(No. 137.)

1889.

PARLIAMENT OF TASMANIA.

WATER SUPPLY OF THE TOWN OF ST. HELEN'S:

REPORT BY MR. A. MAULT.

Presented to both Houses of Parliament by His Excellency's Command.

WATER SUPPLY OF THE TOWN OF ST. HELEN'S.

To the Honourable the President and the Members of the Central Board of Health.

GENTLEMEN,

THE attention of the Local Board of Health, the Officer of Health, and the inhabitants generally of St. Helen's having been called by the prevalence of typhoid fever to the condition of the water supply of the town, I was instructed by you, at their request, to report upon the matter. I accordingly went to St. Helen's on the 21st of September, and have the honour to submit the following Report to you.

1. The town of St. Helen's stands on the flat deposits at the head of George's Bay. The surface soil is porous, but rests on a retentive subsoil. The township as laid out covers a considerable area, but the occupied portion of it consists of the neighbourhood of the main road (Cecilia-street) and parts of Tully, Annie, Medea, Quail, and Groom streets. There are about 60 houses, with a population probably over 300. Of the above 60 houses 21 have wells, 19 have rainwater tanks, 3 are supplied from a brackish spring on the beach, 3 have supplies carted from the River George, and 14 are supplied from wells on neighbouring properties. As will be seen from analyses given below, water from five of the wells has been analysed, and in every case found bad. It is not likely that that of the other wells is much better. The water from most of the tanks is insufficient in quantity, and has to be supplemented during the dry season with water carted from the river. The rainfall at Falmouth (the nearest registering station on the coast) was 17·11 inches in 1888, being 8·21 inches under the mean of the previous five years. The rainfall at St. Helen's is probably about the same, but the people of the town think that they have an exceptionally small amount of rain, as the clouds are drawn off to the hills north and south of the George River.

2. The following are the analyses of the above-mentioned well-waters.

	Iles' well.	Johnston's.	Brooks'.	Lee's.	Doddridge's.	Dr. Parkes' limit allowable.
Free ammonia (parts in a million)	0·10	0·10	1·60	0·28	0·12	0·05
Albumenoid ammonia (ditto)	0·36	0·26	7·04	0·48	0·20	0·10
Nitrogen as nitrates (ditto)	4·28	4·15	1·97	5·70	4·84	1·13
Chlorine in chlorides (grains in a gallon)	8·00	3·30	35·70	23·50	4·90	3·00
Total solids (ditto).....	43·00	26·00	131·90	70·00	28·50	30·00

It will be noticed with respect to all the more dangerous elements of pollution, that they are present in these waters in quantities largely in excess of the limit fixed by Dr. Parkes as allowable in *usable* water. The natural result of such a condition of things duly followed.

3. During the past season 24 cases of typhoid fever occurred in St. Helen's. I am indebted to Dr. Fox, Officer of Health of the Local Board, for the information that enables me to give the following account of the outbreak. The cases may be said, to a great extent, to group themselves into clusters, of which the common tie seems to have been the derivation more or less immediate of the disease from a polluted well. The most important group may be said to be thus connected with a well, the water of which was not analysed, as without detailed analysis it was found so bad that Dr. Fox ordered the well to be closed. This well was on Mr. Williams' premises. A workman of Mr. Williams' named Smith was first attacked, and the attack proved fatal. Mr. Williams was himself was next attacked, then Mrs. Miller who nursed him, then one after another,—Turner who replaced Smith, Newman who replaced Turner, Fitzgerald who replaced Newman, and Bishop who succeeded Fitzgerald. The excreta, in Mr. Williams' case, was buried in the garden adjoining to which Miss Turner lived, who was then attacked. Then connexions of these people suffered,—Newman's brother, Mrs. Miller's two children, and Miss Moyes, who had slept with

Miss Turner. Perhaps to these may be added Morling, the constable, who was charged with the service of disinfection, and his son. This group of twelve or fourteen cases may be thus arranged:—

Owner of well.	Workmen.	Nurse.	Neighbour.	Constable on Duty. (?)
Williams	Smith	Miller	Turner	Morling
	Turner	Miller	Moyes	Morling
	Newman–Newman	Miller		
	Fitzgerald			
	Bishop			

There was another small group at Mr. Steel's, including Mr. Steel, Brooks (who worked for him), and Dwyer, who succeeded Brooks. Connected with Doddridge's well there are Fanny Avery (a servant at Doddridge's), and Harry Avery (her brother). And with Iles' well, Mr. Iles, and Tilley, a neighbour using the water from it.

4. The circumstances attending this outbreak of fever very naturally called the attention of the local authorities and inhabitants to the consideration of the best means of obtaining a better supply of water. It is not likely that by sinking deeper wells that a better quality could be obtained, as the level of the land on which the town is built is not twenty feet above mean sea level. It is very probable that the great excess of chlorine shown in Brooks' and Lee's wells is due to percolation of sea water, or from the wells having been sunk through recent marine beds. And similar water would be found wherever else about the town deep wells were sunk, unless expensive precautions were taken to keep out the brackish water certain to be met with. The George River offered another source of supply. Unfortunately for the appearance of the water, a great deal of mining takes place along the course of the river and its tributary streams, and the tail-races from the workings often make the water more or less turbid; but, judging from the following analyses, it does not seem that the wholesomeness of the water is much affected by the mining operations, as the relative proportions of the constituents of the water would point out that the excess in albumenoid ammonia was due to vegetable matter, probably taken up from the rank vegetation through which the upper waters of the river flow.

5. The upper waters of Power's Rivulet were also suggested as a supply; but the analysis of them showed that they were almost identical in composition with that of the George River, and that consequently it was not worth while to go to a longer distance to bring them to the town than was needed in the case of the river.

6. The following are the analyses:—

	George River.			Power's Rivulet.	Dr. Parkes' limit.
	May 23.	June 6.	Sept. 23.	Oct. 5.	
Free ammonia (parts in a million).....	0·08	0·09	0·04	0·02	0·05
Albumenoid ammonia (ditto)	0·18	0·14	0·18	0·18	0·10
Nitrogen in nitrates (ditto)	0·066	0·04	0·11	0·09	1·13
Chlorine in chlorides (grains in a gallon)...	1·00	1·10	1·30	1·80	3·00
Total solids (ditto).....	7·00	9·00	7·00	7·50	30·00

From these analyses it is clear that the water of the river is not of very good quality. But the river is practically the only source of supply, and as its water may be improved by filtering, and even without filtering is much better than that of the wells in the town, I have not much hesitation in recommending the following scheme.

7. Within three miles of the town there are a series of falls and rapids on the River George, that within that distance give a head of 70 feet, and this head would be sufficient to secure an ample supply for the town, with the necessary pressure for fire extinction purposes. At the intake, which should be placed at the most convenient place between 30 and 40 chains above the principal falls, a small filter bed and tank should be built for the purpose of purifying the water. And thence a 4-inch wrought iron main would deliver the water upon the township; cast-iron pipes of 2-inches in diameter, and wrought galvanised of 1-inch diameter, would form the distributory system, and house services would be laid to each property. The principal outlying farms would also be supplied. This service would be sufficient to supply the town for many years to come, as the pipes would deliver 250 gallons of water a day to every one of the present population. I do not think it necessary to provide filtering power at present for so large a quantity.

8. As the intake would be on Crown land, and, as I understood that the various proprietors of the land through which the mains thence to the town would pass are so favourably disposed as to offer free way-leave for a pipe track, no allowance has been made for purchase of land in the following estimates. They include the providing and laying of 250 chains of 4-inch pipes, 160 of 2-inch pipes, 85 of 1-inch pipes, and the connexions for 60 house services; 10 fire-plugs and sluice-valves, the necessary special castings, and the work at the intake, filter bed, and tank. These works it is estimated would cost £2372, or, with ten per cent. for contingencies, £2600.

9. It is proposed to make a water district of the portion of the township lying to the eastward of a line running north and south from the point of junction of Tully-street and Young-street, and to the southward of the north boundary line of Mr. Treloggan's farm and of the River George. This district would include all the occupied portion of St. Helen's as described in paragraph 1 of this Report. The yearly value of the rateable property in this district is, according to the Assessment Book of the District of Portland, £1575. This valuation includes many properties of less yearly rateable value than £10. If, as is usually done in the case of water rates, the yearly value of all properties under £10 be taken as £10, the yearly rateable value would be £1727, and in the following calculations it is so taken. Among the properties not assessed, and therefore not included in the above valuation, are the Public School and Schoolmaster's house, the Police Court, Lock-up, Superintendent's and Constable's houses, and the Post and Telegraph Office, all belonging to the Crown, and for which Government might be reasonably asked to pay a yearly water rate of £25. There is also a regular service of steamers, and their water supply would be worth £15 or £20 a year; and the water supply in connexion with other services—such as the extinction of fires—would be probably worth £5 or £10 a year more. These two services are estimated to produce £25 a year together in the following calculation. It is also taken for granted that arrangements can be made through the Government to obtain the necessary capital at 5 per cent., being $3\frac{1}{2}$ per cent. for interest and $1\frac{1}{2}$ per cent for forming a Sinking Fund.

10. On these bases the following calculation is made of the yearly charge that would be needed for supplying the Town with water :—

Charge.	£	*Discharge.*	£
5 per cent. on Capital of £2600.....	130	Government Rate	25
Occasional service of man for Repairs, Stationery, &c.	45	Shipping and other Services	25
		Rate at 1*s.* 6*d.* in the pound on £1727	130
	£175		£180

In considering the narrow margin of profit thus shown, it should be borne in mind that the introduction of a good water supply would probably increase the residential population of the Town, and so every year increase the rateable value also.

In conclusion, I have to thank the members of the Local Board, and Dr. Fox, their Officer of Health, for the courtesy and kindness with which they rendered me all the assistance in their power to obtain the information necessary to prepare this Report.

I have the honour to remain,
Gentlemen,
Your faithful Servant,
A. MAULT, *Engineering Inspector.*

Hobart, 18*th October*, 1889.

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.