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Special Features

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Deinking Wastes—Hodge and Morgan

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ing action will be counteracted will depend on the concentration and potency of the inhibiting agent. It may take place with only 50 per cent dilution or may require as much as 99 per cent dilution. Increasing dilutions beyond the critical point will then result in proportionate decreases in oxygen demand or constant B.O.D. values. The critical dilution thus determined in the laboratory may then be used as a basis for the design of the large scale treatment plant. It may be that such dilution may be obtained by using water from other sources in the industrial process which do not contain toxic materials, or sufficient dilution may be available by discharging the waste into a municipal sewer. If no source of readily available dilution water can be obtained, or in cases where the dilution required is excessive, ways and means of excluding the particular substance from the general waste should be sought.

In addition, the inhibiting concentration of any specific compound can be tested by the addition of various amounts to sewage and other suitable substrates. The effect of inorganic toxic materials on the deoxygenation rates can be studied in this manner. With organic materials the toxicity may be due to the high concentration of the compound, which upon dilution may be shown to be oxidizable. Formalin and chloroform fall in this category.

There is little doubt that the list of such compounds, which formerly were considered unoxidizable or toxic, can be greatly enlarged. An organic waste which normally would be oxidizable may fail to oxidize because of the presence of certain inhibiting agents. It is also possible to have a type of organic matter which is neither oxidizable nor inhibiting. All of these possibilities can be uncovered by studying the effect of the pure substance or the mixed waste itself. It would be valuable to know the various ingredients in a given waste. From the information obtained by this method, it is possible to ascertain the critical dilution necessary before biological treatment of a given waste. The possible effect on sewage treatment plants can be evaluated if the dilution ratio is known. The effect on the self-purification of streams may also be ascertained.

The observations made in this paper are not concerned with the effect of pH value and nutrient deficiency of a waste, although these factors can also be studied by this method.

In short, the direct oxygen method presents a parallel to the bottle experiments with sludge digestion and gas measurement, which were so valuable in establishing the fundamental phases of sludge digestion and the influence of various environmental factors.

Conclusions

The direct oxygen method permits the study of oxidation rates of industrial wastes at any desired concentration, and the information obtained is valuable in establishing the oxygen demand at any concentration.

If the demand increases with dilution, the presence of a toxic material is indicated, provided the pH and the nutritional factors are corrected.

Reference

1. Heukelekian, H., "The Use of the Dilution Method for Determininig the Effect of Industrial Wastes on Deoxygenation." THIS JOURNAL, 19, 4, 612 (July, 1947).

Stream Pollution

FEDERAL AND STATE LEGISLATION FOR STREAM POLLUTION CONTROL

By WARREN J. SCOTT

Director, Bureau of Sanitary Engineering, Connecticut Department of Health, Hartford, Connecticut

State Legislation

The writer has tabulated the various agencies engaged in stream pollution abatement work in the different states. While new legislation is constantly being enacted, and it is difficult to keep pace with all the latest developments, the most recent data from the various states are summarized as follows:

Stream Pollution Control Vested in	Number of States
(a) State department of health only	10
(b) Agency separate from state department of health but closely allied to it, with technical service furnished by state department of health and a representative of the state department of health serving as a member of separate agency	11
(c) State department of health and other agencies	17
(d) Water pollution control board separate from state department of health handling all water pollution control activities	4
(e) No state agency	6

In many of the 17 states grouped above under (c), certain specific powers in the field of water pollution control are vested in the state health department and certain powers are vested in another agency. This is true, for example, in Connecticut, where the Department of Health has jurisdiction over the health aspects of sewage pollution and supervises the operation of municipal sewage treatment plants; the State Water Commission is given broad powers to abate pollution and control new sources of pollution, and acts almost exclusively in the field of industrial wastes treatment. Some of the specific powers granted to agencies other than the state health departments in this group are of very limited nature.

There is frequently the cry that the state department of health alone cannot solve the stream pollution problem as there are numerous interests involved such as in boating and fishing and industrial use where other than health aspects exist. This is often the case, and the health department acting singly on health grounds alone may find the going difficult. On the other hand, benefit to the public health is the most important consideration in the eyes of the public and is a dominating factor in selling pollution abatement. Use of streams for water supply, for bathing and for shellfish growth, as well as the absence of nuisance, are all of highest importance from a health standpoint and from the public viewpoint. It must be granted that economic considerations are also of great importance, for municipalities must assume serious financial burdens in many instances in order to provide sewage treatment. Treatment of some industrial wastes is a serious problem because of the cost, and research still has to show the way to practical methods of treatment of certain wastes.

In the long run, there is much to be said for the establishment of state boards on which state health depart-

ments, industry, agencies acting for fisheries or conservation, and possibly other groups or interests, may be represented, with technical service being furnished by the state health departments which must maintain a staff of sanitary engineers to deal with problems of water supply and other sanitary engineering functions. Separate technical organizations are likely to be more expensive and there may be some duplication.

It is encouraging to see the progress that the states are making in setting up legislation. One of the relatively new pieces of state legislation is that enacted in Tennessee, where a commission organized along the lines mentioned above has just been established. New York State is now working officially on a study of pollution control legislation, which will bring forth recommendations that will be considered by the state legislature. A preliminary report by the study group which discusses the problems at issue has recently been published.

Interstate Compact Legislation

There is an increasing interest today in interstate negotiations leading to interstate informal agreements or formal compacts to control the pollution of waters which are common to two or more states. In the Great Lakes Drainage Basin and the Upper Mississippi River Basin sanitation agreements have been reached to work out solutions of problems of pollution control of interstate waters. In the East, there are several examples of the approach through interstate agreements or compacts.

Incodel, an agency interested in water conservation and water pollution problems in the Delaware River Basin, has been established by the states of Delaware, New Jersey, New York and Pennsylvania. It does not operate under a formal compact but rather by the passage of reciprocal legislation in each of the states whereby common objectives are set up and promoted. The agency acts as an educational, advisory and promotional body, and has accomplished a great deal through cooperation of the states and its own activities. Certain standards relating to water quality and acceptable degrees of sewage treatment according to water use have been agreed upon by the subscribing states, and a chronological schedule for the installation of sewage treatment has been set up by the chief engineers of the four state agencies and approved by Incodel and by the state departments of health. The agency issues no orders and enforces no laws. It is an excellent example of successful interstate cooperation without use of the "big stick."

The Interstate Sanitation Commission established by New York, New Jersey and Connecticut has jurisdiction over certain shore areas, mainly adjacent to or near New York City and heavily populated areas in nearby New Jersey, and along the Hudson River and Long Island Sound. Its district embraces only a small portion of all of the waters of the three states. Provision is made for the classification of waters into two classes, according to use. The compact specifies that after classification is made by the commission, certain fixed degrees of treatment of sewage must be provided, the treatment to be accomplished being definitely set forth in the compact. The compact has been favorably subscribed to by all the three states and approved by Congress; it has the force of law and steps are taken to enforce it.

In New England, the state sanitary engineers have been active in promoting a somewhat different type of compact and the state health officers and directors of state water pollution boards have endorsed the project. The idea for this compact rests on the fact that New England is a region of the country with many similar characteristics, natural resources and interests, and with numerous streams flowing across state borders. It is believed that the general approach to stream pollution abatement in the six states can proceed on parallel lines to quite an extent. It is true that some of the states are more adversely affected by out-of-state pollution than others. It is the consensus of opinion of the state sanitary engineers of New England, however, as expressed at several of the meetings of the Conference of New England State Sanitary Engineers, that the states should band together to solve their pollution problems. An important factor in arriving at this decision is that an approach on a regional basis directed by the cooperating states is believed far preferable to Federal control, even though a receptive attitude is maintained toward Federal advice or stimulation in connection with a national stream pollution abatement program. It is believed that the states are in much more intimate contact with the water use potentialities and the economic aspects of their region than the Federal government.

The legislatures and governors of the states of Rhode Island, Massachusetts and Connecticut have already approved the compact which has been drafted. This action will insure the formation of a compact commission so as to get the work under way. Approval by Congress is being sought. While there appears no likelihood that the three northern New England states will approve the compact this year, it is hoped that they will later decide in favor of joining.

The compact has some interesting features which may be listed briefly:

1. The compact applies to interstate streams, ponds and lakes, and tributaries and tidal waters ebbing and flowing past the boundaries of two states.

2. The New England Interstate Water Pollution Control Commission is set up with five commissioners from each state. Membership must include representatives of the state health department and of any other state water pollution control agency that may exist in the state. Further, it is provided that unless a state so determines otherwise, there shall also be from each state a member representing municipal interests, a member representing industrial interests and a member representing an agency acting for fisheries or conservation.

3. There is provision for appointment of a secretary and clerical staff, but there is no provision for setting up an engineering staff in the commission. Technical experts from each of the states are authorized to confer.

4. The commission is directed to establish reasonable physical, chemical and bacteriological standards of water quality satisfactory for various classifications of use of receiving waters. Each state agrees to submit its classification of its own waters to the commission for approval.

5. Each state pledges to provide for abatement of existing pollution and control of future pollution of interstate waters and to put and maintain the waters in a satisfactory condition consistent with the highest classified use of each body of water.

6. Action by the commission must be approved by a majority of the commissioners of each state, as in the case of the Interstate Sanitation Commission.

7. Specified maximum appropriations by each state for operation of the commission are set up, pro-rated mainly on the basis of populations of the various states.

8. The commission has no power to issue orders.

9. The compact becomes effective when approved by any two contiguous states.

10. Provision is made for New York State to join the compact if the state so desires, but the area of the Inter-

state Sanitation District is excluded. New York State has joint interest with the state of Vermont in certain waters, and to a much less extent with the states of Massachusetts and Connecticut.

It is believed that this compact and the establishment of a compact commission will be a strong motivating force to bring about the clearing up of the interstate streams in New England to the degree warranted by their present and future proposed use.

Federal Legislation

As far back as 1936, the United States Congress has debated the merits of a considerable number of pollution abatement bills. In 1938, a Federal bill was passed by Congress and vetoed by the President. In 1940, principal attention was concentrated on H.R. 4070 which received the backing of many organizations including many state health departments, and H.R. 6024 which was supported by certain groups interested in drastic legislation. Among objections raised to H.R. 6024 were: (1) it provided for classification of navigable waters into sanitary water districts, limits to be fixed by the Surgeon General; (2) it gave the Federal government rather than the states the right to decide on the necessary degree of cleanliness for navigable waters and minimum requirements as *to treatment*; (3) *it provided for immediate drastic action to clean up all* sources of pollution whether because of effect on health or on fish or birdlife, which is impracticable and unwarranted; and (4) it set up a water pollution control advisory board of which all of the members were representatives of the Federal government.

It was thought by many, including such organizations as the New England Sewage Works Association and the New England Water Works Association, that it would be preferable in the present session of Congress to endeavor to get behind some reasonable Federal legislation rather than wait to have varied proposed legislation thrust forward. Both associations passed resolutions to this effect at their 1946 meetings. Following the meeting of the Conference of State Sanitary Engineers in Cleveland in the fall of 1946, a meeting was arranged in New York City on November 22, 1946, by Arthur D. Weston, chairman of the Committee on National Water Policy *of the Conference of State Sanitary* Engineers, and representatives of various groups and organizations were invited to attend. The writer attended the group meeting of 11 persons in New York City as a representative of the New England Sewage Works Association and the New England Water Works Association. Hudson Biery, chairman of the Committee on Stream Sanitation of the Cincinnati Chamber of Commerce, and a previous strong supporter of H.R. 4070, and Kenneth A. Reid, Executive Director of the Izaak Walton League of America, who had previously supported H.R. 6024, were present. As a result of this meeting, general agreement seemed to be reached on a bill very similar to H.R. 4070 but including a new provision to the effect that the Surgeon General may take legal action if all efforts to secure state or interstate action fail. The bill agreed upon was subsequently introduced in the present (Eightieth) Congress as S. 418 (Senators Barkley and Taft); H.R. 315 (Congressman Spence); and H.R. 470 (Congressman Elston).

S. 418 (and the companion bills) designates the Surgeon General in charge of water pollution control; provides for cooperative state and Federal action and approves interstate compacts; provides for grants-in-aid or loans to states, municipalities and other public bodies; provides for loans to industry; sets up an advisory board with broad representation of interests; sets a *maximum appropriation* for grants or loans of $100,000,000, such grants-in-aid not to exceed 33⅓ per cent of the cost; and authorizes an annual expenditure of $1,500,000 by states or interstate agencies which may be used in part to defray cost of studies, research and engineering reports. Section 2(d) states that when the Surgeon General finds that pollution of interstate waters jeopardizes the health or welfare of citizens of the United States, he shall bring the matter to the attention of the appropriate state health authority or interstate agency and may recommend or specify that remedial action be taken. *Such recommended remedial measures must be reasonable and equitable.* If such action is not taken within a specified time, the Surgeon General may recommend to the state or interstate agency that legal action be taken. *If legal action is not taken within a reasonable time, not to exceed two years, the Surgeon General may initiate legal action in the United States courts.* (The italicized words in this paragraph constitute additions to the provisions of H.R. 4070.)

Subsequently H.R. 123 was introduced by Congressman Mundt. This bill is similar to S. 418 and its companion bills except in two respects. The first difference is that a provision is added that after enactment of the act, no new sources of pollution shall be permitted without approval of the state health authority and the Surgeon General. While the purpose of this provision is laudable, the definition of what is a "new source of pollution" is uncertain and it appears that this provision may be opposed by industry on the ground that unreasonable interpretation might be made. Would new connections to an existing sewer or a change in an industrial process constitute a "new source of pollution"? At recent Congressional hearings on S. 418, when amendments were offered to make it similar to H.R. 123, it is understood that the proponents of the changes suggested that the prohibition apply to "new sewer outlets," which is somewhat more definite but still open to some question.

Another difference between S. 418 (and companion bills) and H.R. 123 is that an additional section in H.R. 123 provides that if the water pollution advisory board finds it is impossible or impracticable for a municipality or industry to provide adequate treatment because of financial inability, the Surgeon General shall not bring a court action within such period of time as may be determined by the board to be necessary, such period not, however, to exceed five years; extensions of time may be granted if the board is satisfied that reasonable progress is being made. There is some argument in favor of this second difference and the additional provision in H.R. 123 may be desirable.

At least, these two bills represent a nearer approach to agreement among interested groups than has ever been the case previously.

Some individuals and organizations have definitely opposed the principle of Federal financial aid for pollution abatement except as part of a general public works program. Arguments have been heard that municipalities and the states are in as good or better position than the Federal government to finance needed work. On the other hand, Federal aid is being dispensed in many other fields, debatable as may be the advisability of some of these expenditures, too. The writer does not believe that Federal financial aid in the form of grants-in-aid or loans is a "must." Some opposition is also voiced to the provision in the new pollution control bills that, failing state or interstate action after a reasonable time, the Surgeon General may institute legal action. However, if the Federal government is to be made a party

to a national program of pollution control through Federal legislation, it appears to the writer difficult to justify its exclusion from any manner of enforcement whatsoever. Present Congressional bills lay a great deal of stress on machinery for state and interstate action rather than Federal legal action.

Two other bills introduced in the Eightieth Session of Congress are of interest. These bills are identical bills, S. 244 and H.R. 1047. The bills are introduced in the interest of encouraging the prevention of stream pollution by industrial wastes through allowing sums paid for treatment of industrial wastes, including amounts paid for plans for construction and treatment, to be deducted by industry in computing net income for taxation purposes.

Summary

The pollution problem has unquestionably grown beyond state borders. Discharge of sewage and industrial wastes in one state may and frequently does affect the water use in a neighboring state. This fact alone, however, does not make Federal pollution control necessary. Without additional legislation, legal action in the Federal courts may now be undertaken where real damage occurs, even though this is not the most desirable solution of interstate pollution problems. As shown by progress already made, states can join together through interstate compact agreements on a unified water pollution control program. Surely this approach by interested neighboring states which are so intimately concerned with regional water use problems, especially the potential water uses that should be planned for on each watershed, is preferable to granting broad mandatory powers to the Federal government.

Perhaps the principal service the Federal government could render would be to promote, coordinate, and even carry out research in the field of sewage and industrial waste treatment, particularly the latter. The development of practical treatment methods for many industrial wastes is a hurdle yet to be overcome. Some state agencies have done splendid research work but the results are not well coordinated and one state is frequently unaware of research in another state or of studies by private industrial groups.

The slowness of action on the part of some states to accept their responsibilities in the field of water pollution control will hasten the day of Federal legislation. Such legislation, if enacted, should be restricted to interstate streams, should foster the formation of interstate compacts and should limit the issuance of Federal orders for abatement of pollution of interstate streams to extreme cases where states will not assume their responsibilities. With awakening action by all those states which to date have failed to undertake any pollution control programs, and with increasing adoption of the interstate compact approach, the Federal government would then need to act only as a coordinating agent and as a sponsor of research to work out practical ways and means of treating all types of wastes before discharge into streams, to the degree called for by the present and probable future use of streams, with due regard to the benefits and the costs.

Existing concentrations of municipal sewage pollution and industrial wastes pollution have grown to their present proportions over a span of many years. Industries and heavily populated communities are a part of modern civilization. We cannot hope to restore *all* streams to their state of pristine purity as some enthusiasts have advocated, certainly in the light of all known scientific advances, unless, as one worker in the field recently put it, we wish to "turn the country back to the Indians." Yet, reckless and unwarranted pollution of water resources must be controlled, and waters must be improved to the extent justified by their present and planned future uses, whether for water supply, for bathing, for commercial or recreational fishing, for boating, for industrial purposes, for irrigation, or for navigation.