COMMISSION OF CONSERVATION

COMMITTEE ON PUBLIC HEALTH

AN ADDRESS

on

PURE WATER AND THE POLLUTION OF WATERWAYS

by

CHAS. A. HODGETTS, M.D.

Medical Adviser to the Committee on Public Health
of the Commission of Conservation

Before the Dominion Public Health Conference,
Ottawa, October 12th, 1910.

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the Dominion Public Health Conference, a meeting of Dominion and Provincial Public Health representatives with the members of the Committee on Public Health of the Commission of Conservation, which was convened at Ottawa on October 12th, 1910, at the instance of the Standing Committee on Public Health of the Senate of Canada.

Pure Water and the Pollution of Waterways.

In a discussion of the subjects of pure water supplies, the pollution of waterways and the disposal of sewage, it is found as difficult to consider them separately as it is to expect to find pure water when man wantonly pollutes it with his own excreta and will neither provide the means for removing that pollution by some adequate method of filtration or sterilization, nor minimize it by adopting any method of sewage treatment. He transgresses all the laws of Nature and hopes the God of Nature will help him out in some miraculous manner and furnish him with pure water. These subjects will therefore be dealt with in a general or collective manner, domestic water supplies and public water supplies from subterranean sources being eliminated.

The inhabitants of a village or small town depend primarily upon wells as their sources of domestic water supply, but with the growth of these municipalities, the population becomes gradually more dense and pollution of the wells results. Fire insurance companies also demand better fire protection service, and so a time is reached when a public water supply must be installed; and this latter development is in many instances the important and deciding factor. It is then the authorities get busy; it is then that old time ideas and prejudices have to be broken down and overcome, for many householders will cling tenaciously to the "old oaken bucket"

as a source of domestic supply, even for years after the installation of the purest public water supply possible. Not even the temptations of the modern bath-room will lure them from the wells, although Augean stables and privy pits innumerable pollute the crystalline contents of the uncleaned depths and the daily quota of domestic slops from surrounding houses are offered up on the earth around as a libation to the goddess of ignorance, and incidentally, to the death and destruction of members of their own households.

In looking for and in deciding upon the source of any particular public water supply, the authorities concerned naturally seek for quantity sufficient to supply the demand for domestic and manufacturing purposes and fire protection, and for quality to satisfy the critical public with a bright, clear, palatable water, having in view that the former must be sufficient at all seasons of the year, not only for present needs, but for the ever-increasing demands consequent upon growth in population. The quality must be as nearly uniform as possible at all seasons, of reasonable hardness and yet not too hard to permit of the use of the water for manufacturing purposes, and of colour and taste to please the palate and satisfy the eye of the critical public who have to be reckoned with as the prospective consumers. These considerations, coupled with those of method of operation, financial questions, and others not of a sanitary character, have all to be considered.

The natural sources of supply generally in Canada must be the rivers and lakes. They may be divided into two classes for purposes of description and consideration, viz.: the non-navigable and the navigable:—

NON-NAVIGABLE WATERS.

First, Non-Navigable Waters:—These include the many small lakes and streams upon which vessels do not ply, and which, either directly or indirectly, are tributary to the larger bodies of water. Where they flow through an agricultural district, they are subject to pollution from the cultivated fields where manure is used as a fertilizer, and by the drainage from barn yards and the cattle themselves. It is into these bodies of water we frequently find that factories discharge their waste and sewage in an untreated state and often into them the raw sewage of inland municipalities is poured regardless of consequences. Fortunately, these bodies of water are rarely selected as the source of a public water supply and the discharge of a relatively small amount of sewage into them brings about no serious conditions. But with the gradual increase in the amount discharged consequent upon the increase of population and the extension of sewers, the waters become discoloured, the bed of the stream or lake becomes befouled, while upon the surface a scum appears and conditions which may be styled offensive and dangerous are established. In short, a nuisance is created, and if allowed to continue it becomes impossible for the water to be used either for man or animal. And further, the streams discharging into larger bodies of water are often a menace to municipalities taking their supplies from the larger bodies of water to which they are tributary. These smaller bodies of water more frequently lie within provincial boundaries and, as a rule, can be dealt with by provincial laws administered by provincial boards of health. It happens now and again that they are

interprovincial and in such cases the problem is more difficult to deal with.

NAVIGABLE WATERS.

Second, the Navigable Waters:—This important class of waters constitutes one of the great natural resources of our country. They depend upon the smaller streams for their existence and as they form the receptacles for the water pouring into them, so they derive in part their polluting matter from these tributaries, as referred to under the first heading. But undoubtedly the chief sources of contamination come from the cities and towns lying along their banks, whose peopling millions ruthlessly deposit sewage into their waters. Likewise, in a lesser degree, but none the less menacing to public water supplies, is the careless pollution due to the many ships which ply thereon during the season of navigation.

Navigable waters are to be found in nearly every province in Canada, but one example will at this time alone be dealt with, viz.: The chain of the St. Lawrence and the Great Lakes which extends from the point where it ceases to be influenced by salt water to the head of lake Superior, a distance of some 1,500 miles. For the greater part of this distance it forms the international boundary between this country and the United States, upon the waters of which ply, for some seven months of each year, many hundreds of vessels, each depositing therein its domestic sewage. Pollution arises chiefly from the large volumes of untreated sewage which the large cities and smaller municipalities unheedingly discharge directly therein, or deposit in the smaller rivers and streams tributary thereto, and which, commingling with these naturally pure waters, renders

what was by Nature intended for the use of mankind, an ever present and increasing menace to the health of all who use them. Indeed, it is not within the possibility of any one to say with certainty that water which is free from contamination, can be taken at all times from any point in this great tract of fresh water. That this fact has already been brought to the attention of municipal authorities is indicated by the following resolution, adopted by the Lake Michigan Water Commission, Sept. 10th, 1908:

> "WHEREAS, Occasionally currents of considerable velocity, say several miles per hour, may be expected to arrive from almost any direction at any point reasonably near either shore of the lake;
>
> "RESOLVED, That while, in the opinion of the Commission, the direction of predominating currents should be considered in determining the relative position of sewer outlets and water-works intakes, nevertheless it is the sense of this Commission that if the waters of the lake are polluted by the discharge into it of large quantities of sewage, then localities in the lake, even 20 or 30 miles distant from the point of entrance of the sewage, and in any direction therefrom, are not safe places from which to derive water for domestic use."

That the amount of untreated sewage effluent and factory waste has been yearly increasing, is a fact. That municipal authorities, in many instances, have sought to overcome the problem of typhoid outbreaks by a mere extension of the water intake out into deeper water with the object of securing water uncontaminated by sewage, is also a fact. That, in some instances, after making extension of the intake it has been found necessary to provide some system of water filtration

in order to give a pure supply, is equally well known. What then is the situation? Briefly this: If the municipalities bordering on these lakes must take their water supply from some point therein, they must include in the system some means for ridding the water of the contamination which is deposited there mainly by themselves; otherwise they cannot guarantee to the public that which it has a right to demand—pure water.

In other words, the cities and towns adjacent to the Great Lakes are the chief agents in wantonly polluting the water which the inhabitants must drink. How long this condition of affairs is to continue, it is incumbent upon the Governments, whose duty and right it is to prevent such unrighteous acts and thus protect its citizens generally, to carefully consider and determine. It is clearly the duty of the Governments concerned to make adequate and proper laws, and when these are made, to systematically enforce them by providing the machinery to see that they are regularly lived up to by the municipalities affected; for failure to maintain a constant oversight means municipal neglect and indifference, particularly as regards sewage purification. If this is not done, the public will be uselessly paying for plant, etc., intended to produce a sewage effluent free from disease producing organisms.

It is generally conceded that a large percentage of all sickness happening in cities and towns is due to impurity of the water supply, sewage contaminated water being an important cause of diarrhœa, typhoid fever, cholera, and probably of a number of other diseases of which at present we cannot speak with certainty.

It has been so far accepted, and is now almost the general rule, to consider that a continued typhoid death rate of over 20 per 100,000 of population is an indication that the public water supply is greatly at fault. With the object of ascertaining how this rule would work out for Canadian cities, information has been obtained as to the deaths from typhoid fever reported in cities of Canada during the decade 1900-1909, and this has been set forth in Table A.

TABLE A—TYPHOID FEVER.
Mortality Statistics of Cities of Canada, by provinces, 1900-1909 (inclusive).

PROVINCE	CITY	RATE PER 100,000 OF POPULATION BY YEARS									
		1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Alberta	Edmonton	.....	75.4	20.0	32.3	37.5	40.0	254.3	180.0	110.0	76.0
British Columbia	Nanaimo	80.0	.....	.....	40.0	.....	.....	.....	18.1	.....	.....
	New Westminster	.....	46.1	.....	.....	.....	25.0	62.6	42.1	76.1	58.3
	Rossland	.....	.....	.....	.....	.....	.....	18.1	.....	25.0	25.0
	Vancouver	.....	.....	.....	.....	.....	.....	15.3	26.9	10.5	8.8
	Victoria	39.1	21.7	.....	18.5	3.4	16.1	18.1	17.1	5.4	10.0
Manitoba	Winnipeg	122.3	118.3	95.0	82.8	248.3	175.0	108.8	49.2	40.5	38.4
New Brunswick	Moncton	87.5	58.8	88.8	42.1	10.0	47.6	36.3	34.7	58.3	8.0
	St. John	26.1	.....	.....	.....	.....	.....	.....	.....	.....	31.2
Nova Scotia	Halifax	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.0
	Sydney	.....	90.9	8.3	16.6	30.7	15.3	42.8	13.3	31.2	11.7
Ontario	Fort William	.....	.....	.....	88.6	200.2	132.6	946.9	.....	98.5	94.0
	Hamilton	23.2	18.9	13.0	11.1	12.7	13.8	33.5	17.9	14.0	....
	Kingston	16.5	32.8	10.8	87.6	21.6	38.4	37.9	32.2	41.7	31.2
	London	.....	.....	.....	.....	67.3	23.9	44.0	6.7	10.4	4.0
	Niagara Falls	.....	44.0	.....	.....	14.1	.....	37.7	37.0	74.0	24.3
	Ottawa	31.6	19.7	5.9	9.7	11.0	20.0	20.7	51.6	26.1	31.2
	Peterborough	73.5	36.5	18.0	34.6	49.3	41.7	26.7	25.0	18.1	5.9
	St. Catharines	38.6	57.0	47.1	18.7	36.6	44.7	25.5	.....	.....	24.3
	Stratford	28.7	46.4	....	37.2	20.1	24.5	23.3	7.5	.....	20.7
	Toronto	10.5	11.1	11.8	15.9	18.1	16.7	24.8	19.4	19.8	25.7
	Woodstock	137.6	52.9	10.5	21.1	31.7	21.1	43.2	10.8	43.2	....
Prince Edward Is.	Charlottetown	.....	.....	.....	.....	.....	.....	16.6	16.6	.....	8.3
Quebec	Montreal	42.6	44.4	30.9	31.4	31.8	18.1	37.0	33.2	33.1	53.8
	Quebec	7.3	13.0	.....	.....	.....	.....	.....	.....	23.1	5.3
	Sherbrooke	476.6	227.0	60.8	60.8	30.7	52.3	21.6	108.0	131.4	78.4
Saskatchewan	Saskatoon	.....	.....	.....	.....	.....	.....	.....	.....	133.3	66.6

Computations are made only where the number of deaths and estimated population are given. In some

few instances, the health officers have been unable to state the number of deaths. It will also be noted that no reference has been made as to whether the deaths reported were those of residents or non-residents, but as it is generally the rule for a small proportion of the residents of rural districts to be sent to city hospitals for treatment, the prevalence of this custom will not materially affect the comparison of the rates.

In studying the table, one cannot fail to be struck with the fact that during the past decade the inhabitants of each of the cities have been served out "polluted water" and that, as a consequence, many valuable lives have been lost and many thousands of people have had to endure sickness and suffer loss of time and money, all on account of the indifference and criminal carelessness of individuals and of failure on the part of the legislatures to make adequate statutory provision for requiring—yes making—the body corporate do just what the individual citizen is required now to do, viz.: to care for his own domestic waste so it will not be a nuisance either to himself or his neighbours. In other words, a city should care for its own sewage in such a manner that it will not prove a nuisance.

For purposes of comparison of typhoid statistics with some of the cities of the United States, a compilation of the mortality figures of twelve cities of the United States located on the chain of Great Lakes, has been made in Table B. These figures are for the corresponding years of Table A, with the exception of 1909, for which the figures could not be obtained. The mortality rates given are gathered from the reports of the Washington Census Bureau. This table clearly shows

TABLE B.—TYPHOID FEVER.

Cities of the United States, bordering Great Lakes, mortality rate per 100,000 of population, 1900-1908, (inclusive).

CITIES	RATE PER 100,000 OF POPULATION BY YEARS.								
	1900	1901	1902	1903	1904	1905	1906	1907	1908
Ashtabula	7.7	44.9	36.3	49.4	137.1	60.0	38.9	19.0	86.2
Buffalo	23.5	27.1	33.7	34.6	24.2	24.4	23.6	29.2	20 7
Chicago.....	21.1	29.8	45.1	32.1	20.2	16.5	18.3	17.7	15.3
Cleveland.....	56.8	34.9	35.5	115.0	49.6	14.9	20.2	18.9	12.6
Detroit.....	28.4	20.1	23.5	20.0	17.6	21.2	22.3	28.3	22.3
Duluth	109.5	74.1	53.7	64.8	54.4	44.7	46.0	41.6	56.8
Milwaukee	19.3	22.1	15.1	16.8	13.6	22.7	30.5	25.7	17.4
Niagara Falls...	107.9	143.9	130.4	126.9	139.8	181.6	147.3	126.8	98
Ogdensburg.....	55.4	20.4	95.0	54.2	60.9	40.5	87.6	40.4	33.6
Port Huron	47.0	41.3	61.2	25.2	34.9	14.8	53.8	43.5	19.1
Sault Ste. Marie	132.9	92.9	172.9	115.9	52.4	68.6	58.9	16.5	72.9
Toledo	41.0	32.2	34.7	29.5	37.2	45.7	45.0	36.4	40.1

that if the conditions of Canadian cities bordering on the Great Lakes is bad, those of the cities of the United States referred to are equally so. The possibilities of sewage pollution there are many times greater than in Canada. The people of the United States have not yet learned the lessons of municipal sanitation —the laws of common sense— and as a consequence the typhoid death rate in the United States is 46 per 100,000.

To further emphasize the fact that Canada has lessons to learn in respect to sanitation generally, from the older countries of Europe, where population is and has been congested for many years, as well as from the nation to the south of us, Table C has been prepared. A typhoid index certainly goes far to show what these countries are doing in respect to water supplies and the protection of the same as well as to general measures of sanitation which cannot be dwelt upon here. The figures are the latest obtainable.

TABLE C.—TYPHOID FEVER.
Death rate of nine countries, per 100,000 of popnlation.

YEAR GROUP	COUNTRIES	RATE PER 100,000 OF POPULATION
1901-1905.....	Scotland	6.2
	Germany.....	7.6
	England and Wales	11.2
	Belgium	16.8
1901-1904.....	Austria	19.9
	Hungary..... ..	28.3
	Italy.....	35.2
1901(census) ...	Canada.....	35.5
1901-1904.....	United States.....	46.0 (estimated)

What can we say for the efficiency of our laws for the safeguarding of the public of Canada against this one disease, typhoid fever, let alone the other diseases due to or dependent upon polluted water supplies? Is there any sanitarian or any legislator who will be bold enough to say the existing health laws are adequate or efficient in respect to this question?

Imagine, if you can, the population of the countries of Europe included in Table C, viz., Scotland, Germany, England and Wales, Belgium, Austria-Hungary and Italy, totalling over one hundred and seventy-eight million, crowded into the provinces of Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario and Manitoba, which about equal them in area. And yet, with all this density and its accompanying poverty, out of both of which you may read disease, the typhoid rate in none of them is as great as is that of Canada.

Is it not time we were alive to our responsibilities and made haste to put our house in sanitary order? This glorious Canada of ours possesses natural advantages in the way of everlasting reservoirs which we should at once take steps to purify and keep pure as

long as time will last—a national heritage which it is our duty to hand down to posterity as pure and wholesome as it is possible to make and maintain it. Certain it is we are not doing it by our present methods and laws. It can, however, be done by efficient laws, by better laws than we have as yet seen fit to enact, the enforcement of which should, in the main, rest with some centrally well-organized and wisely administered Federal department, co-operating with each of the various Provincial departments of health.

LAWS RESPECTING WATER SUPPLIES.

To assist in a consideration of the questions involved, a statement of the various provincial laws in reference to water and to sewage pollution and disposal is given as showing the situation in Canada at the present time.

ALBERTA
Sec. 23

When the establishment of a system or the extension of any existing system of waterworks for the purpose of providing a water supply for public consumption is contemplated by the municipal council of any municipality or by any person or body corporate, it shall be the duty of such municipal council, person or body corporate, whether incorporated by special or private Act of Parliament, or otherwise howsoever, to submit to the provincial board the plans and an analysis of the water from the proposed source or sources of supply, verified by affidavit stating that the plans and specifications so submitted are those to be used and followed in the construction of such proposed system, that the particulars set forth in the said analysis are

true and that the water analyzed was taken from the proposed source or sources.

(2) It shall not be lawful to construct, establish or operate any such system of waterworks or any extension of an existing system of waterworks as aforesaid, without first obtaining from the provincial board a certificate signed by the chairman certifying that the plans, specifications and analysis so submitted and the proposed source or sources have been considered and approved by the board and that the proposed system or extension may, with safety to the public health, be constructed, carried out and operated.

(3) If in the opinion of the provincial board alterations are necessary in the plans or in the specifications of such proposed system, the certificate aforesaid may specify the alterations so deemed necessary and it shall not be lawful to construct, establish or operate the proposed system or extension unless and until such alterations have been made in the said plans and specifications.

(4) Where in any locality or place it shall be necessary in order to obtain a supply of water for the consumption and domestic purposes of the persons resident in such locality or place, to enter upon, take possession of, or use in common with the owners of any flume, ditch, water system or water course, the waters of which are recorded, diverted or used for irrigation, industrial or mining purposes, the provincial board or a member or officer thereof appointed by the board for that purpose, shall, subject to the provisions of The Irrigation Act, examine the source of water supply, the flume, ditch, water system or water course afore-

said, the locality or place, and shall report to the Lieutenant Governor in Council the amount of water, estimated as nearly as may be, actually required for the consumption and domestic purposes of the residents of such locality and the means and measures necessary to be adopted in order to secure such amount of water so actually necessary and thereupon the Lieutenant Governor in Council may, by order in council, provide for, direct and enforce the doing of all acts and things and the adoption and continuance of all means and measures necessary for the securing and the continued supply of such amount of water so actually necessary as aforesaid.

BRITISH COLUMBIA. *Sec. 23.*

When the establishment of a system, or the extension of any existing system of waterworks for the purpose of providing a public water supply is contemplated by the Municipal Council of any municipality, or by any person or body corporate, it shall be the duty of such Municipal Council, person or body corporate, whether incorporated by Special or Private Act of Parliament, or otherwise howsoever, to submit to the Provincial Board the plans and specifications of the proposed system of waterworks, and an analysis of the water from the proposed source or sources of supply, verified by affidavit stating that the plans and specifications so submitted are those to be used and followed in the construction of such proposed system, that the particulars set forth in the said analysis are true, and that the water analysed was taken from the proposed source or sources.

(2) It shall not be lawful to construct, establish or operate any such system or waterworks r any exten-

sion of an existing system of waterworks as aforesaid, without first obtaining from the Provincial Board a certificate, signed by the Chairman and Secretary, certifying that the plans, specifications and analysis so submitted, and the proposed source or sources, have been considered and approved by the Board, and that the proposed system or extension may, with safety to the public health, be constructed, carried out and operated.

(3) If in the opinion of the Provincial Board alterations are necessary in the plans or in the specifications of such proposed system, the certificate aforesaid may specify the alterations so deemed necessary, and it shall not be lawful to construct, establish or operate the proposed system or extension unless and until such alterations have been made in the said plans and specifications.

(4) When in any locality or place it shall be necessary, in order to obtain a supply of water for the consumption and domestic purposes of the persons resident in such locality or place, to enter upon, take possession of, or use in common with the owners, any flume, ditch, water system or water-course, the waters of which are recorded, diverted or used for irrigation, industrial or mining purposes, the Provincial Board, or a member or officer thereof appointed by the Board for that purpose, shall examine the source of water supply, the flume, ditch, water system or water-course, aforesaid, and the locality or place, and shall report to the Lieutenant-Governor in Council the amount of water, estimated as nearly as may be, actually required for the consumption and domestic purposes of the residents of such locality

and the means and measures necessary to be adopted in order to secure such amount of water so actually necessary, and thereupon the Lieutenant-Governor in Council may, by Order in Council, provide for, direct and enforce the doings of all acts and things, and the adoption and continuance of all means and measures necessary for the securing and the continued supply of such amount of water so actually necessary as aforesaid.

MANITOBA. *Sec.* 28. Whenever the establishment of a public water supply or system of sewerage shall be contemplated by the council of any city, town or village municipality, it shall be the duty of the said council to place itself in communication with the Provincial Board of Health and to submit to the said board before their adoption all plans in connection with said system.

(a) It shall be the duty of the Provincial Board of Health to report whether in its opinion the said system is calculated to meet the sanitary requirements of the inhabitants of said municipality, whether any of its provisions are likely to prove prejudicial to the health of any of the said inhabitants, together with any suggestions which it may deem advisable, and to cause copies of such report to be transmitted to the Minister of Agriculture and Immigration, to the inspector and to the clerk of the municipality.

(b) No sewer or connections of the same with houses or fixtures connected therewith or appliance for ventilation of the same shall be constructed in violation of any of the principles laid down by the Provincial Board of Health, provided that there may be an appeal from any decision of the Board of Health under this section to the Lieutenant-Governor in Council.

NOVA SCOTIA *Sec. 53.* No person shall put in any place, on land or water, any offensive matter or thing likely to endanger the public health, under a penalty not exceeding twenty dollars for each offence, and if any person suffers any such matter or thing to remain upon his premises after notice in writing requiring him to remove the same, the sanitary inspector may remove the same, under the direction of the local board and at the charge of the owner or occupant of such place.

ONTARIO. *Sec. 30* (1) Wherever the establishment of a public water supply is contemplated by the council of any city, town or village, it shall be the duty of the said municipal council to submit to the Provincial Board of Health, together with the plans, an analysis of the water from the proposed source of supply, and an affidavit stating that the water analyzed is taken from the proposed source, and that the analysis submitted to the Board exactly represents the conditions of the sample examined. In case the source of any proposed water supply does not, in the opinion of the Provincial Board of Health, meet the sanitary requirements of the municipality, either by reason of the quality of the water, or because the water is likely, owing to the situation of the proposed source of supply, to become contaminated, it shall not be lawful to establish such waterworks without first obtaining from the Provincial Board of Health a certificate signed by the chairman and secretary, stating that the proposed source is the best practicable, having regard to all the circumstances of the case, and that all proper measures have been taken to maintain the supply in the highest possible and practicable state of purity.

(4) The decision or report of the Provincial Board of Health with regard to any system of water supply or any common sewer or public system of sewage or the disposal of sewage therefrom shall be subject to appeal to the Lieutenant-Governor in Council, such appeal to be made within one month after the filing of the report or decision in the office of the Minister of the department to which the Provincial Board of Health is attached, and such decision or report, where not so appealed against, or where confirmed or amended and confirmed upon appeal by the Lieutenant-Governor in Council, shall be binding and conclusive upon all the municipalities and persons affected by the same; but wherever it appears that any change of circumstances or conditions has arisen, the Provincial Board of Health may, if it deem it advisable, make further inquiry and report as to any system of water supply or common sewer or system of sewage or the disposal of sewage, which report shall be subject to appeal as aforesaid and have the same force and effect as aforesaid.

PRINCE EDWARD ISLAND. *Sec. 22.*

No person, unless specially licensed in that behalf, shall put in any place on land or water any offensive matter or thing likely to endanger the public health, under a penalty not exceeding one hundred dollars for each offence, and if any person shall suffer any such matter or thing to remain on such place after the notice in writing requiring him to remove the same, the same may be removed under the directions of the Provincial or Local Board of Health, at the charge of the owner or occupant of such place or of the party who placed the same thereon, and double the expense may be recovered for such removal as a private debt, by the party who is entitled to sue for the same.

QUEBEC.
Sec. 41-44.

No municipality shall establish or allow to be established, and no corporation, company or person shall establish an aqueduct or intake for drinking water before having submitted the plans to the Board of Health of the Province and obtained its approval.

In addition to the penalty attached to the infringement of this article, the works made without such previous approval shall be modified or demolished by the municipality, the corporation, company or person who made them, if the Board of Health of the Province thinks that the water supplied may be injurious to the public health.

The Board of Health of the Province may require an analysis of the water to be made at the expense of the municipality, or corporation, company or persons submitting the plans, before giving its approval.

No municipality shall proceed or allow to be proceeded with and no corporation, company or person shall proceed with carrying out public or private drainage works before having submitted the plans to the Board of Health of the Province and obtained its approval.

In addition to the penalty attached to the infringement of this article, the works made without such previous approval shall be modified or demolished by the municipality, corporation, company or person who made them, if the Board of Health of the Province thinks that they may become injurious to public health.

Every person who knowingly and voluntarily soils or contaminates, in any manner whatever, the water of a well, spring, stream, lake, pond, river or reservoir, used for drinking by men or animals, or every person who

voluntarily soils or contaminates the intake of any aqueduct, whether such intake be frozen or not, or every person who deposits in such intake or upon the ice thereof any carcass of any dead animal or any other matter injurious to health, is liable to a fine not exceeding one hundred dollars, and in default of payment, an imprisonment not exceeding two months.

(2) It shall not be lawful to construct, establish or operate any such system of waterworks or any extension of an existing system of waterworks as aforesaid without first obtaining from the commissioner a certificate certifying that the plans, specifications and analysis so submitted and the proposed source or sources have been considered and approved by him and that the proposed system or extension may with safety to the public health be constructed, carried out and operated.

(3) If in the opinion of the commissioner, alterations are necessary in the plans or in the specifications of such proposed system the commissioner shall notify the municipality, person or body corporate, as the case may be, of the necessity of such alterations and shall specify the same; and the certificate shall not be granted until such alterations have been made in such plans and specifications.

(4) If in the opinion of the commissioner the quality of the water of any existing system of waterworks is of such a character as to be a menace to the public health such changes or additions shall be made by the municipal council of any municipality or by any person or body corporate in such manner and within such time as

the commissioner with the approval of the minister shall direct.

Sec. 23.—No bylaw providing for the raising of money for the construction, operation or extension of any system of waterworks or common sewer or system of sewerage or sewage disposal shall be submitted to the votes of the electors by the council of any municipality until the consent of the commissioner to the proposed construction, operation or extension has been first obtained under the provisions of Sections 21 and 22 hereof, as the case may be, and the preamble to every such bylaw shall declare that such consent has been duly obtained; no debenture shall be valid if issued under any bylaw passed in contravention of the provisions of this section.

LAWS ON SEWERS AND SEWERAGE SYSTEMS.

ALBERTA. *Sec. 24.*

When the construction, alterations or extension of a common sewer or system of public sewerage shall be contemplated by the municipal council of any municipality, village, or by any person or body corporate, such council, person, or body corporate shall submit to the provincial board all plans and specifications in connection with the construction, alteration or extension of such common sewer or system of sewerage and in connection with the purification and disposal of the sewage.

(2) No common sewer or system of sewerage shall be established or continued unless there is maintained in connection therewith a system of sewage purification and disposal which removes and avoids any menace to the public health, and the provincial board may call for and any council, person or body corporate shall, when requested, furnish as soon as may be, such information

and data in relation to such matters under their control as the provincial board may deem necessary; provided that with regard to systems in operations at the date of the passing of this Act the provincial board may dispense with the requirements thereof for a sufficient time in their opinion to permit of compliance therewith.

(3) It shall not be lawful for any such council, person or body corporate to construct, alter, extend or operate any common sewer or system of sewerage or sewage disposal without first obtaining from the provincial board a certificate, signed by the chairman, stating that the proposed construction, alteration or extension may be carried out, and the constructed or extended common sewer or system of sewerage and sewage disposal maintained and operated without injury or danger to the public health.

(4) If in the opinion of the provincial board for the purpose of guarding against injury or danger to the public health, alterations or additions are necessary in any existing or proposed common sewer or system of sewerage or in the plans or specifications for sewage disposal or in both the plans and specifications submitted as aforesaid, the said certificate may specify the alterations and additions deemed necessary and it shall not be lawful to construct, establish or operate the existing common sewer or system of sewerage or sewage disposal of the proposed system or extension unless and until the alterations and additions specified in the said certificate have been made and adopted.

Sec. 25.—The decision or certificate of the provincial board with regard to such alterations and additions or to the construction or extension of any common sewer

or public system of sewerage or sewage disposal or of any system of waterworks or public water supply shall be subject to appeal to the Lieutenant-Governor in Council, such appeal to be made and taken within three months after the receipt by the person affected of the certificate or notice of the decision complained of; and such decision or certificate, when not so appealed against or when confirmed or amended and confirmed upon appeal by the Lieutenant-Governor in Council, shall be binding and conclusive in all respects; provided that whenever, in reference to any of the matters aforesaid, it shall appear that any change of circumstances or conditions has arisen or exists, the provincial board may make further inquiry and may file a further or supplemental decision or certificate, which shall be subject to appeal in manner and have in all respects the force and effect aforesaid.

BRITISH COLUMBIA. *Sec. 24.*

When the construction or extension of a common sewer or of a system of public sewerage shall be contemplated by the Municipal Council of any municipality, or by any person or body corporate, it shall be the duty of such council, person or body corporate to submit to the Provincial Board all plans and specifications in connection with the construction or extension of such common sewer or system of sewerage.

(2) The Provincial Board may call for, and such council, person or body corporate shall furnish, as soon as may be, such further information and data, in addition to the said plans and specifications as the Provincial Board may deem necessary.

(3) It shall not be lawful for any such council, person or body corporate to construct or extend any

common sewer or system of sewerage without first obtaining from the Provincial Board a certificate, signed by the Chairman and Secretary, stating that the proposed construction or extension may be carried out, and the constructed or extended common sewer or system of sewerage maintained and operated without injury or danger to the public health.

(4) If in the opinion of the Provincial Board, for the purpose of guarding against injury or danger to the public health, alterations are necessary in the plans and specifications, or in both the plans and specifications submitted as aforesaid, the said certificate may specify the alterations so deemed necessary, and it shall not be lawful to construct, establish or operate the proposed system or extension unless and until the alterations specified in the said certificate have been made and adopted.

MANITOBA. *Sec. 28.* Whenever the establishment of a public water supply or system of sewerage shall be contemplated by the council of any city, town or village municipality, it shall be the duty of the said council to place itself in communication with the provincial board of health and to submit to the said board before their adoption all plans in connection with said system.

(a) It shall be the duty of the provincial board of health to report whether in its opinion the said system is calculated to meet the sanitary requirements of the inhabitants of said municipality, whether any of its provisions are likely to prove prejudicial to the health of any of the said inhabitants, together with any suggestions which it may deem advisable, and to cause copies of such report to be transmitted to the Minister of

Agriculture and Immigration, to the inspector and to the clerk of the municipality.

NOVA SCOTIA. *Sec. 60.*

When the establishment of a public water supply or system of sewerage is contemplated by the council of any city or town, or by any corporation, such council or corporation shall submit all plans in connection with such supply or system to the Governor-in-Council, and no work on such supply or system shall be commenced until the plans have been approved by the Governor-in-Council.

ONTARIO. *Sec. 30.*

(2) Whenever the construction of a common sewer or of a system of public sewerage is contemplated by the council of any city, town or village, it shall be the duty of the council to place itself in communication with the provincial board of health, and to submit to the board before their adoption all plans in connection with said sewer or sewerage system. It shall be the duty of the provincial board of health to inquire and report upon said sewer or system of sewerage, as to whether the same is calculated to meet the sanitary requirements of the inhabitants of the municipality; and as to whether such sewer or system of sewerage is likely to prove prejudicial to the health of the inhabitants of the municipality or of any other municipality, liable to be affected thereby.

(3) The Provincial Board of Health may make any suggestions or amendments concerning the plans submitted or may impose any conditions with regard to the construction of such sewer or system of sewerage or the disposal of sewage therefrom as it may deem necessary or advisable in the public interest; and the construction of any common sewer or system of sewerage

shall not be proceeded with without being reported upon and approved of by the Provincial Board of Health, and no change in the construction thereof or in the disposal of sewage therefrom liable to injuriously affect the public health shall be made without previous submission to and approval by the said Board.

(4) The decision or report of the Provincial Board of Health with regard to any system of water supply or any common sewer or public system of sewerage or the disposal of sewage therefrom shall be subject to appeal to the Lieutenant Governor in Council, such appeal to be made within one month after the filing of the report or decision in the office of the Minister of the department to which the Provincial Board of Health is attached and such decision or report, where not so appealed against, or where confirmed or amended and confirmed upon appeal by the Lieutenant Governor in Council, shall be binding and conclusive upon all the municipalities and persons affected by the same; but wherever it appears that any change of circumstances or conditions has arisen, the Provincial Board of Health may, if it deem it advisable, make further inquiry and report as to any system of water supply or common sewer or system of sewerage or the disposal of sewage, which report shall be subject to appeal as aforesaid and have the same force and effect as aforesaid.

(5) The said Board may from time to time modify or alter the terms and conditions as to the disposal of sewage imposed by any award authorizing any system of sewerage or the extension of a sewer, and their report or decision shall be subject to appeal as aforesaid.

(6) No sewage, domestic or factory refuse, excremental or other polluting matter of any kind whatsoever, which, either by itself or in connection with other matter, corrupts or impairs, or may corrupt or impair,the quality of the water of any source of any public water supply for domestic use in any city, town, incorporated village or other municipality, or which renders, or may render, such water injurious to health, shall be placed in or discharged into the waters, or placed or deposited upon the ice of such source of water supply, near the place from which any such municipality shall or may obtain its supply of water for domestic use, nor shall any sewage, drainage, domestic or factory waste or refuse, excremental or other polluting matter be placed or suffered to remain upon the bank or shore of any such source of water supply,near the place from which such municipality shall or may obtain its supply of water for domestic use as aforesaid, nor within such distance thereof as may be considered unsafe by the Provincial Board of Health, after an examination thereof by a member or officer of the said Board, and any person who shall offend against any provision of this section shall upon summary conviction be liable to a penalty of not more than $100 for each offence, and each week's continuance after notice by the Provincial Board of Health or Local Board of Health, to abate or remove the same shall constitute a separate offence.

QUEBEC. *Sec.* 44. Every person who knowingly and voluntarily soils or contaminates, in any manner whatever, the water of a well, spring, stream, lake, pond, river, or reservoir, used for drinking by man or animals, or every person who voluntarily soils or con-

taminates the intake of any aqueduct, whether such intake be frozen or not, or every person who deposits in such intake or upon the ice thereof any carcass of any dead animal or any other matter injurious to health, is liable to a fine not exceeding one hundred dollars and in default of payment an imprisonment not exceeding two months.

SASKATCHEWAN. *Sec. 22.*

When the construction, alteration or extension of common sewer or system of public sewerage is contemplated by the municipal council of any municipality or by any person or body corporate such council, person or body corporate shall submit to the commissioner all plans and specifications in connection with the construction, alteration or extension of such common sewer or system of sewerage and in connection with the purification and disposal of the sewage.

(2) No common sewer or system of sewerage shall be established or continued unless there is maintained in connection therewith a system of sewage purification and disposal which removes and avoids any menace to the public health and the commissioner may call for and any council, person or body corporate shall when requested furnish as soon as may be such information and data in relation to such matters under their control as the commissioner may deem necessary;

Provided that with regard to systems in operation at the date of the passing of this Act the commissioner may dispense with the requirements hereof for a sufficient time in his opinion to permit of compliance therewith.

(3) It shall not be lawful for any such council, person or body corporate to construct, alter, extend or operate

any common sewer or system of sewerage or sewage disposal without first obtaining from the commissioner a certificate stating that the proposed construction, alteration or extension may be carried out and the constructed or extended common sewer or system of sewerage and sewage disposal maintained and operated without injury or danger to the public health.

(4) If in the opinion of the commissioner for the purpose of guarding against injury or danger to the public health, alterations or additions are necessary in any existing or proposed common sewer or system of sewerage or in the plans or specifications submitted as aforesaid, the commissioner shall notify the municipality person or body corporate, as the case may be, of the necessity of such alteration and shall specify the same and the aforesaid certificate shall not be granted until the alterations and additions specified in the said certificate have been made and adopted.

Sec. 23.—No by-law providing for the raising of money for the construction, operation or extension of any system of waterworks or common sewer or system of sewerage or sewage disposal shall be submitted to the votes of the electors by the council of any municipality until the consent of the commissioner to the proposed construction, operation or extension has been first obtained under the provisions of Sections 21 or 22 hereof, as the case may be, and the preamble to every such by-law shall declare that such consent has been duly obtained; no debenture shall be valid if issued under any by-law passed in contravention of the provisions of this section.

It will thus be seen that each province, with the single exception of New Brunswick, has placed in the hands of the Provincial Health authorities certain powers in regard to public water supplies and the construction of sewers and sewerage systems and the providing for the proper or adequate disposal of the sewage effluent. Many of these laws have been on the statute books for years. In some of the older provinces they have been amended, apparently with the object of preventing the pollution of the waterways, and thus, in a measure, they present evidence of good intention on the part of the legislatures to protect the public. Personal experience leads me to express the opinion that, in the main, they are non-efficient; they look well on paper, but in practice, municipal authorities do pretty much as they please and as the powers of most Provincial Boards of Health are only advisory, they accept or reject the advice or recommendations of the Board just as they see fit. Too frequently is it the case that the matter has already been voted upon by the ratepayers and passed by the Municipal Council—indeed, systems have often been known to be under construction, if not in actual operation, before the submission of the plans to the provincial authorities. The provincial laws, with the exception of Saskatchewan, lack all mandatory, restrictive or corrective power; other boards may recommend, direct or order, but in this new province, Sec. 23 of the Act respecting the Public Health provides that the consent of the Commissioner of Health shall be obtained before any by-law providing for the raising of money for the construction, operation or extension of any system of waterworks, common sewer, system of sewerage or

sewage disposal shall be voted upon by the ratepayers and that no debenture shall be valid unless this provision has been complied with. This new departure is restrictive and if properly enforced, will, it is hoped, go a long way in preventing what has been happening in older portions of the Dominion for some years. To have control over the actions of a municipal council through the purse strings should prove of marked advantage and the operation of this statutory provision will be watched with interest by those desirous of securing for the people the best in both water supplies and sewerage purification.

If the question of the prevention of the pollution of public water supplies and the efficient disposal of sewage were merely matters for provincial control and interference, the problem might be left with the several legislatures to deal with. In some instances the protection of particular water supplies, such for instance as those at Fort William in Ontario, Truro and Halifax in Nova Scotia, certainly come under this head, but geographical or political boundaries are not based on the laws of hygiene; nor do the provincial laws of Quebec govern the resident ratepayer in Ontario, or *vice versa*. Still less do the laws of Ontario control or govern the acts of the foreigner, as for instance a resident in the State of Michigan or New York. The waters of the St. Lawrence River at Montreal, which should be comparatively pure, are polluted by the unlawful acts of the municipalities situated in Ontario as also by those of millions of the residents in the states of New York, Michigan, Ohio, etc., who wantonly pour millions of gallons of sewage daily into the

waters of the Great Lakes. It is true those living within the bounds of Ontario are amenable to Canadian law, but what shall we say of our neighbours to the south of the international boundary line, many millions of whom transgress the laws of health by dumping garbage, factory waste and sewage wantonly into the Great Lakes system to the detriment of their own health as well as to that of the residents of Montreal?

It is therefore evident that the enactment and enforcement by any particular provincial government of laws regulating the disposal of sewage and providing for the protection of water supplies will not of itself safeguard even the people of the province to which those laws apply. Even if every province had similar or identical laws on this subject, the dangers respecting waters which are in part international in origin or location would not be entirely removed. This important aspect of the question is not confined to any particular province of Canada, although Ontario and Quebec are perhaps at the present time more particularly concerned owing to the fact that, lying to the south of the international boundry line, there are many millions of people discharging untreated sewage and factory wastes into rivers which discharge into the Great Lakes and their connecting rivers. What is happening in these provinces through the failure on the part of the Governments concerned to deal with the situation by adequate statutory provisions should not be allowed to become the case in the other portions of Canada where the conditions are not so serious owing to sparsity of population.

It is quite apparent there are difficulties presented in dealing with this important question by reason of

the fact that many of our streams and lakes flow not only through or between different provinces, but also between this country and the United States and are consequently international in character. The prevention of pollution by legislative enactment on this side of the line cannot therefore affect the action of the states lying to the south of the boundary. What shall we say of the pollution of the Great Lakes, where it is estimated by competent authorities that, during a single season, as many as ten million persons travel in the ships plying on these waters? General Wyman, chief of the staff of the Public Health and Marine Hospital Service of the United States, in referring to the work of the interstate commission, known as the Lake Michigan Water Commission, gives his valuable opinion on this international aspect of the question. He says:—

> "The entire investigation is of vast importance and interest to the federal government because of its bearing on interstate commerce. It should receive the active co-operation of the Department, and there should be legislative action authorizing the Service to undertake the investigation of similar interstate bodies of water."

To aid in an intelligent consideration, a résumé of the progress made in some of the states where the legislatures are alive to the importance of the subjects involved may be of interest. A brief reference can here be made only to those states having more advanced laws than others.

MASSACHUSETTS. Massachusetts places in the hands of the State Board of Health the general oversight and care of all waterways, streams and ponds used by

any municipality or public institution as sources of water supply, with power to examine into the purity of the same. The Board may make rules and regulations for the protection of water supplies and publish the same in newspapers or by poster. Dr. F. W. Shumway, Secretary of the Michigan State Board of Health, says there are "No weak spots in the law."*

PENNSYLVANIA. The powers in this state are vested in the Commissioner of Health. The laws 1895-1899 apparently apply only to future additions to and changes in existing water supplies or to proposed systems. The Commissioner of Health judges of the advisability of securing water supply from any proposed source, and additions and changes can only be made upon his written permit.

No person, corporation or municipality can place or discharge any sewage into any waters of the State save by duly applying to the Commissioner, who shall confer with the Governor and Attorney General, when a permit shall be either granted or refused. The permit is subject to modification or change by the Commissioner after investigation. It will be noted that power on the part of the Commissioner of Health does not extend to those persons, corporations, or municipalities discharging sewage at the time of the passing of the Act.

NEW JERSEY In the year 1900 the Senate and General Assembly of the State created a "Sewage Commission," amending and supplementing the Act in 1904 and 1907. At the present time the enforcement

*First Report of the Lake Michigan Water Commission

of these laws is in the hands of the State Board of Health. The powers of the Commission in respect to pollution of waters are indicated in the following:—

"1. The State Sewerage Commission is hereby authorized and empowered to inspect any of the waters of this State, and if it finds that any of the waters of this State are being polluted in such manner as to cause or threaten injury to any of the inhabitants of this State, either in health, comfort or property, it shall be its duty to notify in writing, any person, municipal or private corporation found to be polluting said waters that prior to a time to be fixed by said commission, which time shall not be more than five years from the date of said notice, said person or corporation must cease to pollute said waters and make such other disposition of the sewage or other polluting matter as shall be approved by said commission; any person or corporation aggrieved by any such finding may appeal therefrom to the Court of Chancery at any time within three months after being notified thereof, and the said court is hereby authorized and empowered to hear and determine such appeal in a summary manner, according to its course and practice in other cases, and thereupon to affirm, reverse or modify the finding of said commission in such manner as it may deem just and reasonable.

"2. The State Sewerage Commission is hereby authorized to apply to the Court of Chancery for writ of injunction to prevent any violation of or enforce the provisions of this act and the act to which this is a supplement, and it shall be the duty of the said court, in a summary way, to hear and determine the merits of said application; and in all such cases to restrain violation of or enforce the provisions of the said acts.

"3. "Waters of this State" as used in this act and the act to which this is a supplement shall include the ocean and its estuaries, all springs, streams and bodies, or surface or ground water, whether natural or artificial within the boundaries of this State or subject to its jurisdiction."

And it is further enacted that it is unlawful to build sewers so as to pollute streams or to discharge sewage except under conditions prescribed and approved of by the Board. The Acts in this State, too, are not retroactive as regards the municipality polluting streams by the discharge from sewage systems which were in operation prior to the passing of the legislation above referred to. Crimes Act (revision) provides (Sec. 82) that waters distributed for public use shall not be polluted; while Chap. 151, Laws of 1909, is similar in character to Sec. 30, s.s. 6 of the Ontario Public Health Act; it prohibits the pollution of potable waters in the following words:—

"No excremental matter, domestic, factory, workshop, mill or slaughter-house refuse, creamery or cheese factory waste, garbage, dye stuff, coal tar, sawdust, tan bark or refuse from gas houses, or other polluting matter, shall be placed in, or discharged into, the waters, or placed or deposited upon the ice of any river, brook, stream, or any tributary or branch thereof, or of any lake, pond, well, spring or other reservoir above the point from which any city, town, borough, township, or other municipality, shall or may obtain its supply of water for domestic use; nor shall any such excremental matter, domestic, factory, workshop, mill or slaughter-house refuse, creamery or cheese factory waste, garbage, dye stuff, coal tar, sawdust, tan bark or refuse from gas houses,

or other polluting matter, be placed or suffered to remain upon the banks of any such river, brook, stream, or of any tributary or branch thereof, or of any lake, pond, well, spring, or other reservoir, above the point from which any city, town, borough, township or other municipality shall or may obtain its supply of water for domestic use as aforesaid; and any person or persons, or private or public corporation, which shall offend against any of the provisions of this section, shall be liable to a penalty of one hundred dollars for each offence; and each week's continuance after notice by the State or local board of health to abate or remove the same, shall constitute a separate offence; *provided, however*, that nothing in this section contained shall be construed to repeal, modify or otherwise affect any law or statute now conferring upon any local board of health the power or authority to institute any proceedings in any court of this State for the recovery of any penalty for, or obtaining any injunction against, the pollution of any of the waters of this State."

NEW YORK. New York enacted in 1885 that the State Board of Health might make rules for the inspection of water supplies, and in 1903 it was made unlawful to discharge sewage into any water without permission of the State Commissioner. The Commissioner cannot order the discontinuance of any pollution which existed at the time of the passing of the Act. Thus what was, and is, manifestly an unlawful and unsanitary act on the part of all the large cities of that populous state, is perpetuated indefinitely.

KANSAS. Kansas enacted in 1907, with amendments in 1909, that all water systems existing at the time, must file with the State Board

description, plans, etc. and that any additions or changes thereto could only be made with the approval of the Board. Futhermore, the Board may investigate if it has reason to believe that the sanitary quality of any water supply is prejudicial to the public health, and authority is vested in the State Board of Health "to "make an order requiring such changes in the source "or sources of the said water supply or in the manner "of sewage purification or treatment of the said supply "before delivery to consumers, or in both, as may in "its judgment be necessary to safeguard the public "health. It shall be the duty of the person, company, "corporation, institution or municipality having the "same in charge to fully comply with the order." On the whole, the provisions of this law are more up-to-date than those of any other State. They lack, however, the retroactive powers.

OHIO.

Ohio has vested the control of the installation of waterworks systems and the methods of the disposal of sewage with the State Board of Health; old systems cannot be changed or added to without the approval of the Board. The State Board, together with the Governor and Attorney-General may decide as to whether either an old system or any system of water supply or sewage disposal is detrimental to public health and may order the same to be changed. In the matter of interstate streams, this State has already taken action, the legislature having appointed a Commission to recommend the measures to be taken to prevent the pollution of the Ohio River. It has also asked the legislatures of the States of Pennsylvania, West Virginia, Indiana and Kentucky, to co-operate

by taking similar action. This Commission is now at work and a report may be expected at an early date.

As regards the Susquehanna river, Pennsylvania and New York have taken joint action and in a like manner the pollution of the Delaware River has been considered by the same two states in conjunction with New Jersey.

As indicating the opinion of the chief state and provincial health authorities of this continent upon the subject of "Pollution of Streams," the report of a special committee presented at the Conference of State and Provincial Boards of Health held in Washington, D.C., 1909, may be briefly stated. The Committee, after a careful review of the important questions involved, recommended as follows:—

First—That inasmuch as any discharge of organic matter into streams used as public water supplies is dangerous to public health, we recommend that such practices be disapproved.

Second—That as an excessive discharge of organic matter into a stream creates a public nuisance restricting its normal use and enjoyment, we recommend that partial purification be practiced in such cases.

Third—That the State Boards of Health represented present at every opportunity to the people generally the importance of the questions involved, and that those states not having effective legislation covering the subject shall endeavor to secure the same, with proper appropriations for conducting the work.

Fourth—That the control of this work shall be placed in the hands of the State Boards of Health.

Fifth—That the Federal Government be given such control that it may be in a position to assist the states

in studying special problems, and that the Conference heartily endorses the proposed bill giving the Surgeon-General of the United States Public Health and Marine Hospital Service authority to investigate these questions as being a step in the direction of federal control in the prevention of the pollution of our streams and lakes.

GREAT BRITAIN. In regard to Great Britain, the present opinions in respect to the purity of rivers and other bodies of fresh water have not always prevailed. Public opinion has slowly developed. It was not until 1858 that pollution was prohibited in England by legal enactment, and in 1861 an Act was passed by the House of Commons which required sewage to be purified and freed from fæcal and other prutresible matters before being discharged into the streams. Nothing definite was accomplished until 1865 when the First Royal Commission was appointed. This was followed in 1868 by The Rivers Pollution Prevention Commission, which dealt very fully with the question of sewage purification. One of the instructions given this Commission was as follows: "Although it may be taken as proved generally that there is a widespread and serious pollution of rivers, both from town sewage and the refuse of mines and manufactories, and that town sewage may be turned to profitable account as a manure, there is not sufficient evidence to show that any measure absolutely prohibiting the discharge of such refuse into rivers, or absolutely compelling town authorities to carry it on the lands, might not be remedying one evil at the cost of an evil still more serious in the shape of injury to health and damage to manufactures."

In 1869 a Commission was appointed to specially consider the question of the disposal of London sewage and largely as a result of the work of this latter commission the Local Government Board was founded in 1871 and the Public Health Act passed in the next year and subsequently amended in 1875. In 1876 The Rivers Pollution Prevention Act came into force. The amending Act of 1875 stipulated that the Local Government Board should sanction the raising of loans for purposes of sewage disposal only after a favourable report was made by the Inspector after a local enquiry. It further enacted that all town authorities should remove solids and fæcal matter from sewage to such an extent that no nuisance should be caused, before its discharge into canals, rivers, lakes or the sea. The Act of 1876 gave the same Board power to require land treatment in all cases.

The general law relating to sewage disposal in England is to be found in the Public Health Act, 1875, the Public Health Amendment Act, 1890, the Acts relating to London and also the Rivers Pollution Prevention Acts.

Sewage works may be constructed either within or without the district of a local authority. As regards the former class, all the existing sewers are vested in the local authority and power is given to compulsorily purchase land and erect works for the treatment of sewage, either by natural or artificial means. Sec. 32 Public Health Act, 1875, gives the local authority power to construct sewage disposal works *without* the district and prescribes procedure as follows:—

"A local authority shall, three months at least before

commencing the construction or extension of any sewer or other work for sewage purposes *without* their district, give notice of the intended work by advertisement in one or more of the local newspapers circulated within the district where the work is to be made. Such notice shall describe the nature of the intended work, and shall state the intended termini thereof, and the names of the parishes, and the turn-pike roads and streets, and other lands (if any) through, across, under or on which the work is to be made, and shall name a place where a plan of the intended work is open for inspection, at all reasonable hours; and a copy of such notice shall be served on the owners or reputed owners, lessees or reputed lessees, and occupiers of the said lands, and on the overseers of such parishes, and on the trustees, surveyors of highways, or other persons having the care of such roads or streets."

Sections 33 and 34 provides that objection may be taken and when taken prescribes that the work shall not be proceeded with unless the local Government Board after enquiry and inspection, disallows or modifies the plans.

Under Section 299, Public Health Act, 1875, power is given to the Local Government Board to enforce the performance of the duty of defaulting local authorities. They may enforce the same by writ of mandamus, or may appoint some person to perform the duty as prescribed. The section is as follows:—

"Where complaint is made to the Local Government Board that a local authority has made default in providing their district with sufficient sewers, or in the maintenance of existing sewers, or in providing

their district with a supply of water, in cases where danger arises to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply of water and a proper supply can be got at a reasonable cost, or that a local authority has made default in enforcing any provisions of this Act which it is their duty to enforce, the Local Government Board, if satisfied, after due inquiry, that the authority has been guilty of the alleged default, shall make an order limiting a time for the performance of their duty in the matter of such complaint. If such duty is not performed by the time limited in the order, such order may be enforced by writ of mandamus, or the Local Government Board may appoint some person to perform such duty, and shall by order direct that the expenses of performing the same, together with a reasonable remuneration to the person appointed for superintending such performance, and amounting to a sum specified in the order, together with the costs of the proceedings, shall be paid by the authority in default; and any order made for the payment of such expenses and costs may be removed into the Court of Queen's Bench, and be enforced in the same manner as if the same were an order of such Court."

"Any person appointed under this section to perform the duty of a defaulting local authority shall, in the performance and for the purpose of such duty, be invested with all the powers of such authority other than (save as hereinafter provided) the powers of levying rates; and the Local Government Board may from time to time by order change any person so appointed."

Section 300 makes provision for recovery of expenses and Sections 15 and 16 of the same Act provides for the maintenance of sewers and sewage works without the district.

As regards the purification of sewage, Sec. 17 of the Act of 1875 provides as follows:—

> "Nothing in this Act shall authorize any local authority to make or use any sewer, drain, or outfall, for the purpose of conveying sewage or filthy water into any natural stream or watercourse, or into any canal, pond, or lake, until such sewage or filthy water is freed from all excrementitious or other foul or noxious matter such as would affect or deteriorate the purity and quality of the water in such stream or watercourse, or in such canal, pond, or lake."

The Public Health Acts Amendment Act, 1890, prohibits the discharge into sewers of chemical refuse, waste steam, etc.

The requirements of the Local Government Board as regards sewerage and sewage disposal, have not been officially published, hence the plans of any new works and of any proposed changes to existing plants must be submitted and each separately considered.

THE RIVERS POLLUTION PREVENTION ACT, 1876.

The object of this act is to make provision to prevent the pollution of rivers and to prevent the establishment of new sources of pollution. The sources dealt with are classified under the following heads:—

1. Solid refuse of any manufactory manufacturing process or quarry, or any rubbish, cinders or other waste, or any putrid solid matter.

2. Any solid or liquid sewage matter.

3. Any poisonous, noxious or polluting liquid from any factory.

4. Any solid matter from any mine in such quantity as to prejudicially interfere with the flow or any poisonous, noxious or polluting matter.

It is divided into six parts which, briefly described, are as follows:—

Part I makes it an offence for any person to put an solid matter, or any putrid solid matter, rubbish or cinders into any water-course.

Part II prevents any person from allowing any solid or liquid matter to enter a water-course.

Part III prohibits the draining of any waste material from any factory or mine into a water-course, and the owners of the factory or mine must show to the Court they are using the best reasonably available means to render the waste material harmless.

Part IV is administrative in character and provides that sanitary authorities shall afford facilities enabling factories, etc., to drain into sewers; prescribes a maximum penalty not exceeding fifty pounds per diem for every day's continuance of the offence.

Part V and VI are applicable to Scotland and Ireland only.

Apparently it was found this latter act was a dead letter, for while Sec. 3 provided that the throwing of solid matter into the streams and the pollution of them by sewage and manufactory refuse was prohibited, yet to secure a conviction it was necessary to prove that the solid matter was either putrid or prutrescible, or that it polluted the waters of the stream or that it was discharged in such quantities as to interfere with the due flow of the stream. Moreover, action could only be taken with the express sanction of the Local Government Board. Indeed, it would appear that in England, at least, the question of protection of streams and the disposal of sewage is complicated. Between the influence of the larger corporations controlling the larger water supplies, and that of the manufacturing interests,

the health of the public is not protected as it should be and much remains to be done by efficient and effectual legislation.

In addition to the foregoing, there is a series of acts relating particularly to the City of London and its various authorities, vesting them with special provisions in respect to the sewerage area. Certain it is the various acts of Parliament make it obligatory upon local authorities to purify the whole of the sewage before discharging it into any water-course, but all the difficulties surrounding this important question are not as yet fully overcome, although Royal Commissions have been considering the question for many years.

The Commission of 1859 declared that the proper method of purifying sewage was to distribute it on land and that only in this manner could the pollution of rivers be prevented. The Commission of 1868, which issued five reports up to 1874, also declared that land treatment was the only suitable method of rendering sewage non-prutrescible and that all other methods could only be regarded as palliatives. The 1882 Commission declared similarly. This Commission indicates that, whereas former commissions were only able to judge of results by chemical methods, bacteriological methods had so far developed to be of use. The Commission of 1882 indicates that there are conditions which would permit of the Local Government Board relaxing its requirements as regards the land treatment. They further state they are convinced that by means of artificial biological processes effluents can be obtained non-prutescible in character and satisfactory enough to be discharged into streams without causing a nuisance.

It may be pointed out that the Commissions of 1857, '65 and '68 had each recommended the formation of special authorities to supervise each watershed. The Commission of 1868 had considered a central authority necessary to deal with all matters relating to river pollution and to supervise the administration of the law, and this latter recommendation was again urged by the Commission in its third report, 1903, which claimed that to this central authority all appeals should be made rather than to the courts as this method of appeal had been found costly and dilatory.

It is recommended that this central authority should have power to conduct inquiries, to call witnesses, to enter premises, to take samples of trade effluent and perform such other acts as are necessary for the performance of its duties. Its officers were to consist of an administrative head, a chemist, an engineer and a bacteriologist.

The fourth report of this Commission deals with the pollution of tidal waters and recommends safeguards in the interest of the shell-fish industry as well as of the consumers.

In 1888 an effort was made to form joint committees having representatives from all sanitary authorities bordering on a particular river. That of the Mersey and Inwill seems to have been the most active, but it was soon found the existing legislation did not meet the situation and a step forward was made in 1892 when Parliament passed the Mersey and Inwill Act and, in 1894, the West Riding of Yorkshire Rivers Act. The chief feature of these acts is that they give the committees special powers against the pollution of streams

by solid matters and the pollution by sewage matter and liquid manufacturing refuse or waste. The value of these two acts is greatly diminished by certain clauses which prevent prompt action being taken; enquiry by the Local Government Board and then three preliminary warnings, all having to precede action.

GERMANY. In Germany the prevention of the pollution of the rivers which flow through several states would be a greater task were it not that the rivers are of large volume, for each state has its own laws upon the subject. Repeated attempts have been made to obtain Imperial legislation but the Constitution seems to render this impossible. The Introductory Act of the Civil Code expressly places water legislation in the hands of the federated states; and further, the supervision and legislation regarding measures to be adopted by the Medical and Veterinary Police authorities is vested in the Imperial Government and the Epidemic Diseases Act, 1900, passed by the Imperial legislature, provides that the methods for the disposal of waste shall be supervised by the State and that local authorities shall remove nuisances and adopt preventive measures against infectious diseases and, if it is necessary, that certain regulations shall apply to several states. The Imperial Chancellor is vested with power to see that the state authorities adopt uniform measures. Under the provisions of Sec. 43 of this Act the Imperial Council of Health was created, but its work, so far as river pollution is concerned, was restricted by the Federal Council, in 1901, to interstate waters. In this connection, it is interesting to note that the Imperial Government in 1903 declared that the keeping of the rivers and other

public bodies of water free from pollution was to be regarded as one of the main efforts of public health administration, and while the advisory reports of the Imperial Council of Health have no legal force, it is expected its pronouncements will produce good results.

The question of trade wastes is dealt with under the Trade Regulations which provide that local authorities shall consider the possibility of river pollution before granting a permit. The several federated states have each their own laws relating to river pollution.

PRUSSIA. In Prussia an order was issued in 1901 to the Presidents of the various districts, in which it was pointed out that difference in local and economic conditions between various provinces made general legislation in Prussia impossible. The order indicated that the existing laws, together with a revision of the police regulations, would suffice for the present. It further pointed out that inspection should be made every two or three years of all streams at that time polluted or of which pollution was feared, bearing in mind the following:—

(1) The prevention of the spread of infectious diseases.

(2) The prevention of the pollution of water used for drinking or other purposes.

(3) The protection of the public against nuisances.

(4) The protection of fish.

The order further states that streams which are chiefly used for the drainage of villages and factories or having factories along their banks must be dealt with differently from those used for agricultural purposes or for fisheries. The actual state of things must always

be considered and if, however, the water of the stream is necessary for domestic purposes, measures must be taken against pollution.

SAXONY. The regulations of Saxony prevent the emptying of waste materials from pulp factories into the streams and apply also to all factories, the waste material of which would, of necessity, find its way into streams and thus cause pollution, killing or injuring fish, affecting the health of the community, or destroying natural beauty. There are no regulations which set forth the exact method of precedure on the part of factories for the prevention of contamination of streams with the exception that waste material must be rendered inert before entering the same. The general economic principle of freedom in business enterprise and trade does not restrict the right of the authorities to prevent the pollution of streams in the interest of the public health. The closing of an establishment on account of water pollution can be ordered by the higher administrative authorities only. In such case the owner is reimbursed.

HAMBURG. In Hamburg no statutory provisions exist for the regulation of the disposal of sewage. The sewers are controlled by the municipal building department, which also constructs new works and keeps old ones in repair. The department of trade inspection is authorized to take such measures as may be necessary to prevent the deterioration of existing sewers by chemical action or by erosion. The regulations of this department, however, are merely instructions given to individual, industrial, or other establishments, from time to time, each case being separately considered and

decided. Before promulgating its instructions the Department of Trade Inspection consults representatives of the building and fire departments or other appropriate official bodies likely to have an interest in the particular matter.

This brief review of the situation in European countries is given to indicate what is being done in these crowded centres of civilization and to point out that while many difficulties have been overcome, as yet no definite conclusions have been arrived at in the way of statutory enactments. Indeed, it may be said that legislation along these lines is progressive—finality has not been arrived at any where. On the other hand, it is a case every where of study, but, while studying, organize the work under a central health authority and give that authority power to prevent—conserving the good which is left unpolluted, taking care that what is bad shall not be made worse, and striving to improve all.

A study of the map* of the watersheds of Canada indicates the interprovincial and international character of some of the more important watersheds of the Dominion. The provinces of Nova Scotia and Prince Edward Island, by reason of their insular positions, are exceptions to the general rule, while British Columbia is an example where failure to protect its own rivers might be a menace to the states lying to the south. Alberta, on the other hand, is an example where, owing to the flow of the rivers easterly through Saskatchewan, the difficulties are local and interprovincial. In Saskat-

*Map No. 33 in the Dept. of the Interior's Atlas of Canada, 1906, is very satisfactory.

chewan and Manitoba the questions are also local and interprovincial; while in Manitoba, owing to the fact that the watersheds of the Assiniboine and Red rivers lie largely to the south of the international boundary line, chiefly in North Dakota and Minnesota, the problem assumes an international aspect. The pollution of the Great Lakes is to a great extent international, since they receive a portion of their waters from the states of Minnesota, Michigan, Ohio, New York, Vermont, New Hampshire and Maine. The pollution of the Ottawa river, the interprovincial boundary between Ontario and Quebec, makes the question of pollution of the watershed of that river of interprovincial interest, the chief sources of contamination being in the former province. In New Brunswick, the question is local but chiefly international, owing to the fact that a portion of the watershed of the St. John river lies within the state of Maine.

It is not contended that the dangers at present existing in the various provinces are identically the same either in degree or in fact, but there exists the same underlying principles in that provincial legislation alone will not solve the difficulties. It requires some other authority, viz., that of the Federal Government to deal with them, particularly those of an international character. It will be for the Commission of Conservation to investigate the various watersheds, collecting all available data with the assistance of the several provincial and local health authorities, in order correctly to estimate the character, quantity and variety of the various pollutions at present existing and to ascertain their exact point of discharge and their bearing upon

the present sources of water supply of towns and cities, both near and remote from the point of discharge; and further, to consider and recommend ways and means for the abatement of these nuisances, having always in mind that the health of the citizens of this country is paramount, but ever remembering the necessity for the fostering of agriculture and the development of manufactures.