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(3) Initials of the Referencer

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 165 Press ~~Mis.~~

329-340

Dated 15 — 1 — 1866.

Not to be folded or roughly handled

1-63

No. 339. Read the following Proceedings of the Governor General of India in Council, Public Works Department, (Civil Works—Miscellaneous), dated Fort William, 4th December 1865, Circular No. 116:—

Best means of keeping water sweet when stored in Tanks.

Read the following papers:—

From the Acting Secretary to Government of Bombay, in the Public Works Department, to the Secretary to Government of India, Public Works Department, dated 26th October 1865, No. 1,239 C. W./2,309 M.

I am directed by His Excellency the Governor in Council to acknowledge the receipt of your letter No. 761C, dated 26th July 1865, calling for a report on the Vehar Lake, and on the general question whether water artificially stored can ever be so safe for drinking purposes as deep well water, in reply I beg to transmit a Report* on the subject from the Government Consulting Engineer, and also Extracts from the Proceedings of the Committee assembled to investigate the causes of the impurity in the Lake water, and to devise means for purifying the same.

* No. 79 of 1865, and accompaniments.

From the Officiating Consulting Engineer to Government for Bombay Water Works, to the Secretary to Government of Bombay, in the Public Works Department, No. 79 of 1865.

1. I have the honor to acknowledge your Memorandum No. 721/1,734 of 1865, dated the 8th instant, forwarding for report a letter No. 761, dated 26th July, from the Secretary to the Government of India, Public Works Department, on the subject of the Vehar water.

2. It is a fact that during last hot season the Vehar water, which does not undergo any filtering process at present, was more or less in an impure state. The cause of the impurity is explained in the Proceedings of the Committee assembled by order of Government on the 9th June last, and the remedies recommended by the Committee are described. As Dr. Leith, the President of the Committee, has kindly furnished me with a copy of the Report, I append an Extract paragraphs 1 to 6, to which it is needless for me to add any remarks.

3. The complete Proceedings were submitted to Government by Dr. Leith, through the Secretary to Government, General Department.

Extract from Proceedings of the Committee appointed by Government letter No. 678 of 1865, in the General Department, and assembled at the Town Hall, Bombay, 9th June 1865.

PRESENT:

A. H. LEITH, Esq., M. D.,	A. J. CRAWFORD, Esq.,
LIEUT.-COL. A. DELISLE,	CAPT. H. F. HANCOCK,
SURGEON R. HAINES, M. D.,	J. ORMISTON, Esq.,

One Member, BHOW DAJEE, Esq., absent.

It is ascertained from evidence before the Committee, and from the personal observations of most of its members, that the Vehar water was in a more or less impure state during a great part of the last hot season, and that animalcules and particles of aquatic plants were present in the water drawn from the distribution pipes; it is ascertained also from reports received that at the same time, aquatic vegetation was so abundant in the neighbourhood of the inlet tower as to choke its strainers, and that there was a layer of foul mud several inches thick in the lower part of the bed of the reservoir.

2. It has been reported also to the Committee that the water drawn from near the bottom of the reservoir, through the lowest valve of the inlet tower, had an offensive odour, while what was taken from the surface was nearly free from it, and that a sample of the water which was drawn from below for examination had lost its offensive smell when it arrived at Bombay.

3. The Committee is of opinion that the general offensive condition of the water was caused by the decomposition of both the vegetable and the animal matter it contained, and the greater intensity of the foul odour at the greater depth was owing to the water which was in contact with the mud at the bottom, being more fully impregnated with the gas evolved during the putrefaction of organic matter, while this gas became dissipated or destroyed by oxidation when the water came into contact with the atmosphere.

4. The water, although it was temporarily deteriorated, appears from recorded recent chemical analysis, after being freed from suspended impurities, to hold dissolved in each gallon only six-tenths of a grain of organic matter, which is not more than exists in the purest waters supplied to towns in Great Britain.

5. To maintain the purity of the water, it is recommended by the Committee that all aquatic plants be most assiduously uprooted from all parts of the basin. That every year the surface layer of that part of the bed of the reservoir left bare by the reservoir of the water, and on which there is vegetation of any kind, be thoroughly scraped off, and that mud or earth thus removed be deposited in a place from which it cannot be washed back into the reservoir in the subsequent rains. Also that all trees and bushes on the level ground and gentle slopes near the water be cut down and removed. It is thought to be necessary to have the trees on the steeper slopes of the gathering ground to prevent the earth from being loosened by heavy rain, and carried into the bed of the basin, which would be likely to take place were the surface to be deprived of the protection afforded by the binding fibres of the roots of the trees. It is recommended also that in every hot season the dry grass and fallen leaves on every part of the surface of the gathering ground be carefully and thoroughly burnt, so that no perishable vegetable matter be left that can be carried into the water during the rains.

6. If it be still found that the Vehar water is subject to deterioration in quality, such as was recently experienced, or that it continues to have impurities suspended in it, it is recommended that filtration be had recourse to, without further delay. Quartz and silicious sand for the filters will have to be brought from a distant part of the Presidency, as the river gravel which is formed of the detritus of the trap-rock of the neighbouring country, and the calcareous sand of the Bombay sea-shore, are not well fitted for the purpose.

From the Secretary to Government of India, Public Works Department, to the Secretary to Government of Bombay, in the Public Works Department, dated 4th December 1865, No. 1,154 C.

1. I am directed to acknowledge receipt of your letter No. 1,239 C. W., 2,309 M., dated the 26th October 1865, forwarding a Report by a Committee on the water of the Vehar Lake, in which the removal of aquatic plants from the bed, and of vegetation as far as possible from the gathering ground, as also the introduction of filtering, are recommended.

2. In reply I am to observe that the first of these recommendations is opposed to the common opinion that the growth of certain water-weeds purifies the water. There are many tanks in India where no such precautions as are recommended by the Committee are taken, and where the water remains perfectly pure, or, at least, not offensive, all the year round.

Proceedings of the Madras Government, Public Works Department,
15th January 1866

3. His Excellency in Council desires me to draw attention to this fact, and to request that the Government of Bombay will have the subject further investigated with reference to its great importance on the general question of water-supply, not only as regards the Vehar Lake, but generally. Reports on the subject should be called for from all Public Works Officers; and any other persons who are known to take an interest in the subject should also be invited to favor Government with their views and experience. The practical point to which the enquiry should be directed is the means of keeping water sweet when stored in tanks, and especially what precautions are requisite in regard to new tanks.

Governments of Bengal, Madras, North-Western Provinces, and Punjab.
Chief Commissioners, Oudh, Central Provinces, and British Burmah.
Commissioner of Mysore.
Resident at Hyderabad.
Agents, Governor General, for Rajpootana, and Central India.

ORDER.—Ordered, that copies of the foregoing papers be forwarded to the Local Governments and Administrations noted on the margin, with a request that Reports similar to those called for from the Government of Bombay, may be submitted to this Department.

(Signed) C. H. DICKENS, Lieut.-Colonel, R. A.,
Secy. to the Govt. of India.

No. 340. ORDER THEREON, 15th January 1866, No. 165.

CIVIL WORKS, No. 61.

Communicated to the Consulting Engineers for Railways and for the Madras Irrigation and Canal Company, and to the Superintending Engineers of the 1st, 2nd, 4th, and 6th Divisions, with a request that they will submit their opinions on the best means of keeping water sweet when stored in tanks, and on what precautions are requisite in regard to new tanks.

(True Extract.)
(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Consulting Engineer for Railways.
" Do. for the Madras Irrigation and Canal Company.
" Superintending Engineers, 1st, 2nd, 4th, and 6th Divisions.

Exd. S. T. Augustin.

CIRCULAR No. 116 of 1865.

PUBLIC WORKS.

PROCEEDINGS OF THE GOVERNOR GENERAL OF INDIA IN COUNCIL.

PUBLIC WORKS DEPARTMENT,
FORT WILLIAM, *4th December*, 1865.

Civil Works.
Miscellaneous.

Best means of keeping water sweet when stored in Tanks.

Read the following papers:—

No. $\frac{1239 \text{ C. W.}}{2309 \text{ M}}$, dated 26th October, 1865.

From—COLONEL W. KENDALL, R. E., *Acting Secy. to Govt. of Bombay, in the P. W. Dept.*,

To—*Secretary to Government of India, P. W. Dept.*

I am directed by His Excellency the Governor in Council to acknowledge the receipt of your letter No. 761 C, dated 26th July 1865, calling for a report on the Vehar Lake, and on the general question whether water artificially stored can ever be so safe for drinking purposes as deep well water, in reply I beg to transmit a Report* on the subject from the Government Consulting Engineer, and also Extracts from the Proceedings of the Committee assembled to investigate the causes of the impurity in the Lake water, and to devise means for purifying the same.

* No. 79 of 1865, and accompaniments.

No. 79 of 1865.

From—CAPTAIN J. H. WHITE, R. E., *for Offg. Consg. Engr. to Govt. for Bombay Water Works*,

To—*Secretary to Government of Bombay, in the P. W. Dept.*

I have the honour to acknowledge your Memorandum No. $\frac{761}{734}$ of 1865, dated the 8th instant, forwarding for report a letter No. 761, dated 26th July, from the Secretary to the Government of India, Public Works Department, on the subject of the Vehar water.

2. It is a fact that during last hot season the Vehar water, which does not undergo any filtering process at present, was more or less in an impure state. The cause of the impurity is explained in the Proceedings of the Committee assembled by order of Government on the 9th June last, and the remedies recommended by the Committee are described. As Dr. Leith, the President of the Committee, has kindly furnished me with a copy of the Report, I append an Extract paras. 1 to 6, to which it is needless for me to add any remarks.

3. The complete Proceedings were submitted to Government by Dr. Leith, through the Secretary to Government, General Department.

Extract from Proceedings of the Committee appointed by Government letter No. 678 *of* 1865, *in the General Department, and assembled at the Town Hall, Bombay, 9th June* 1865.

PRESENT:

A. H. LEITH, Esq., M. D.,	A. J. CRAWFORD, Esq.,
LIEUT.-COL. A. DELISLE,	CAPT. H. F. HANCOCK,
SURGEON R. HAINES, M. D.,	J. ORMISTON, Esq.,

One Member, BHOW DAJEE, Esq., absent.

It is ascertained from evidence before the Committee, and from the personal observations of most of its members, that the Vehar water was in a more or less impure state during a

great part of the last hot season, and that animalcules and particles of aquatic plants were present in the water drawn from the distribution pipes; it is ascertained also from reports received that at the same time, aquatic vegetation was so abundant in the neighbourhood of the inlet tower as to choke its strainers, and that there was a layer of foul mud several inches thick in the lower part of the bed of the reservoir.

2. It has been reported also to the Committee that the water drawn from near the bottom of the reservoir, through the lowest valve of the inlet tower, had an offensive odour, while what was taken from the surface was nearly free from it, and that a sample of the water which was drawn from below for examination had lost its offensive smell when it arrived at Bombay.

3. The Committee is of opinion that the general offensive condition of the water was caused by the decomposition of both the vegetable and the animal matter it contained, and the greater intensity of the foul odour at the greater depth was owing to the water which was in contact with the mud at the bottom, being more fully impregnated with the gas evolved during the putrefaction of organic matter, while this gas became dissipated or destroyed by oxidation when the water came into contact with the atmosphere.

4. The water, although it was temporarily deteriorated, appears from recorded recent chemical analysis, after being freed from suspended impurities, to hold dissolved in each gallon only six-tenths of a grain of organic matter, which is not more than exists in the purest waters supplied to towns in Great Britain.

5. To maintain the purity of the water, it is recommended by the Committee that all aquatic plants be most assiduously uprooted from all parts of the basin. That every year the surface layer of that part of the bed of the reservoir left bare by the reservoir of the water, and on which there is vegetation of any kind, be thoroughly scraped off, and that mud or earth thus removed be deposited in a place from which it cannot be washed back into the reservoir in the subsequent rains. Also that all trees and bushes on the level ground and gentle slopes near the water be cut down and removed. It is thought to be necessary to have the trees on the steeper slopes of the gathering ground to prevent the earth from being loosened by heavy rain, and carried into the bed of the basin, which would be likely to take place were the surface to be deprived of the protection afforded by the binding fibres of the roots of the trees. It is recommended also that in every hot season the dry grass and fallen leaves on every part of the surface of the gathering ground be carefully and thoroughly burnt, so that no perishable vegetable matter be left that can be carried into the water during the rains.

6. If it be still found that the Vehar water is subject to deterioration in quality, such as was recently experienced, or that it continues to have impurities suspended in it, it is recommended that filtration be had recourse to, without further delay. Quartz and silicious sand for the filters will have to be brought from a distant part of the Presidency, as the river gravel which is formed of the detritus of the trap-rock of the neighbouring country, and the calcareous sand of the Bombay sea-shore, are not well fitted for the purpose.

No. 1154 C, dated 4th December, 1865.

From—Lieut.-Col. C. H. Dickens, R. A., *Secy. to Govt. of India, P. W. Dept.*,

To—*Secy. to Govt. of Bombay, in the P. W. Dept.*

I am directed to acknowledge receipt of your letter No. $\frac{1239 C. W.}{2309 M.}$ dated the 26th October 1865, forwarding a Report by a Committee on the water of the Vehar Lake, in which the removal of aquatic plants from the bed, and of vegetation as far as possible from the gathering ground, as also the introduction of filtering, are recommended.

2. In reply I am to observe that the first of these recommendations is opposed to the common opinion that the growth of certain water-weeds purifies the water. There are many tanks in India where no such precautions as are recommended by the Committee are taken, and where the water remains perfectly pure, or, at least, not offensive, all the year round.

3. His Excellency in Council desires me to draw attention to this fact, and to request that the Government of Bombay will have the subject further investigated with reference to its great importance on the general question of water-supply, not only as regards the Vehar Lake, but generally. Reports on the subject should be called for from all Public Works Officers;

and any other persons who are known to take an interest in the subject should also be invited to favour Government with their views and experience. The practical point to which the enquiry should be directed is the means of keeping water sweet when stored in tanks, and especially what precautions are requisite in regard to new tanks.

Order.—Ordered, that copies of the foregoing papers be forwarded to the Local Governments and Administrations noted on the margin, with a request that Reports similar to those called for from the Government of Bombay, may be submitted to this Department.

Governments of Bengal, Madras, North Western Provinces, and Punjab.
Chief Commissioners, Oudh, Central Provinces, and British Burmah.
Commissioner of Mysore.
Resident at Hyderabad.
Agents, Governor General, for Rajpootana and Central India.

(Signed) C. H. DICKENS, *Lieut.-Col., R. A.,*
Secy. to the Govt. of India.

Captain, R. E.,
Asst. Secy. to the Govt. of India.

To
The Secretary to the Govt of Madras
Public Works Department.

1029

17 Dec 1865 & Date
Desp. Govt Genl

Civil Works.

Miscellaneous.

CIRCULAR No. 116.

SECY. TO GOVT. OF INDIA,
IN THE P. W. DEPT.

Dated 4th December, 1865.
Received 27 Dec 1865

Calls for a Report on the best means of keeping water sweet when stored in Tanks.

No. 165 - 15th Jan
With an Ord

X 1339.034

Civil Works

No 165

Communicated to the Consulting Engineers for Railways and for the Madras Irrigation & Canal Company and to the Superintending Engineers of the 1st 2d 4th and 5th Divisions, with a request that they will submit their opinions on the best means of keeping water sweet when stored in tanks, and on what precautions are requisite in regard to new tanks.

Work

To the Consg Engr for Railways / Desp. 16th January
" Consg Engr for the M. & C. Co /
" Supg Engrs 1st 2d 4th & 5th Divns /

Fort St George
X 82 15th Jany 1866

41

Ord. 5th Jany 1866 No. 8th