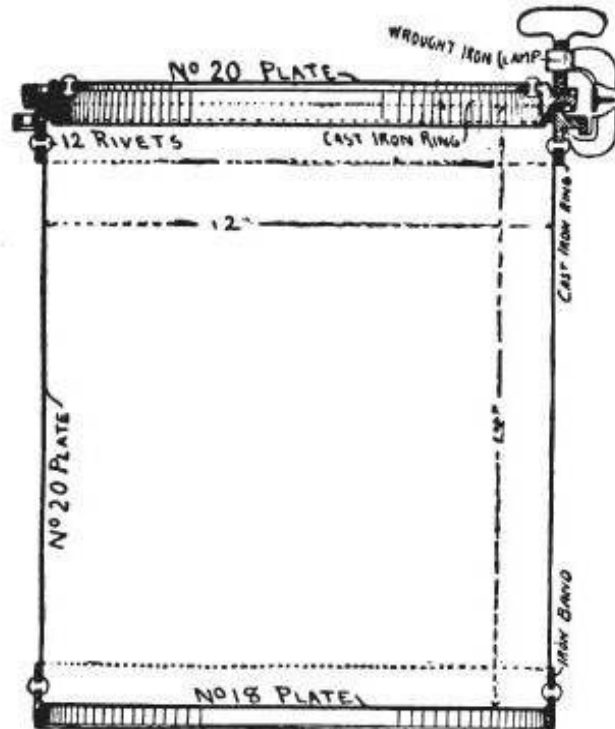


The Pail System at Hemlock Lake 1894

Chapter 21 of Sewage Disposal in the United States

by G. W. Rafter & M. N. Baker

The domestic water supply of the city of Rochester, New York, is obtained from Hemlock lake, in the County of Livingston, about 30 miles southerly from and at an elevation of 386 feet above the city.



Metal Privy Pail - Fig 30A

Hemlock lake is about seven miles long and 3/4 mile wide. It occupies the northern extremity of a deep, narrow valley, 15 miles long. The shores of the lake are bluff and steep, rising to a height of from 300 to 700 feet, and along the beach are mostly covered with a growth of timber. The average depth is over 40 feet.

About the time at which Hemlock lake was utilized as a source of water supply for the city the attention of the citizens of Rochester, as well as those of surrounding cities and towns, was attracted to the lake as a desirable point for summer residence. (footnote 1)

In 1892, there were in use about 120 cottages and several

hotels or summer boarding-houses, and the summer population, including transient visitors, was from 800 to 1,000 persons. The gradual growth of this large summer

population, living directly on the shores of the lake, and using it not only as the source of water supply but also allowing all refuse substances, including contents of privies, to drain into it, had its natural effect in a probable marked deterioration of the quality of the water (footnote 2), and the necessity for an efficient sanitary protection of this watershed accordingly became self-evident. In the spring of 1885 a complete sanitary survey was made and sketch plans prepared of every source of pollution about the lake. At the same time the State Board of Health, under the provisions of the act already referred to on page 71 formulated rules and regulations for the sanitary protection of this water-shed (see Appendix III.).

These regulations provide: (1) That privies, pig-pens, and barn-yards shall not be located over or adjacent to any stream, spring, or dry water-course tributary to the lake, where the contents can reach the lake; (2) that any privy situated within 50 feet of any spring, stream or dry water-course, or ravine, must be constructed without a vault, and provided under the seats with water-tight receptacles for night-soil, which shall be frequently removed, emptied, cleaned, and returned, and the contents buried in the earth in such a manner that they cannot reach any water-course or permanent level of subsoil water.

Further, no manufacturing waste is allowed to be discharged or drained into any spring, stream, or dry water-course on said watershed. The same restriction applies to depositing dead animals, birds, fish, decayed fruit, leaves, sawdust, roots, branches or trunks of trees in any spring, dry water-course, or in the lake itself. The washing of sheep or other animals in the lake or any of its tributaries is also prohibited.

The provisions relating to houses, cottages, tenements, tents, and picnic grounds within 200 feet of the shores of the lake may be summarized as follows: Each property is furnished with at least one privy set upon the surface of the ground, without a vault, and so constructed that metallic pails, 15 inches high by 15 inches in diameter, can be placed under the seats and easily removed with their contents. This pail is shown by Fig. 30 A.

The occupants are required daily to add dry loam in small quantities, as a deodorizer and absorbent. It is also made the duty of the occupant to provide a receptacle for garbage and to place the same therein. Slop or wash water is to be scattered upon the surface of the ground at a distance from either the lake, or any ravine or watercourse, and the points at which slops are deposited frequently changed.

Animal manures from stables are to be deposited in tight covered receptacles and the contents frequently removed.

The city of Rochester furnishes under the rules a sufficient number of metallic pails for the use of each privy within 200 feet of the lake and is required to remove, empty, cleanse, and disinfect the same as often as necessary. Whenever a full pail is removed an empty one is supplied in its place. The pails during removal are provided with air-tight covers, so that no odor can escape. The contents of the pails, together with the dry garbage, are removed to a point below the foot of the lake and buried.

In practice, the night-soil and garbage is collected and removed to the foot of the lake by means of a broad, flat-bottomed steamboat, the collections being usually made in the early morning. From the steamboat landing at the foot of the lake the night-soil and garbage are transported by a tramway about 1,800 feet to the sanitary building and disposal grounds, where it is treated as follows: Narrow trenches are excavated, care being taken that the permanent level of the subsoil water is not reached, and the contents of the pails are deposited therein in thin layers, and immediately covered with dry loam to a depth of six inches. This process is repeated day by day until the trench is nearly filled, when the balance is rounded up with earth and a new trench started. The location of the trenches is recorded, the surface cultivated and cropped, and after a suitable period the same land again used. A trench 500 feet in length has proved sufficient for a year's operation, and as these trenches need not be more than three feet apart, a small area is sufficient for the purpose.

The cans, as emptied, are taken to a sanitary building, which is provided with an elevated tank filled with a solution of copperas, and other necessary appliances for washing, cleansing, deodorizing, and drying the cans. The cans are constructed of heavy galvanized iron, coated, inside and out, with black asphalt varnish. In cleansing the cans, if necessary, more active deodorizing and disinfecting agents than copperas are employed.

The process has been so conducted that local prejudice has subsided and fears as to possible offensive odors in the neighborhood allayed. In the sanitary building and about the grounds no offensive odors are discernible, although during the year 1890 the contents of 3,128 cans and 80 tubs of garbage were thus removed and treated. (footnote 3)

In connection with the disposal by burial of this refuse organic matter from the habitations on the shores of Hemlock lake, it may be of interest to note that the soil in the trenches which were filled one, two, and three years before, was examined in November, 1890, to ascertain whether complete decomposition had taken place. The excavations disclosed the following- facts: In trench No. 3, used in 1888, no quicklime was employed to hasten decomposition; nevertheless, the soil exhibited no trace of putrid matter, either by appearance or odor. In trench No. 2, used in 1889, quicklime had been strewn upon each layer of organic refuse as it had been deposited and then covered with a layer of earth, but although traces of the lime and a discoloration of the soil could plainly be seen, yet the earth was entirely free from any unpleasant odor. The excavation was made about three feet deep. In trench No. 1, burial with the use of lime was commenced in May, 1890, and only partial decomposition was found to have occurred after the lapse of six or seven months. It was also found, as anticipated, that the destruction of the organic matter took place much more quickly near the surface than at a depth of three feet. The soil is a clayey loam, whose surface is from four to five feet above the level of the water in the outlet. From these examinations,

it appears that shallow trenches are better than deep ones, and after a period of three years the indication is that the same trench can be used again. The trenches were again examined in November, 1891, with the result that a decomposition of the organic wastes, similar to that already described, was observed. (footnote 4)

This Hemlock lake pail system is operated chiefly by steamboat for the summer season, only a few of the habitations being in use the balance of the year. In winter the necessary collections are made by wagon.

The total cost of operation during the municipal year ending April 6, 1891, was as follows: (footnote 5)

Wages for labor involved in collecting excreta, garbage, etc.	\$1,413.05
Cost of collection by contract during winter	\$103.03
Cartage of coal and supplies for boat	\$21.00
Coal for steamboat	\$65.57
Copperas and chloride of lime	\$9.80
Asphaltum paint, and oil	\$64.40
Moving pig-pens to other locations	\$15.00
Miscellaneous expenses and repairs	\$47.61
Total	\$1,739.46

During the year there was also expended in the way of permanent additions to plant and renewals, the sum of \$352.18.

The approximate first cost of the permanent plant is given by the following statement, which is made in detail in order to show what the several items making up the total cost of such a plant really are:

Sanitary surveys and examinations, and law expenses attending inauguration of system in 1885	\$265.40
Surveys for and preparation of plans of sanitary building, lake pier, tramway, and other permanent fixtures and superintendence of construction, estimated	\$500.00
Frame building, elevated tank, and additions to same since original construction, including inside fittings, pump, etc.	\$850.22
Flat-bottom scow in use for first three years	\$149.77
Original road from lake to sanitary building	\$39.59
Original landing dock at lake	\$11.25
For permanent pier 400 feet long, and tramway 1,800 feet long	\$4,660.55
Tram-cars	\$57.50
Flat bottom steamboat with small row-boat	\$1,907.20
Remodeling about 100 privies for reception of pails	\$69.47
For metallic sanitary pails, transportation of same, etc.	\$1,256.17
Miscellaneous, including laud (partly estimated)	\$232.88
Total approximate cost of permanent plant to April 6, 1891	\$10,000.00

The total cost of operation for six years is shown by the following statement:

For the municipal year ending April 5, 1886	\$497.49
For the municipal year ending April 4, 1887	\$1,525.58
For the municipal year ending April 2, 1888	\$1,461.53
For the municipal year ending April 1, 1889	\$1,740.78
For the municipal year ending April 7, 1890	\$3,912.09
For the municipal year ending April 6, 1891	\$1,739.46
Total cost of operation for six years	\$10,876.93

During the six years of operation which are here included, from 18,000 to 20,000 pails of night soil, garbage, and dead fish have been disposed of by this pail system.

The expense of doing this work, both in first cost and annual cost of operation, is evidently much greater than it would be for a similar performance in a town or city. The peculiar nature of the plant and the long distances covered may be taken as the main reasons for this.

The moving of the pails by boat, and the construction of a pier for facilitating such moving at all stages of the lake, is an imperative necessity due to the peculiar situation. The west side of the lake, on which is located a considerable number of the cottages, is absolutely inaccessible except by water; the cottagers themselves, even, going to their temporary homes by boat from the opposite side. As yet we have no pail system in a town with which to compare the figures as given for this exceptional case.

Footnotes:

1 - See 16th An. Rept. of the Ex. Bd. of the City of Rochester for estimates in detail of permanent and transient population in the various cottages, permanent residences, hotels, etc. During July and August there is stated to be, probably, a constant population of about 1,200, which is largely increased on holidays and by special excursions.

2 - See (a) On the Micro-organisms in Hemlock Water, by Geo. W. Rafter (1888). (b) A Report on an Endemic of Typhoid Fever at Springwater, N. Y., in October and November, 1889, by Geo. W. Rafter and M. L. Mallory (1890).

3 - See (a) Paper by J. Nelson Tubbs in Proceedings of the 11th. An. Meeting of the Am. W. Wks. Assn. (Cleveland, 1888), pp. 18-23. (b) The several An. Reports, Koch. W. Wks. 1886 to 1892, inclusive. (c) Eng. and Bldg. Rec, vol. xxii., p. 412 (Nov. 29, 1890), where illustrations of appliances may be found, and from which Fig. 30A has been taken.

4 - 15th An. Kept. Ex. Bd. city of Rochester, for year ending April 6, 1891, p. 43. Also see 16th Rept., p. 32.

5 - From June 1, 1891, to October 1 of the same year, there were collected by steamboat 3,060 pails of excreta, 171 tubs of garbage, and 3 1/2 pails of dead fish. From October 1, 1891, to April 1, 1892, the collections were made by wagon and row-boat, and amounted to 1,208 pails, the cost of this latter service being \$6 per week.

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