

1883.

CITY DOCUMENT.

[No. 24.]

REPORT  
OF THE  
JOINT STANDING COMMITTEE ON THE  
CITY ENGINEER'S DEPARTMENT  
IN RELATION TO THE  
POLLUTION  
OF THE  
Tributaries of the Providence River.

[Presented December 17, 1883.]



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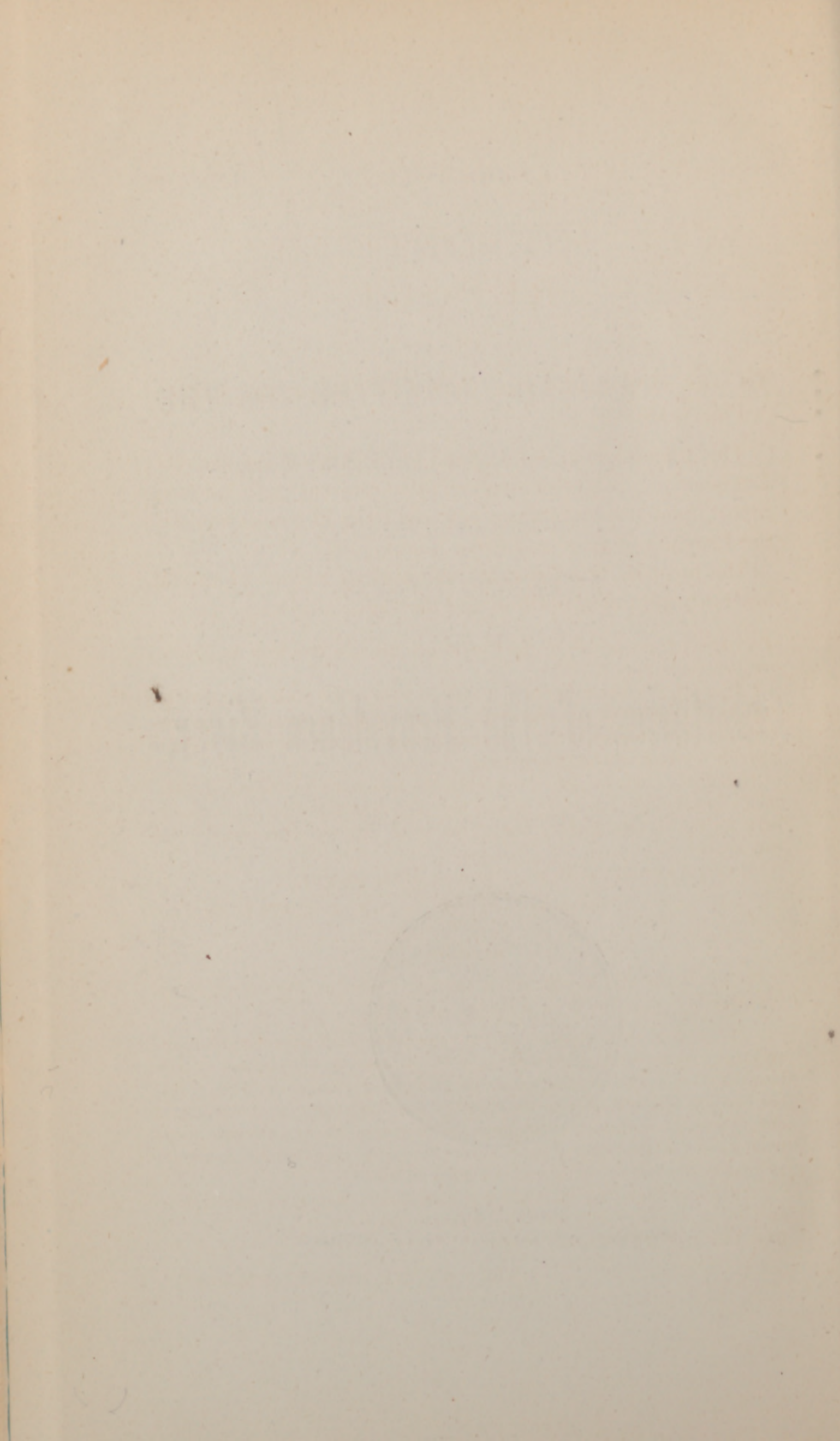


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## REPORT.

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TO THE HONORABLE THE CITY COUNCIL OF THE CITY OF PROVIDENCE :

The undersigned, joint standing committee on the City Engineer's department, respectfully present the following report upon certain matters referred to us in connection with the Providence river and Cove basin.

The business was brought before us by reason of the following resolutions, petition and message.

"RESOLUTIONS passed by the Providence Board of Trade at its monthly meeting, held May 1, 1883.

"*Resolved*, That this Board of Trade, in view of the present state of the waters of Providence river and Cove basin, deem it essential for the preservation of the health of our city, that immediate steps should be taken to provide a better system of sewerage.

"*Resolved*, That the above resolution be submitted to the city government, and that the president of this board be directed to prepare a memorial for the signature of the tax payers of the city, to be presented to the city council.

"I hereby certify this to be a true copy of the records.

"(Signed)

F. P. LITTLE, Sec'y."

### PETITION.

"*To His Honor the Mayor, and to the City Council of the City of Providence :*

"The undersigned, citizens of Providence and tax payers therein, respectfully represent that the sewage at the present time permitted to flow into the Cove basin, and the waters of Providence river above Fox point, has become very offensive to the comfort and dangerous to the health of our people; that the evil will increase in magnitude and become more troublesome as the population of the city increases; and that means should at once be devised to remedy so serious a nuisance.

"Therefore they pray that you will take this matter into consideration and do, at an early day, whatever may be necessary to relieve the city from this growing source of danger."

"(Signed by 68 citizens of Providence.)"

## MESSAGE.

“ CITY OF PROVIDENCE,  
 “ EXECUTIVE DEPARTMENT, CITY HALL, }  
 “ June 18, 1883.

“ *Gentlemen of the City Council:*

“ I have received from Charles H. Merriman, Esq., president of the board of trade, and transmit herewith a copy of resolutions passed by the board, and a memorial, bearing the signatures of many of our well known citizens and tax payers, urging upon the city council the importance, for the health and comfort of the city, of early action in relation to the sewage permitted to flow into the waters of the Cove and the Providence river above Fox point.

“ This deliberate expression of the opinion of the board of trade, comprising in its membership, as it does, so large a number of the intelligent business men of this city will serve as an endorsement of the action already taken by the city council, looking to a remedy of the evils complained of, and an assurance that the early prosecution of such measures for the disposition of the sewage of the city as may be demanded for the preservation of the health of the community, although necessarily involving a large expenditure of money meets with general approval.

“(Signed)

WILLIAM S. HAYWARD,

“ Mayor.”

THIS SUBJECT HAS BEEN EXAMINED BEFORE.

You are doubtless aware that the subject referred to us is no new one. On the 27th of July, 1876, Dr. Edwin M. Snow, superintendent of health, presented to the board of aldermen a communication in relation to the foul condition of the waters of the Moshassuck river.

This report was not printed, but it called attention to the need of measures to prevent the continuance of the pollution then practiced.

Again on November 22, 1877, Dr. Snow presented another report (City Document of 1877, No. 33,) upon the water in the Moshassuck river. In this report Dr. Snow makes the following declaration :

“ In view of the whole subject I give my opinion unhesitatingly that the water in the Moshassuck river, before it reaches the limits of the city—and of course when entirely



beyond the control of the city government—is rendered so impure that it is utterly unfit for domestic use and is a constant source of nuisance and danger to public health.

"After the river reaches the city limits it receives the filthy waste and other offensive matters from another large woolen manufactory and another large bleachery on West river, from a very extensive print works, from several large manufactories of different kinds, from numerous privies on the banks of the river, and also receives a very large and rapidly increasing amount of sewage. In fact the river, in its course within the city and especially after it passes the print works, can be looked upon only as an open sewer, and the time is rapidly approaching when it must be treated as such and must be covered or the filth must be kept out of it.

\* \* \* \* \*

"I would, therefore, earnestly recommend that a commission be appointed by the city council to urge upon the General Assembly such legislation as shall thoroughly remove the present difficulties and effectually prevent their recurrence in the future."

To the report is appended one by Professor John H. Appleton, of Brown University, giving the results of analyses of several samples of water from the Moshassuck river, all of them showing unquestioned evidences of the pollution of this stream. We reprint this report in full.

PROFESSOR APPLETONS REPORT.

"PROVIDENCE, R. I., August 29, 1877.

"EDWIN M. SNOW, M. D., SUPERINTENDENT OF HEALTH :—

"DEAR SIR :—I herewith hand you a table showing the result of five analyses of Water, tested at your request.

"Samples 1, 2 and 3 were received from you. They were marked as taken on July 26, 1877. I request you to enter in the table their proper designations. Samples 4 and 5 were taken by myself, in your presence on August 22, 1877.

"Sample 4 shows the condition of the Moshassuck river at the date referred to. It is excellent river water,—the results showing it to be but slightly inferior in quality to Pawtuxet water at Pettaconsett.

"The other samples show distinctly that the river has suffered serious pollution. These samples indicate that large quantities of mineral and organic matters have been poured into the river.

"TABLE.

"Showing results of water-analyses. The numbers represent parts (*by weight*) per million parts of water (*by weight*).

LOCATION, ETC.	Total Residue.	Organic and Volatile Matter.	Mineral Matter.	Common Salt.	Albuminoid Ammonia.	Ready-formed Ammonia.
	A.	B.	C.	D.	E.	F.
1. <i>Below Slaughter Houses, On bridge over river on Power road or Cemetery street.....</i>	238.	94.	144.	23.64	2.50	4.50
2. <i>In Catholic Burying Ground, Between Slaughter Houses and Darling's Works and Woolen Mill.....</i>	264.	120.	144.	26.79	2.00	12.00
3. <i>Above Mineral Spring Avenue and below Sayles' Bleachery..</i>	306.	114.	192.	29.16	1.30	0.10
4. <i>Above Sayles' Bleachery.....</i>	54.	23.	31.	5.52	.38	0.04
5. <i>Same as number 3, different date Below Sayles' Bleachery.....</i>	240.	88.	152.	18.91	1.20	0.15



" I will add a few words of explanation of the foregoing table, even at the risk of repeating some explanations already given you in a previous communication.

"(A.) What is described as *total residue*, is all the solid matter obtained when the water sample is carefully evaporated to dryness in a platinum dish.

"(B.) The *organic and volatile matter*, is that which is burned and expelled when the total solids are heated to a red heat.

"(C.) The *mineral matter* is that which remains unburned and unvolatized by the heating just described.

"(D.) The *common salt* is calculated from the amount of chlorine found in the water.

"(E.) *Albuminoid ammonia* is the ammonia that is formed by the artificial decomposition of certain animal matters, more or less analogous to albumen. A few nitrogenous vegetable matters yield the same product.

"(F.) *Ready-formed ammonia*, is ammonia that is expelled by simply boiling the water with pure carbonate of soda.

"The amount of albuminoid ammonia and of ready-formed ammonia in a water, is at present almost universally taken as the best chemical measure of the amount of animal contamination that the sample of water has suffered.

"I have therefore spoken of the meaning of the *terms* employed in the table. I will now refer to the interpretation of the *numbers* used. For the purpose of comparison, I give here a statement of the result of a recent analysis of the Pawtuxet river water at Pettaconsett :

LOCATION, ETC., AND DATE.	Total Residue.	Organic and Volatile Matter.	Mineral Matter.	Common Salt.	Albuminoid Ammonia.	Ready-formed Ammonia.
August 15, 1877.						
Pawtuxet river.....	48.	24.	24.	6.30	0.28	0.10

"By reference to the table, it appears that the samples there described had, as compared with the Pawtuxet river water, as follows :

*"Of Total Residue,*

- No. 1, had about 5 times as much as Pawtuxet.
- No. 2, had about  $5\frac{1}{2}$  times as much as Pawtuxet.
- No. 3, had about  $6\frac{1}{3}$  times as much as Pawtuxet.
- No. 5, had about 5 times as much as Pawtuxet.

*"Of Organic and Volatile Matter,*

- No. 1, had about 4 times as much as Pawtuxet.
- No. 2, had about 5 times as much as Pawtuxet.
- No. 3, had about  $4\frac{1}{2}$  times as much as Pawtuxet.
- No. 5, had about  $3\frac{1}{2}$  times as much as Pawtuxet.

*"Of Mineral Matters,*

- No. 1, had about 6 times as much as Pawtuxet.
- No. 2, had about 6 times as much as Pawtuxet.
- No. 3, had about  $8\frac{1}{2}$  times as much as Pawtuxet.
- No. 5, had about  $6\frac{1}{2}$  times as much as Pawtuxet.

*"Of Common Salt,*

- No. 1, had about 4 times as much as Pawtuxet.
- No. 2, had about  $4\frac{1}{3}$  times as much as Pawtuxet.
- No. 3, had about 5 times as much as Pawtuxet.
- No. 5, had about 3 times as much as Pawtuxet.

*"Of Albuminoid Ammonia,*

- No. 1, had about 9 times as much as Pawtuxet.
- No. 2, had about 7 times as much as Pawtuxet.
- No. 3, had about  $4\frac{1}{2}$  times as much as Pawtuxet.
- No. 5, had about  $4\frac{1}{2}$  times as much as Pawtuxet.

*Of Ready-Formed Ammonia,*

No. 1, had about 45 times as much as Pawtuxet.

No. 2, had about 120 times as much as Pawtuxet.

No. 3, had about 1 times as much as Pawtuxet.

No. 5, had about 1½ times as much as Pawtuxet.

"I need not add any remarks to these striking figures.

"Yours respectfully,

"JOHN H. APPLETON."

The quotations here presented are but meagre extracts from an intelligent and decided report, to the whole of which we respectfully call careful attention.

The pollution of the Moshassuck river is the subject of still another report presented by Dr. Snow to the Board of Aldermen, Oct. 23rd, 1878. (City Document of 1878, No. 30). We call attention to the whole of this report also, and particularly to the following extracts.

"There can be no doubt that the whole of both rivers—the West and the Moshassuck—above Allen's Print Works, and still worse the Moshassuck below the Print Works,—are causes to some extent of sickness, disease and death to the public."

\* \* \* \* \*

"Nearly a year since I presented a report to your Board upon the impurities of the Moshassuck river, and urged immediate action. The report was printed, but no action was taken. There can be no doubt in the minds of any one that the Moshassuck river before it enters the city, is in a very filthy condition, and that after it enters the city the amount of filth is enormously increased by manufactories within the city limits. When to these sources of filth we add the rapidly increasing amount of sewage that is turned into the river we ought not to be surprised that the river at the



Weybosset bridge has become extremely filthy and at times very offensive to sight and smell. Of course it must be more or less injurious to health, though there are counter-acting causes that remove the danger in some degree.

"The Woonasquatucket river is, in some respects, in a similar condition to the Moshassuck, though not yet as bad.

"There are two important measures that require the early attention of the city government,—in fact that are imperatively demanded in the interest of the public health.

"The first is that which I urged a year since, to obtain action through the General Assembly to prevent pollution of the streams by manufactories throughout the state. This subject is exciting much attention in other states and most valuable information has been recently printed in relation to it, especially in Massachusetts. It is a subject in which the manufacturers are interested as well as the public, as at the present time the manufacturer who is located farthest up stream seems to enjoy the right to ruin the water for the use of all below him. The city is especially interested in the subject as two mill streams are flowing through it and another supplies us with drinking water.

"The second measure of immediate importance is the construction of intercepting sewers to receive all the sewage of the city and carry it down to Sassafra's point or beyond. This was, and is, a part of the system of sewerage upon which the city has entered, which was known to be an absolute necessity from the beginning, and the construction of which was made imperative by the introduction of the Pawtuxet water. As then, its importance and positive necessity are universally conceded, it would seem to be the part of wisdom to make preparations for commencing the work at as early a day as possible."

#### WORK OF THE COMMITTEE.

As a committee we have held several meetings, and have devoted considerable time to the matter referred to us.

We find that the rivers emptying into the Cove basin are the Woonasquatucket river and the Moshassuck river. At a point about one and three-eighths miles from the Cove basin another river, called the West river, empties into the Moshassuck, and so eventually into the Cove itself.

We have made a careful examination of the Cove, the rivers flowing into it, and of such sources of pollution of them as we have been able to detect.

Your committee have also made a careful inspection of the Providence river underneath the bridges, between the Cove basin and the Crawford street bridge. Further, we made an examination of it at the sewer outlets on both sides of the river.

The slimy scum, having an oily appearance, seen in the vicinity of the Providence Gas Company's wharf, led your committee to believe that much offensive and impure material finds its way into the river from that establishment.

We have consulted Dr. Edwin M. Snow, Superintendent of Health, Mr. Samuel M. Gray, City Engineer, and Professor John H. Appleton of Brown University, with respect to matters treated in this report, and moreover, by invitation of the committee, these gentlemen personally attended us in most of our inspections.

In order to obtain fuller information than that gained by mere inspection of the river, and the nuisances themselves, the committee called upon Professor Appleton, to make chemical examinations of certain of the samples of water collected by us.

Professor Appleton's report is herewith appended. No one can doubt that the results therein shown, point clearly to the fact that the waters of Moshassuck river, West river, and Woonasquatucket river, are defiled to an enormous degree by the manufacturing establishments located on their banks.

As your committee, we now proceed to state the results of our investigations. In doing so we shall pursue the following course: Describing the rivers in turn, and beginning at the Cove basin and following each river towards its source, we shall proceed to a point upon each where the waters appear to be flowing in a comparatively pure and unpolluted condition. We shall mention one by one the sources of pollution detected. It will be seen that, in order to make it more convenient to refer to the points inspected, we have numbered them. Some of these points are described with less fullness than others because we were not able, in all cases, to gain as complete information as might be desired. In fact these examinations have developed in us the opinion that this whole subject demands a far more extended investigation than we have been enabled to give it.

#### MOSHASSUCK RIVER.

The committee visited the Moshassuck river, July 26, 1883.

#### *1st Point Inspected.*

This is the mouth of the Moshassuck river as it empties into the Cove basin beneath the bridge in the Cove promenade. At this point masses of filth and garbage in the water were plainly observed by the committee. Water sample No. 1, of July 26, was taken here.

This sample of water was sent to Professor Appleton for analysis. From his report in the appendix we select certain of the numerical results and place them here in a proper juxtaposition.



TABLE.

The numbers express parts, by weight per million parts of water, by weight.

	Organic and volatile matters : including animal and vegetable matter.	Mineral matters.
Moshassuck river, pond <i>above</i> Sayles' bleachery.....	20.	46.
Moshassuck river, at Cove basin.	735.	4,443.

That the great increase in the amount of impurities indicates a strong defilement of the water will hardly be denied.

*2nd Point Inspected.*

This was Comstock's beef storehouse situated opposite Haymarket street, overhanging the river.

The committee observed that the river emitted a very bad odor at this point.

The Messrs. Comstock assured the committee that no pollution came from this business.

*3rd Point Inspected.*

This is Comstock's stable, connected with the beef storehouse mentioned under Point No. 2. Five horses are kept here.

The Messrs. Comstock informed the committee that no pollution came from this stable, except the urine from the horses, nothing else being allowed to run into the river.

Water sample No. 2, of July 26, was taken at 10.20 A. M., from the Moshassuck river about opposite the Central police station.

*4th Point Inspected.*

This is a Market, located near the Smith street bridge.

Mr. Darcy the then proprietor of the market informed the committee that the stench from the river was terrible, both at night and early in the morning. The committee observed that nearly two feet of filth and garbage matter had accumulated under the bridge.

The committee, upon examining the market, discovered that the decayed vegetables and refuse materials from it accumulated into a back cellar and apparently had thence fallen into the river.

The committee also noted that all the privy-vaults in sight emptied their contents into the river.

*5th Point Inspected.*

The committee went down into the rear of Smith street, on land fronting on the river. They found the old Red Lion (so called), owned by Mr. G. W. Bowen, in a state of decay and neglect and contributing its share of foul odors to the immediate neighborhood.

*6th Point Inspected.*

Moulton & Ingraham's Planing Mill.

The committee were informed that the shavings from this mill were burned.

*7th Point Inspected.*

In the rear of Moulton & Ingraham's shop was found a small stable and a filthy pig-sty, both of which contributed d filement of the river.

*8th Point Inspected.*

The Fletcher Manufacturing Co.'s establishment.  
Agent, William Ames.

Location, Mill and Charles street.

Kind of business, manufacture of cotton braids.

The committee were informed by Mr. William Ames, manager of these works, that nothing of a deleterious nature runs from them into the river. The refuse matter from privies runs into a cess-pool.

The committee observed that some coloring matter flowed into the river, but they were informed by Mr. Ames that it was neither offensive nor injurious.

Mr. Ames said that a sewer was needed in this vicinity. He stated that the odor from the river was often excessively offensive.

*9th Point Inspected.*

The committee discovered that a privy from Stillman White's building emptied its contents into the river.

*10th Point Inspected.*

The committee also noticed that a privy belonging to the building leased by James Hanley empties its contents into the river.

*11th Point Inspected.*

The committee remarked that the Charles street sewer finds an outlet into the river under the bridge at Mill street.

*12th Point Inspected.*

Proceeding along Bark street the committee discovered that a very large number of privies and sink-drains from tenements on Charles street empty their contents into the river, and that masses of garbage and filth are piled up along the river bank.



*13th Point Inspected.*

Mill of The American Screw Co.

Agent, Charles T. Salisbury.

Location, Stevens street.

Kind of business, manufacture of screws, from iron, steel and brass.

Mr. Rogers, superintendent of this factory, stated to the committee that, during the spring just passed, the Screw Company had cleaned the bed of the river for the entire length of its mill. He said that the closets belonging to the mill empty into large cess-pools which are cleaned twice a year, and that none of the matter from them flows into the river; that the old drain-pipes from these closets to the river had been closed for ten years.

Water sample No. 3, of July 26, was taken from the river just above the Stevens street bridge.

*14th Point Inspected.*

The committee next visited the Randall street bridge, and observed that a large number of privies near by contributed their filth to the river.

*15th Point Inspected.*

Franklin Foundry and Machine Co.'s Works.

Agent, Mr. F. E. Sprague.

Location, Charles street.

Kind of business, manufacture of machinery and castings.

Mr. Sprague assured the committee that the privies of this establishment empty into a cess-pool, and that little, if any, filth passes into the river from it.

*16th Point Inspected.*

About two hundred feet south of Nash lane, and at the northern extremity of the Franklin Foundry property, the

river was found to be in a very bad state, the water being in a most putrid and filthy condition. A white scum was visible on the water from this point up to the old Nash lane bridge.

Water sample No. 4, of July 26, was taken here.

*17th Point Inspected.*

The next point visited was the Wheldon street bridge. The water appeared to be of a blue-black color, and was very filthy.

Water sample No. 5, of July 26, was taken at the upper end of this bridge.

This sample of water was sent to Professor Appleton for analysis. In his report in the appendix, he speaks of it as having a very offensive odor, as having a dirty brown color, as containing a brown and flaky sediment. From this report we select certain of the numerical results and place them here in comparison.

TABLE.

The numbers express parts, by weight per million parts of water, by weight.

	Organic and volatile matters : including animal and vegetable matters.	Mineral Matters.
Moshassuck river, pond <i>above</i> Sayles' bleachery.....	20.	46.
Moshassuck river, north side of Wheldon street.....	356.	522.

*18th Point Inspected.*

Allen's Print Works.

Treasurer, John B. Kelley.

Location, corner Thurber's lane and Branch avenue.

Kind of business, cotton bleaching and calico printing.

The water, after being used at the print works, runs by a trench into the river again. The committee found that on the premises of the print works is a large cesspool where madder, and other waste dye-stuffs, are collected, and that from time to time the liquid is allowed to run away into the river, the solid material being cleaned out and carted away.

The water-closets at the print works empty into the river.

*19th Point Inspected.*

This was above Allen's print works and at the junction of the West river with the Moshassuck.

The West river was found by the committee to have a black color, and to be terribly offensive and foul. The Moshassuck river was milky and also offensive.

Water sample No. 6, of July 26, from the Moshassuck river, was taken from a point about four hundred feet south of Branch bridge.

*20th Point Inspected.*

R. L. Tool Co.'s Works.

Treasurer, W. B. Dart.

Location, West River street.

Kind of business, manufacture of machinery.

The committee were informed that the water-closets of this establishment do not empty into the river. Further, they learned that the matters put into the river consist mainly of water used on the grindstones, and acids used on castings.



*21st Point Inspected.*

I. B. Mason's slaughter-houses.

The committee found that blood and other animal matters were turned into the river from this establishment, and that these substances made a sickening odor of the most offensive description at the point where the drain from the slaughter-houses empties into the swamp, whence the liquid finds its way into the river.

*22nd Point Inspected.*

Sayles' Bleachery.

Owners, W. F. & F. C. Sayles.

Kind of business, bleaching and finishing of cotton goods.

The committee found that most of the water-closets empty into the river.

They found that after the water is used by the Bleachery, it is run into a large cesspool, apparently with a view to giving the impurities an opportunity to settle. But when the committee examined it, the contrivance as used appeared not to be accomplishing this object. After leaving this cesspool the waste liquor flows into the river. Below the bleachery a line of planking, placed in the centre of the river, separates it lengthwise into two portions. The water from the bleach-house proper flows on the west side into the cesspool referred to, shaped like a half-circle, the radius being upwards of two hundred feet. The gate of this cesspool was found open, and polluted water pouring from it into the river at 6.25 o'clock, P. M., July 26, 1883, when the committee were there.

Water sample No. 12, of July 26, was taken from the river, below the outlet of this cesspool, and it is believed to fairly represent the condition of the river itself, below the bleachery.

This sample of water was sent to Professor Appleton for analysis. In his report in the appendix, he speaks of it as

very turbid and dirty, giving out an exceeding sickening odor, having a sediment of lumpy flakes almost black, and one-half inch in depth.

We compare some of the results of the analysis :

TABLE.

The numbers express parts, by weight per million parts of water, by weight.

	Organic and volatile matters : including animal and vegetable matters.	Mineral matters.
Moshassuck river pond <i>above</i> Sayles' bleachery.....	20.	46.
Moshassuck river below Sayles' bleachery.....	483.	737.

That the great increase in the amounts of impurities indicate a strong defilement of the water, is very apparent.

*23d Point Inspected.*

At Sayles' pond, above Sayles' bleachery, the water appeared to be clear.

Water sample No. 11, of July 26, was taken from Sayles' pond.

This sample of water was sent to Professor Appleton for analysis. In his report in the appendix, he speaks of it as but very slightly colored. In Dr. Snow's report of November 22nd, 1877, (City Document, No. 23, already referred to), we have certain results of analyses which we introduce into this table, for purposes of comparison :



TABLE.

The numbers express parts, by weight per million parts of water, by weight.

	Organic and volatile matters, including animal and vegetable matters.	Mineral Matters.
Above Sayles' bleachery, Aug., 1877.....	23.	31.
Pawtuxet river, Aug., 1877.....	24.	24.
Above Sayles' bleachery, July, 1883.....	20.	46.

WEST RIVER.

The committee visited the West river on two occasions, that is, July 26, and August 7, 1883.

*24th Point Inspected.*

Silver Spring Bleachery.

Treasurer, Charles Warren Lippitt.

Location, on the West river near Charles street.

Kind of business, bleaching, dyeing and finishing of cotton goods.

The committee observed two different streams of waste liquors flowing from these works. The one was inky black; the other was creamy and appeared to be charged with starch or some similar material.

Water sample No. 7, of July 26, was taken from the river after it had been used in the dye-house.

This sample of water was sent to Professor Appleton for analysis. In his report in the appendix he speaks of it as being straw colored and having a sediment of jet black color one-half inch in depth.



A portion of the results of analysis are given in the table below :

TABLE.

The numbers express parts, by weight per million parts of water, by weight.		
	Organic and volatile matters : including animal and vegetable matters.	Mineral matters.
West River, Geneva Pond.....	16.	33.
West River, below Silver Spring bleachery.....	542.	340.

That the great increase in the amounts of impurities indicate a strong defilement of the water will hardly be denied.

Water sample No. 8, of July 26, was taken from the West river, west of the railroad bridge, below the Silver Spring bleachery.

Water sample No. 9, of July 26, was taken as the water flows from the Silver Spring bleachery stream as it enters the West river about forty feet above the railroad bridge.

Water sample No. 10, of July 26, was taken from the West river on the northern side of the Charles street bridge.

*25th Point Inspected.*

Wanskuck mills.

Agent, Jesse Metcalf.

Location, at Wanskuck near Branch avenue, and on the West river.

Kind of business, the scouring of wool, and the dyeing and manufacture of goods from it.

An examination was made of the new reservoirs of the Wanskuck mills used for settling the refuse liquors. These reservoirs are situated just off Woodward road, and consist of three series of large vats of two each. The refuse matter is pumped from the mills and, after leaching through the six vats, runs into a drain, thence flowing across a field for nearly a mile, finally making its way into Wanskuck pond.

Water sample No. 6, of August 7, was taken from Wanskuck reservoir.

Water sample No. 7, of August 7, was taken from the drain about three-quarters of a mile from the reservoir.

*26th Point Inspected.*

Tripe works of Lewis Woodward.

The committee believe that practically all of the refuse matters are carted away and sold for manuring purposes.

Water sample No. 8, of August 7, was taken from the river below these Tripe works.

*27th Point Inspected.*

Geneva worsted mills.

Treasurer, Albert A. Sack.

Location, on the West river at Geneva, near Douglass avenue.

Kind of business, spinning, weaving, dyeing and finishing of worsted goods.

Water sample No. 4, of August 7, was taken from the outlet of the mill-drain where it runs into the West river, and while the dye vats were being emptied.

Water sample No. 5, of August 7, was taken from Geneva pond, on the west side of the bridge, near the Geneva mills.

This sample of water was sent to Professor Appleton for analysis. From his report in the appendix we select two of the principal data respecting this sample, and compare these



with corresponding ones, referring to the Moshassuck river above Sayles' bleachery. This comparison shows that the Moshassuck river and West river, above the points where they are polluted, are of approximately similar character.

TABLE.

The numbers express parts, by weight per million parts of water, by weight.

	Organic and volatile matters : including animal and vegetable matters.	Mineral matters.
Moshassuck river, <i>above</i> Sayles' bleachery.....	20.	46.
West river, Geneva pond.....	16.	33.

## WOONASQUATUCKET RIVER.

The committee visited the Woonasquatucket river on two occasions, that is, on July 31 and August 7, 1883.

*28th Point Inspected.*

This is Keily Brothers brewery.

The committee were informed that the malt and hops used at the brewery were sold for manure; and further, that the only refuse matter emptied into the Woonasquatucket river was the water used in washing empty beer barrels. The committee observed a stream of impure water running from this brewery about four hundred feet north of Harris avenue, and they believe that it produced the very offensive odor which prevailed at that time in that neighborhood.

Water sample No. 12, of July 31, was taken from this drain.



*29th Point Inspected.*

This is Burnside bridge, so called, near the Locomotive Works.

Water sample No. 10, of July 31, was taken here.

Water sample No. 11, of July 31, was taken from this bridge about the middle of the river.

*30th Point Inspected.*

Eagle street bridge.

At this point there empties into the river a sewer, used to discharge the refuse liquors from the Weybosset Mills, and the Atlantic mills, all situated further up the stream.

The committee was informed by Mr. Charles D. Owen, of the Atlantic mills, that a number of private property owners on the line of this sewer had connected with it without permission, and were discharging house waste into it. When the committee inspected the mouth of this sewer, a large amount of foul water was flowing from it into the Woonasquatucket river.

Water sample No. 3, of August 7, and water sample No. 9, of July 31, were taken from the Woonasquatucket river, just below Eagle bridge.

Water sample No. 8, of July 31, was taken from the river at Eagle street bridge.

Water sample No. 9, of July 31, was taken from the river just below this bridge.

Water sample No. 2, of August 7, was taken from the river just below the Eagle street bridge.

This sample of water was sent to Professor Appleton for analysis, and the results he obtained are given in his report. From this report we have taken some of the results as in the other cases. As no sample of water from the Woonasquatucket river *from a point above polluting influences* was sent to him for examination, we compare the results

obtained by analysis of the sample from below Eagle street bridge, with the results from the Moshassuck river and West river at points where they are pure. The numbers point to indubitable pollution of the Woonasquatucket river at this point.

TABLE.

The numbers express parts, per weight per million parts of water, by weight.

	Organic and volatile matter : including animal and vegetable matter.	Mineral matters.
Moshassuck river, <i>above</i> Sayles' bleachery.....	20.	46.
West river, Geneva pond.....	16.	33.
Woonasquatucket river, below Eagle street bridge.....	291.	218.

*31st Point Inspected.*

Woonasquatucket Print Works.

Owners, Richmond Manufacturing Co.

Location, Valley street.

Kind of business, cotton bleaching and calico printing.

In the yard of their works the committee saw a large catch-basin for the purpose of retaining waste dye woods, etc., and preventing their entering into the stream. From this basin a drain leads the liquid matters to the river.

*32d Point Inspected.*

Valley Worsted mill.

Treasurer, William J. Cross.

Location, Eagle street.



Kind of business, spinning and dyeing of worsted yarn.

The dye vats were being emptied just as the committee arrived, and near the outlet of the river the stream was colored for twenty or thirty yards of a deep magenta color. The privies overhang the river.

Water sample No. 1, of August 7, was taken from the river near the outlet of these drains.

*33d Point Inspected.*

Providence worsted mill.

Proprietor, Charles Fletcher.

Location, Valley street.

Kind of business, manufacture and dyeing of worsted goods.

The privies from this establishment empty into the river. The refuse dye material runs into a large tank beneath the dye-house; thence it is run into the river at night.

Water sample No. 7, of July 31, was taken from this tank.

*34th Point Inspected.*

Providence Dyeing & Bleaching Co.

Agent, Nathan H. Baker.

Location, on the Woonasquatucket river, near Valley street.

Number of persons employed, 650.

Kind of business, dyeing and finishing of cotton goods.

Refuse material from this establishment is emptied into the river.

*35th Point Inspected.*

Atlantic mills.

Agents, Owen Bros.

Location, Manton avenue.

Mr. Charles D. Owen informed the committee that at this point only the exhaust steam from the engine flowed into the



river from these mills. All the sewage and waste matter is emptied into a large sewer owned jointly by the Atlantic mills and the Weybosset mills. This sewer empties into the Woonasquatucket river, under the Eagle street bridge. (This sewer is already referred to as Point 30.)

Water sample No. 6, of July 31, was taken from the river at the Delaine street east bridge.

*36th Point Inspected.*

Union Railroad Co.'s stables in Olneyville.

The water from the river backs up into the cellar of these stables. Between 280 and 300 horses are kept here, and the urine and waste water from them run into the river.

Water sample No. 5, of July 31, was taken from the Woonasquatucket river at the west line of Tar bridge in Olneyville.

*37th Point Inspected.*

Mill of the Dyerville Manufacturing Co.

Agent, Amos N. Beckwith.

Location, on Manton avenue.

Number of persons employed, 200.

Kind of business, spinning and weaving of cotton goods.

All the water closets empty into the river. At the time of inspection however the water appeared clear.

Water sample No. 1, of July 31, was taken from the river about eighty-five feet below this mill.

*38th Point Inspected.*

Allendale mill.

Owners, Allendale Manufacturing Co. William D. Ely,  
President.

Number of persons employed, 175.

Kind of business, spinning and weaving of cotton goods.

All the privies empty into the river.

Water sample No. 2, of July 31, was taken from the river about one hundred feet below this mill.

*39th Point Inspected.*

Works of the Franklin Manufacturing Co., and the Union mills.

At the latter place privies used by one hundred and fifty employes empty into the river.

*40th Point Inspected.*

Merinville Manufacturing Co.

The water closets from this mill empty into the river.

Water sample No. 4, of July 31, was taken from the river about one hundred and forty feet below this mill.

*41st Point Inspected.*

The committee visited the Georgiaville reservoir, where the water appeared to be in its natural condition and free from pollution.

Water sample No. 3, of July 31, was taken from this reservoir near the dam.

CONCLUSIONS.

From the consideration that as a committee we have given the matter referred to us, we have reached the following conclusions :

*First.* The subject of the pollution of the waters of the Cove Basin, and thence of the Providence river, is one of great magnitude, and it is one that affects large manufacturing interests.



*Second.* The committee find that the objectionable condition of the waters of the Cove basin and Providence river arises from the filth that is allowed to flow into and pollute them. This filth, as we have shown, flows in abundant streams from the West river, the Moshassuck river and the Woonasquatucket river. In the case of the Moshassuck, at least, it is plain that the impurities introduced into the stream are not removed by deposition, or by any other natural influences, before they reach the Cove. For Professor Appleton finds that the foulest sample sent to him for analysis was that taken at the mouth of the Moshassuck river, where it enters the Cove basin.

If the city government shall insist that these rivers shall be allowed to flow into and through the city in a clear and pure condition and shall take such steps as will procure this end a most valuable result will be secured. In order to bring back this state of things which once distinctly existed here, not only must continued defilement of the rivers flowing into the Cove basin and Providence river be stopped, but, moreover, the beds of the rivers should be so far cleaned as the foul materials accumulated there from past pollutions shall make necessary.

*Third.* We detect a considerable source of pollution from out-houses, privies and similar nuisances connected with private estates. We believe that these will be dealt with by the health officers of the city.

*Fourth.* Another important source of defilement is referable to large manufacturing establishments. We believe that the city of Providence has clearly the right to demand of these corporations that they shall not pollute the waters flowing within the city limits to the Cove basin and thence to the Providence river. We believe that it is possible for



each one of these manufacturing concerns to purify, by filtration or otherwise, its foul liquors :—in fact our investigations have shown us that many of them are doing something in this direction. We do not think that the purification of any foul water can be called an impossibility ; it is merely a question of cost.

*Fifth.* We are assured by the city engineer that the adoption of any plan for the final disposition of the sewage of the city of Providence will involve the construction of marginal or intercepting sewers ; we are of the opinion that immediate steps leading to such construction should be taken.

The committee therefore recommend :

1st. That measures be taken to prevent the polluting, from outside the city limits, of the streams flowing into the city.

2d. That measures be taken to prevent the pollution of streams from points within the city limits.

3d. That such legislation shall be invoked as may be necessary to assure to the city that the water from these several rivers flowing into the city shall be free from everything offensive to smell or deleterious to the public health.

4th. That action be had looking to the immediate construction of marginal or intercepting sewers.

And also recommend the passage of the accompanying resolution, viz. :

RESOLVED, That the city solicitor be, and he is, hereby instructed to apply to the General Assembly at its next January session for such legislation as may be necessary to prevent the pollution of streams flowing into and through the city and otherwise to carry into effect the recommenda-

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tions of the joint standing committee on the city engineer's department, submitted December 17th, 1883.

Respectfully submitted,

WILLIAM S. HAYWARD,  
Mayor and Chairman.

GILBERT F. ROBBINS,  
President of Board of Aldermen.

J. CARTER BROWN WOODS,  
President of Common Council.

JAMES G. WHITEHOUSE,  
Chairman Committee on Highways.

THOMAS A. MILLETT,  
Chairman Committee on Sewers.

JAMES McNALLY,  
Member of the Common Council.

*Joint Standing Committee on City Engineer's Department.*



## APPENDIX.

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### REPORT OF JOHN HOWARD APPLETON,

*Professor of Chemistry in Brown University.*

PROVIDENCE, Dec. 13, 1883.

HON. WM. S. HAYWARD, MAYOR, ETC. :

DEAR SIR :—I enclose herewith a tabular statement of the results of my tests of several samples of water sent to me for examination by the committee of City Engineer's department.

The numerical amounts shown, together with the descriptive statements of the condition of the various samples, show beyond a question that at certain points the Moshassuck river, the West River, and the Woonasquatucket river, are subjected to very serious defilement. The amount of this defilement is not likely to be the same at all times, at any given point. It is the custom of manufacturing establishments to discharge their waste liquors in considerable volumes at certain times, separated often by considerable intervals.

It is evident, however, that as the result of the pollution of the rivers mentioned, and at the time when inspected by the committee, the waters were in many places very foul both in appearance and in odor.

I ought to remark of sample No. 5, of July 26th, that its bottle was fractured in transportation, and a portion of the contents was lost. This vitiates the complete accuracy of the numerical results reported in this particular case ; but it does not invalidate the declaration that the water of this sample was very foul.

I remain,

Yours very respectfully,

JOHN HOWARD APPLETON.



LABEL ON SAMPLE BOTTLE.		Condition of sample when received by J. H. A., Oct. 29th.	Organic and volatile matter: including animal and vegetable matters.	Sand and mineral matters insoluble in acid.	Alumina and oxide of iron.	Lime, Magnesia.	Other mineral matters, including alkali salts.	Total matters of all sorts dissolved and suspended in the water.
Moshassuck River.								
" Pond above Sayles' bleachery, (No. 11, July 25.)		Very slightly colored yellow; a few brown flakes of vegetable matter.....	20.	6.5	2.5	9.8	27.2	66.
" River below Sayles' bleachery from settling tank, (No. 12, July 26.)		Very turbid and dirty; color light greenish yellow; gave an exceedingly sickening odor; had a sediment $\frac{3}{4}$ inch deep; lumpy flakes, almost black.....	583.	13.	52.	195.	445.3	1320.
" River, north side of Whelden st. (No 5, July 26.)		Color dirty brown, very offensive odor, brown and flaky sediment.....	356.	45.	35.	84.8	357.2	878.
" Mouth of river at Cove, (No. 1, July 26.) .....		Cloudy greenish yellow color; no odor; black, flaky sediment .....	735.	21.	27.8	122.	4011.2	5178.
West River.								
" Geneva pond, west side of bridge, above Geneva Mills, (No. 5, Aug. 7.)		Water very clear, except a few vegetable flakes; no odor.....	16.	5.	1.	5.	22.	49.
" From Silver Spring bleachery, (No. 7, July 26,) as it comes from works; west side of swamp .....		Light straw colored water, with sediment $\frac{1}{2}$ inch deep, of jet black color; no odor.....	542.	56.	18.	63.	203.	882.
Woonasquatucket River.								
From river just below Eagle street bridge, (No. 2, Aug. 7.).....		Light greenish color; very abundant sediment, almost jet black in color, and slow to subside; odor very offensive .....	291.	33.5	31.	9.	144.5	509.

The numbers express parts, by weight, per million parts of water, by weight.



