

**REPORT OF THE COMMISSIONERS  
APPOINTED BY AUTHORITY OF THE CITY  
COUNCIL, TO EXAMINE  
THE SOURCES FROM WHICH A SUPPLY  
OF PURE WATER MAY BE OBTAINED FOR  
THE CITY OF BOSTON**

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Report of the Commissioners Appointed by Authority of the City Council, to examine the sources from which a supply of pure water may be obtained for the City of Boston by Walter R. Johnson & John B. Jervis

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**WALTER R. JOHNSON & JOHN B. JERVIS**

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1845.

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CITY OF BOSTON.

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*In Common Council, May 29, 1845.*

ORDERED, That the Joint Standing Committee on Water, be authorised and instructed to take such measures as in their judgment may be necessary to enable the City Government to decide as to the expediency of accepting the proposition of the Proprietors of Spot Pond, to sell said Pond to the City, for the purpose of distributing its waters therein.

Sent up for concurrence.

P. W. CHANDLER, *President.*

*In the Board of Aldermen, June 9, 1845.*

Read and concurred.

BENSON LEAVITT, *Chairman pro tem.*

CITY OF BOSTON.

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*In Common Council, October 23, 1845.*

ORDERED, That the Joint Standing Committee on Water, be authorised and instructed to cause to be printed, not exceeding Ten thousand copies, for distribution among the inhabitants, of the Report of Messrs. Jervis and Johnson, Commissioners, appointed to estimate the probable cost of supplying Boston with pure water from a foreign source.

Sent up for concurrence.

P. W. CHANDLER, *President.*

*In the Board of Aldermen, October 27, 1845.*

Read and concurred,

BENSON LEAVITT, *Chairman pro tem.*

*To the Committee of the City Council, having charge of the  
subject of supplying the City of Boston with Pure Water.*

GENTLEMEN,

The annexed Report is submitted, as the result of the investigations of the undersigned, Commissioners appointed to examine the sources from which a supply of Pure Water may be obtained for the City of Boston.

JOHN B. JERVIS,  
WALTER R. JOHNSON.

*Boston, Nov. 18th, 1845.*

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**ERRATUM.**—On page 35, from 19th line to end of sentence in 27th line should be erased, for which read,

In a work on the Cornish Engines, by William Pole, published in 1844, is given a table showing the reported performance of the Cornish Engines from 1822 to 1843; from which it appears that the average performance of 36 Engines, reported in 1843, was 60,000,000, (and this is stated to be too high for a fair average.) And of 49 Engines reported in 1842, the average was 53,800,000, while the maximum was 96,000,000 and 107,000,000 in the same years. He also states the average duty of the Engines at the Cornish Mines, at the date of the publication (1844), to be 54,000,000—which shows the average performance at the Cornish Mines to be but little more than half that which is performed by the best engine under the most favorable circumstances.



# WATER REPORT.

## INTRODUCTORY REMARKS.

In accordance with an engagement made in the latter part of June last, several sources for supplying the City of Boston with water, have been examined.

The sources that have been examined are Spot Pond, Charles River and Long Pond. It was our intention to have examined Mystic Pond, in connection with, and as an auxiliary to, Spot Pond; but the time allotted to the examination did not permit. It appears from reports made in 1837 and 1838, by Commissioners appointed to examine the subject, that Mystic Pond was considered the proper auxiliary to Spot Pond. At that time the navigation of Charles River did not extend above the bridge at Cambridge, and the navigation, or ship building, had not gone so far up on Mystic River as it has now done. The plan then proposed by the Commissioners, was to carry a pipe from Spot Pond, crossing Mystic River on a bridge a short distance above Medford village, and then to a reservoir on Walnut Tree Hill—the complement of the supply to be forced up from Mystic Pond, by pumps, into the same reservoir. The water of the two sources, here united, was to be conveyed by iron pipes across Charles River, at Cambridge, over a permanent bridge, and thence to a City reservoir on Beacon Hill. The change in navigation would now require that the Spot Pond pipe should be either carried up to a higher point on Mystic River—which would increase its length—or it must be carried under the river, at such place as is most favorable for the line to cross it. And the crossing of Charles River must be made, if by a permanent bridge, at, or near, the United States Arsenal, requiring a circuitous line—or it must be carried under the bed of the river if it takes the line proposed by the Commissioners in 1837, this change, produced by the extension of navigation on the two rivers, renders it doubtful whether the supply, auxiliary to Spot Pond, had better be taken from Mystic Pond or Charles River. It appears probable that the supply may be obtained more economically from Charles River than from Mystic Pond.

Charles River will be free from the contingency of works constructed under the bed of the river, and Mystic Pond may furnish the better quality of water. If, therefore, the City desire to take Spot Pond, they will find, in the estimate of pumping from Charles River, a sufficient guide for the expense of any auxiliary supply that may be required, and no practical evil will be experienced from the omission to present an examination of Mystic Pond at this time.

Of the three sources contemplated, two—Spot Pond and Long Pond—furnish their supply at an elevation sufficient to deliver the water by the power of gravitation. The third—Charles River—must be elevated by mechanical power.

The amount of supply that can, at all times, be relied on, is the first thing to be determined leaving the question of quality at present out of view. The two ponds have received constant attention since the examination was commenced, by carefully noting their condition, the discharge of water at their outlets, the amount of evaporation, and the quantity of rain that has fallen during the time. Charles River has been gauged for eight weeks during the low stages of water. A survey has been made of the area of the Ponds, at three different levels, and also of the area of country that naturally drains into them, and from which they must receive their supply. In relation to the latter, the important question to decide, is the proportion of the annual fall of rain that will reach the Ponds. It is obvious that a part of it will be lost by the evaporation which takes place from the surface of the Ponds and the ground that constitutes the drainage: and a part by filtration, that is carried to a lower level and consequently can never reach the Ponds. The nature of the soil, the total quantity of annual fall of rain, and the rapidity or ease of the slopes drained, and their condition of cultivation, are circumstances that will affect the proportion that may be collected in a reservoir.

By observations carefully made and long continued, evaporation has been found greatest from surfaces of water; next from those covered with vegetation, and least from naked soils. That evaporation from water surfaces may vary considerably, according to locality, has been rendered evident by the observations of Messrs. Bostock, Dobson, Dalton, Howard, Daniel, Colquhoun and Thompson. Those observations also prove the great diversity which exists between the winter and the summer evaporation,—a point which is most fully confirmed and even more clearly illustrated by the researches of Dr. Hale, as given in his valuable tables, deposited in the Library of the American Academy of Arts and Sciences. Mr. Howard found that at an elevation of 43 feet

from the ground, evaporation was by an average of three years, 37.85 inches. At a lower position it was in three other years 33.37 inches, and in a third term of three years, when the evaporating vessel was near the ground, the evaporation was 20.28 inches. These differences refer doubtless to the higher degree of saturation with moisture at the lower than at the higher level. This may possibly account for a considerable difference in the evaporation found at Long and at Spot Ponds, during certain periods of the present season, as shown by the gauges at the respective localities, the excess being observed at the latter source. Spot Pond is situated in a high rocky basin, fully exposed to be swept by a stratum of air which has come over the adjacent country at an elevation of 150 to 200 feet, and therefore has received little moisture directly from the surface. At Long Pond, on the other hand, the waters lie somewhat lower than most of the adjacent country, and to the south west of it (the quarter of the prevailing summer winds) for some miles are ponds and rivers higher than its own surface, covering a large extent of ground.

It may serve to impress more fully the importance of attending to the extent of drainage and the amount of evaporation, to exhibit a concise view of the results of some of the observations made by the authors above cited.

By using a vessel 12 inches in diameter out of which water was evaporated, Mr. Dobson found that the average annual evaporation at Liverpool was 36.77 inches.

Mr. Dalton, in three years, with a cylinder 10 inches in diameter, found the annual evaporation at Kendall 25.75 inches.

With a similar apparatus 5 inches in diameter, and by a mean of observations continued for eight and a half years, Mr. Howard found the evaporation at Tottenham 30.47 inches. The mean temperature at the same place was 49°.56.

Three years' observations at London, with a gauge 6 inches in diameter, afforded to Mr. Daniel an average evaporation of 23.98 inches—with a mean annual temperature of 49°.39.

Mr. Golquhoun found at Glasgow, as an average of two years' observations, 32.41 inches of evaporation.

The mean of the above five results is 29.91 inches. Dr. Thomson adopts as the general result of the inquiries on this subject, 32 inches as the average annual evaporation in Britain.

Mr. Dalton makes the annual fall of rain in Britain 35.2 inches, exceeding the above annual evaporation by only 3.2 inches, or 9.1 per cent.