

STATE OF NEW HAMPSHIRE  
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REPORTS, 1914

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CONCORD, N. H.  
1914

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TWENTY-THIRD REPORT  
(TENTH BIENNIAL)

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF NEW HAMPSHIRE

FOR THE FISCAL PERIOD ENDING AUGUST 31, 1914

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CONCORD, NEW HAMPSHIRE  
1914

## LANCASTER.

Under date of February 18, 1914, Dr. Frank Spooner, Secretary, Board of Health, Lancaster, informed the State Board of Health that the water company of that town had notified the public that they were about to pump water from Israel River into the reservoir, on account of shortage of the regular supply, and he asked if the board of health should allow it to be done, requesting a reply by telegraph.

The river referred to being a badly polluted stream, the State Board of Health replied that such action should not be permitted.

On the same date, the following letter was received, together with a copy of the notice of the water commissioners and the fire engineers to the effect that they should begin pumping water from Israel River on the evening of February 19, and advising consumers to boil all the water that was to be used for drinking purposes as a safeguard against any bad effects that might otherwise follow :

February 18, 1914.

*Dr. Irving A. Watson,*  
*State Board of Health, Concord, N. H.*

DEAR DOCTOR WATSON:

I enclose herewith circular issued today, February 18, by the water commissioners and fire engineers of the town of Lancaster, N. H., which is self-explanatory as far as it goes. There are certain facts not stated on the circular which are important. The intake pipe for pumping water from the river to the reservoir is located in what is known as the Frank Smith & Co. mill pond, situated in the heart of the village. This pond lies between the parallel streets known as Middle and Mechanic Streets, both thickly populated streets. The mill pond in the course of perhaps a quarter of a mile above the intake pipe, receives the sewage from the abutting houses of both these streets. The reservoir is situated a matter of a mile or less from the village. This reservoir is the only public water supply of the town.

I wish to enquire whether or not this proceeding, as set forth in the enclosed circular, is a violation of the public statutes with reference to the pollution of public water supplies, regardless of whether such action is sanctioned or ordered by town officials in the light of what they consider an emergency with reference to fire protection.

Thanking you for any information on this subject, I am,

Respectfully yours,

HOMER B. SMITH.

Enclosure.

The following is a copy of the circular mentioned in the foregoing letter:

*To the Users of Water from the Lancaster Fire Precinct Water System:*

Owing to the extravagant use or the wasting of the water by the patrons of the system, largely, as we suppose, to prevent the freezing of their water pipes, which should have been properly protected from frost without making it necessary to waste the water, and as the reservoir is nearly empty and the property in our village is practically without fire protection, we, the Lancaster Fire Precinct Commissioners and Fire Engineers, have decided that it is necessary, under the circumstances, to pump water from the river into the main pipes of the system, and to continue doing so until such a time as the reservoir is at a sufficient fullness to give us a protection against fire.

After 8 P. M., February 19, 1914, and to continue until you are notified to the contrary, by advice of one of our prominent physicians, you are advised to boil all of the water used for drinking purposes, as a safeguard from any bad effects to the users of the water.

The above will be in effect unless the reservoir shows a marked increase during the day and night of the date above given.

W. E. BULLARD,  
J. B. MCINTIRE,  
C. A. CLEVELAND,  
*Commissioners.*

ALLEN MOYLE,  
J. P. WARK,  
F. J. WILLIAMS,  
*Fire Engineers.*

Immediately following the receipt of this information by the State Board, its chemist, Mr. C. D. Howard, was directed to go to Lancaster to investigate conditions there. This he did, and a few days later a copy of his report was transmitted to the board of health of Lancaster, as follows:

THE STATE OF NEW HAMPSHIRE,  
OFFICE OF THE STATE BOARD OF HEALTH,  
CONCORD, N. H., February 24, 1914.

*Frank Spooner, M. D.,  
Secretary Board of Health,  
Lancaster, N. H.*

DEAR DOCTOR—Inclosed is a copy of the report of our chemist, Mr. Charles D. Howard, on his inspection of the water situation in Lancaster, on February 19, 1914.

This report is so comprehensive that little or no comment is necessary. The State Board of Health endorses to the letter the recommendations made by Mr. Howard. This board will insist that the following recommendations be carried out by your board:

1. That no water shall be pumped from the mill pond into the reservoir or into the mains connected therewith, unless:

(a) The water in said reservoir shall be exhausted to within two feet or less in depth, or

(b) In case of a conflagration which might render such pumping necessary to protect the town against serious loss by fire.

2. In case it should become necessary to pump water from the mill pond into the reservoir in either of the above events, the process of chlorination must be started simultaneously with the pumping and be maintained so long as any water is pumped from the said millpond into the reservoir.

A bacteriological examination of a sample of water taken from the mill pond by Mr. Howard and brought to the State Laboratory of Hygiene at the time of his recent visit revealed extensive infection with the colon bacillus, and this at a season of the year when much household drainage which would otherwise reach the pond is presumably frozen, and yet the water is seriously polluted. There can be no question, whatever, upon this point.

The number of buildings that surround the pond, with the sewage that is going into the water, is sufficient in itself, if there were no other known facts, to condemn the water *in toto* for domestic purposes.

The State Board of Health had occasion a few years ago most emphatically to warn the town of Littleton against pumping water from Ammonoosuc River into its mains, but the warning was not heeded, and as a result, in the winter of 1902-3 there occurred one hundred and thirty-nine cases of typhoid fever, with eleven deaths, from using water against which the public had been warned.

In 1903, and previously, the authorities and the public at Woodsville, had been warned against pumping water for domestic purposes from the Ammonoosuc River, but the arvice was disregarded, and forty-eight cases of typhoid fever, with five fatal cases, resulted.

We are certain that the people of Lancaster do not want and cannot afford an experience of this kind. The Woodsville epidemic occurred in the face of the fact that the authorities and the public had been warned that Ammonoosuc River water was unsuitable for domestic purposes, and that if used it must be boiled. As a matter of fact, such a warning is heeded by only a small proportion of water takers in any case.

We regard it as the imperative duty of your board to take these questions into consideration, and to enforce such regulations as may be necessary to protect the people of Lancaster against impure water.

Very truly yours,

IRVING A. WATSON,

*Secretary.*

The chemist's report follows:

*Dr. Irving A. Watson,*

*Secretary State Board of Health:*

DEAR SIR—On February 19, 1914, I went to Lancaster to investigate conditions in connection with a shortage in the water supply and the alleged necessity of augmenting such by pumping from the river.

Upon the arrival of your representative, a joint meeting of the boards of health and water commissioners was held, during which the situation was discussed. It appeared that on account of the nearly empty condition of the reservoirs, the board of water commissioners had already taken steps preliminary to immediate pumpage therein from the river, and that consumers had been notified of this intended action by the circulation of "fliers" suggesting the boiling of the water. Learning of this, the board of health served a notice of protest upon the water commission, which latter board consented to defer action for a few hours longer. It appeared that this board considered that an extremely hazardous situation existed, and that it would be amply justified, in the interests of property protection, in taking this step, regardless of any other considerations that might be urged. The board of health on the other hand, while acknowledging the danger to which the village was exposed, nevertheless expressed itself as being distinctly opposed to such emergency pumping except in the actual event of an outbreak of fire.

I subsequently made an examination of conditions at the reservoir, also at the river above the proposed point of intake. The supply consists of a spring-fed mountain brook having its source in the town of Kilkenny, from which it is piped to the reservoir, a distance of about six miles. The reservoir is situated one mile from the village, with an elevation of one hundred and eighty feet above the main street, giving a normal pressure of about eighty-five pounds per square inch. The capacity of the reservoir, which is of irregular shape, is variously estimated at from two to four million gallons, no definite information on this point being available. The depth to the point of overflow is twelve feet. The supply is unmeasured and no estimate as to the consumption was available. It does, however, serve a population of some two thousand people, with about six hundred services. In addition to some water used for manufacturing purposes, about one seventh of the revenue accruing to the precinct from the sale of water is on account of that supplied to the railroads for boiler use. It may be added that the quality of this supply is uniformly of a very high order.

Examination of the reservoir on February 20, showed a level of but two feet of water. This was considered as favorable, as contrary to the condition on the previous day, no further drop was indicated, notwithstanding that the night had been severely cold, and also that a rather serious leak in one of the street mains had persisted for some two or three hours the previous evening. It seemed to be agreed that the cause of the present shortage was a combination of a deteriorated and leaky condition of the plumbing, together with a habit, become widespread as a result of the unusually severe weather, of leaving the faucets open at night for the purpose of preventing freezing. As opposed to this explanation is the admission that no condition at all closely approaching the present one has ever before occurred during the winter season.

As serving to demonstrate the value and greater economy in a metered system and the carelessness and indifference to waste and the need of plumbing repairs in an unmeasured one, it was said to have been admitted

by one householder that his closet flush tank had been running continuously for three years, while as a result of the present emergency, the local plumbing establishment had booked orders for several days' work repairing faucets. Evidence was also said to have been found that in the case of one house, nine spigots had been left open during the previous night.

The emergency, or fire intake, is at the mill pond dam on a rather small stream locally known as Israel's River, said to have its origin twenty miles back in the mountains. The mill pond is of some three acres area, with an average depth of fifteen feet. Only a brief inspection was made of the sanitary condition of the shores, but this was ample to demonstrate, especially in connection with the admission of the water commissioners that a number of house sewers discharge directly into the pond, that this source as a water supply is necessarily absolutely unsafe and unfit, this notwithstanding that such water may not, and very probably does not, present any very bad physical characteristics. Both shores of this pond are closely lined by houses, very many of which are unconnected with and could not be readily connected with the public sewer. In addition, a number of manure piles, stables and chicken houses were noted close to the water's edge.\*

It may be pointed out that while the physical condition of this river water may be somewhat better at this time than it is during the summer season, nevertheless there is, on the whole, actually more danger in the use of this water at this time than there would be in summer, due in part to the absence of those favorable opportunities then existent for the destruction of the sewage forms of bacteria; in part to the fact that in the event of a sudden thaw much filth will necessarily be carried directly and unimpeded into the pond.

In a statement of the situation which I prepared for submission at a meeting of the precinct to be held the evening of February 20, the salient features were pointed out, and occasion was taken to state that assuming it were possible to secure sufficient fire pressure to care for a fire, operating the pump with the water power available, the pumping of such river water into the reservoir with a view of securing storage in anticipation of such an emergency, should be forbidden. It is stated, however, that while under favorable conditions it is possible to develop with this pump a pressure equal to the normal reservoir pressure, yet at times, due to the fluctuation in the volume of water going over the dam, there is insufficient water power to properly operate the pump. It is my opinion, however, considering all the facts, that there would be justification for restraining the board of water commissioners from such pumping into the reservoir, unless the present level should decline materially, i. e., unless such reservoir should become practically empty. Actually, it would appear that no further diminution is likely, and it seems to be the present sentiment of the board that under the present circumstances, it would be disposed to refrain from river pumping.

\*A sample of water collected from beneath the ice in the wheel pit of the grist-mill gave positive results by the presumptive test for colon bacilli on 10cc., 1cc. and 0.1cc quantities.

However, in the event either of the reservoir becoming empty, or the outbreak of a fire, the necessity of applying a sterilization to the river water was emphasized, and full details for effecting this were left with the board of health. It was promised by the constructor that the barrels, together with the necessary piping, and a water-closet flush tank to serve as a constant level tank, should be assembled in place, ready for use, during that afternoon (February 20). Based upon the estimated capacity of the pump operating under the conditions obtaining of ten thousand gallons per hour, a treatment was devised which would involve a dosage of approximately 0.5 parts chlorine per million, such, if conscientiously applied, being ample to render this water safe for drinking. I have, however, recommended that for the present at least, as a further check, the water be boiled by the consumer, following any emergency pumping.

It has been proposed that this emergency intake be moved to a point above what is known as the upper dam. It seems to be agreed that the stream at this point is not subject to any great amount of domestic sewage pollution. Unfortunately, there was neither time nor favorable conditions for any adequate inspection to verify this view. In case the change is made, it is believed the board would be justified in regarding such as coming under the law passed by the legislature of 1913 and that an inspection and the approval of the board should be secured.\*

It may be added that in view of the fact that practically every public water supply is provided with an emergency intake, such frequently if not usually being in a polluted source, and that also in view of the fact that many water superintendents or water boards are inclined to place property protection above health protection and to belittle the likelihood of any serious consequences arising as a result of emergency pumping, there should be more extensive oversight of such intakes by the State Board of Health. It would seem that such board ought not only to exert a specific authority in regulation of the use of water from sources of this character, but also that it should, in the event that a choice of location is available, have something to say as to where such shall be placed, also as to the sanitary character of the surroundings.

Respectfully submitted,

CHARLES D. HOWARD,  
*Chemist.*

February 21, 1914.

The matter of relocating the emergency intake in Israel River in connection with the Lancaster water supply having arisen, the chemist of the board went to Lancaster June 9, 1914, for the purpose of examining conditions on this river. His report, as well as the letter of transmittal and the order of the board issued in connection with the matter, follow:

\*See report following.

## STATE BOARD OF HEALTH.

THE STATE OF NEW HAMPSHIRE,  
OFFICE OF THE STATE BOARD OF HEALTH,  
CONCORD, N. H., June 11, 1914.

*Mr. W. E. Bullard,*  
*Chairman Board of Water Commissioners,*  
*Lancaster, N. H.:*

DEAR SIR—Inclosed is a copy of the report of our chemist, Mr. Charles D. Howard, on his recent examination of the situation with respect to the emergency water supply from Israel's River.

I think a careful reading of this report will convince you that the position taken by the State Board of Health in the inclosed order is certainly justifiable.

There can be no question that the water of Israel's River, unless chemically treated, is dangerous for domestic purposes.

The carrying out of the inclosed order will not entail any unreasonable expense, and it is in accordance with the proposition which I think was assented to by your company in February last, when some question arose regarding your water supply.

I would emphasize the statement in Mr. Howard's report, that if the present supply were conserved there probably would be no need whatever of pumping water from the river.

Very truly yours,  
IRVING A. WATSON,  
*Secretary.*

Inclosures.

THE STATE OF NEW HAMPSHIRE,  
OFFICE OF THE STATE BOARD OF HEALTH,  
CONCORD, N. H., June 11, 1914.

*Board of Water Commissioners,*  
*Lancaster, N. H.:*

GENTLEMEN—A careful investigation of Israel's River and its tributaries reveals the fact that this stream receives at all times more or less sewage, which renders it a dangerous source of water supply for domestic purposes. It is, therefore,

ORDERED, That no water from Israel's River shall be pumped into the town supply pipes except in case of great emergency (such as a conflagration), and that all water so pumped shall be chlorinated in accordance with specifications approved by the State Board of Health, and that all households and other establishments using the said water shall be immediately notified of such action.

Per order,

IRVING A. WATSON,  
*Secretary.*

## MR. HOWARD'S REPORT.

CONCORD, N. H., June 9, 1914.

*Dr. Irving A. Watson,*  
*Secretary State Board of Health:*

DEAR SIR—The matter of re-locating the emergency intake in Israel's River in connection with the Lancaster water supply having arisen, I went to Lancaster on June 9 for the purpose of studying the situation. In this examination of conditions on the above-named river, I was accompanied by Mr. W. E. Bullard of the board of water commissioners.

This emergency intake, at present located at the gristmill dam, is operated by a pump designed to force river water at considerable pressure into the mains in the event of an extensive fire.

Because of sanitary conditions on the pond above (pointed out in an earlier report), water drawn at this point cannot be considered as fit in any sense for drinking purposes, or as a suitable adjunct to the main supply in any other respect than for the extinguishing of fires.

However, it is represented that at times the level of the water in the reservoir drops materially below the overflow point (12 feet). On a few occasions the level has been greatly reduced, and it is therefore the desire of the commissioners, with a view to maintaining at all times satisfactory fire protection, to be able to pump from some suitable source, at such times as may seem expedient, sufficient water to maintain the normal level.

Whereas in the past such pumping has been practised in very rare instances only, I should infer that the present intent in re-locating the intake involves the expectation that water of sufficiently good quality would be secured as to permit of pumping into the reservoir at any time when it might seem expedient to do so, and without, necessarily, notifying the consumers of such action at the time.

The quality of the present Lancaster supply is hardly excelled by any other public supply in the state. This high quality is distinctly a valuable asset of the town—something in which its citizens may justly take pride. It is manifest that the introduction of any inferior auxiliary source would be unfortunate; and it is, therefore, not at all likely that the people of Lancaster would care to consider the use, even during very short or infrequent intervals, of a supplementary system of distinctly polluted origin.

This emergency intake re-location included two propositions: 1st. To establish the pump at the Jones & Linscott Electric plant, some half mile or more above the gristmill, with the intake at the canal dam furnishing power for such plant; 2d. Pumping from the same point, but extending the suction pipe up the canal to the old paper mill dam on the main river. The later course would avoid some contamination from the Maine Central Railroad roundhouses, situated just above the Jones & Linscott plant.

An examination of the sanitary conditions above the latter plant showed the following facts: Just opposite the railroad roundhouse, two sewers discharge into the canal. The first includes the discharge of a

flush tank, also the washings of locomotive boilers, inclusive of boiler chemicals, etc. The second, while said to be a small natural brook, is nevertheless charged with street washings, etc.

It is true that by extending the suction pipe some seven or eight hundred feet up to the river dam, the roundhouse contamination would be avoided.

One fourth mile above this dam is a second dam, supplying power for the Lancaster & Jefferson Electric Company. This plant employs two men; no closet; employes state that they "go to the river," or else use a closet discharging into the river and attached to an abandoned mill immediately above.

At this plant it was said that there is a practice of dumping garbage of all descriptions into the river. Between the two dams there are but two houses on the immediate watershed, neither of which sewers directly into the river.

A half mile above the upper electric plant is the Quimby brickyard, employing a half dozen men; one dwelling attached, with earth closet; wash from brick machines discharges on the grass a number of rods from the river.

Otter Brook discharges into Israel's River about one and one half miles above the gristmill. Just above this junction there are located on or very near the brook some eight or ten sets of farm buildings, inclusive of dwellings. One half mile farther up this brook is a small village known as Grange, a collection of some fifteen dwellings, with two stores, saw-mill, blacksmith shop, etc. The sewer entering the brook at this point includes the discharge, it was represented, of four flush closets, besides the street washings entering at the grating, and there are at least two other flush closets delivering into the brook, not to mention seepage from various sink drains, etc., eventually reaching this stream.

From this point we proceeded to the village of Jefferson Hill, noting from an elevation on the way the location of the regular supply intake in a mountain brook some five and one half miles from the reservoir. It could be observed that this section is practically all wooded, with no apparent possibility of sewage contamination.

At Jefferson Highlands we were informed by responsible parties that there are two sewers (a) that of the Waumbec Hotel and cottages (at this date still closed), and (b) a sewer serving a number of private residences and connecting with that from the hotel property. The combined sewerage, it was stated, enters a brook at a point one fourth mile from the river, thence reaching the latter stream. From this point, the flow to Lancaster is estimated at about eight miles, much of the way, it was noted, being through open farm land with the usual farm buildings.

It will be observed, therefore, that in addition to the small amount of pollution entering the river just above the Jones & Linscott plant, there is a material amount discharging therein from Grange. More serious still and affording a source of very great danger during the summer season, is the sewage discharged from the Waumbec Hotel at Jefferson—a place accommodating five hundred persons.

It is futile to suppose that the subsequent river flow of eight miles is sufficient—or anything like sufficient—to purify the river of this extensive contamination and render its water safe for drinking.

It should be obvious, therefore, that any plan involving direct pumping from the river, unannounced, and with the view merely to maintain a satisfactory stage of water in the reservoir, ought not to be seriously considered except in time of dire emergency, and even then only when accompanied by the use of the chemical treatment already prescribed, and followed also by an immediate warning to the consumers.

The only advantage, therefore, in changing the present location of this emergency intake would be that, in the event of a serious fire demanding river pumping, an intake at the upper point mentioned would afford water of a somewhat cleaner character, thus involving somewhat less serious fouling of the mains.

It would appear, however, that there is yet much that can be done, and at relatively small expense, in the way of augmenting the present high quality brook supply.

There seems ground for a belief that by going a few hundred feet farther up the brook, the present "head" would thereby be materially increased, affording a corresponding increase in the quantity discharged at the reservoir in a given time. It is stated that extensive repairs at the brook dam will be necessary at a very early date, so that the present is a favorable time for the re-location of such dam.

A second means of increment is through enlarging the reservoir storage. Thus it was noted that water was wasting at the overflow at a rate of five to ten gallons a minute. At night the wastage would be greater, as it also doubtless was during the past very rainy season. There is no reason, whatever, why this wastage should be permitted to occur, especially in the face of any question as to the securing of more water. Storage would in no wise injure the quality, and it is estimated that by simply joining on an upturned bend to the inlet of the overflow pipe, with practically no other expense whatever, beyond possibly a little grubbing off of vegetable matter, an increased depth of at least one and one half feet could thereby be secured. And by the expenditure of a comparatively small sum for raising and strengthening the reservoir embankment slightly, it would appear that the available maximum stage could be raised at least three feet above the present. This would mean really a greater increase of storage than might at first appear, in view of the fact that the shores shelf off very gradually, the area of the lower three or four feet of depth being very much less than that of the full reservoir area.

By a combination, therefore, of increased storage and increased delivery capacity of the supply main from the brook, it would appear that a materially increased supply of the pure brook water might thereby be attained, thus rendering it unnecessary to pump dangerous river water into the system, except in the event of an extraordinary emergency.

Respectfully submitted,

[Signed]

CHARLES D. HOWARD,

*Chemist.*

June 10, 1914.