and the employees engaged in the industry.

#### BRITISH WATERWORKS ASSOCIATION.

The Metropolitan Water Board can claim a great part of the credit due for the formation of the British Waterworks Association, on which I have the privilege of being one of the Board's representatives.

The first President of the Association was the late Sir Edmund Barnard, who was then Chairman of the Metropolitan Water Board.

The objects of this Association are, amongst others :—

To facilitate the acquisition, by conference, inquiry, research, experiment, or otherwise, of engineering, financial, legal and parliamentary, statistical, scientific, and other knowledge and information relating to waterworks.

To obtain and diffuse such knowledge and information among the members of the Association.

Generally to afford opportunities for conference and co-operation among its members in regard to matters of common interest.

#### EARLY DAYS OF THE BOARD

#### NATIONAL JOINT INDUSTRIAL COUNCIL FOR THE WATERWORKS UNDERTAKINGS INDUSTRY.

It is interesting to note that this was the first Joint Industrial Council to be set up in connection with municipal and public utility services and served as a model for other public utility services.

The first Chairman of the Council was the late Sir Edmund Barnard, who was then Chairman of the Metropolitan Water Board.

The objects of the Council are, amongst others :—

The consideration of wages, hours and working conditions in the industry as a whole.

The settlement of differences between different parties and sections in the industry.

It is reported that a lady came to one of the Board's cashiers and asked by what right the Board charged for water, as this being the gift of God no person or corporation had the right to charge for it. The diplomatic reply given was, "Madam, you are right. Water is the gift of God, but He uses the agency of the Water Board to bring it to your tap, and it is for that service you have to pay." Rumour has it that the money was promptly paid. While it is true that water is the gift of God, the Metropolitan Water Board has to pay for water abstracted from the rivers Thames and Lee.

Prior to 1920 the sum of £40,000 per annum was paid to the Thames Conservancy Board for the right of abstraction, the sum being increased in that year to £45,000. In 1921 this had increased to £112,500, and in 1925 reduced to £90,000. As a result of negotiation the present annual figure of £90,000 was fixed and was embodied in the Thames Conservancy Act of 1932, Section 163.

The conditions with regard to abstraction of Thames water by the Board are shown on the following table.

#### THAMES ABSTRACTION.

By the Metropolitan Water Board.

Payments to Thames Conservancy :  
£90,000 per annum (T.C. Act, 1932, Sec. 163).

#### General Conditions as to Abstraction of Water under Thames Conservancy Act, 1932.

1. (i) Maximum quantity in any one day not to exceed 1,200 m.g. Sec. 162.
- (ii) Average daily quantity during calendar year not to exceed 300 m.g. (since additional storage authorised by M.W.B. Act, 1935). Sec. 162 (1).
- (iii) Water not to be abstracted at any time when actual flow over Teddington Weir is less than 170 m.g. Sec. 162 (6), but

Until completion and first filling of reservoirs Nos. 1 and 2 authorised by M.W.B. Act, 1935, or eight\* years from 2nd August, 1935, whichever shall be the earlier, 140 m.g. substituted for 170 m.g. subject to the consent of the Port of London Authority, and to the other conditions mentioned in Sec. 61 of M.W.B. Act, 1935.

\*Extended to 11 years by the Metropolitan Water Board (Extension of Time) Order (No. 3) 1943.

**Conditions as to Abstraction above Penton Hook Weir.**

2. When flow over Penton Hook Weir—
  - Exceeds 285 m.g. a day, but does not exceed 385 m.g. a day :  
All water in excess of 285 m.g. a day : Sec. 162 (3).
  - Exceeds 385 m.g. a day, but does not exceed 815 m.g. a day :  
In addition to 100 m.g., one-half of flow in excess of 385 m.g.  
a day : Sec. 162 (4).
  - Exceeds 815 m.g. a day : In addition to 100 plus 215 m.g. a day,  
all water in excess of 815 m.g. a day : Sec. 162 (5).

**Conditions as to Abstraction between Penton Hook and Shepperton Weirs.**

3. No abstraction when actual flow less than 150 m.g. a day ascertained as directed by Section 162 (7).

**Gravel Water.**

4. Gravel water may be taken and is not to be deemed part of quantity authorised to be drawn from Thames; under same conditions as to flow at Teddington as govern the abstraction from the Thames: Sec. 166, T.C. Act, 1932, and Sec. 61, M.W.B. Act, 1935.

In addition to the payment for water taken from the Thames the Board has to pay for water abstracted from the River Lee. After safeguarding the priorities of the River Lee Trustees in respect to the Upper, Middle and Lower Reaches respectively for the purposes of the Navigation, the Water Board, as successors to the New River Company, may take 2,500 cubic feet per minute (approximately 22½ million gallons per day); as successors to the East London Company may then take the same quantity—22½ million gallons per day; after this as successors to either, the remaining flow of the river. The amalgamation under the Board in effect abrogates this separation. These quantities can only be taken when the minimum Navigation quantities of 3,600,000 gallons, 4,500,000 gallons and 5,400,000 gallons are within the Upper, Middle and Lower Reaches respectively. These safeguarded and the abstractions taken to the tune above-mentioned, should there be any surplus, this too may be taken for the Board's purposes.

The Lee Conservancy (Increased payments by Metropolitan Water Board Extended Period) Order, 1941, prescribes payments by the Board to the Lee Conservancy of £20,000 per annum in respect of abstraction of water and not exceeding £4,000 per annum in respect of protection of water for the period of five years expiring 24th June, 1946.

In addition to the payments made to the Conservancies, expenditure is incurred for every drop of water supplied to London. Unlike the water systems of some areas, it is impossible to gravitate water from its sources to any of the Board's customers. Every drop has to be pumped, which means incurring expenditure in machinery, wages, etc., etc.

Reference has been made to the huge quantities supplied daily to London water consumers, resulting on the average in every consumer using more than his own weight of water each day, and this has to be supplied to a population of seven millions of people.

To get a correct viewpoint of the Board's obligations in this respect comparison should be made with other populations. The total population of the whole of Scotland is 4,842,000; that of Ireland 4,199,000; the whole Commonwealth of Australia numbers 6,620,000 souls; the Union of South Africa 8,000,000. Compared with foreign countries the population of Water London is greater than that of Sweden, and is about double that of Denmark.

Londoners are a long-suffering people and, generally speaking, are dumb to boot. They do not sing the glories of the proud pre-eminence of their city, as do the citizens of other towns and cities. Concerning Glasgow it is difficult for the Glaswegian to remain silent, while the citizens of Liverpool, Manchester, Leeds and Birmingham generally thrust their cities upon one's notice. Some relative London water data may well be cited here, which may help Londoners to get "a good conceit of themselves." Birmingham and Bristol could, together, be satisfied with the water obtained from London's wells; Liverpool and Bristol, combined, with that taken from the Lee; Glasgow, Manchester, Liverpool, Bradford and Bristol, combined, with the water taken from the Thames. Small wonder is it that London's water supply can be described as the greatest water undertaking in the world, and in making this claim no undue strain need be placed on a Londoner's modesty.

In addition to the duty of supplying its own area the Board is under obligations, imposed either by statute or agreement, to supply neighbouring water undertakings. Under the Arbitration Award of 1904, Croydon County Borough Council can demand up to 500 million gallons per annum, and this is satisfied by water supplied from Selhurst, Norwood and Rockhill reservoirs. There is also an obligation to supply Richmond Borough Council in bulk, but no specified limit is imposed. This water is supplied by a 30-inch main from Hampton. The Barnet Gas & Water Company can call on the Board for 6 million gallons per day, and, in this case, Thames water is supplied from Fortis Green pumping station. Water from the Lee Valley wells is supplied to the Herts. & Essex Waterworks Co. Ltd., with no specified limit. At one time water in bulk had to be supplied to the South Essex Water Works Co., but this has now ceased to be required. Colne Valley Water Co. can demand up to 5 million gallons daily, and, should the demand be made, Thames water would be supplied through a 48-inch main from Kempton to Bishops Wood. From 1934 onwards the Sutton & District Water Co. has a call on 3 million gallons per day. This can be met either via a 48-inch main from Walton to Honor Oak or, alternatively, from one of the 30-inch mains from Surbiton to Brixton. The South West Suburban Water Co. can demand up to 5 million gallons a day, which can be supplied from Kempton Park. In either case Thames water would be supplied. Compared with the foregoing, the possible demand by the Sevenoaks Rural District Council for 5,000 gallons daily is a small one, and would be met from the Kent wells.



5TH MARCH, 1943

Members and officers of the Board have been very kind to me, both with this lecture and with its two predecessors. To me the work has been a labour of love, and I have been richly repaid in my researches by the interest the work has given me.

We have a great Water Undertaking, with a long history. While the dead hand of the past should not be allowed to handicap us in our forward march for the improvement of the Undertaking, nevertheless appreciation of the way that we and our predecessors have come is necessary to enable us to function as intelligently as we should. If the backward steps we have taken during these three lectures help towards better administration and service for London and the future, our time will not have been ill-spent.

Among the outstanding features of the primeval garden, in which our first parents were placed in the days of their innocency, were rivers of waters. In the apocalyptic vision of St. John a leading feature of the great heavenly Eternal City was the River of the Water of Life. Situated as we are between each of these far-off events, one in the far past, one in the future, can we not feel that in the work we are doing in supplying abundant pure water to the sons and daughters of men, we are indeed in a great and beneficent line of descent.

I would like to close in expressing my thanks to those who have helped me in this labour of love:—Mr. A. Crook, the Board's Statistical Clerk; my Secretary, Mr. W. S. Chevalier; and last, but by no means least, my Stenographer, Miss M. J. Sabourin, to whose patience and forbearance, as well as to whose work, I am greatly indebted.

