DERBY WATER SUPPLY.

(From the 1908 Public Health Report)

[For the following particulars I am indebted to Mr. Ward, Borough Surveyor and Waterworks Engineer.]

The Water Supply of the Borough of Derby is derived principally from filter tunnels or culverts 4ft. in diameter, laid in the gravels and shales alongside the river Derwent, in the Parishes of Little Eaton and Allestree and also from a few springs in the valley of the Bottle Brook, between Little Eaton and Coxbench. The two Storage Reservoirs have a capacity of 2,800,000 gallons, and there are 9 filter beds and 3 service reservoirs of a total capacity of 2,725,000 gallons. Under the Derwent Valley Water Acts, the Derby Borough is entitled to a first instalment of $3^1/_4$ million gallons per day, and two future instalments, making a total of $8^1/_3$ million gallons per day. The first instalment under this scheme is expected in the year 1912. In the year 1908, the quantity supplied was $16^1/_2$ gallons per head for domestic purposes, and $8^1/_4$ gallons per head for trade use, giving a total of $24^3/_4$ gallons per head per day of an estimated population supplied of 127,800 or an average quantity throughout the year of about $3^1/_4$ million gallons per day. It should be noted that the quantity per day sometimes reaches $4^3/_4$ million gallons and at the maximum period of drought, may reach for some hours a rate of 6 million gallons per day. It should also be pointed out that the area supplied by the Derby Waterworks extends considerably beyond the Borough, and includes Allenton, Mickleover, Spondon, Littleover, Breadsall, Normanton, and Alvaston and Boulton.

Historical.

There appears to have been an organized system of water supply established as early as 1691. The power derived from an artificial fall in the River Derwent was applied by means of a wheel and three small pumps to raise water from the river to the top of St. Michael's Church, from whence it was distributed unfiltered through pipes, four or five hundred yards long. Hutton remarks that "perhaps this is the most useful Church in Derby although preached in but once a month." The supply was intermittent and the pressure was in no case more than 20 or 30 ft. above the ground floor level of the houses. The population of Derby when these works were established must have been small, as about one century later it amounted to only 8,563. The above works appear to have remained about the same as originally formed in regard to condition and extent, except that the lengths of mains were increased to about 21 miles, until 1848, when the population was 41,098, of whom only about 1.9 per cent were supplied from the then existing Waterworks, the remainder being supplied from shallow wells. In 1848, a new Company, with a capital of £40,000, was formed, and an Act of Parliament obtained for a better supply of water for the Borough of Derby and certain adjoining Parishes. Under the powers so acquired land was purchased at Breadsall, about three miles from Derby, and the first instalment of the present works was constructed in 1849 and 1850, consisting of a line of pipes collecting springs from the valley of the Bottle Brook, a portion of the filter tunnels alongside the River, and a circular collecting tank 150 feet in diameter, two Cornish Pumping Engines, about 50-horse-power each, supplied with steam from 4 boilers, a pumping main of 18" diameter and service main also 18" in diameter, a storage Reservoir of $1^1/_4$ million gallons capacity, 3 filter beds, and a Service Reservoir of 800,000 gallons capacity, these works comprising what are known as the Low Level Works. Additional works were erected in 1875, comprising a circular collecting tank 50 feet in diameter, further extensions of the filter tunnels, and 2 rotary single-

cylinder pumping engines about 100 horse-power each, supplied with steam from 4 boilers, a pumping main of 20in. diameter, and a service main 18in. (a main of 30in. in diameter has since been laid to the town), a storage reservoir of $1^1/_2$ million gallons capacity with 4 filter beds and a service reservoir of 1 million gallons capacity, these comprising what are known as the High Level Works. The Service Reservoir at Littleover, two miles from Derby, with an original capacity of 300,000 gallons supplied from the High Level Works, has since been enlarged to a total capacity of 925,000 gallons, and assists in supplying the higher parts of the town. The filter tunnels were extended on the sides of the River Derwent in 1891, and again in 1903, thus increasing the collecting area. Additional pumping plant was erected in 1900 for use in emergencies, and two additional filter beds have been constructed at the Low Level Works.

In 1880, the whole of the works were purchased by the Corporation at a cost of £351,000. The original works of 1849 were designed by the late Mr. Thomas Hawksley, and all later additions by Messrs. T. & C. Hawksley, of Westminster.

CHEMICAL AND BACTERIOLOGICAL ANALYSES.

The Laboratory,
11, Billiter Square,
London, E.C.,
3rd March, 1909.

Report on Samples of Water received on February 24th, from Mr. John Ward, Borough Surveyor, Derby.

The samples comprised two unfiltered waters from the Carr Brook and Tunnel, and three filtered samples from the High and Low Reservoirs and Freeman's Filter Bed respectively. The sample from the Carr Brook had a faint blue colour and was practically free from suspended particles, that from the Tunnel was colourless and contained some fungoid growths, while the filtered samples were quite clear and faintly blue. The composition was found to be as under: —

Parts per 100,000.	**(Unfiltered).**		**(Filtered)**	
	Springs only, Carr Brook	**Filter Tunnels.**	**Low Service.**	**High Service.**
Chlorine	2.15	1.85	2.00	1.90
Sulphuric Acid	4.56	5.28	4.92	5.36
Nitric Acid	2.62	0.48	1.08	0.80
Phosphoric Acid	None	None	None	None
Free Ammonia..	0.0024	0.0110	0.0015	0.0017
Albuminoid Ammonia	0.0038	0.0036	0.0037	0.0025
Oxygen absorbed from manganate at 80° F in 15 minutes	0.0120	0. 0144	0.0128	0.0128
Do. in 4 hours	0.0256	0.0340	0.0276	0.0296
Total Solids dried at 212 ° F	32.88	35.68	32.88	33.76
Loss on ignition	3.20	3.60	3.44	3.52
Appearance of solids on heating	No visible change			
Total Hardness	22.0	25.7	22.1	24.2

BACTERIOLOGICAL RESULTS.

	Carr Brook.	**Filter Tunnels.**	**Low Service.**	**High Service.**	**Freeman's Filter Bed.**
Total No. of organisms per cubic cm.	15	14	14	14	14
Do. growing at blood heat	6	2	2	4	4
E. Coli.	Not in 36 cc.		In 20 cc. Not in less		Not in 36 cc.

The composition of all samples is exceedingly satisfactory. The unfiltered supplies are exceedingly low in organic matter and contain the smallest number of bacterial organisms which I have ever met with in them. Their number is so insignificant that it could not be and was not reduced by filtration. Probably the ground near the Carr Brook and over the filter tunnels is frozen, and impurities cannot enter.

The water as supplied to the inhabitants of Derby is very good, both chemically and bacterially.

Freeman's filter tank contains pure and well-filtered water.

(Signed) OTTO HEHNER.