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Contributors

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MINISTRY OF HEALTH

PREVENTION OF RIVER POLLUTION

Report of the
Rivers Pollution Prevention Sub-Committee
of the
Central Advisory Water Committee

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1949

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NOTE

This Report has been prepared by the River Pollution Prevention Sub-Committee of the Central Advisory Water Committee appointed by the Minister of Health under Section 2 of the Water Act, 1945. The Report was adopted unanimously by the Main Committee.

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CENTRAL ADVISORY WATER COMMITTEE
RIVER POLLUTION PREVENTION SUB-COMMITTEE

TERMS OF REFERENCE

To investigate measures for strengthening the law regarding the prevention of pollution of rivers and streams.

ORIGINAL MEMBERS

Chairman

MR. S. R. HOBDAY, O.B.E., F.R.S.A.

CAPT. SIR JOCELYN BRAY, D.L., J.P., F.R.I.C.S., F.L.A.S.

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MR. A. TITHERLEY

SECRETARY

MR. W. G. HONNOR

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[1] Resigned on 20th November, 1947.
[2] Resigned on 23rd October, 1946.
[3] Appointed on 10th October, 1946.
[4] Resigned on 20th August, 1946.
[5] Resigned on 31st March, 1948.
[6] Appointed on 2nd February, 1948.

CONTENTS

APPENDICES

Note: The following abbreviations are used in the Report:—

Act of 1876—Rivers Pollution Prevention Act, 1876.

Act of 1923—Salmon and Freshwater Fisheries Act, 1923.

Act of 1938—Lancashire County Council (Rivers Board and General Powers) Act, 1938.

Act of 1948—River Boards Act, 1948.

The terms " stream " and " river " are both used in the Report. Except where the context requires a more limited interpretation, both terms are intended to refer to " stream " as defined in the Rivers Pollution Prevention Act, 1876.

REPORT TO THE

CENTRAL ADVISORY WATER COMMITTEE

I. APPOINTMENT

GENTLEMEN,

1. We were appointed by the Central Advisory Water Committee on 28th June, 1946, to investigate measures for strengthening the law regarding the prevention of pollution of rivers and streams.

We have the honour to present our report.

2. It was arranged that, in addition to the original appointments, Mr. M. Kissane should join the Sub-Committee. Mr. E. W. Scorer accepted an invitation to be co-opted to the Sub-Committee. Mr. J. E. James resigned from the Committee on the 20th August, 1946, and Mr. C. W. Ellen was appointed to the Committee and to the Sub-Committee in his place. Mr. D. Eccles, M.P., resigned from the Sub-Committee on the 23rd October, 1946. Sir Robert Doncaster resigned from the Committee on the 20th November, 1947, and Mr. E. Sims-Hilditch was appointed to the Committee and to the Sub-Committee in his place. Mr. J. N. McClean resigned from the Sub-Committee on the 31st March, 1948.

II. PROCEDURE

3. We have held thirty-three meetings. In the first place we obtained by written evidence the views of the principal organisations representing interests concerned in the control and use of rivers. Subsequently we heard oral evidence from representatives of these organisations where we considered it desirable to obtain further information or to clarify questions which were in doubt. Lists of the organisations who have submitted written evidence, and of the witnesses who gave oral evidence are given in Appendix A. We have not called for evidence from Departments of State, but assessors appointed by the Departments mainly concerned have taken part in our meetings and have given us all the information that we have required. Useful information has also been given by officers of the Ministry of Fuel and Power.

Our inquiry is primarily concerned with questions of law and administration, and with local conditions only so far as they affect those questions. We have received evidence on the problems arising in connection with, and the different conditions and requirements of various rivers, but we have not considered it necessary to make any inspections in particular areas.

III. PREVIOUS INVESTIGATIONS

4. Questions relating to the prevention of pollution have, from time to time, been considered by previous bodies, notably:—

THE RIVERS POLLUTION PREVENTION COMMISSION, 1865-1867 AND 1868-1874

The first Commission was appointed to inquire into the subject of river pollution in England. It issued three Reports. The Commission was revoked in 1868 and a new Commission appointed, which was subsequently extended to Scotland. They took up the inquiry where the first body had left it, and issued six reports. Their final report in 1874 presented a series of conclusions and recommendations. A Bill on the subject of river pollution was subsequently introduced, and became law as the Rivers Pollution Prevention Act, 1876.

THE ROYAL COMMISSION ON SEWAGE DISPOSAL

5. This Commission was appointed in 1898 to inquire into methods of disposing of sewage and trade effluents. The inquiry extended over 16 years and the Commission issued nine Reports, which were summarised in the Final Report published in 1915. The Reports which we consider to be of special interest in relation to our inquiry are the Eighth, which dealt in detail with the question of standards to be applied to sewage and sewage effluents discharging into streams, and the tests to be used in determining these standards, and the Ninth, which dealt with the discharge of manufacturing wastes which for any reason could not be taken into sewers, and with the disposal of domestic refuse in rural areas.

THE JOINT ADVISORY COMMITTEE ON RIVER POLLUTION

6. This Committee was appointed by the Minister of Health and the Minister of Agriculture and Fisheries to consider, and from time to time report on, the position with regard to the pollution of rivers and streams and on any legislative, administrative or other measures which appeared to them to be desirable for reducing such pollution.

The Committee's First Report, published in 1928, dealt mainly with the machinery for enforcement of the law. They pointed out that under the law as it stood it was possible for the Minister of Health, on the application of any one of the County Councils or County Borough Councils through whose jurisdiction a river passes, to set up a Rivers Board to control the whole length of a river, including its tributaries, so far as it is subject to the Rivers Pollution Prevention Acts ; they recommended that this should be specially brought to the notice of these Councils. They did not recommend any amendment of the law because they were convinced that no amendment would be of much value unless the administration was in the hands of bodies responsible for one or more rivers, and exercising regular supervision over them.

7. Their Second Report, published in 1930, dealt with the question of the reception of trade effluents into the sewers of local authorities, and the provisions of the Public Health (Drainage of Trade Premises), Act, 1937, are largely based on the recommendations in that Report.

8. The Committee then considered the general law relating to the prevention of river pollution and the question of its amendment or extension. Their conclusions and recommendations were given in their Third Report, submitted in July, 1931. This Report was not published because of the economic situation at the time, but a summary of its recommendations was given in the Annual Report of the Ministry of Health for the year 1932-33. Copies of the Report have been supplied for our information, and although we have not reproduced the Committee's conclusions in full in our Report, we have given them careful consideration, and have referred to them in connection with our own conclusions on particular questions.

9. The Committee resumed their meetings in 1935 to consider the question of the administration of river pollution in relation to the establishment of Catchment Boards under the Land Drainage Act, 1930. In their Fourth Report, published in 1937, they said that they did not consider that it would be practicable to obtain any substantial improvement in administration by conferring pollution prevention powers on Catchment Boards. They recommended that the question of the formation of river authorities, in whom should be centralised the functions relating to river pollution prevention, land drainage, fisheries, water abstraction, and, in suitable cases, navigation, should

receive consideration by an authoritative body who should hear evidence and arrive at conclusions. They did not undertake any further examination of the general law or make any recommendations relating to it.

THE CENTRAL ADVISORY WATER COMMITTEE (THE MILNE COMMITTEE)

10. This Committee, in their Third Report published in 1943, dealt with the question whether measures were required to co-ordinate the various interests in the conservation of water resources, and in particular whether it was desirable and feasible to constitute new river authorities with responsibility for all or some of the functions of existing bodies responsible for river control. In the course of their investigation they considered the existing arrangements for the administration of the law relating to the prevention of pollution, and received certain suggestions for its amendment in the event of new comprehensive river boards being formed. They considered that it would be undesirable to recommend widespread alterations of the law because their investigation was not directed to that matter, and some of the interests concerned had not therefore expressed any opinions on the question. They thought that any proposals for a revision of these and other general powers with which the river boards would be concerned would tend to complicate unnecessarily the distinct and separate problems referred to them. Subject to this reservation, they reached certain conclusions which are referred to in the appropriate passages of this Report.

IV. EXISTING LAW

11. Although the prevention of pollution of rivers can be secured, under the Common Law, by persons whose interests are affected, it is, in practice, difficult to obtain effective remedies in this way, and various measures dealing with the prevention of pollution generally, or in particular areas and circumstances, have been enacted from time to time.

RIVERS POLLUTION PREVENTION ACT, 1876

This Act was the first general Act passed to deal comprehensively with the prevention of pollution in the general public interest, and so far as the great majority of rivers and streams are concerned it is still the main provision for the purpose. As previously mentioned the Act was passed after the final report, in 1874, of a Royal Commission.

It relates to all streams, which are defined as including rivers, streams, canals, lakes and watercourses (except watercourses which, at the passing of the Act, were mainly used as sewers and empty directly into the sea), and includes the sea to such extent, and tidal waters to such a point, as the Minister of Health may, after local inquiry and on sanitary grounds, determine by Order. We understand that six such orders have been made.

Part I. *Solid matter*

12. Under Section 2 it is an offence for any person to put or cause to be put or to fall, or knowingly permit to be put or to fall or to be carried into a stream, the solid refuse of any manufactory, manufacturing process or quarry, or any rubbish or cinders, or any other waste or any putrid solid matter, so as either singly or in combination with other similar acts of the same or any other person to interfere with the stream's due flow or pollute its waters. Evidence may be given of repeated acts which together cause interference or pollution, although evidence of a single such act may not be sufficient.

Part II. *Sewage pollution*

13. Under Section 3 it is an offence to cause, or knowingly permit* any solid or liquid sewage matter to fall or flow or be carried into any stream. Where the matter passes through a channel used, constructed, or under construction at the passing of the Act, an offence is not deemed to have been committed if it is shown to the satisfaction of the Court before which proceedings are taken that the best practicable and available means are being used to render the matter harmless.

A person other than a sanitary authority is not guilty of an offence under this Section in respect of the passing of sewage matter into a stream along a drain connected with a sewer belonging to or under the control of a sanitary authority if the sanction of that authority has been given to the connection.

Part III. *Manufacturing and mining pollution*

14. Under Section 4 it is an offence to cause, or knowingly permit any poisonous, noxious or polluting liquid from any factory or manufacturing process to fall or flow or to be carried into any stream. Where such liquid passes through a channel used, constructed or under construction at the date of the passing of the Act (or through any new channel constructed in place of such a channel with its outfall at the same spot) an offence is not deemed to have been committed if it is shown to the satisfaction of the Court before which proceedings are taken that the best practicable and reasonably available means are being used to render the liquid harmless.

15. Under Section 5 it is an offence to cause to fall or flow, or knowingly permit to fall or flow into a stream, solid matter from a mine in such quantities as to prejudicially interfere with the flow of the stream, or poisonous, noxious or polluting solid or liquid matter from a mine (other than water in the same condition as that in which it was raised or drained from the mine). It is not an offence to discharge the poisonous etc., matter if it is shown to the satisfaction of the Court before which proceedings are taken that the best practicable and reasonably available means are being used to render the matter harmless.

16. Section 6 enacts that proceedings under this part of the Act shall be taken only by a sanitary authority,† and with the consent of the Minister of Health. The Act of 1948 provides for the transfer of the power to take proceedings to River Boards when they are formed. If an authority refuses to take proceedings or to apply for consent, a person interested may apply to the Minister who can direct the authority to commence proceedings.

17. In deciding whether to consent to proceedings the Minister must have regard to the industrial interests involved in the case and to the circumstances and requirements of the locality. He must not consent to proceedings by the authority of a district which is the seat of any manufacturing industry "unless he is satisfied, after due inquiry, that means for rendering harmless the poisonous, noxious, or polluting liquids proceeding from the processes of such manufactures are reasonably practicable and available under all the circumstances of the case, and that no material injury will be inflicted by such proceedings on the interests of such industry."

Notwithstanding any consent by the Minister any person within such a district against whom proceedings are proposed to be taken may object and require the sanitary authority to give him an opportunity of being heard,

* See also the Rivers Pollution Prevention Act, 1893, referred to in Paragraph 23.
† See Paragraph 18.

and the authority must then determine, having regard to the above-mentioned considerations which the Minister is required to take into account, whether proceedings shall be taken.

Administration

18. Section 8 empowers every sanitary authority to enforce the Act in relation to any stream within or passing through or by any part of their district, and to institute proceedings for any offence under the Act which causes pollution or interferes with the flow of a stream in their district, whether the offence is committed within or without their district. The Act of 1948 provides for the transfer of the powers to River Boards when they are formed. Under Section 14 of the Local Government Act, 1888, County Councils and Joint Committees constituted under that Section also have power to enforce the Act of 1876, but under the Act of 1948 this section will not apply in any River Board area. A person aggrieved by an offence under the Act of 1876 may institute proceedings subject to the restrictions in the Act.

Under Section 9, the Lee Conservancy Board have powers to enforce the Act in their area to the exclusion of any other authority and they may enforce the pollution prevention provisions of the Lee Conservancy Act, 1868, by using the County Court procedure provided under the Act of 1876.* This is an alternative to the procedure under the Act of 1868, which is in a Court of Summary Jurisdiction.

Legal proceedings, etc.

19. Section 10 provides that the County Court may by summary Order require a person to abstain from committing an offence under the Act and the Order may require him to perform a duty under the Act if he is in default. An Order may include conditions as to time or mode of action, and may be suspended or rescinded on such undertaking being given or condition performed as may be agreed by the Court. Before making an Order the Court may remit to skilled parties to report on the "best practicable and available means" and the nature and cost of the works and apparatus required. Such report must take account of the reasonableness of the expense.

The Court may order a penalty not exceeding £50 a day to be paid to the complainant (or such other person as the Court may direct) for every day during which there is default in complying with an Order. If there is persistent default the Court may appoint a person to execute the Order.

Section 11 provides for an appeal to the Court of Appeal in point of law or on the merits, or on the admission or rejection of any evidence, and for removal of a case to the High Court by leave of a Judge of that Court.

20. Section 12 provides that for all proceedings in the Court a certificate granted by an Inspector of proper qualifications, appointed by the Minister of Health, that the means used for rendering harmless any sewage matter or poisonous, noxious, or polluting solid or liquid matter entering a stream are the best or only practicable and available means in the particular case, shall be accepted as conclusive evidence. A person aggrieved by the granting or withholding of such a certificate may however appeal to the Minister.

Section 13 requires two months' notice in writing to be given of intention to take proceedings and provides that proceedings may not be taken under the Act while other proceedings in relation to the offence are pending.

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* The functions concerned are now exercisable by the Lee Conservancy Catchment Board.

Saving provisions

21. There are saving provisions for other rights and powers, for rights of impounding and diverting water, for the rights of certain specified authorities and for works of local authorities who have been empowered or required by any Act of Parliament to carry any sewage into the sea or any tidal waters.

Definitions

22. " Solid matter " does not include particles of matter in suspension in water, and " polluting " does not include innocuous discoloration. " Stream " includes the sea to such extent, and tidal waters to such point, as may, after local inquiry and on sanitary grounds, be determined by the Minister of Health. Otherwise it includes rivers, streams, canals, lakes, and watercourses, but does *not* include watercourses which at the passing of the Act were mainly used as sewers, and empty directly into the sea, or tidal waters which have not been determined to be streams under the above procedure.

RIVERS POLLUTION PREVENTION ACT, 1893

23. This Act, which is construed as one with the Act of 1876, provides that for purposes of Section 3 of that Act a sanitary authority shall be deemed to knowingly permit sewage matter to enter a stream if it reaches the stream after passing through a channel vested in the authority.

THE SALMON AND FRESHWATER FISHERIES ACT, 1923

24. This Act was passed to consolidate and amend the enactments relating to salmon and freshwater fisheries. It contains provisions for the prevention of pollution which would affect waters containing fish. Under Section 8 it is an offence to allow liquid or solid matter to enter waters containing fish (or any tributaries thereof) to such an extent as to cause the waters to be poisonous or injurious to fish, or the spawning grounds, spawn, or food of fish. A person is not liable to a penalty for any act done in the exercise of any right to which he is by law entitled, or in continuation of a method in use in connection with the same premises before the passing of the Act " if he proves to the satisfaction of the Court before which he is charged that he has used the best practicable means, within a reasonable cost, to prevent such matter from doing injury to fish or to the spawning grounds, spawn or food of fish ".

25. It is also an offence, within a fishery district, to discharge any trade effluent into waters containing fish by means of any new work, unless notice of the proposed construction of the work has been given to the Fishery Board or to the Minister of Agriculture and Fisheries. The Fishery Board or the Minister may exempt any new work from this provision. The notice of the proposed new work must be given at the same time as any notice thereof or application for approval under an Act or byelaw is made to a local authority ; or in any other case not less than three months before commencement of the work. It must be accompanied by plans and specifications of the work or must state where they can be inspected. The provisions do not apply to works carried out by a local authority under powers given by a Public General or local Act or by a Provisional Order.

Proceedings under this Section can be instituted only by the Fishery Board or by a person who has obtained a certificate from the Minister of Agriculture and Fisheries that he has a material interest in the waters concerned. Under the Act of 1948, in a River Board Area references to a River Board will be substituted for references to a Fishery Board in Section 8 of the Act of 1923.

Under Sections 73 and 74 offences may be prosecuted in a Court of Summary Jurisdiction. A fine not exceeding £50 and a further fine not exceeding £5 a day for a continuing offence after a conviction may be imposed.

26. Sub-section (1) of Section 55 enables a Fishery Board, for the protection of the fisheries in their district, to institute proceedings under the Act of 1876, and provides that for this purpose they shall have the same powers and be subject to the same restrictions as a sanitary authority. It also empowers them to aid any person or local authority in instituting proceedings. Under the Act of 1948 this provision will not apply to a River Board or in a River Board area (as explained in paragraph 18, the River Board will have power to take proceedings under the Act of 1876).

It is also provided that for the protection of fisheries the Rivers Pollution Prevention Acts may be made to extend to the sea to such extent, and to tidal waters to such point, as may, after a local inquiry held by two persons appointed by the Ministers of Health and Agriculture and Fisheries, be determined by Order of the former Minister. The Order becomes provisional if there is objection by an affected local authority or joint board. Proceedings under these Acts in respect of pollution of any part of the sea or tidal waters to which the Acts are so extended, may not be taken without the consent of the Minister of Health. We understand that no such orders have been made. Section 8 of the Act of 1923 applies to tidal waters if they contain fish.

27. Under Section 59 a Fishery Board may make byelaws, subject to confirmation by the Minister of Agriculture and Fisheries, for purposes including the regulation of the "deposit or discharge in any waters containing fish of any liquid or solid matter specified therein detrimental to salmon, trout or freshwater fish, or the spawn or food of fish." There is a reservation for a local authority discharging sewage under powers given by a Public General Act, a local Act or a Provisional Order.

THE PUBLIC HEALTH ACTS

28. Section 30 of the Public Health Act, 1936, provides that nothing in Part II of the Act (which relates to sanitation and buildings) shall authorise a sanitary authority to discharge any foul water into any stream, canal, pond or lake unless it has been so treated as not to affect prejudicially the purity and quality of the water.

Section 259 (1) of that Act requires the local authority to detect and deal with, under the provisions relating to statutory nuisances, the following conditions:—

(*a*) Any pond, pool, ditch, gutter or watercourse which is so foul or in such a state as to be prejudicial to health or a nuisance;

(*b*) Any part of a watercourse not normally navigated by vessels carrying goods which is so choked or silted up as to obstruct or impede the flow of water and cause a nuisance, or give rise to conditions prejudicial to health.

Section 68 of the Public Health Act, 1875, forbids the fouling of streams etc., by gas washing or other processes connected with gas supply. Proceedings may be taken by a local authority if they own the water and in other cases by the owner of the water or in his default by the local authority.

29. Under Section 69 of the Public Health Act, 1875, any local authority, with the sanction of the Attorney-General, may, either in their own name

or in the name of any other person, with the consent of such person, take such proceedings by indictment, bill in Chancery, action or otherwise as they may deem advisable for the purpose of protecting any watercourse within their jurisdiction from pollutions arising from sewage either within or without their district; and the costs of and incidental to any such proceedings, including any costs that may be awarded to the defendant, are deemed to be expenses properly incurred by such authority in the execution of the Act.

Under the Act of 1948, in a River Board area the reference to "any local authority" will be construed as a reference to a River Board. The words "either within or without their district" and so much of the Section as relates to costs will not apply to a River Board.

30. The Public Health (Drainage of Trade Premises) Act, 1937, was passed in consequence of the recommendations in the Second Report of the Joint Advisory Committee on River Pollution which dealt with the reception of trade effluents into the sewers of the local sanitary authorities. The Act gives a right to discharge trade effluent into public sewers if permitted by byelaws which may be made under the Act, or otherwise with the consent of the local authority. No consent is necessary if a similar trade effluent was lawfully discharged into the sewer at some time during the year ended 3rd March, 1937, provided that certain conditions are satisfied with regard to the quantity, quality, and rate of discharge, and that if any agreed payments were made to the local authority in respect of the discharge during the year referred to, payment is made at the same rate. Disputes arising on these questions are to be referred to the Minister of Health unless the parties otherwise agree.

It is necessary for the owner or occupier to serve a written notice on the local authority stating:—

(i) the nature or composition of the effluent;

(ii) the maximum quantity which it is proposed to discharge at any one point; and

(iii) the highest rate at which it is proposed to discharge.

The local authority may direct that discharge shall not take place till a specified date; if their consent is required it may be given unconditionally, or with conditions with regard to certain matters specified in the Act. A person aggrieved by the local authority's action may appeal to the Minister.

31. The local authority may make byelaws with regard to certain matters specified in the Act in connection with the discharge of trade effluent; the Minister may require the local authority to make such byelaws and if they fail to do so may himself make the byelaws. The local authority may enter into agreements with traders or with other local authorities for the reception and disposal of trade effluents.

THE WATER-WORKS CLAUSES ACT, 1847, AND THE WATER ACT, 1945

32. The Act of 1847, which is incorporated in whole or in part with most local enactments of statutory water undertakers, contains provisions specifically for the protection of public water supplies. Under Sections 61 and 62 of the Act of 1847 it is an offence to foul the water in a stream belonging to the undertakers by certain prescribed acts such as bathing, washing animals or materials, allowing filthy water to enter the stream, or permitting substances produced in making gas to enter the stream.

Part XIV of the Third Schedule to the Act of 1945 continues the restrictions on polluting streams (and other water supplies) by liquids resulting from

the manufacture of gas or the treatment of by-products. It does not include the other provisions with regard to fouling water, but Section 18 of the Act gives a general power to statutory water undertakers to make byelaws, subject to confirmation by the Minister of Health, for the protection against pollution of water which belongs to them or which they are authorised to take. Such byelaws may define the area in which control is to be exercised, and may prohibit or regulate within that area the commission of acts specified by the byelaws. In such an area the undertakers may, subject to an appeal to the Minister, require the construction and maintenance of works for preventing pollution of their water. Undertakers may be liable in certain circumstances to pay compensation in respect of such works or for rights curtailed or restrictions imposed by the byelaws.

THE GASWORKS CLAUSES ACT, 1847, AND THE GAS ACT, 1948

33. The Act of 1847, which was normally applied to statutory gas undertakings, contained provisions under which the undertakers were liable to penalties for allowing washings or other substances produced in the making of gas to flow into a stream, etc., or for wilfully doing anything to foul the water. The Third Schedule to the Gas Act, 1948, contains a code relating to gas supply which will normally apply to the Area Boards constituted under that Act. The code includes provisions, similar to those mentioned above, under which an Area Board is liable to penalties for the pollution of inland waters, but these provisions do not apply to water undertakers to whom Part XIV of the Third Schedule to the Water Act, 1945, applies.

PROVISIONS RELATING TO THE PREVENTION OF POLLUTION IN HARBOURS

34. Under an Act of 1746 it is an offence to put ballast, rubbish, filth, etc., from any vessel into any haven, port, road, channel or navigable river in England. Under an Act of 1814 it is an offence to put ballast, earth, filth, etc., from any vessel or from any quarry or pit, into, or in a position where it may be washed into a port, roadstead, harbour, haven or navigable river, so as to injure or obstruct navigation. Section 73 of the Harbours, Docks and Piers Clauses Act, 1847, which is normally applied to statutory harbour authorities, imposes a penalty on persons who throw ballast, earth, etc., into a harbour or dock. Under the Oil In Navigable Waters Act, 1922, it is an offence to discharge oil or allow it to escape into territorial waters or a harbour. Proceedings for an offence under the Act in relation to a harbour may be taken only by a harbour authority, and in any other case only by a person authorised by the Minister of Transport or the Minister of Agriculture and Fisheries. The latter Minister has given a general direction authorising the institution of proceedings under the Act by any local fisheries committee constituted under the Sea Fisheries Regulation Act, 1888, as amended by Section 51 of the Sea Fish Industry Act, 1938, or by any Fishery Board constituted under the Salmon and Freshwater Fisheries Acts, 1923 to 1935, or under any Act relating to salmon and freshwater fisheries in force before the passing of those Acts. The direction and authority do not apply to any offence committed by any sanitary authority or Joint Board.

LOCAL ACTS

35. In addition to the general law summarised in the preceding paragraphs, special powers for the prevention of pollution have been given by local Acts in relation to particular areas. For instance, comprehensive powers are exercised by the Conservators of the River Thames for rivers and streams in the Thames Catchment area, and by the Lee Conservancy Catchment Board for the River Lee and its tributaries. The powers given to the

Thames Conservancy are without prejudice to the general powers of local authorities under the Act of 1876, but, under a special provision in that Act, the Lee Conservancy Board* were given power to enforce it within the area of their jurisdiction, to the exclusion of any other authority.

The West Riding of Yorkshire Rivers Board and the Lancashire Rivers Board, which were formed to enforce the Act of 1876 in certain specified areas, have each obtained additional powers by Local Act.

The County Councils of Cumberland, Essex, Middlesex and Surrey have each obtained special powers for the prevention of pollution of rivers and streams in their areas, but not to the exclusion of the rights of other authorities under the general law.

We have not thought it necessary to give details of the provisions in these local Acts, but reference is made, in the appropriate paragraphs of this Report, to those provisions which we have considered in arriving at our own conclusions.

V. PRELIMINARY STATEMENT

36. The need for the improvement of the condition of rivers and streams in many parts of the country can hardly be exaggerated. It is generally accepted that the condition of many of them has deteriorated over comparatively recent periods, and this was stressed in much of the evidence submitted to us.

The developments caused by the growth of the population and the expansion of industry have changed the character and usage of many rivers, but the need for pure water remains. Water undertakers, agriculturists, industrialists, fishermen and the public generally require water to be kept to a high level of purity. On the other hand, sewage disposal works produce effluents which must be disposed of through natural channels of drainage, particularly where, as in many cases, water for the areas which the works serve has been abstracted from the drainage area, and ought therefore to be returned to restore the flow of the river; and many industrialists are faced with the problem, as an essential function of their undertakings, of disposing of large quantities of trade effluents or waste waters which cannot be received or treated satisfactorily in the local authority's sewers, or may be needed to maintain the flow of a river for the use of other persons.

37. We are satisfied that during the war years there was a falling off in the condition of many rivers; though we believe that the deterioration was much less than that which occurred during the war of 1914-18, mainly because of the considerable amount of research into the treatment of effluents which was carried on during the recent war. Nevertheless, the diversion of manpower and materials to the war effort compelled the postponement of many desirable schemes of sewerage and sewage disposal which would have had a gradual but increasing effect on the condition of rivers generally. The expansion of industry, the construction of new factories and the establishment of new service camps, airfields, etc. caused additional problems which could not all be effectively dealt with under war-time conditions.

38. There was also, inevitably, a check in the progress of schemes for the reception of trade effluent into the public sewers. The Joint Advisory Committee on River Pollution said, in their Third Report, that one of the most important changes required in the law was the acceptance of the principle that the treatment of trade effluents should normally be centralised in the local sanitary authorities, thus reducing the trade effluent problem at its

* These powers are now exercised by the Lee Conservancy Catchment Board.

source. The change in the law has been effected by the Public Health (Drainage of Trade Premises) Act, 1937, but full advantage cannot be taken of it under present economic conditions.

39. The evidence we have received clearly shows that the existing law for the prevention of pollution, particularly the Act of 1876, has not been effectively enforced, and there has been general agreement with the views of the Central Advisory Water Committee ("the Milne Committee") in their Third Report, that the primary reason is the number of authorities authorised to administer it. The recommendations in that Report have now been given general effect by Parliament in the passing of the River Boards Act, 1948, and we are confident that the concentration of powers for prevention of pollution in the hands of River Boards cannot fail to improve administration.

40. It was suggested by the Milne Committee, and the suggestion was repeated to us in evidence, that additional powers for the prevention of pollution should not be considered until the River Boards have been formed and have gained experience. We understand that, in accordance with our terms of reference, it is the intention that we should report on the measures that are required to ensure that River Boards should be equipped as soon as possible after their formation with any necessary additional or strengthened powers. We agree that the Boards should have these powers; it is clear that the completion of the setting up of River Boards must take some time, and further time will be needed for them to obtain technical staff and complete their organisation. If a further period for experience must elapse it will be a long time before a modern code of law can be available.

41. The Act of 1948 had not been passed when we commenced our investigation; but our inquiries have been conducted on the assumption, which was made clear to the interests who were invited to give evidence, that any revised powers conferred as a result of our recommendations would be exercised by River Boards. The proposals in our Report are made on that basis.

Our task, as we see it, is to suggest such amendments of the law as we consider necessary to enable the appropriate authority to prevent and check pollution, while having regard to the interests of all parties concerned.

VI. GENERAL CONSIDERATIONS

42. Although River Boards will be able, in the earlier stages of their administration, to do much to remove obvious causes of pollution, particularly where little has been done by the authorities who preceded them, far-reaching improvements will, in our view, be obtained only by long-term measures. The main reasons for this are first, the fact that few of the Boards will have anything like complete information about the present condition of the rivers under their control; second, the very large programme of works of sewerage and sewage disposal which will be necessary, not only to provide additional services and improve existing discharges into rivers, but also to allow full use to be made of the Public Health (Drainage of Trade Premises) Act, 1937; and third, the great importance of maintaining industrial production.

43. On the first point, it is clear that, for the proper exercise of their powers, it will be essential for River Boards to have information about such matters as the volume and rate of flow of rivers and tributaries, the nature and volume of effluents discharged into the rivers, and the points of discharge. Much useful information will no doubt be obtained in many cases

from Catchment Boards, and from Fishery Boards and other authorities previously concerned with the prevention of pollution, but it is evident that in the majority of cases the Boards will find it necessary, as one of their first steps, to carry out a factual survey of the rivers and streams in their areas.

We do not consider that River Boards require any additional statutory powers to enable them to undertake these surveys. The powers given to them in Section 9 of the Act of 1948 enable them to obtain information about the volume and flow of rivers and streams; and Sections 15 to 17 of that Act give them the necessary power to obtain information about discharges of effluents and other matters.

We attach considerable importance to the making of surveys of this nature, and we have no doubt that River Boards will, as a general rule, undertake them in the interests of good administration. The powers of the Minister of Health under Section 9 of the Act of 1948 appear to be sufficient to enable him to direct a River Board to undertake a survey in any particular area if he is satisfied that such a course is necessary. We recommend that River Boards should be required to submit reports to the Minister of Health as they complete their surveys.

44. Turning to the second point, we are advised that the Ministry of Health have already received proposals for works of sewerage and sewage disposal estimated to cost about £72,000,000, and that this is by no means the full cost of the work which will be necessary, particularly if the practice of treating trade wastes in the public sewers continues to increase. We have already referred to the views expressed by the Joint Advisory Committee on River Pollution on the importance of the principle that the treatment of trade effluents should so far as possible be centralised in the local authorities, and we are convinced that, in the long run, the problem of industrial pollution of non-tidal waters will be greatly alleviated in this way. It would clearly take several years to complete such a programme in the most favourable circumstances, and under present conditions, with the competing claims of industry and of other public services, it may take a good many years.

45. On the third question it is evident that restrictions which would unduly hamper industrial production cannot lightly be imposed when the whole productive capacity of the country must be kept at the highest possible level and only a limited supply of labour and essential materials can be allocated to work which does not have any considerable effect on the volume of production.

Under these conditions there must inevitably be some delay in effecting considerable and far-reaching improvements throughout the country, but we expect that early results will be obtained by the establishment of River Boards with the prevention of pollution as one of their main responsibilities. In addition, surveys, on the lines already discussed, will undoubtedly bring to light cases of pollution which can be remedied with little hardship to anyone, and should give the Boards information which will enable them to consult with the interests concerned on more comprehensive improvements to be carried out when labour and materials are available. Nevertheless, we consider that any new code of legislation for the prevention of pollution should give the Boards powers which will enable them, from the outset, to take all reasonable steps to improve the condition of rivers and streams in their areas, and should include, as far as possible, the powers they will need when circumstances allow them to exercise their functions to the fullest extent. In the following paragraphs we review the existing law and explain the alterations which we consider to be desirable.

VII. EXAMINATION OF ACT OF 1876 AND RECOMMENDATIONS

46. The majority of the interests we consulted were of the opinion that this Act had not worked satisfactorily and needed amendment. It was admitted that defects in administering the Act were largely the cause of this, but it was maintained that, nevertheless, the law needed strengthening. On the other hand the Federation of British Industries considered that the existing law, if applied everywhere with a reasonable uniformity, was adequate, and that any major amendment might be deferred until River Boards had been in operation long enough to reveal whether additional powers were necessary, and if so, their nature. The National Coal Board hoped that questions affecting their interests would normally be settled by consultation, but suggested that the existing law is sufficient to enable River Boards to exercise a proper standard of care.

47. We have given this matter careful consideration, and we are satisfied that strengthening of the law is necessary. We agree that it is possible to secure improvements under the Act as it stands, if it is properly enforced, but we suggest that an Act which has been in operation since 1876, without substantial amendment, needs drastic revision in its drafting to bring it into line with modern legislation, and that certain parts of it may be difficult to operate or interpret when the River Boards take over its administration.

Parts I, II and III of the Act deal separately with the different types of pollution, viz. solid matter, sewage pollution and manufacturing and mining pollution. We consider that it is both desirable and possible to substitute fresh definitions which will also cover forms of pollution which it may be difficult to deal with under the present law.

Solid matter (*Section* 2 *of the Act of* 1876)

48. There are advantages in dealing separately with pollution by solid matter; the law already accepts the principle that matter which is not polluting may have a harmful effect on the river. It is necessary, however, to prove the fact of pollution or interference with flow before an offence is established. The Joint Advisory Committee on River Pollution considered that this requirement tends to nullify the value of the Section. It was represented to them that it is often difficult, if not impracticable, to prove that actual pollution or interference with flow results from a particular discharge of solid matter, although it may be a clear case where such a discharge ought not to be allowed to take place.

They pointed out that in the Mersey and Irwell Joint Committee Act, 1892, and the West Riding of Yorkshire Rivers Board Act, 1894, the requirement was omitted and the fact of discharge, rather than the proven result of discharge became the offence; certain specified acts for bona fide purposes were permitted. These Acts established the principle that the river should not be used for the disposal of solid matter, and expressly prohibited the discharge of such matter, with necessary safeguards for authorised acts. The Joint Advisory Committee favoured this change; they realised that negligible acts might, in theory, be prohibited, but were confident that normal rational practice would avoid proceedings in such cases, quite apart from the "de minimis" maxim of the law.

49. The local Acts referred to in the preceding paragraph also make it an offence to cause or knowingly permit solid matter to be put in such a position as to be liable to fall or to be carried into the stream. The Joint Advisory Committee favoured this further provision; it is clearly better to impose preventive measures than to institute proceedings after the damage has been

done. The latest provision in a local Act which incorporates these principles, and in which the term " solid matter " has a more comprehensive meaning, is Section 43 of the Act of 1938, which we reproduce in Appendix B.

50. It will be noted that solid matter as defined in this Section includes solid refuse from any mine or pitshaft. This is not covered by the definition in Section 2 of the Act of 1876, though by Section 5 it is an offence to let solid matter from a mine enter a stream " in such quantities as to prejudicially interfere with its due flow," or to allow any poisonous noxious or polluting solid matter from a mine to enter a stream. The National Coal Board said that while in principle they would agree to the general application of the provision in the Act of 1938, there were certain circumstances in which they would be unable to comply with it. There are, they say, places, particularly in the steep and narrow valleys of South Wales, in which it is virtually impossible to site a pit heap so far away from the stream that there is no risk of its slipping, and they claimed that more than any other industry, they have large volumes of matter to dispose of in restricted spaces.

51. Apart from this (to which we refer in the following paragraph) we found little opposition to the general application of a provision similar to that in the Act of 1938, and we consider that the general law should be revised on similar lines. In a later part of our Report which refers to sewage pollution and manufacturing and mining pollution (Sections 3, 4 and 5 of the Act of 1876) we deal with pollution by offensive and injurious solid matter in a comprehensive provision which also deals with liquid pollution. We therefore consider it unnecessary to make separate provision for solid matter of that nature. We recommend that, with this exception, the provisions relating to pollution from solid matter should follow, in principle, Section 43 of the Act of 1938. The law should include safeguards for bona fide acts such as those mentioned in the proviso to the Lancashire Section.

52. We feel that the particular difficulty mentioned by the National Coal Board should be recognised and that it may also apply to other mines or quarries. We recommend that the law should contain a reservation that an offence shall not arise in respect of deposits of solid matter from a mine or quarry if the Court is satisfied that no other site for the deposit is reasonably practicable and that all reasonable and practical steps have been taken, within a reasonable cost, to prevent the solid matter from passing into the stream.

53. We also considered Section 96 of the Lee Conservancy Act, 1868, which makes it an offence for any person without reasonable excuse (the burden of proof to lie on him) to place any manure heap or other collection of offensive or injurious matter on the banks of the river or any of its tributaries so that any offensive or injurious matter will drain or pass into them. There was considerable support for such a restriction, provided that it did not interfere with normal agricultural operations. We recommend that it be incorporated in the revised provision relating to solid matter with the reservation that this restriction be applied only for a limited distance from the river bank.

54. There is a further provision in the Act of 1938 (Section 44) which gives the Board power to require a person who has been convicted of an offence in respect of solid matter to remove the matter within a specified time. If he fails to comply the Board may notify the sanitary authority of the district in which the offence is committed, and that authority may remove the matter and recover the cost and expenses summarily as a civil debt. There was general acceptance of the view that in certain circumstances the River Board should be able to require the removal of solid matter which has wrongfully been allowed to enter the river, and we agree that the law should give them

this power, but we also agree with the suggestion that it should be the River Board, and not the sanitary authority, which should undertake the removal. In some cases, removal may not be practicable, or may not justify the labour and cost which would be involved. We therefore recommend that when a person is convicted of an offence in respect of solid matter, the Court should be empowered, on the application of the River Board, to make an Order requiring the offender to remove the solid matter within a reasonable period, and authorising the Board in his default to undertake the removal and recover the cost.

Solid matter in suspension

55. Solid matter, as defined in Section 20 of the Act of 1876, does not include particles of matter in suspension in water. A special problem arises in certain areas in checking or controlling the sludging out of mill dams or weirs, but we deal specifically with this matter in paragraphs 146 to 149. Some other difficulties were mentioned in evidence ; for instance, it was stated that matter in suspension prevents light from entering the water, and that it is light acting on vegetable matter which is one of the principal oxygen-producing agents in water. We consider that, in general, these difficulties could be dealt with under provisions other than those dealing with solid matter. Trade effluents or sewage effluents which contain solid matter in suspension of an offensive or injurious nature could be dealt with adequately under the general provision relating to the discharge of such matter which we discuss in paragraph 58 of this Report.

There may be instances in which the proper flow of a stream is affected by the discharge of solid matter in suspension which could not be so dealt with. We have in mind cases in which large quantities of suspended matter, harmless in themselves, may be passed into the stream and by subsequent settlement may cause obstruction. We think that the River Board should be empowered to deal with such cases. We recommend that the provisions dealing with solid matter should not relate to suspended solid matter unless, in the case of such matter allowed to pass into a stream, the Court is satisfied that it is obstructing or is likely to obstruct the due flow of the stream.

Sewage pollution (Section 3 of the Act of 1876)

56. The present law under this heading is directed to the prevention of " any solid or liquid sewage matter " passing into the stream. We do not think this description is satisfactory. It is impossible to produce a sewage effluent which is free from solid or liquid sewage matter. Except in special cases, such as the Thames and the Lee, authorities refrain, in practice, from proceedings for pollution from sewage if the effluent reaches a standard such as that recommended by the Royal Commission on Sewage Disposal. We consider it preferable that the offence to be defined by the law should be related to the question whether the matter discharged is offensive or injurious, and that it should not be necessary for this purpose to distinguish sewage from other such discharges. We therefore propose to consider it in conjunction with such discharges, to which we refer in the following paragraphs.

Manufacturing and mining pollution (Sections 4 and 5 of the Act of 1876)

57. Under this heading the existing law deals with the discharge of " any poisonous, noxious, or polluting liquid proceeding from any factory or manufacturing process "; and with " any poisonous, noxious, or polluting solid or liquid matter proceeding from a mine " (there is an exception for water in the same condition as that in which it has been drained or raised from the mine, to which we refer in paragraphs 61 to 65 of this Report).

Comprehensive definition of polluting matter

58. Subject to what we say in later sections of this Report in regard to protection for certain interests, we see no good reason why the separate provisions relating to sewage pollution and industrial pollution should not be replaced by a comprehensive provision that if a person without lawful excuse (proof of which shall lie upon him) wilfully causes or knowingly suffers any offensive or injurious matter, whether solid or fluid, to flow or pass into the river he shall be deemed to have committed an offence. We recommend that provision be made accordingly. A provision on similar lines is Section 123 (*b*) of the Thames Conservancy Act, 1932, and we were told by the representatives of the Conservators that the code of which it forms part has been successfully administered. A similar provision appears in the Lee Conservancy Act, 1868. It is true that in both sections there is specific reference to sewage but we have already explained our reasons for considering that the separate reference is unnecessary.

We propose, however, to recommend the general adoption of a provision similar to Section 76 of the Act of 1938, which empowers the Board, on the application of any sanitary authority or owner or occupier of premises, to grant time to take steps to prevent the commission of an offence. We discuss the proposal in our recommendations on notices and proceedings.

Protective provisions

59. The present law provides protection in certain cases and we have considered whether it should be retained and if so in what form. Under the Act of 1876 it is a defence against proceedings in respect of sewage matter entering the stream through a channel used, constructed or under construction at the date of the passing of the Act if the person concerned satisfies the Court that he is using the best practicable and available means to render the sewage matter harmless.

There is a similar provision for poisonous, noxious, or polluting liquid from a factory or manufacturing process, but it applies also to a new channel constructed in place of the existing channel if it has its outfall at the same spot, and the defence is established if the Court is satisfied that the best practicable and *reasonably* available means are being used to render the liquid harmless. There is no prohibition, in either case, of the discharge of a greatly increased volume of effluent, or of a radical change in the nature of the effluent.

60. It seems difficult to justify the continuance of protection in this form for discharges which originated so long ago, although it is true that the Court can take into account improvements in treatment methods which may have been evolved. We were told by the representatives of the West Riding of Yorkshire Rivers Board that in their area, discharges to which this protection applied are so unimportant that they have practically no effect on the river. Mr. Atter, the Clerk to the Board, stated that he did not know a single case where it applied and that if it did, in practice it was never necessary to ask for more than the best practicable and available means of treatment.

We think that the continuance of these distinctions between discharges before and after the Act of 1876 is undesirable ; they are confusing and may even be harmful in practice. The County Councils Association said that they made the law substantially less effective and should be discontinued, and the Lancashire Rivers Board suggested that no regard should be paid to acquired rights ; other interests suggested that the protection should be retained for a limited period. We recommend that the special provisions in Sections 3 and 4 of the Act of 1876 in respect of a discharge through

a channel, etc., used, constructed or under construction at the date of the passing of the Act, or through a substituted channel with an outfall at the same spot, be repealed. We do not think that any undue hardship will arise and we have already mentioned our intention to recommend a provision under which the River Board will be able to allow time for action to be taken to avoid commission of an offence.

61. There are special provisions for mining interests in Section 5 of the Act of 1876. First, it is not an offence to allow poisonous, noxious, or polluting solid or liquid matter proceeding from any mine to enter a stream if the best practicable and reasonably available means are being used to render the matter harmless. Second, it is not an offence to allow water from a mine to enter a stream if it is in the same condition as that in which it has been drained or raised from the mine.

On the first point it will be noted that the use of the best practicable and reasonably available means of treatment is an absolute defence ; no distinction is made between mines opened before and mines opened after the passing of the Act. We received no evidence to show that there is any substantial discharge of such matter—as distinct from water discharged in the same condition as when pumped or raised—that it could not be treated before discharge, or that its treatment would involve a serious problem. We recommend that this separate provision should not be continued, but that polluting matter from a mine should fall within the scope of the general prohibition of the discharge of offensive or injurious matter which we have already recommended.

62. Representations were made to us that the second provision should be reconsidered. We were told by the West Riding of Yorkshire Rivers Board that water raised from some mines—referred to as ochre water—is highly impregnated with iron and acid, is a vivid yellow in colour and renders quite unfit for drinking any water with which it mixes ; it is also injurious to stream life and corrosive to boilers, pumps, etc. As the law stands it is not an offence to discharge it into a stream. The Board stated that reasonably practicable and available means exist for purifying this discharge at a cost not greater than that involved in treating many other trade effluents. The Pure Rivers Society said that mine water may be polluted by metallic solids which would sterilize a stream. The County Councils Association suggested that the discharge of polluted water from mines should be an offence unless the best practicable treatment is used.

63. The Federation of British Industries said that conditions vary, and are largely matters for consultation with the industries concerned, but suggested that streams ought normally to deal with water raised from mines. The greatest interest in this matter is probably that of the National Coal Board who said that the quantity of water dealt with is the over-riding consideration. They raise at least as much water as coal—in some pits ten tons of water to one ton of coal. They cannot control the quantity of water as conditions compel them to remove it all and the composition of the water is determined by the strata through which it passes. They said that the cost of treating polluted water would be prohibitive, and that in some cases the discharge could be stopped only by closing the mines concerned and/or adjacent mines. They therefore considered the present saving to be essential to the mining industry.

64. Much of the water discharged from mines is harmless and is often useful for industrial or domestic purposes. No information is available about the quantity which is polluted and would need treatment, the areas in which it occurs, whether it could be satisfactorily treated, or the cost of treatment.

We asked the National Coal Board whether they could obtain this information, but they replied that they could not give it without a very complete investigation, which it would be very difficult to undertake at the present time because of shortage of staff. We understand that they have now commenced a preliminary survey in the North-East Division, and that they intend, in due course, to survey the whole position.

65. We find some difficulty in reaching a conclusion on this matter. In principle, we see objection to the continuation of an unlimited right to discharge water without regard to its condition. It is not of much use to press for the removal of other causes of pollution if the resulting improvement may be much lessened by a discharge of polluted mine water. On the other hand we cannot lightly suggest the removal of the existing protection if, as stated by the representatives of the Board, the result would be that pits might have to be shut down. We therefore make no recommendation for the amendment of the law on this matter at the present time, but we suggest that the question be deferred for a reasonable time to enable the National Coal Board to complete their investigation and furnish the information for which we asked. It should then be possible to decide, after consulting other mining interests, such as those concerned with lead mines, and referring the question again to the Central Advisory Water Committee, whether any change should be made in the law.

Control of new openings for discharge of polluting matter

66. The provisions of the Act of 1876 already discussed deal mainly with pollution from works which have been established, and no action can be taken until the pollution actually arises, although it may be obvious that a work or process proposed to be set up is bound to cause pollution. It seems to us to be essential that the River Board should have an opportunity of considering the probable effect of a new factory or sewage disposal works, or of proposals which would involve a radical change in existing discharges.

This principle is already established to a certain extent in the Act of 1923, Section 8 of which makes it an offence to discharge trade effluent from any new work into waters containing fish unless notice has been given to the Fishery Board or to the Minister of Agriculture and Fisheries.* The same principle is followed in Section 47 of the Act of 1938, which provides that any person who proposes to discharge any liquid trade refuse into a stream by any new work or to carry on a new trade or manufacturing process which will change the nature of any liquid trade refuse being discharged from any premises when the provision came into force, must give not less than four weeks' notice in writing to the Board ; where a new work is proposed the notice must state where plans and specifications can be inspected at all reasonable times by an officer of the Board.

67. These provisions ensure that there is prior consultation between the Board and the interest concerned, a practice which we consider essential in all matters in which discharges to a stream are involved. We were told by Mr. Garner, Chief Inspector to the West Riding of Yorkshire Rivers Board, that industrialists frequently come to the Board for advice on the design and construction of purification plant though there is no statutory requirement for consultation, and the representatives of the Thames and Lee Conservancies told us that similar consultation is a feature of their administration.

Several interests took the view that notification of proposals, though helpful, did not go far enough, as it left the authority with no immediate remedy if the new proposals were insisted on, despite the authority's view that pollution

* See Paragraph 25.

would inevitably arise. We therefore considered whether it would be desirable to give River Boards control over the opening of new sewers, drains, channels, etc., for the discharge of sewage or other effluents into a stream. We see no reason why a person setting up a new work should not be required to take all reasonable steps, before work is commenced, to ensure that the effluent will be satisfactory, having regard to the condition and existing use of the stream into which it would be discharged.

68. The Thames Conservancy Act, 1932 (Section 123) makes it an offence to open a sewer, drain, pipe or channel by which sewage or any offensive or injurious matter whether solid or fluid will enter or is likely to enter the river or any tributary. Section 91 of the Lee Conservancy Act, 1868, contains a similar provision, but Section 14 of the Lee Conservancy Act, 1928, provides that an offence shall not arise if the opening is made with the previous consent of the Board, to which they may attach such terms and conditions as they think fit.

We suggest that a power of control, based on these local Act provisions would not only enable the River Board to be reasonably sure that a new discharge would not cause pollution, but would also give the applicant reasonable assurance that by adhering to the quantity and quality of the proposed effluent there would be little risk that proceedings could be taken for pollution when the actual discharge commenced.

69. The local Act provisions which we have quoted do not however give any right of appeal against a decision of the authority to refuse consent, or against the conditions it may impose; we suggest that the inclusion of such a right would ensure that the River Board's requirements are not too rigid in relation to local conditions or an overriding national interest. Moreover, the absence of a right of appeal would be inconsistent with the general basis of the revised law which we propose.

We therefore recommend that it should be an offence to open into a stream any sewer, drain, pipe, or channel unless the consent of the River Board has been obtained; that the River Board be entitled to attach terms and conditions to their consent; that if consent be not given within six weeks it should be deemed to be refused; that consent should not be unreasonably withheld; and that any difference arising on a question whether consent should be granted or whether the conditions imposed are reasonable, should be determined by the Minister of Health. The provisions should not apply to the Manchester Ship Canal, in view of the special statutory provisions relating to that undertaking.

70. It seems unnecessary, however, to require the consent of the River Board to a new opening for the discharge of sewage effluent if the proposals have already been under review by the Minister. We therefore recommend that the consent of the River Board be not required to a new opening for the discharge of effluent from the sewage disposal works of a local authority if the scheme has been approved or authorised by the Minister, or if he has consented to a loan to defray the cost. We consider it essential that a River Board should have prior notice of an Inquiry to be held by the Minister into such proposals, and we recommend that the local authority should be required to notify the Board that an Inquiry is to be held.

71. We realise that there are other authorities—e.g., those concerned with planning and the location of industry in the national interest—which have interests in the siting of factories and other installations; we do not think it wise or proper that cases in which those authorities are concerned should be removed from the jurisdiction of the River Boards. There should obviously

be consultation between all parties concerned at the earliest stage, and not when permission to open a new discharge to the stream is about to be sought.

Notice of changes in liquid effluent

72. We also recommend that the law should require four weeks notice (or such lesser period as the River Board may agree) to be given to the Board of any proposals which involve radical changes in the volume, nature or rate of discharge of any liquid effluent being discharged into a river. It is not our intention that day-to-day variations occurring in the normal course of industrial working should be notified, and the provision should be so drafted as to make this clear. We do not think it necessary or desirable to require the River Board's consent in such cases. This provision should secure prior consultation, the importance of which we have already stressed ; if the result is not satisfactory to the River Board they will be able to take action under their general powers.

Evidence on proposed amendments

73. Suggestions for an amended code of law in place of Sections 3, 4 and 5 of the Act of 1876 on the lines which we have recommended did not, as might be expected, obtain the full support of all interests. The Thames Conservancy and the Lee Conservancy both said that the comparable powers which they administer had worked well and should be applied generally. Other interests agreed that strengthened powers similar to those operated by those authorities were necessary, but made some reservations. For instance the Rural District Councils Association and the Urban District Councils Association both suggested that the amended provisions should not apply to the effluents from sewage disposal works constructed by a local authority with the approval of the Minister of Health. It must however be remembered that approved works may later produce a bad effluent through mismanagement, overloading or from other causes. The Association of Municipal Corporations said that local authorities must discharge storm water to rivers in order to drain their areas and that complete prohibition of discharge is therefore impracticable. This seems to us to be a matter in which a River Board might be expected to exercise reasonable discretion. It should be the duty of a local authority so to plan its drainage that normal discharges will not be polluting. There may, however, be emergencies in which the standard is temporarily not maintained and we suggest that a River Board would not normally think it necessary to take action in such cases.

74. The Federation of British Industries took strong exception to the general adoption of provisions similar to those applicable to the Thames and the Lee because those provisions are related to the special position of the water supply to the Metropolis. They said they had evidence that the operation of those Acts resulted in particularly heavy financial burdens falling on the industries in the areas affected and they quoted one case by way of example. We understood that while these burdens are accepted as a necessary incident of industrial operation in those areas the Federation see no reason for the application of powers more stringent than those of the Act of 1876 in industrial districts. They also said that it would be unreasonable to prohibit absolutely the discharge of offensive or injurious matter without a stipulation that the prohibition related only to such constituents and in such quantities as would actually cause material offence or injury.

The National Coal Board were strongly opposed to the general application of powers such as those exercised by the Thames and Lee Conservancies. They suggested that the adoption of such provisions would seem to abolish

even the rather imperfect machinery which exists to-day for ensuring that all uses of the river shall be fairly balanced.

We do not under-rate the importance of these representations from industry, and we have considered them very carefully. We think however that, apart from the concessions we have already recommended, the objections will be very largely met by the procedure which we discuss in the following part of this Report.

Restriction on proceedings in respect of manufacturing and mining pollution

75. The first part of Section 6 of the Act of 1876 restricts to certain authorities the right to take proceedings under the part of the Act which relates to manufacturing and mining pollution, with a saving for the rights of persons interested if the authority refuses to take action. We think it more convenient to discuss this part of the Section with other questions of the right to take proceedings, with which we deal in Part X of this Report.

Standards for controlling polluting effluents

76. Section 6 also provides that proceedings under Part III of the Act may not be taken without the consent of the Minister of Health. A number of representations were made to us about this requirement and the arguments raised are discussed in paragraphs 95 to 109 of this Report. We felt, however, that the matter could not be properly considered until we had decided whether it is feasible to provide by law, either centrally or locally, minimum standards of quality which a discharge into a stream must reach to avoid being treated as "offensive or injurious" for the purpose of the general prohibition which we have recommended.

77. Clearly it would facilitate administration of the law if such standards could be prescribed and we received much evidence in favour of such a scheme. Mr. Garner (Chief Inspector, West Riding of Yorkshire Rivers Board) said—

> "It seems to me that if there is legislation which does not take into account the setting up of standards to be stipulated either by some central authority or by River Boards we shall be in a very serious position".

Mr. Turing (representing the British Field Sports Society) said—

> "The object of standards to my mind is that people should know what they have to comply with".

78. The Urban District Councils Association drew attention to the different standards laid down by the various river authorities, saying that there were no less than seven different tests prescribed by seven different authorities; they suggested that there ought to be some uniformity, particularly in view of the proposed new river authorities, so that sanitary authorities can work to a uniform standard in connection with the discharge of effluents from sewage works. The County Councils Association said that standards of purity for both trade effluents and sewage effluents vary considerably throughout England and Wales and considered that the establishment of some general criteria would be helpful, if only as a guide. The Thames Conservancy suggested that we should consider whether it is possible to make a recommendation or recommendations as to the laying down of some standard or standards of purity as regards samples of effluent and water and other matters appertaining thereto.

79. In Acts dealing with the prevention of pollution of rivers and streams from sewage or industrial effluents no standard of quality has generally been defined (though in certain local Acts the quality to which the effluent from

a particular sewage disposal works must conform has been specified). It is left to the Courts to decide whether an effluent is polluting within the meaning of the terms used in the particular Act.

80. The question is, of course, not a new one. It was dealt with in considerable detail by the Royal Commission on Sewage Disposal. Their final conclusions on pollution by sewage were given in their Eighth Report, in which they recommended that an offence should not be deemed to arise under the Act of 1876, from the discharge of sewage matter, if it reached the prescribed standard. This should be the general standard they proposed or a special standard which might be higher or lower than the general one according to local circumstances. The general standard suggested was related to the amount of suspended matter in the effluent, and the amount of dissolved oxygen taken up in five days. In fixing any special standard the dilution afforded by the stream was the chief factor to be considered. The Ninth Report dealt with manufacturing wastes which for any reason could not be taken into sewers, and recommended that there should be prescribed for trade effluents a standard of purity " which should at once be a guide to administrative authorities and a security to manufacturers in regard to the extent of their obligations ". The Report said that it would be necessary to consider each kind of trade waste separately and suggested standards for a number of different industries.

81. The standards they recommended have not been given any general legal force though we understand that they have been used to a certain extent by authorities responsible for the prevention of pollution. We also understand that authorities such as the Thames Conservancy, the Lee Conservancy, the West Riding of Yorkshire Rivers Board and the Lancashire Rivers Board, who have consistently administered the law for the prevention of pollution over a number of years, use working rules either based on the Royal Commission's recommendations or determined from their own experience, to guide them in deciding whether effluents are causing pollution, and, if necessary, whether proceedings should be taken.

82. We were agreed that the fixing of standards in some form was desirable, both to facilitate administration and to assist authorities and industrialists in deciding the basis on which treatment plant should be planned, and we considered whether it would be practicable to devise comprehensive standards of quality which could be applied to all kinds of polluting liquids.

The first step would be to devise a series of tests, preferably as few as possible, the results of which could be expressed in quantitative terms and would define the character (so far as the effect on the stream is concerned) of any kind of domestic or industrial liquid. Attention would have to be paid to the varying purposes for which river water is required and the qualities which are desirable for those purposes. The qualities required in water for domestic supplies, industrial use, fisheries, agricultural use, navigation, or for general amenities, are not necessarily the same.

83. We have obtained the views of the scientific assessors from Government Departments and we are advised that it is practicable to devise suitable tests. It is not possible to deal with them in detail in this Report, nor are we competent to do so ; the tests would have to be chosen with great care, and preliminary discussion and research would be required before they could be settled. It is suggested, however, that it might be an advantage if the same tests were made by all River Boards. It is thought to be quite impracticable to use tests for particular constituents of polluting liquids, particularly of industrial waste waters. A very great variety of substances—some of them difficult if not impossible to determine by chemical analysis—are discharged

into industrial waters, and with the introduction of every new industry the number of waste substances increases. The plan would be to fix tests, each of which would measure some general property of a polluting liquid, for example, the test for biochemical oxygen demand already mentioned, and a test for toxicity to fish.

84. The next step would be to prescribe standards for polluting liquids, fixed in relation to examination by the standard tests. If the standard were not reached, the liquid would be deemed to be " offensive or injurious matter " for the purpose of the proposed provision dealing with the discharge of such matter to the stream. In fixing standards account would be taken of local circumstances, including the flow of water in the particular stream (particularly the minimum flow), the total volume of effluents likely to be discharged into it, the amount of self-purification in the river which could be expected and the uses to which the river water is put. The standards might differ very materially from one river to another, or for different parts of the same river. We consider that the Courts, and the Minister, where his consent is necessary to proceedings, should have regard to these considerations in the interpretation of the words " offensive or injurious " if no standards have been fixed.

In many circumstances it might not be desirable to lay down standard limits for all those properties of an effluent which might under certain conditions be injurious. In a particular stream these conditions might not arise and it would seem unnecessary to provide for them in fixing standards, which would relate only to those properties of an effluent which might in fact cause harm.

85. The general feeling of the interests who discussed this question was that the River Board should be the authority responsible for originating proposals for the fixing of standards, but it was also the general opinion that the proposals should be subject to confirmation by a central authority. For instance Mr. Garner (Chief Inspector, West Riding of Yorkshire Rivers Board) said—

> " I think the River Board should be able to prescribe standards, probably subject to confirmation by a central authority. I think there should be central control, otherwise you might have every River Board setting up its own particular standard, and you would get little uniformity throughout the country."

Asked whether it was possible to have a uniform standard for all rivers, Mr. Garner said—

> " I think you must set up . . . a minimum standard which should apply generally and deviation from the standard should be on the recommendation of the River Board."

Again, Mr. Turing (British Field Sports Society) said—

> " I think it should be with the River Board to say what the standard should be for any particular river or any particular reach, with of course an appeal if objection is made."

The representatives of the Urban District Councils Association, asked whether it would be satisfactory if it were left to the discretion of a River Board as to the standards they apply in different parts of the river, said that a River Board could be left discretion, subject to that discretion being tied down by leave to appeal to the Minister.

86. The Federation of British Industries did not agree that the fixing of standards should be within the discretion of the River Board. In oral evidence, the question was raised of setting up a uniform standard for the whole of the river, leaving it to the discretion of the River Board to relax that

standard in various degrees for the different parts of the river. In reply, Mr. Lea (for the Federation) said—

> "I think the standard to be applied, if it can be described as a standard, is the standard of the adoption of the best practicable means for avoiding pollution. Where you have an idealistic standard, such as is incorporated in the Thames Conservancy Act, the Conservators do in fact give a degree of indulgence which may vary from point to point on the river: but there the industrialist is carrying on by grace of the Conservators. Many industries could not comply with those standards, or could not even approach them. In fact, some industrialists, under the exceptional conditions which exist today, cannot comply with the standards that are laid down by the Conservators, and there has to be, in practice, further relaxation."

87. It was also made clear that the safeguard for industry which the Federation desired to be maintained is the necessity for obtaining the Minister's consent to proceedings (a question with which we deal in paragraphs 95 to 109 of this report) and that the Federation was not prepared to consider any alternative.

We appreciate these arguments but we feel that the advantages of fixing standards outweigh them, provided that proper protection is provided, and we think that the procedure we propose is adequate for that purpose.

88. It should not be necessary to determine standards for effluents discharged into every stream in the country. The results would not, in our view, justify the immense amount of work that would be involved. In the greater part of the country the only discharges which will need consideration are effluents from sewage disposal works of local authorities; in many cases the only sewage disposal works will be small works serving rural populations. The general standards of quality recommended by the Royal Commission on Sewage Disposal (see paragraph 80) have generally been accepted as satisfactory for determining whether effluents from sewage disposal works are suitable for discharge into streams, and we see no reason why these standards should not be accepted by River Boards in normal cases. It may, however, be desirable to fix standards for such streams in exceptional circumstances where a particularly high standard of purity is necessary, or if the dilution is very low. The streams for which it will be desirable to fix standards are mainly those which receive large volumes of trade discharges. We consider that wherever standards are prescribed they should be made applicable to *all* effluents.

89. In existing conditions it would clearly be difficult for the central department to fix minimum standards which could be enforced throughout the country, and we are advised that technically it would be impracticable. Standards would have to be fixed in relation to local conditions, and we are satisfied that the proper authority for initiating proposals is the River Board. We consider that the most suitable method of prescribing standards would be by byelaws, subject to confirmation by the Minister of Health, which would specify the streams or parts of streams to which the standards would relate, and the minimum standards applicable.

90. The procedure for making byelaws provided for in Sections 18 and 34 of the Act of 1948 would require some modification. This procedure provides for byelaws to be confirmed by the Minister of Health; notice of the intention to apply for confirmation must be advertised and copies of the byelaws sent to local authorities in the area to which the byelaws would apply; and the byelaws must be on deposit for one month before the application. The Minister may refuse to confirm any byelaw, or may confirm it either without modification, or with modification if the River Board agree; the

Minister, if he considers that the revocation of any byelaw is necessary or desirable, may, after giving notice to the River Board, considering their objections, and holding a local Inquiry if the Board wish, revoke that byelaw.

91. The modifications which we consider necessary where standards are proposed are:—

(i) The period of one month's notice is insufficient for interests affected to consider complicated technical questions which might arise on proposals for the fixing of standards. We propose that a period of not less than three months should be substituted.

We think this would be sufficient for persons interested to decide whether they wish to object to the byelaws, and to ask, if necessary, for further time to complete their investigations.

(ii) Where objections to confirmation of byelaws are received, full opportunity should be given to the objectors to state their case, and to the River Board to be heard in support of their proposals, at a public local Inquiry.

There will doubtless be considerable difficulty at first in predicting the effects which effluents conforming to given standards will have on a particular stream, though with accumulating experience it should be possible to predict these effects with more confidence. It is desirable therefore that byelaws should be effective for a limited period (though we do not propose that this should be a condition specified in the law).

92. We recommend that:—

(*a*) A River Board be empowered to make byelaws subject to confirmation by the Minister of Health for any stream or part of a stream in their area, prescribing minimum standards with which an effluent discharged into the stream must comply ;

(*b*) The procedure for making byelaws provided in the Act of 1948 should for this purpose be modified in the following respects:—

(i) Notice of intention to apply for confirmation of byelaws should be given at least three months before the application is made.

(ii) The Minister should be required to hold a public local Inquiry if any objections to confirmation of the byelaws are received from persons he considers to be interested.

(*c*) An effluent which does not reach the prescribed standard shall be deemed to be " offensive or injurious " for purposes of the provision which we have recommended in paragraph 58 of this Report.

(*d*) If an effluent complies with a standard fixed for the stream into which it is discharged, such compliance shall be a defence against any proceedings under Section 8 of the Act of 1923 in respect of the effluent.

93. It will be impossible for a River Board to fix reasonable and suitable standards for a stream or part of a stream until they have full information about its rate of flow, the present quality of the water and the industries and sewage disposal works already discharging into it ; and until they have formed some estimate of the growth in population and industry which is likely to occur within a period of—say—ten years. For many streams this information may be wholly or in part available, but for the majority it will probably

be necessary to undertake surveys as recommended in this Report. We therefore recommend that a byelaw fixing a standard for any part of a stream should not be confirmed until the Minister is satisfied that a proper survey of the area concerned has been completed.

94. It is important, in our view, that the tests to which standards are related should be uniform, and that full advantage should be taken of present knowledge and experience. We therefore recommend the formation of an inter-departmental scientific committee to advise on the tests to be used. We also wish to draw the attention of all parties to the services which can be rendered by the Water Pollution Research Laboratory of the Department of Scientific and Industrial Research, and to urge that the fullest possible use be made of those services.

Consent to proceedings.

95. Section 6 of the Act of 1876 provides that proceedings under that part of the Act relating to manufacturing and mining pollution shall not be taken without the consent of the Minister of Health, and sets out the industrial considerations which he must take into account. This provision has been the subject of much controversy and we received considerable evidence on the question of its retention. The original intention was, no doubt, to safeguard industrial and mining interests from unreasonable interference by the operation of a statute which, though based on the principles of riparian rights and general sanitary welfare, nevertheless gave new and extensive powers to local authorities who might not be able to command skilled advice or to determine the better course when conflicting interests arose.

96. The requirement to obtain the Minister's consent does not appear in certain local Acts, for instance those giving powers for the prevention of pollution to the Lee Conservancy, the Thames Conservancy, and the Essex, Middlesex and Surrey County Councils. Under the Essex and Middlesex Acts the powers do not apply to streams for which other authorities (e.g., the Lee Conservancy, Thames Conservancy and Port of London Authority) have jurisdiction. The Surrey Act applies only to three streams which join the tidal part of the River Thames. On the other hand the requirement is included in the local Acts giving such powers to the Lancashire Rivers Board and the Cumberland County Council. Proceedings under Section 8 of the Act of 1923, in respect of pollution of waters, including tidal waters, containing fish, by matter injurious to fish or to their spawn or food may be taken by a Fishery Board without consent; but consent to proceedings in respect of manufacturing or mining pollution is necessary if the Board wish to take proceedings under the Act of 1876 (as they have power to do). If a Fishery Board obtains an Order for the extension of the powers of the Act of 1876 to tidal waters for the protection of fisheries, consent is necessary to any proceedings for pollution of those waters.

97. The principal reasons against retaining the requirements which were given in evidence may be summarised as follows:—

(*a*) River Boards will be large and responsible authorities, should be able to employ skilled staff, and ought to be trusted to act in a reasonable manner. It is wrong in principle that their discretion in such a matter should be hampered.

(*b*) Obtaining consent necessarily causes delay, during which the pollution may continue unchecked.

(*c*) The necessity for obtaining consent means, in effect, that there are two hearings if a case proceeds, which is contrary to the general

principles of justice. The fact that consent has been given does not assist the authority who have to prove their case again before the Court.

(*d*) Conditions have changed considerably since the Act was passed. Industry has increased but methods of treatment have been improved and are more widely known. If there are differences on technical or other issues the Court is competent to judge them.

(*e*) Refusal of consent permits the pollution to continue indefinitely and makes it difficult to take proceedings against other polluters.

98. For the retention of the requirement it is argued:—

(*a*) Industry attaches great importance not only to the requirement of consent but also to the considerations which the Minister of Health is required to take into account before reaching a decision.

(*b*) The Minister has facilities for technical investigation of complex problems of pollution and the terms of the Act of 1876 enable him to take into account technical improvements in matters of treatment, and to decide quesions on modern methods of treatment or whether variation of an industrial process is feasible in a particular case.

(*c*) The Minister's investigation will sometimes produce a solution that is satisfactory to both sides without proceedings.

(*d*) Neither a local authority nor a local Court is competent to weigh the importance of the wider interests that may be involved; for example it may be necessary to determine where the balance of national interest lies when the effect on a particular industry is being considered.

99. The last point was particularly stressed by the National Coal Board. They hoped that difficulties would normally be settled by consultation with the skilled staff of the River Boards, but considered that disputes not so settled should be decided at the national level. In oral evidence Sir Geoffrey Vickers, for the Board, said "it seems to us essential to retain some kind of machinery, such as reference to the Minister of Health, for review at national level. . . . If you abolish this safeguard you have the difficulty that the local inquiry is concerned with weighing up the *pros* and *cons* the effect of which on us can only be computed nationally. We are a national body, and the effects of any particular measure for preventing pollution here or there can only be judged, as far as coal and ancillary production are concerned, at national level. If you were to abolish this without substituting something much more far-reaching you would take away the only national forum which now exists. Making every allowance for the efficiency of the River Boards, which will be responsible statutory bodies, it may well be extremely difficult for them to judge the national implications in any situation which may arise."

100. The Joint Advisory Committee on River Pollution considered the general question for purposes of their Third Report, but did not propose any alteration in the law. Their view was that the Minister's inquiry is a convenient tribunal for clarifying many of the technical questions at issue, and they thought that the requirement should be retained for safeguarding industry. We decided that the recommendation of that Committee ought in any case to be reviewed in view of the establishment of River Boards, and we consider that our proposals for the fixing of standards form an additional reason for review. In those proposals we have suggested a procedure which gives full opportunity for all interests to make representations and be heard in support of any objections they may wish to raise before standards are

fixed. When that procedure is in operation there should be no need for any further reference to a central authority. We therefore recommend that where standards have been prescribed a River Board should be empowered, without any prior consent from the Minister of Health, to take proceedings in respect of the passage into a stream of polluting matter which does not reach the prescribed standard.

101. We still had to consider whether consent to proceedings should be required where byelaws are not in operation or where the proceedings are in respect of offences which are not covered by the byelaws.

We are satisfied that under the present procedure both industry and the pollution authorities get the benefit of the knowledge and experience of the central Departments which is invaluable in deciding on the methods which might be used for dealing with difficult effluents and which might not be available to the River Board or to the local Courts. Many River Boards will not at the outset have members or officers with experience of the contentious technical and other questions which may arise, and it is doubtful whether, in many cases, the local Courts have had sufficient opportunity to consider and decide such questions. It is also open to doubt whether the Court is the proper place to decide the wider questions of policy which may arise. In our view the intention of the law was that such questions should be decided by a central authority, leaving the Courts to decide, if a case proceeds, whether the offence is proved and what is the appropriate penalty or other remedy.

102. Some representations were made to us that the policy of the Minister of Health in dealing with applications for consent had frustrated the intention of the Act, because refusal to consent had allowed people to continue polluting streams, had encouraged others to do so, and had discouraged many authorities from going to the trouble and expense of applying for consent. This allegation is not borne out by the facts given to us. We understand that between 1930 and 1947 only 44 applications were made, of which no less than 29 came from one authority, the West Riding of Yorkshire Rivers Board. Examination of the 31 applications made between 1930 and 1939 showed that consent was given in 14 of these cases ; in 16 cases the application was withdrawn or lapsed because remedial works were undertaken. Only one case was refused, and that because the war supervened and labour and materials could not be spared from the war effort for the very considerable works necessary to remove the cause of pollution.

103. The arguments put forward by the National Coal Board raise a general question of some importance. We assume that the Board would also object to proceedings being taken against them, without the Minister's consent, for non-compliance with a standard. The Board referred to their position in relation to planning and we understand that the Board, like the private developer, are fully subject to planning control both for surface and underground development. The principal difference between their position and that of a private mineral developer is that by Regulations which may be made under Section 90 of the Town and Country Planning Act, 1947, special compensation provisions would be applicable to the Board when planning permission is refused, revoked or granted subject to conditions. Where, under the normal procedure of planning control, a decision affecting the Board's interests is given by the Minister of Town and Country Planning, he will in practice consult the Minister of Fuel and Power as he consults other Ministers on decisions affecting statutory undertakings or interests with which they are concerned.

104. We are not convinced that the law for prevention of pollution ought to make any distinction between private and public industrial undertakings.

It does not, at present, make any special concessions to local authorities, or to statutory undertakers. In fact there are special provisions about the fouling of streams in the Acts applied to statutory gas undertakers which are more stringent than those of the Act of 1876. They can be enforced without any Minister's consent and without regard to the effect on the gas undertaking. We do not recommend that any special procedure should be provided for proceedings against the National Coal Board, or against any other nationalised undertaking.

105. A suggestion was made to us that proceedings for pollution from sewage should require consent. We do not think there is any ground for making such an addition to the law nor was there any request for such protection from the local authorities, who are chiefly concerned. Subject to labour and materials being available there should be no insuperable difficulty in securing that effluents from sewage treatment works are of a sufficiently high standard to avoid pollution.

106. We expect that within a reasonable time procedure in many cases will be for non-compliance with a standard, but in the meantime we propose that consent should be required where no standard is prescribed or where it is not practicable to prescribe one. We therefore recommend that proceedings in respect of liquid effluent from industrial, manufacturing and mining undertakings shall not be taken without the consent of the Minister of Health if no standards have been prescribed in respect of the stream or part of a stream involved, or if the proceedings are proposed in respect of matters for which no standard has been prescribed. We do not propose that this should affect the power of the River Board to take proceedings under Section 8 of the Act of 1923, without any consent.

107. We agree that the necessity for obtaining consent to proceedings is bound to involve some delay but we have three proposals which will reduce it to some extent. The first, explained more fully under our recommendations for supplementary powers, is that where neglect to use proper treatment works is alleged, proceedings may be taken without the consent of the Minister of Health.* Second, proposals dealing with notice of intention to take proceedings, explained more fully in our recommendation on proceedings, which will reduce the time before proceedings can commence.† Third, proposals—also dealt with in our recommendations on proceedings—by which the Minister will normally inform the River Board within three months whether he gives or withholds his consent.†

108. A further question which arises is whether the law should continue to specify the matters which the Minister must take into account in considering an application for consent. At present he must have regard to "the industrial interests involved in the case and to the circumstances and requirements of the locality." In addition, where the proceedings are proposed by the authority of a district which is the seat of any manufacturing industry, he must not consent unless he is satisfied that "means for rendering harmless the liquids proceeding from the processes of such manufactures are reasonably practicable and available under all the circumstances of the case, and that no material injury will be inflicted by such proceedings on the interests of such industry." The latter part will clearly be unworkable as it stands, for a River Board area cannot very well be the seat of a manufacturing industry, even if that rather vague term could be defined. It may be possible to amend the provision so as to give effect, under the changed system of administration, to the original intention, but the provision needs review

* See Paragraphs 142 to 145.

† See Paragraph 169.

in other respects. Industry is much more widely distributed than it was at the passing of the Act of 1876, and the term the "seat of a manufacturing industry" has not now the same importance.

109. Moreover, the provision requires the Minister to be satisfied that means of treatment are reasonably practicable and available before giving his consent to proceedings, but it requires him to be so satisfied only if the proceedings would affect the seat of a manufacturing industry. It says nothing about *using* the means of treatment. We think that these confusing requirements should be replaced by something more straightforward. It is hardly necessary at this date to instruct the Minister to have regard to industry. His colleagues at the Board of Trade and elsewhere will leave him in no doubt about that. Nor do we think it necessary to draw any distinction between different industrial cases. We are, however, of the opinion that if consideration is to be given to means of treatment the decision should turn on their use and not their availability.

We therefore recommend that the Minister, before giving his consent to proceedings, should be required to consider whether the best practicable means, within a reasonable cost, are being used to render polluting liquids harmless, and if they are not being used, to give (if he thinks it reasonable) the person concerned an opportunity of obtaining and using them.

Further right to object to proceedings

110. Where proceedings are proposed against a person in a sanitary authority's district which is the seat of any manufacturing industry he has a further opportunity, even after the consent of the Minister has been given, to object to proceedings being taken, and if he wishes, the authority must give him a hearing so far as the question relates to his works or manufacturing processes. In deciding whether or not to take proceedings the authority must have regard to the same considerations to which the Minister is directed to have regard in considering applications for consent to proceedings. We fail to see any adequate reason for this further hearing, with the delay it would involve, and we recommend that the amended law should not provide for a hearing at that stage. The provision would in any case be difficult to operate when the powers are exercised by a River Board.

We do consider it desirable that the River Board should meet the alleged offender before proceedings are initiated, and we are proposing a procedure which will provide for this. It is explained in the part of this Report dealing with notices and proceedings.

VIII. TIDAL WATERS

111. The effect of the definition of "stream" in Section 20 of the Act of 1876* is that tidal waters are not brought within the jurisdiction of the Act except so far as the Minister of Health may determine on sanitary grounds (which would now be described as public health grounds). Only six such orders have been made, the last one many years ago. For the protection of fisheries an Order under Section 55 of the Act of 1923 may extend the Act of 1876 to the sea or to tidal waters to such extent as may be determined by the Order. No such Orders have been made.

The position therefore is that, with few exceptions, tidal waters of rivers, and the sea have never been subject to the provisions of the Act. The result is that in the majority of cases sewage and liquid industrial effluents are being discharged to tidal waters without any treatment at all.

* See Paragraph 22.

112. We received much evidence to the effect that the pollution of tidal waters of rivers has increased and is increasing, and that the powers of the Act of 1876 should be applied. The County Councils Association said that "in many cases insufficient care is taken with regard to the discharge of effluent into tidal waters. The potential results of such negligence are obvious and the contamination of oyster beds is a case in point. There is every justification for the extension of river pollution powers to tidal waters . . . . so far as the discharge of solid matter is concerned."

113. The Lancashire Rivers Board expressed their considered opinion that the Act should be extended to tidal waters and supported it with a detailed report on the discharge of sewage to tidal and coastal waters in their area. The Lee Conservancy Board considered that there should always be an authority responsible for controlling the pollution of tidal waters, though it would still be desirable for the Minister of Health to decide the limits within which the powers should apply. They thought that the powers exercised by a River Board should extend to both the tidal and non-tidal portions of the River within their jurisdiction. This is the position in the Conservancy Board area, and they said that no difficulty had arisen. The standard applied to tidal waters is whether the discharge will be injurious to health or cause a nuisance, and is of course not so high as that applicable to non-tidal waters. The National Association of Fishery Boards were in favour of all the legislation relating to the prevention of pollution being applied to tidal waters. They said that the Boards cannot control pollution in the tidal reaches, the result being that migratory fish are prevented from entering the rivers.

114. The Dock and Harbour Authorities' Association did not consider that there were likely to be any grounds, other than sanitary grounds, for the extension of the Act to tidal waters where navigation interests predominate. Their view was that in navigable tidal waters the harbour authorities had the chief interest in controlling pollution. The National Coal Board said that general extension of control to tidal waters is not desirable at present. They would not object to the Minister having a general authority to extend the powers if local industrial difficulties were taken into account.

115. The Federation of British Industries considered that there should be no general or automatic extension of the powers of the Rivers Pollution Prevention Acts to tidal waters. They submitted that the protection now provided on sanitary grounds is adequate. They said that a considerable body of industry has established itself on tidal waters to obtain facilities for effluent disposal and that in certain cases the sea or tidal waters provide the only outlets for intractable effluents from factories of vital importance to the national economy. Further limitation of existing facilities might well place a heavy technical and financial burden on the industries concerned, and might place them at a grave disadvantage in comparison with overseas competitors.

116. It appears that it is difficult to prove that danger to public health arises from the existing conditions; for example, Dr. Bullough, County Medical Officer for Essex (representing the County Councils Association) said that he had never been able to prove that sewage in tidal waters would be dangerous to the health of bathers, though it was obviously objectionable.

We were informed, too, that there is no evidence that the conditions of the tidal waters of the Tyne and the Tees, badly polluted as they are, constitute a danger to the public health of the districts through which the rivers flow. A number of other reasons for greater control of pollution were advanced; the effects on migratory fish and the movement of fish, the loss

of amenities, the occurrence of nuisances which may not be actually dangerous to health, and the effect on navigation. The National Farmers' Union said that farm land may be damaged if it is subject to flooding from polluted tidal waters. There was no suggestion that the condition of tidal waters had any considerable influence on the purity of the upper reaches of a river, though it might and does in a number of cases greatly affect the movement of migratory fish.

117. It was agreed by most interests that general enforcement of prevention of pollution powers in tidal waters would be liable to involve industry and local authorities in difficult technical problems and heavy financial burdens. The Association of Municipal Corporations said that in many cases it would mean a complete reconstruction of the sewerage system. The Federation of British Industries said that there are a number of effluents discharged into tidal waters which could not be purified at a tolerable cost. If a standard of purity were enforced an industry might have to move its location. The National Coal Board said that additional measures to prevent pollution in tidal waters would impose a heavy burden on the coal industry. The National Association of Fishery Boards agreed that the cost would be heavy, but suggested that it be spread over a term of years. The Council for the Preservation of Rural England suggested that Government assistance should be made available if it is decided that the cleaning up of tidal waters is in the national interest. As regards sewage, a number of interests said that towns situated on tidal reaches ought to be prepared to incur expense on treatment plant in the same way as inland towns.

118. Some interests said that difficulties had arisen because the term " tidal waters " is not defined in the Act of 1876. The West Riding of Yorkshire Rivers Board referred to a case in which part of a river in their area which is 80 miles from the sea was decided to be tidal because its level is affected by the tides, although there is no ebb and flow. The Lancashire Rivers Board suggested that tidal limits should not include watercourses, the flow of which is held up during certain states of the tide by the closing of tidal gates. Mr. Jolliffe (for the Board), quoted the case of the River Alt, the outfall of which is tide-locked for about six hours every tide by tidal gates. He understood that, in law, this river is a tidal watercourse because it is held up by the tide.

119. The Joint Advisory Committee on River Pollution discussed the general question in their Third Report, but did not recommend that the powers of the river authority should normally extend to tidal reaches. They said that such a drastic revision, without regard to local circumstances, was not warranted on the evidence. They recommended that the decision should remain with the Minister of Health, but that he should be able to consider all relevant circumstances, and should not be restricted to sanitary grounds. To protect navigation interests, they recommended that orders should be made only after consultation with the Department exercising the functions of Central Navigation Authority. The Milne Committee made similar recommendations.

120. The question is a difficult one, and cannot be easily solved, particularly where pollution is already extensive. For instance, in many cases, it would mean heavy expenditure to re-organise the disposal of domestic sewage alone. Sewers are usually designed to discharge by gravitation into the rivers and major reconstruction of internal as well as trunk sewers might be necessary; in some cases pumping would be required and in most closely developed areas long lengths of very large trunk sewers would be required to divert

sewers from the estuaries to the open sea. We understand that recent estimates of the cost of individual schemes show that the cost throughout the country might well exceed £100 million. There is also the possibility that the diversion of large quantities of effluent would reduce the volume of flow (which may already be reduced by abstraction at higher points) and disturb the regime of a navigable river. But domestic sewage is only part of the problem ; it would still be necessary to dispose of trade wastes, which may be more dangerous to fish life than domestic sewage. It might be possible to receive some of them into the sewers, but there must be many cases where this would be impracticable. To provide treatment might well mean a major problem for many industries, even if room could be found for the plant, and there would still remain the factories with a large volume of difficult or intractable effluent.

121. These very real difficulties make it impracticable to suggest an automatic extension of the law to tidal waters. On the other hand, the present position whereby the Minister can so extend it only on sanitary grounds is too restrictive. We recommend that the Minister should be empowered to extend the general law to tidal waters by Order, after a public local Inquiry, without being limited to any particular grounds for making the Order.

122. In some areas, as we have shown, the full application of the law would not be feasible in present conditions, and might not, indeed, be possible for many years to come. Moreover, some of the new powers we have recommended would rarely, if ever, be necessary for the prevention of pollution of tidal waters. We think that considerable improvement of existing conditions might be obtained by the application of the new code by stages to tidal waters. For example, a River Board might reasonably be empowered to prescribe a standard which could be satisfied by partial treatment of sewage (e.g., by tanking or settlement), but would be a good deal lower than the Royal Commission standard for non-tidal waters, or by partial treatment of industrial effluents which would eliminate or reduce some of the worst of the polluting properties.

123. We consider that the Minister should have a new power to extend, by order, particular provisions of the law to tidal waters where it is not practicable to extend the law as a whole. A River Board would have to state, in applying for such an Order, the powers which they required, with details of any standards they proposed to prescribe in regard to sewage or industrial effluents. Notice of the proposal to apply for an Order should be given so as to allow interests affected an opportunity to make representations. The Board would have to satisfy the Minister at a public Inquiry that their proposals were reasonable having regard to the special conditions and uses of the river, and the Minister would take into account the probable cost to local authorities and industry, the effect on industry and other interests, and whether labour and materials would be available for carrying out the work. We recommend that the Minister should be empowered, after a public local Inquiry, to make an Order applying to tidal waters such provisions of the general law for the prevention of pollution as may be specified in the Order, and prescribing, where appropriate, the standard to be complied with ; that (as in our earlier recommendation), he should be able to take all the circumstances into account, and should not be limited to any particular grounds for making an Order ; that an application by a River Board for an Order should state the provisions proposed to be applied, with details of any standards proposed ; and that notice of the application should be given by the procedure we have recommended for confirmation of byelaws for prescribing standards (paragraph 92). We think that these powers would enable

River Boards to bring about gradual but substantial improvements of polluted tidal waters, and to protect the many estuaries in which pollution does not now occur to any serious extent.

124. It is important that there should be no conflict of jurisdiction between River Boards and navigation or port authorities. Any difficulties arising would be reviewed at the local Inquiry, but to ensure that they receive full consideration we recommend that no Order extending any powers to tidal waters should be made by the Minister without consultation with the Minister of Transport on questions affecting navigation and harbours. There should be similar consultation with the Minister of Agriculture and Fisheries on questions with which his Department is concerned.

125. We do not feel able to make any suggestion about a basis for defining "tidal waters". Interpretation of the term is based on a number of decided cases, and no satisfactory suggestion for a fixed definition was made to us. We make no recommendation in the matter, but we suggest that where the question of interpretation is in doubt, or the River Board consider that particular parts of a stream ought to be subject to the Act, though under normal interpretation of the law they are excluded, the Board should apply for the tidal limits to be determined by the Minister under the procedure we have recommended.

126. The pollution of coastal waters other than tidal reaches of rivers is not a matter with which the Central Advisory Water Committee is concerned, and is therefore not within the scope of our inquiry.

IX. SUPPLEMENTARY PROVISIONS

Control of heated discharges

127. Several suggestions were made to us that the discharge of excessively heated liquids should be restricted or controlled. It was stated that the effect of such discharges is to encourage the growth of weeds and algae and to rob the stream of dissolved oxygen which is necessary for its self-purification. They may also be harmful to fish. The British Waterworks Association said that excessive heat may give rise to a condition which would encourage undesirable plant or animal growths in reservoirs, and make the water more difficult to treat for public supply.

128. It is possible that a discharge of liquid of excessive heat, even if otherwise unobjectionable, could be held to be "noxious" or "polluting" within the meaning of Sections 4 or 5 of the Act of 1876, but we are not aware of any decision on this point. Apart from this, heated discharges have not been dealt with in general legislation, except so far as they are dealt with by Section 15 of the Electricity (Supply) Act, 1919, which is referred to in paragraph 135 of this Report. Provision is, however, made, in varying forms, in certain local Acts. Section 24 of the Essex County Council Act, 1933, makes it an offence to allow to pass into any stream any fluid of such temperature that within 200 yards from its point of discharge the temperature of the stream is raised—either by the discharge or in combination with other discharges of heated fluid—by more than 7½° Centigrade. The Act contains saving clauses for specific industrial works: in one case the point of discharge is defined, in another the maximum increase in temperature is varied. Section 152 of the Middlesex County Council Act, 1944, puts liquid of a temperature of more than 110° Fahrenheit from any factory or manufacturing process on the same basis as poisonous, noxious, polluting or offensive liquid from such a source, and it is an offence to allow it to pass into any stream. It is not an offence to pass such liquid through channels, etc., used, constructed

or under construction at a prescribed date, or through substituted channels with an outfall at the same spot, if the Court is satisfied that the best practicable and reasonably available means are being used to render the liquid harmless. Section 16 of the Surrey County Council Act, 1925, also contains a restriction on the passing into a stream of any liquid of a temperature of more than 110° Fahrenheit from any factory of manufacturing process, with a similar reservation for fluid passing through an existing channel, etc. It also provides that where any small quantities of such heated fluid enter the stream from the operation of blowing down boilers an offence shall not be deemed to arise unless the heated fluid, either directly or in combination with other small quantities of such fluid from the same or similar operations, tends to pollute or to be detrimental to the purity of the stream.

129. We thought it desirable to have the advice of the scientific assessors from Government Departments on the effect of the discharge of heated liquids into streams, and they submitted a memorandum. We understand that the subject is one on which research is by no means complete, and that inquiry on certain aspects of it is being pursued by the Department of Scientific and Industrial Research. The memorandum gives, however, a clear statement of the position so far as it is known, and we think it would be useful to reproduce it in full. We append it to our Report (Appendix C).

130. We are advised that there are probably few, if any, instances in the country where the discharge of pure but heated water to an unpolluted stream causes so great a rise in temperature as to render the stream unsuitable for a domestic water supply, or to make it incapable of supporting fish life. The consequences of discharging pure but heated water to a stream which is already polluted may be much more serious. A rise in temperature increases the rate of oxidation of organic matter in the stream, such as that from sewage effluents, and causes a reduction in the content of dissolved oxygen in the water. The temperature of a stream is of great importance in relation to its capacity to support fish. It can affect their breeding and utilisation of food, and in a polluted stream a rise of temperature may reduce the concentration of dissolved oxygen to such a point that fish cannot live in it. It may also increase the lethal effect on fish of certain toxic substances which may be put in the stream. Other effects of a rise of temperature which have been observed are an increase in the rate of growth of sewage fungus, and excessive growth of water weeds.

131. We received evidence from the Federation of British Industries on the question. They agreed that circumstances may arise in which it is desirable to control the discharge of heated liquids into a stream, but said that the provisions of Section 24 of the Essex County Council Act, 1933,* were unsuitable for incorporation in the general law. They considered that if control is desirable or necessary, it must be to varying degrees in different cases, and would best be effected by byelaws, which have the advantage that the whole of the facts in relation to a particular locality can be considered in relation to the use of the river by industry in addition to other people.

132. We are satisfied that heated discharges may have an injurious effect on a stream, and that there should be means of control, even if the effluent is not otherwise polluting, where the effect of discharge is likely to be serious. The effect will, of course, depend to a great extent on variable local conditions, such as the volume of the stream, its rate of flow and the volume and temperature of the total discharges. All these must be considered and what may be unreasonable for one place may well be tolerable in another. We do not think that any of the local Act provisions which we have mentioned

* See Paragraph 128.

would be suitable for general application. It would be difficult, in many cases, for an industrialist to satisfy a provision similar to that in the Essex local Act, with its principle of control in relation to a rise of temperature in the stream within a specified distance. The prescribed figure is, in fact, modified for certain cases by the Act itself. Nor would it be satisfactory, in the general law, to rely only on a maximum effluent temperature as in the Middlesex and Surrey local Acts referred to in paragraph 128.

133. We consider that the best method of control would be by byelaws. In settling the byelaws, the temperature and heat content to be allowed would be fixed in relation to all the relevant factors, including the minimum flow of the stream which might be expected in a dry season, and the maximum temperature which the stream might reach during hot weather. Both the temperature of the discharge and the total heat input may be important. Moreover, a heated discharge is not immediately absorbed into the main flow of a stream. There may be cases in which fish are killed by a heated discharge which, when intimately mixed with the whole volume of the stream, would not cause a considerable rise in a temperature. For this and other reasons it might be desirable to fix an upper limit of temperature for a discharge, irrespective of its volume.

134. It will also be necessary to control the rise in temperature in relation to the volume of effluent discharged. It has been pointed out that in certain power stations more electricity is generated in the winter months and the input of heat into the river is thus greater in those months than in the summer. It would seem reasonable that a greater discharge of heat should be allowed in cold weather than in hot weather since it is plain that a stream could tolerate the addition of more heat when its natural temperature is lower. Such a provision may also be of benefit to other industries; for example, cooling water from beet sugar factories is discharged mainly during the cold months of the year.

In industrial districts there are usually many small discharges of hot water. It would probably be difficult to apply restrictions to these discharges, the effect of which on a stream may be negligible. Standards might well be applied only to discharges which exceed a specified volume per day.

135. There are many generating stations and other installations which abstract water from streams, etc., and return it at higher temperature. The conditions on which they take and return this water must, in a great number of cases, be negotiated with the interests concerned, but under Section 15 of the Electricity (Supply) Act, 1919, as amended by the Electricity Act, 1947, the Minister of Fuel and Power may by Order authorise an Electricity Board to abstract water from any river, stream, canal, inland navigation or other source. The Section requires that any such Order shall provide, inter alia, that all water not consumed shall be returned in a condition not less pure than when it was abstracted, and at a temperature which shall be fixed at such a degree as appears to the Minister necessary to avoid injury to public health or to fisheries, or in the case of a canal or inland navigation, to the works thereof, to vessels using it or to persons using it for trade or business.

136. We heard evidence from the British Electricity Authority, who pointed out the importance to their industry of adequate water supplies for condensing, cooling and make-up purposes, although, as they said, there are other important factors to be considered in siting a generating station. They did not, in principle, object to control, by byelaws, of heated discharges to streams, but thought that provision should be made to enable a special maximum figure to be fixed in relation to a particular generating station, with a right of appeal to a central Department. With regard to this we

would point out that if byelaws are proposed for a stream on which an existing generating station is sited, the undertakers will have full opportunity to make representations to the Minister of Health, and he would no doubt consult the Minister of Fuel and Power before deciding whether or not to confirm or modify the byelaws. If it is decided to construct a new generating station on a stream after byelaws have been made it would be open to the undertakers to make representations that the byelaws be revoked if they could not comply with them. The British Electricity Authority suggested that the powers of Section 15 of the Electricity (Supply) Act, 1919 (as amended), are primarily to give a right of abstraction. If an Order is made, they thought that the temperature of return should be settled at the same time. At present the powers have been little used, the terms normally being settled by consultation with the interests affected. It might well happen, however, that an Electricity Board would propose a temperature higher than that already prescribed in a byelaw made by the River Board. While we have no doubt that the majority of cases will be settled by consultation between the parties, we think that if there is any conflict of opinion the byelaw should prevail, and that if the Electricity Board want a higher temperature they should apply for revocation of the byelaw.

137. We recommend that a River Board be empowered to prescribe, by byelaws, standards of temperature at which liquids may be discharged into any stream or part of a stream. The procedure for making the byelaws should be that recommended in paragraph 92 of this Report, under which the safeguards that may be necessary for existing industrial discharges would be given full consideration before byelaws were confirmed. The powers should not be applicable to the Manchester Ship Canal, in view of the special statutory provisions relating to that undertaking.

Byelaws should not be confirmed without prior consultation with the Minister of Transport on any question affecting navigation and harbours, and with the Minister of Agriculture and Fisheries on questions with which his Department is concerned.

Section 15 of the Electricity (Supply) Act, 1919, should be amended to provide that an Order made under that Section should not conflict with the provisions of any byelaws prescribing standards of temperature for the discharge of liquids to the stream concerned.

138. We have already said (paragraph 93) that it will be impossible for a River Board to fix reasonable and suitable standards for controlling polluting effluents until a proper survey of the stream concerned has been made. It will be equally necessary for a survey to be made, to obtain the special information necessary, before standards for the heat content of liquid discharges are fixed. We recommend that byelaws fixing standards of temperature for heated discharges to a stream should not be fixed until the Minister is satisfied that a survey has been made of the stream or part of a stream affected.

139. The information obtained from the survey should enable byelaws to be framed so as to be equally fair to persons discharging at different points on a stream. In some cases it may be necessary to apply different standards to different parts of a stream, so that its heat-receiving capacity can be fairly divided between the various interests using the river. On these, and other questions relating to standards of temperature, we consider it important that uniform principles should, so far as possible, be followed, and we recommend that River Boards should have the advice of an inter-departmental scientific committee (as we recommend in paragraph 94 in connection with standards for liquid effluents).

Discoloration

140. Under the definition in Section 20 of the Act of 1876 the term "polluting" does not include innocuous discoloration. Pollution is, of course, often accompanied by discoloration, and abatement of the one will often remove the other. We understand, however, that it is quite possible for traces of particular matter, not present in sufficient quantity to justify proceedings for pollution, to cause considerable discoloration; and that in some circumstances the removal of such traces would prove a difficult technical problem. No evidence on the question was submitted to us, but details of specific cases have been reported to us.

141. We have considered whether a discharge causing discoloration could, for that reason alone, be regarded as within the term "offensive or injurious matter" which we have recommended to be substituted for the present definitions of polluting matter. It could hardly be described as "injurious" but there may be circumstances in which it might be considered to be "offensive". We do not consider it practicable to devise a form of words which would leave the matter free from doubt, but we do not think that the existing complete exception should be retained. It is undoubtedly the case that discoloration of some rivers, such as those from which public domestic supplies are abstracted, would be a serious matter, particularly if the colour could not be removed by treatment; and there are some rivers where discoloration would seriously affect amenities. For this reason we consider it desirable that discoloration should be controlled in appropriate cases. We recommend that a River Board should be empowered to make byelaws for the purpose, under the procedure we have recommended for prescribing standards. Where no byelaws relating to the matter are made, innocuous discoloration should be deemed to be *not* "offensive or injurious".

Non-use or misuse of purification plant

142. The Joint Advisory Committee on River Pollution, in their Third Report, remarked that the provisions about trade pollution in the Act of 1876 were designed primarily for the normal case of a trader who is polluting a stream and has either taken no steps (such as the installation of treatment plant) to prevent pollution, or has installed plant which has proved inadequate for the purpose. They thought that the law ought to distinguish between that type of case, and the occasional case of a trader who may have installed plant capable of dealing with his whole output of effluent, but in order to save expense or trouble neglects to use the plant, or fails to operate it fully or properly, e.g., by failing to use sufficient quantities of precipitant or neglecting to clean out tanks and filters. In rarer cases there might be more flagrant abuses, such as the surreptitious emptying of settling tanks and their accumulated sludge into the river.

143. The Joint Advisory Committee considered that in such cases there should not be the same need to go through the formalities of notice, application for the Minister's consent and proceedings in the County Court for an Order, and recommended that a provision under which summary proceedings could be taken, and a direct penalty could be imposed, should be added to the general law. Provision of this nature is made by Section 50 of the Act of 1938, which also refers to failure to use arrangements for discharging liquid trade refuse into a local authority's sewers. The terms of the Section are as follows:—

> "If any person having adopted or possessing suitable means for purifying the liquid trade refuse produced at his trade premises shall neglect duly to use such means or having adopted or possessing works for

discharging any particular liquid trade refuse so produced into a sewer of a sanitary authority shall without reasonable cause neglect or cease to use such works for the discharge of that liquid trade refuse and by reason of or in consequence of such neglect or cesser any polluting liquid trade refuse is discharged into any stream within the district of the Board such person shall be guilty of an offence against this Act."

Proceedings under the Section may be taken in a Court of Summary Jurisdiction (as for other offences under that part of the local Act relating to the prevention of pollution), and do not require the consent of the Minister of Health ; but proceedings may not be taken both under Section 50 and under Section 46 of the Act (which deals with the prohibition of sending polluting liquid other than liquid sewage, into streams). Proceedings under the latter section require the consent of the Minister of Health if the polluting liquid comes from any manufactory or manufacturing process.

144. A number of the interests consulted favoured the general application of such a provision, but the Federation of British Industries considered it unnecessary. While they offered no defence for the trader who failed to make use of a satisfactory plant they thought the existing safeguards were adequate. They said that cases occur from time to time of plants constructed at considerable cost which prove a failure for technical reasons, or are so difficult and expensive in operation that their use cannot be considered reasonably practicable.

145. We feel that there should be a speedy procedure if pollution is wilful or is due to neglect to use suitable means of preventing pollution which are already at the offender's disposal. It would to a large extent meet the representations made to us that because of the delays of the normal procedure, a wilful offender may continue pollution unchecked for a long period. We appreciate the objections raised by the Federation of British Industries, but it is to be noted that under the Lancashire Rivers Board provision the offence arises from neglect to use " suitable " means of purification, or from neglect or ceasing to use " without reasonable cause " works for the discharge of liquid trade refuse into a sewer of a sanitary authority. We consider that a River Board could not successfully take proceedings under such a provision without first ascertaining whether or not there were reasonable grounds for the failure to use the plant or other means at the offender's disposal. If they were satisfied that pollution had arisen which the offender could have prevented by these means they should be able to take immediate steps to stop it.

We recommend that the Minster's consent to proceedings should not be required if suitable means of preventing pollution are at the offender's disposal and he fails to make proper use of them. It will be for the Court to decide whether the allegation of failure is sustained.

Sludging out of mill dams and weirs

146. We have already referred to the exclusion of solid matter in suspension from the provision in the Act of 1876 which deals with pollution arising from solid matter, and we have recommended that except in certain circumstances, the exclusion should be continued. The Joint Advisory Committee on River Pollution, in their Third Report, said that they understood that this exclusion led to difficulty in checking or controlling the sludging out of mill dams and weirs. They had been told that the cleansing of these mill dams is sometimes effected by stirring up the accumulated sludge (often in considerable quantities) and discharging it into the stream in the

form of matter suspended in running water. They thought it was clear that no action to prevent such practices could be taken under the Act of 1876, and pointed out that Section 17 of that Act expressly provides that the Act shall not apply to or affect the lawful exercise of any rights of impounding or diverting water. They were not prepared to recommend that solid matter in suspension should be brought within the scope of the provisions dealing with solid matter, and thought that the remedy might be to give pollution prevention authorities the power to make byelaws governing the sludging of mill dams. They did not feel that they could make any definite recommendation on the evidence available.

147. Since that Report was made, a provision dealing with the question has been included in a local Act. Section 49 of the Act of 1938 provides that :—

> " If any person without the consent of the Board by manual or mechanical or other means puts or causes to be put or carried into any stream within the district of the Board the deposit whether in suspension or otherwise of any mill or river dam weir impound waterlodge reservoir lake or pond so as to interfere with the flow or pollute the water of such stream and it is reasonably practicable to adopt some other method of cleansing the mill or river dam weir impound waterlodge reservoir lake or pond such person shall be guilty of an offence against this Act ". It also provides that a person shall not be guilty of an offence for putting into the stream any sand or gravel or other deposit drawn from or deposited by the stream so long as the sand or gravel or other deposit does not unreasonably interfere with the due flow or pollute the water of the stream. Proceedings under the Section may not be taken without the consent of the Minister of Health. We understand that the Lancashire Rivers Board have no experience of the use of this Section because the war commenced so soon after the Act came into operation.

148. We received evidence on the matter, and the majority of the interests consulted saw no objection in principle to the general application of a similar provision. The Lee Conservancy Board said that there was no corresponding provision in their Acts, and they had not felt the need for it. They also expressed doubt about the meaning of the words " if other means of cleansing are practicable " in the Lancashire Rivers Board provision. Several interests suggested that the consent of the Minister should not be necessary to proceedings for such an offence, but the Central Landowners' Association said that some discretion might have to be exercised in enforcing such powers, as alternative methods might only be available at considerable expense, whereas the damage caused by the more economical methods might be insignificant. They therefore suggested that the Minister's consent should be required.

149. We think that River Boards should have power to deal with the difficulties which have been discussed. A provision generally similar to Section 49 of the Act of 1938 would be suitable, but we do not consider that the Minister's consent to proceedings for offences should be necessary. There should, however, be an appeal against refusal of consent by the River Board.

We recommend that a provision based on Section 49 of the Act of 1938 be added to the general law, making it an offence to sludge out mill dams, weirs etc., without the consent of the River Board ; that consent shall not be unreasonably withheld and that any question whether consent is unreasonably withheld shall be determined by the Minister of Health ; and that no

consent shall be necessary to the taking of proceedings for offences under the provision.

Cutting and disposal of weeds

150. Section 129 of the Thames Conservancy Act, 1932, requires persons cutting or responsible for cutting weeds grass or other vegetation in the river or in any tributary at once to remove them in order to prevent their decay and consequent contamination of the water. The Section also prohibits the deposit of any weeds grass or other vegetation in the river or in any tributary. Persons who act in contravention of the Section are liable to a penalty not exceeding five pounds.

We received no objection to the general application of a similar provision. It was suggested by some interests that immediate removal of weeds might not be desirable, as they provide food for fish, but it is clear that any other requirement would be difficult to administer. We recommend that a provision similar to Section 129 of the Thames Conservancy Act, 1932, be added to the general law.

Byelaws to prohibit or control certain acts of cleansing in streams

151. Section 118 of the Lee Conservancy Act, 1868, empowers the Conservancy Board* to make byelaws:—

(*a*) prohibiting the throwing of any dead animals into the river;

(*b*) prohibiting persons from throwing filth or other noisome things into the river, and from washing or cleansing therein any cloth, wool, leather or skin;

(*c*) prohibiting the washing or cleansing of animals in those parts of the river in which, in the Board's judgment, the washing or cleansing will affect the purity of the water.

We received evidence on the question whether similar powers should be applied generally. We consider it unnecessary to give power to make byelaws for purpose (*a*) or for the first part of purpose (*b*) as we have already recommended a comprehensive provision to prohibit the passing of offensive or injurious solid matter into a stream. No objection was raised from any quarter to a general power to make byelaws for the remainder of purpose (*b*).

152. The general view about purpose (*c*) was that if powers are necessary they should be for the control rather than the prohibition of the washing of animals. Sheep washing would chiefly be affected, and the National Farmers' Union maintained that the practice—which must not be confused with sheep *dipping*—is not harmful; this was generally agreed. No special difficulties in relation to the washing of other animals were brought to our notice. We think that River Boards should have power to control the practice in particular parts of a stream if they consider that it is likely to be harmful to the stream.

Some difficulty has been experienced by Fishery Boards and other authorities through waste sheep dip, which contains harmful chemicals, being allowed to escape into streams, and it was suggested that River Boards should be able to control the siting of sheep dip places. Sheep dipping is a recognised farming practice, which may be enforced for the treatment of sheep scab under a general Order made in pursuance of the Diseases of Animals Acts. The Ministry of Agriculture and Fisheries have published a booklet on dipping which points out that care should be taken to prevent waste from dipping places entering streams, and explains methods by which this can be avoided. We do not think it practicable to provide that River Boards should receive

* These powers are now exercised by the Lee Conservancy Catchment Board.

notice of dipping, nor would it be an effective control because, in the case of some parasites, dipping must be undertaken as soon as the infection is discovered.

153. We recommend that River Boards be empowered to make byelaws, subject to confirmation by the Minister of Health:—

(*a*) Prohibiting the washing or cleansing of any cloth, wool, leather or skin in a stream or any part of a stream;

(*b*) To control the washing of animals in any specified part of a stream if they consider that it is likely to be harmful to the stream.

We make no recommendation about sheep dipping. We assume that the danger of disposing of sheep dip into streams will continue to be brought to the notice of farmers, most of whom in their own interests will take the necessary precautions. If they fail to do so the River Board can have recourse to their powers to take proceedings.

Provisions to prevent pollution from vessels

154. Section 128 of the Thames Conservancy Act, 1932, enables the Conservators and their officers to inspect vessels for the purpose of ascertaining whether sewage or other offensive or injurious matter is passing or can pass into the Thames from them.

155. Section 32 of the Lee Conservancy Act, 1900, enables the Conservancy Board* to require the owners of unseaworthy or leaky barges used for the carriage of manure, gas lime, refuse or other offensive matters to repair them or discontinue their use. If, after the expiration of seven days after the receipt of such a notice the owner fails to comply with its requirements the Board may by a further notice prohibit the use of his barge on the River Lee and its tributaries. If at any time within twelve months after the receipt of a notice prohibiting the use of a barge, the owner continues to use it on the River Lee or its tributaries, any question as to its age, unseaworthiness or leakiness may be referred for the decision of a Court of Summary Jurisdiction, who may order the owner not to use the barge on the River Lee and its tributaries. If the owner then continues to use it he is liable to a penalty not exceeding ten pounds and to a further penalty of five pounds for every day on which the use of the barge continues.

156. These two provisions can conveniently be considered together. Most interests raised no objection to similar provisions being generally adopted, but the Dock and Harbour Authorities' Association said that it would not be practicable to exercise the powers in tidal waters unless the harbour authority were responsible.

We recommend that provisions based on Section 128 of the Thames Conservancy Act, 1932, and Section 32 of the Lee Conservancy Act, 1900, be added to the general law, subject to the reservation that the powers should not be exercisable in harbours frequented by sea-going ships and under the jurisdiction of a harbour authority.

Provision in case of neglect of sanitary authority to perform certain duties

157. Section 132 of the Thames Conservancy Act, 1932, enables the Conservators to complain to the Minister of Health that a local authority have failed to carry out their powers or duties in regard to the cleansing of earth-closets, privies, ashpits or cesspools in any part of their district which is liable to flooding. The Minister, if he is satisfied that there are good grounds for complaint (he must have regard to the need for maintaining and preserving

* These powers are now exercised by the Lee Conservancy Catchment Board.

the purity of the water in the river or in any tributary) may call on the authority for an explanation. If the authority do not give a sufficient explanation or remedy the cause of complaint he may make such order as he thinks fit in the circumstances. The order is binding upon the authority and is enforceable either by the Minister or by the Conservators.

158. The powers or duties in question are those now laid down by Section 72 of the Public Health Act, 1936, which provides that a local authority under the Act (that is normally the council of a borough, urban or rural district) may undertake, and if required by the Minister of Health must undertake the cleansing of earth-closets, privies, ashpits and cesspools or any of them. The provision in the Thames Conservancy Act is, in effect, a supplement to the general procedure in the Public Health Act, 1936, for bringing to notice cases of default by a local authority in the exercise of their functions under that Act, but it goes further, because it enables the Conservators to complain that the sanitary authority have not exercised the power to undertake cleansing, whereas the authority could not be in default under the Public Health Act provisions for something they had not undertaken to do.

We agree that there may be circumstances in which River Boards would find it desirable to have the power to bring such questions under consideration for an area if a stream is liable to pollution from the flooding of that area, and we received no objections to the necessary powers being granted. We recommend that a provision similar to Section 132 of the Thames Conservancy Act, 1932, be added to the general law.

Crown properties

159. The County Councils Association said they understood that samples of effluents from sewage works at Service establishments were taken during the war by some authorities by arrangement with the appropriate Government Departments. They said that there appeared to be some doubt whether the customary Crown exemption applied to prevent authorities having a right of entry for taking samples. We agree that it is essential that River Boards should be able to find out what is being discharged into streams from any such establishments, and we think that a right of entry should be conferred on River Boards, except in those cases where access is objected to for security reasons.

We suggest that in every case the Departments concerned should instruct their responsible officers to give all reasonable facilities to authorised officers of River Boards, and to co-operate with them in ensuring that effluents discharged will not give rise to pollution.

Access to outfalls for sampling

160. The County Councils Association said that they were advised that at some places it is difficult and even dangerous to secure samples of effluents discharged into a river. They suggested that at all future sewage works, either private or public, the provision of proper facilities should be made obligatory. We recognise that this difficulty arises, and not only at sewage disposal works. We understand that some outlets are even under water. We do not, however, make any recommendation in the matter. As regards new works, we think that the River Board should be able to impose any necessary conditions in consenting to new openings under the provision we have recommended.* We do not think it reasonable to suggest a provision under which the reconstruction of existing outlets could be required.

* See Paragraph 69.

X. NOTICES AND PROCEEDINGS

Right to take proceedings

161. The existing powers of local authorities, including County Councils and Joint Boards, to institute proceedings for offences under the Act of 1876* will in future be exercised by the River Boards established under the Act of 1948, who will thus have the exclusive right to take proceedings for offences under Part III (manufacturing and mining pollution) while those provisions remain in force. As the law stands, this change will not affect the existing restriction, under Section 13 of the Act of 1876, that proceedings may not be taken for any offence under the Act while other proceedings in relation to the offence are pending. Nor does it affect the rights of a person, other than a River Board, aggrieved by the commission of an offence under the Act, to institute proceedings in respect of offences other than those covered by Part III of the Act of 1876, or to apply to the Minister of Health to hold an inquiry if the River Board refuse to take proceedings or to apply for consent to take proceedings for an offence under Part III of the Act.

162. We have considered whether, in view of the default procedure of the Act of 1948, it is necessary to retain these rights of persons other than River Boards. That procedure enables the Ministers† to hold a local Inquiry if it is alleged that a River Board have failed to exercise any of their functions in a case where they should have done, and to make an Order declaring the Board to be in default and directing them to exercise any specified functions. If the Board fail to comply with such directions the Ministers, in lieu of enforcing the law by mandamus or otherwise, may make an Order transferring to themselves any specified functions of the Board.

163. The procedure gives a reasonable opportunity to any interested person to press that the River Board shall take proceedings in any particular case, and when enforcement of the law is in the hands of River Boards we do not think it will be necessary to retain the right of a person aggrieved by an offence under the Act to take proceedings himself. We recommend that this right be abolished. The right of a riparian owner to take proceedings under the Common Law will not be affected.

164. We also recommend that the right of an interested person to apply to the Minister to direct a River Board to commence proceedings for offences in respect of manufacturing and mining pollution should not be continued, since it is, in effect, a duplication of the default provisions of the Act of 1948. We think that it is necessary to continue the provision in Section 13 of the Act of 1876, that proceedings may not be taken for an offence under the Act while other proceedings in relation to the offence are pending. We assume that civil proceedings would not be a bar to proceedings for an offence under the Act, and this should be made clear in future legislation.

Notice of proceedings

165. Section 13 of the Act of 1876 provides that proceedings shall not be taken for an offence against the Act until the expiration of two months after written notice of intention to take proceedings has been given to the offender. In the case of an offence against Part III of the Act (manufacturing and mining pollution), proceedings cannot be taken until the consent of the Minister of Health has been obtained. It has been held that the Minister's consent is a condition precedent to the giving of notice, and that the notice

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* See Paragraph 18.

† The Minister of Health and the Minister of Agriculture and Fisheries, acting jointly.

cannot therefore be given until after consent has been obtained. The Joint Advisory Committee on River Pollution, in their Third Report, said that this caused unnecessary delay. They recommended that the two months' notice should run concurrently with the consideration by the Minister of Health of the application for consent. We are in sympathy with the object of this recommendation, but we think that the whole procedure should be revised.

166. We have considered the procedure laid down by the Lancashire Act of 1938, in relation to offences against the prohibition of discharge of polluting liquid into a stream. Under this procedure the Board must first give at least one month's written notice to any person against whom they propose to take proceedings and invite him to appear before the Board at a time and place specified in the notice if he desires to show cause why proceedings should not be taken. If after this stage the Board decide to take proceedings, they must forthwith notify him of their decision and the grounds for it. Under the local Act, the Minister's consent to proceedings is required if the polluting liquid falls or flows or is carried into a stream from a factory or manufacturing process. In such cases, the decision and the grounds for it must also be notified to the Minister. The notice of intention to take proceedings is current while any application to the Minister is being considered.

If the consent of the Minister is required he may hold a local Inquiry, but he must inform the Board and the person concerned whether he gives or withholds his consent before the expiration of three months from the date of the Board's application for it.

167. We consider that this procedure affords a satisfactory means of ensuring that a person charged with an offence may appear before the River Board before proceedings are initiated and that it is preferable to the existing provisions of the Act of 1876, under which the opportunity of appearing before the pollution prevention authority is given at a much later stage, and the notice of intention to take proceedings is not valid until the Minister's consent has been obtained.

168. Section 76 of the Act of 1938 also provides that the Board may, on the application of any local authority or owner or occupier, grant time for the execution of any works or doing any acts necessary to prevent the commission of an offence under the provisions of the Act relating to the pollution and obstruction of streams. The Board may prescribe the periods within which steps to obtain powers to execute the works or do the acts shall be taken, and may extend the time allowed for executing the works or doing the acts. No proceedings may be taken against a local authority or owner or occupier who has made an application for time unless and until there is default in taking any step, executing any works or doing any act within the time prescribed by the Board.

169. The procedure which we recommend is based on that discussed in the preceding paragraphs and may be summarised as follows:—

(i) the River Board to give a month's notice of intention to take proceedings, with an opportunity for the alleged offender to appear before them;

(ii) if, after hearing the person concerned, the River Board decide to take proceedings, they shall forthwith notify him, and the Minister of Health if his consent to the proceedings is necessary;

(iii) if the consent of the Minister of Health is required, he may hold a local Inquiry, but he shall inform the River Board within three months whether he gives or withholds his consent;

(iv) the River Board to have power, on the application of the local authority or person concerned, to allow time for the execution of works or doing of acts to abate pollution of the stream; if the application is refused, the applicant to have the right to appeal to a Court of Summary Jurisdiction to determine whether time shall be allowed, and if so, for what period; proceedings shall not be taken against a local authority or person whose application for time has been granted.

170. We think that whilst this procedure is fair to a person accused of an offence, it involves no unreasonable delay, and would be a considerable improvement on the procedure of the Act of 1876. We recommend that it be prescribed for all offences under the provisions we have proposed dealing with pollution from solid matter or by offensive or injurious matter (paragraphs 51 and 58). We do not think it necessary to apply this procedure to offences against the supplementary provisions which we have recommended, except offences arising from non-compliance with byelaws prescribing standards of temperature for liquid discharges.

171. Cases have been brought to our notice where serious pollution has been caused by deliberate failure or neglect to follow instructions on the part of an employee of a responsible owner or occupier, who has provided adequate means of avoiding pollution. We recommend that in such cases it should be open to the River Board to take proceedings against the employee for an offence under the Act, either in lieu of, or in addition to proceedings against the responsible employer.

Trade refuse dealt with by contractors

172. We were informed by the West Riding of Yorkshire Rivers Board that in many cases in their area manufacturers dispose of their trade refuse to independent contractors who make their profits by recovering by-products. The terms of the agreements between the parties vary considerably, and where (as is often the case) the contractor's plant is on the manufacturer's premises, it may be difficult to say with any certainty who is responsible for the pollution caused by the discharge of imperfectly purified liquids. The Board suggested that the manufacturer should be responsible unless he produces to the River Board a written agreement in force between himself and the contractor, whereby the contractor specifically agrees to deal with the liquid refuse so as to prevent pollution. Where such an agreement is in force it was suggested that the contractor should be made responsible.

We do not agree with this suggestion. We think the only satisfactory arrangement is that the occupier of the premises should be responsible. If it is alleged that the contractor has not fulfilled his agreement, the occupier has his own remedy.

Proceedings

173. Action in respect of an offence under the Act of 1876 is by way of proceedings in the County Court for an Order, in the nature of an injunction, requiring a person to abstain from committing the offence. If the offence consists in default to perform a duty under the Act, the Order may require him to perform such duty in the manner specified in the Order. The Court has no power to impose a penalty unless there is default in complying with its Order; in that case the Court may order the person in default to pay to the person complaining (or to such other person as the Court may direct) a sum not exceeding £50 a day for each day in which he is in default. If the default persists for at least a month (or such lesser period as the Order may fix) the Court may, in addition to imposing a penalty, appoint someone

to carry the Order into effect; the expenses incurred in carrying out the Order, as allowed by the Court, are deemed to be a debt due from the person in default to the person executing the Order, and may be recovered accordingly in the County Court.

Before making an Order requiring a person to abstain from committing an offence the Court may remit to "skilled parties" to report on "the best practicable and available means"* and the nature and cost of the works and apparatus required; the report must take into account the reasonableness of the expense involved.

174. We received evidence on the question of the Court in which proceedings should be taken, and in particular whether procedure in a Court of Summary Jurisdiction should be substituted for, or made available as an alternative to the present procedure in the County Court. Many interests saw no objection to alternative procedure; the County Councils' Association did not object if there was a right of appeal to Quarter Sessions from the Court of Summary Jurisdiction.

175. The Association of Municipal Corporations suggested that procedure should always commence in a Court of Summary Jurisdiction. The Federation of British Industries said that either Court was unsuitable for deciding technical questions but had no objection to the alternative if safeguards for industry were retained. The Rural District Councils Association and the West Riding of Yorkshire Rivers Board preferred the County Court, which the latter body thought was more suitable for deciding the contentious questions which often arose on proceedings for pollution.

176. The National Coal Board said that the County Court was a much more suitable tribunal for considering economic and industrial factors of national importance. They wished to preserve the right of appeal to the High Court "on the merits" as well as on points of law or admission of evidence. Under the provisions for prevention of pollution in the Acts administered by the Thames Conservancy and the Lee Conservancy, procedure is in a Court of Summary Jurisdiction† and both bodies said that they had found no difficulties.

177. It was represented to us that while the procedure provided in the Act of 1876 is generally satisfactory in a case of continuing pollution it affords no remedy or penalty for an isolated act of pollution, caused possibly by wilful negligence or by neglect, which, though of limited duration, may have serious effects. We think that provision should be made for proceedings in such cases and that an offender should be liable to penalty; there may also be circumstances in which the Court would consider that a penalty should be imposed in a case of continuing pollution. Moreover, we have recommended a number of supplementary provisions under which the procedure would be for the recovery of a penalty. Proceedings for recovery of a penalty cannot be taken in the County Court unless there is default in complying with an Order of the Court and it will therefore be necessary to give a River Board power to bring cases before a Court of Summary Jurisdiction. It will still be desirable, in order to deal with cases of continuing pollution, to retain the power of the Court to make an order requiring a person to abstain from committing an offence and to ensure that the order is carried out. We consider that the Court of Summary Jurisdiction should also have this power.

178. Sections 51 and 52 of the Act of 1938 provide for such a procedure. Under these provisions procedure is before a Court of Summary Jurisdiction which has power not only to impose a penalty, but also—in lieu of or in

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* See Paragraphs 13 to 15, and 17.

† The Lee Conservancy have, however, the alternative powers explained in para. 18.

addition to any penalty—by order to require a person to abstain from the commission of an offence or to perform a duty if he is in default. The Court has a general power to give directions for carrying out its order, and a person who is in default in complying with an order is liable to a penalty not exceeding £50 a day for each day in which he is in default. A party aggrieved by the decision of the Court may appeal to a Court of Quarter Sessions.

179. We do not think that provision should be made for procedure in the County Court as an alternative to procedure in a Court of Summary Jurisdiction. The former should be the Tribunal in those cases in which a restraining order only is required. When a penalty is sought proceedings should be instituted in a Court of Summary Jurisdiction or by indictment if a substantial fine is desired. The Court should be empowered to order the offender to abate the pollution and there should be a continuing penalty for each day in which the offender is in default in doing so.

180. Provision should be made for a party aggrieved by a decision in a Court of Summary Jurisdiction to appeal to a Court of Quarter Sessions. Suggestions were made to us that a River Board, if dissatisfied with the decision of a Court of Summary Jurisdiction, should have power to appeal to Quarter Sessions. We consider that such a provision would be contrary to the general principle that a prosecutor who has failed to prove his case to the satisfaction of the Court should not have a right to have the case heard again by a Superior Court, except on a point of law.

Penalties

181. The maximum penalties prescribed by any new legislation should be substantial enough to be a deterrent to the wilful offender. In normal conditions, we should say that penalties similar to those provided by Section 47 of the Water Act, 1945,* would be suitable if a local authority or industrialist had failed to take steps to provide or use adequate treatment plant when the means were available at reasonable cost, although the maximum penalty on summary conviction might, we think, be of the order of £20 with a continuing penalty of £10 a day. But conditions are far from normal, and it may be some years before labour and materials are available in sufficient quantities for the large volume of work that will be necessary to bring treatment works to a fully satisfactory standard. Subject to this consideration being borne in mind when legislation is drafted, we recommend that there should be substantial maximum penalties for infringements of the new law. Somewhat smaller maximum penalties should be prescribed for minor infringements, or if proceedings were taken against an employee, and not against the owner or occupier.

182. We do not think it necessary to retain the power given to the Court by the Act of 1876 to remit to "skilled parties". It is doubtful whether the power has been used to any extent, as the Court is given no power to order any remuneration to the parties. The normal procedure, and that which we think preferable, is by evidence from experts who are subject to cross-examination. Nor do we think it necessary to retain the provision in Section 12 of the Act of 1876† that a certificate granted by a qualified

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* The penalties are—

A fine not exceeding fifty pounds on summary conviction with a further fine not exceeding five pounds for every day during which the offence continues.

A fine not exceeding two hundred pounds on conviction on indictment with a further fine not exceeding twenty pounds for every day during which the offence continues.

† See Paragraph 20.

Inspector appointed by the Minister of Health shall be conclusive evidence on certain questions relating to means of treatment. We understand that the Ministry have no record of these powers having been used in recent years, and that no Inspector is now authorised to give such a certificate. The provision may have been valuable in 1876, when a very large number of sewage disposal works and industrial establishments were being brought within the scope of entirely new provisions, and it may then have relieved the Courts of the burden of deciding certain technical problems. We think that it is out of keeping with current practice under which a decision taking into account all the circumstances of the case can be made either by the Courts or by Ministers.

183. We recommend as follows:—

(*a*) Procedure for offences to be before a Court of Summary Jurisdiction or by indictment if a substantial maximum penalty is prescribed.

(*b*) The Court to have power to impose penalties for a first offence, a higher maximum penalty for a second or any subsequent offence, and a further penalty for every day on which an offence is continued after conviction.

(*c*) The Court to have power (in lieu of imposing a penalty or in addition to any penalty it may impose) to make an Order requiring the offender to abstain from the commission of an offence. The Court to have appropriate power to make conditions, to suspend or rescind any Order, and to give directions for carrying the Order into effect.

(*d*) A person who is in default in complying with any requirement of an Order to be liable to a penalty for every day during which he is in default.

(*e*) The provisions in Section 10 and 12 of the Act of 1876 relating respectively to reference to "skilled parties" and to "a certificate granted by an Inspector of proper qualifications appointed..... by the Minister of Health" to be discontinued.

(*f*) The River Board to be able to institute proceedings in the County Court if they do not seek penalties.

(*g*) The customary provision to be made for an appeal to the appropriate higher Court.

XI. THE SALMON AND FRESH WATER FISHERIES ACT, 1923

184. The Joint Advisory Committee on River Pollution, in their Third Report, said that they found no strong evidence of need for amendment of the pollution provisions of this Act. They thought that the question of its revision should be deferred until more experience had been obtained of its operation. It could then be considered in a comprehensive review of the law relating to the prevention of pollution. It was suggested to us that the restriction of the powers of Section 8 of the Act to "waters containing fish" should be removed, because it prevents action being taken under the Act in respect of streams which have become sterile and in which all fish have been destroyed. For the reasons explained in paragraphs 42-45 of this Report we do not consider that such a drastic alteration of the law is warranted in present circumstances. Improvements of the quality of the streams which now contain no fish could, and should be secured by effective administration

of the strengthened powers which we recommend in this Report. We received no other proposals for the amendment of the Act so far as it deals with prevention of pollution.

We have considered whether, in view of the revised and strengthened provisions for the prevention of pollution which we propose for River Boards, it is necessary to retain the separate provisions which they will administer under the Act of 1923.* There are, however, a number of reasons for retaining the latter powers. Proceedings under Section 8 of that Act can only be taken for the protection of fish, and direct or indirect damage to fish must therefore be proved before an action can succeed. This limits the possibility of alternative proceedings under different statutes for the same offence, and we have already recommended the further limitation that if an effluent complies with a standard laid down by byelaws under the general law for prevention of pollution, that fact shall be a defence against proceedings under the Act of 1923 in respect of the effluent. Moreover, in addition to proceedings by River Boards (as successors to Fishery Boards) under the Act of 1923, proceedings may be taken by a person who has " a material interest in the waters alleged to be affected ", if he first obtains a certificate to that effect from the Minister of Agriculture and Fisheries. It is to be noted that the Minister's consent to the proceedings is not necessary ; his only concern is whether the complainant has the necessary " material interest ".

186. We expect that it will not be necessary to prescribe standards for many streams containing fisheries of importance. Under our recommendations, proceedings for pollution from industrial, manufacturing and mining undertakings in such rivers will need the consent of the Minister of Health if no byelaws are in force. In such circumstances it seems reasonable that a River Board, or a person whose interest in a fishery is established, should retain the present right to take summary proceedings for the protection of the fishery, without any consent.

187. There is the further point that proceedings may be taken in respect of offences relating to tidal waters if they contain fish. (In view of the context of the Act, " fish " must be interpreted as meaning salmon, trout or fresh water fish.) Proceedings may also be taken for an offence at sea if the place of offence is within the jurisdiction of an English Court and salmon or sea trout have been harmed. The general provisions for pollution would, under our recommendations, apply to tidal waters only so far as applied by order of the Minister of Health. Having regard to all these considerations there seems to us to be a sufficient case for retaining separate provision for proceedings in respect of pollution affecting fish.

188. There are also powers in Section 59 (1) (*p*) of the Act of 1923 which enable River Boards to make byelaws to regulate the deposit or discharge, in waters containing fish, of any liquid or solid matter specified therein detrimental to salmon, trout or freshwater fish, or the spawn or food of fish. The requirement to specify the matters to be controlled limits the scope of the byelaws, and there should not be any conflict between these powers and the general law. In any case both will be administered by the River Board. These byelaws are subject to confirmation by the Minister of Agriculture and Fisheries, whereas for byelaws made under the general law for the control of pollution the confirming authority will be the Minister of Health. The former Minister is charged with general duties as the responsible Minister for fisheries, and we consider that these separate powers under his control should be retained.

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* See Paragraphs 24 to 27.

189. We have already remarked that the requirements in Section 8 (2) of the Act of 1923 will not be necessary if our recommendations in paragraph 72 are accepted, and we recommend that the sub-Section be repealed.

XII. THE PUBLIC HEALTH ACTS

190. It was suggested to us that the prevention of river pollution would be much facilitated if the Minister of Health had power under Section 6 of the Public Health Act, 1936, to form a united district of local authorities, with a Joint Board, for sewerage and/or sewage disposal, without an application being made by any of the proposed constituent authorities. Under the terms of the Section the Minister may by order constitute a united district, with a Joint Board of the local authorities concerned and of any County Council contributing towards the expenses of the Board, for any purpose of the Public Health Acts, on application from all or any of the proposed constituent district councils. The Order becomes provisional if it is objected to by the local authority of any district affected, or by the County Council in which any such district is included. For purposes of water supply, the Minister has been given the power to form a Joint Board without any application from a proposed constituent, and it was suggested that he might have similar powers for sewerage and sewage disposal. He has also been given power, under the New Towns Act, 1946, to constitute a united district for any purpose for which such a district may be formed under the Public Health Act, 1936, if he considers it expedient for the purposes of the new town.

It was further suggested that the Minister should have power to require that a sewer vested in one authority should communicate with a sewer vested in, or with the sewage disposal works of, another authority. Under Section 28 of the Public Health Act, 1936, such arrangements can be effected only by agreement, with the approval of the Minister.

191. Both proposals, it was thought, would facilitate improved sewage disposal arrangements where this could be done by combination of several authorities to set up a larger or more efficient works, or by the reception of sewage from one district by another authority which already has an efficient works with spare capacity. Many interests consulted were in favour of these powers being given to the Minister. The Rural District Councils Association and the Urban District Councils Association did not however agree to the compulsory formation of Joint Boards. The former Association preferred Joint Committees, which leave the financial and other decisions to be confirmed by the constituent authorities, but would agree to the Minister being given power to compel local authorities to form Joint Committees for sewerage and/or sewage disposal. The Urban District Councils Association thought the question of forming joint authorities should be left to the authorities' discretion. The Association of Municipal Corporations agreed that in exceptional cases it might be desirable for the Minister to initiate proposals for the formation of a Joint Board, provided that a local Inquiry were held before the Minister decided whether to make an Order. The Urban District Councils Association did not agree to the Minister having power to require the communication of sewers, suggesting that this also should be a matter for voluntary arrangement.

192. The Minister's extended powers under the Water Act, 1945, were designed to assist him in carrying out the general policy set out in the White Paper "A National Water Policy" which contemplated improvements in administration that eventually would result in a considerable reduction in

the number of water undertakings, and it may be said that such extensive powers are not necessary for dealing with sewage disposal functions. Nevertheless, we have no doubt that radical improvements of the condition of the streams in the more highly industrialised areas must depend largely on the treatment of trade wastes in efficient large disposal works, and the reception of trade wastes for treatment would be very much facilitated by combination of local authorities or co-operation between them, measures that often prove to be impracticable because of differences on terms, pre-occupation with boundary problems, questions of local prestige, or for other local reasons which ought not to be allowed to hold up desirable improvements. We recommend that Section 6 of the Public Health Act, 1936, should be amended so as to permit the Minister to form a united district for purposes of sewerage and/or sewage disposal, notwithstanding that an application has not been received from any of the proposed constituent authorities. We also recommend that Section 28 of the Public Health Act, 1936, be amended so as to permit the Minister, in the absence of agreement between authorities, to require a sewer vested in any sewerage authority to communicate with a sewer vesting in, or to discharge to a sewage disposal works of another sewerage authority, to such extent, at such points and on such terms as he may consider desirable. There should be a full opportunity for the sewerage authorities, riparian owners and any other interested parties to be heard before any such requirement is made.

193. A further suggestion was made that the Public Health (Drainage of Trade Premises) Act, 1937, should be amended so as to terminate, after a prescribed period, the rights given to traders who were discharging trade effluents to the sewers within the year ending on the 3rd March, 1937. Section 4 provides that no consent shall be necessary to the discharge of a trade effluent into a sewer from any trade premises if a trade effluent of the same nature and composition was lawfully discharged from the premises into the sewer at some time within the above period so long as:—

(*a*) the quantity discharged on any one day does not exceed the maximum quantity discharged on any one day during the above-mentioned year;

(*b*) the rate at which this discharge is made is not higher than the highest rate at which it was discharged during that year;

(*c*) if the discharge was in pursuance of an agreement between the local authority and the owner or occupier of trade premises which was in force at the end of the year in question but had or thereafter ceased to be in force the owner or occupier pays to the local authority, in accordance with the terms of the agreement, any payments in respect of the reception of the trade effluent that he would have been obliged to make under the agreement if it were still in force.

There are supplementary provisions dealing with discharge into replaced sewers, and a provision limiting the effect of byelaws made under the Act in relation to the protected discharges.

194. It was represented to us that the costs of treating trade effluents had greatly increased, yet in some cases the local authority received no payment, because none had been made for the original discharge; in other cases they were entitled only to the existing charges. No evidence was given to us that the obligation to receive and treat these trade effluents had caused such difficulties at sewage works as to increase the risk of pollution of rivers and streams, or that any relaxation of the liability would mean a reduction in

pollution. We have already commented on the desirability of concentrating the treatment of trade wastes in the sewage works of local authorities, and we should not be prepared to recommend any change in the law which would reduce the practice. The terms and conditions on which local authorities are required to take these particular discharges do not appear to us to be matters with which we are concerned under our terms of reference. We draw attention to the representations, but we must point out that the Federation of British Industries said that in their opinion it would be most unjust to take away a right conferred by Parliament. They considered the right in question to be part of a general arrangement under which both industry and local authorities had made concessions.

XIII. COMPREHENSIVE CODE OF LAW FOR PREVENTION OF POLLUTION

195. We consider that our recommendations for the revision and extension of the Act of 1876 should not be effected by a series of amendments to that Act, but by a new Act repealing the Act of 1876. We think it essential that a comprehensive code of law should be available as soon as possible so that River Boards will know, at an early stage of their work, the powers they are to administer, and interests affected will have a clear indication of the law with which they must comply.

We suggest that consideration should be given to a revised definition of the watercourses, etc. to which the new powers would apply. The Act of 1876 applies to a "stream" as defined in the Act (see paragraph 22). We understand that it is possible for pollution of a stream to arise from farm ditches and other channels which are dry for part of the year, but discharge to the stream after heavy rain. We make no recommendation on the precise wording of a revised definition, but we suggest that in drafting it the difficulty we have mentioned should be borne in mind.

196. We have examined the existing statutory provisions (in addition to those of the Act of 1876) described in Part IV of this Report, and have considered whether, in view of the new circumstances arising from the formation of River Boards, any of them ought to be amended, or administered by River Boards. As regards the Act of 1923, we have recommended in Part XI of this Report that there should continue to be separate powers for the prevention of pollution which would affect fish. We suggest, however, that it might make for administrative convenience if these powers were removed from the Act of 1923 and made a separate part of a new general Act dealing with the prevention of pollution.

197. We do not consider that there is a case for amending any of the other provisions or bringing them within the scope of an Act to be administered by River Boards. There will be some overlapping of functions, but this is not unusual, and need not cause any difficulty. Dealing first with the Public Health Acts, Section 30 of the Public Health Act, 1936, which restricts the discharge of foul water into a stream, canal, pond or lake, is an important check on the way in which public health authorities carry out works of sewerage and sewage disposal, and we think it should be left in the Act giving those powers. It does not give any administrative powers and it would be open to a River Board to take appropriate steps if the law is not complied with. Section 259 (1) of that Act provides that certain matters concerning the fouling or obstruction of watercourses, ditches, ponds, etc., should be statutory nuisances. They can therefore be dealt with by local authorities under the powers given by the Act. We think these authorities should retain

the powers, which are given to them in relation to their public health duties. Section 68 of the Public Health Act, 1875, which forbids the fouling of streams from gas washing or gas making processes, is a public health provision. It also gives certain rights to owners of water, and we think it should be retained in its present form. The Public Health (Drainage of Trade Premises) Act, 1937, deals with the reception of trade effluents into public sewers and must be administered by the local authorities responsible for the sewers.

198. The provisions relating to pollution in the Waterworks Clauses Act, 1847, the Water Act, 1945, and the Third Schedule to that Act, are for the protection of water undertakers' supplies, and should remain with those undertakers. The provisions in the Gasworks Clauses Act, 1847, and the Gas Act, 1948, are a special protection against pollution by gas undertakers, and we think they should be left where they are. Special provisions relating to the prevention of pollution in harbours have been enacted in the interests of navigation, and should continue to be enforced by the harbour authorities. The Oil in Navigable Waters Act, 1922, should also continue to be enforced by those authorities, and by River Boards where they have power to enforce it as successors to Fishery Boards.

199. As for local Acts, it would be impossible, in our view, to repeal them since they contain provisions which were considered to be appropriate for the special requirements of the areas to which they apply, and protection for interests that were presumably considered, on the evidence available, to be essential when the Bills were before Parliament.

Paragraph 17 of the Third Schedule to the Act of 1948 provides that modifications, adaptations and exceptions may be made in a local Act or statutory Order, in its application to a River Board area, by Order of the Minister of Health, unless the powers were conferred for purposes of a water undertaking; and where such Acts or statutory Orders apply to part only of a river, paragraph 18 provides that the Minister's Order may extend them to the whole of the river so far as it is in the River Board area. These powers would enable the Minister to bring local Acts into line with the new general law and to extend any special provisions of those Acts to any parts of a river system to which they do not apply, if this should be deemed to be necessary. We consider that the Minister should give all interested parties an opportunity of being heard before any such Orders are made.

200. Generally, we consider that the powers of the new code which we have recommended should be sufficient for all the purposes of a River Board in the exercise of their functions for the prevention of pollution. If in any special case a River Board should consider that special powers are necessary to meet the peculiar conditions in their area, they could no doubt seek the powers by local Act. Similarly, if they wish to extend powers of existing local Acts to areas where they are not now applicable, or to which they cannot be extended by the Minister's Order, they could do so by local legislation.

XIV. SUMMARY OF RECOMMENDATIONS

Principal Recommendations

201.—(1) We consider that the Act of 1876 requires revision, and in some respects needs strengthening. We recommend that our proposals which we summarise below should be given effect to by a new Act which should repeal the Act of 1876. In reviewing the definition of "stream" in that Act the difficulties arising from farm ditches and other channels which may discharge to a stream, should be considered. We also

recommend that the existing provisions relating to pollution affecting fisheries, in the Act of 1923, should be continued, but should form a separate part of the new Act. (Paragraphs 195 and 196.)

CHANGES FROM THE ACT OF 1876

Sewage pollution and industrial pollution

(2) The separate provisions relating to sewage pollution and industrial pollution should be replaced by a comprehensive provision making it an offence to allow offensive or injurious matter, solid or fluid, to enter a stream. The separate provisions in Section 5 for prevention of pollution from mines should not be continued, but the reservation relating to mine water which enters a stream in the same condition as that in which it has been drained or raised from the mine should be retained pending technical investigation. (Paragraphs 58, 61 and 65.)

The provisions in Sections 3 and 4 of the Act relating to discharge through a channel, etc., used constructed or under construction at the date of the passing of the Act, or through a substituted channel with an outfall at the same spot, should be repealed. (Paragraph 60.)

Standards for liquid effluents

(3) A River Board should be able to prescribe standards with which effluents discharged into a stream or part of a stream must comply; effluents which do not comply with a standard should be deemed to be offensive or injurious.

(4) The standards should be prescribed by byelaws subject to confirmation by the Minister of Health, and the procedure for making byelaws should be that laid down in Sections 18 and 34 of the Act of 1948, with the following modifications:—

(*a*) Three months' notice should be required of a proposal to submit byelaws for confirmation;

(*b*) the Minister should be required to hold a local Inquiry if objections to confirmation of byelaws are received from persons he considers to be interested.

Compliance with a standard should be a defence against proceedings under Section 8 of the Act of 1923. (Paragraph 92.)

(5) A byelaw fixing a standard should not be confirmed until a proper survey of the stream or part of a stream has been completed. (Paragraph 93.)

A River Board should be required to submit to the Minister of Health a report of any completed survey of a stream or part of a stream. (Paragraph 43.)

Consent to proceedings

(6) A River Board should be able to take proceedings in respect of polluting matter which does not reach a prescribed standard, without any consent of the Minister of Health. (Paragraph 100.)

(7) Proceedings should not be taken, without the consent of the Minister of Health, in respect of liquid effluent from industrial, manufacturing and mining undertakings if no standard has been prescribed for the stream, or if the proceedings are in respect of properties of an effluent for which no standards are prescribed. (Paragraph 106.)

(8) The Minister should be required, before giving his consent to proceedings, to consider whether the best practicable means of treatment, within a reasonable cost, are being used; if they are not being used, he should (if he thinks it reasonable) give the person concerned an opportunity of obtaining and using them. (Paragraph 109.)

Control of new openings into streams

(9) It should be an offence to open into a stream any sewer, drain, pipe or channel unless the consent of the River Board has been obtained; the Board should be entitled to attach terms and conditions to their consent: consent should not be unreasonably withheld and any difference on a question whether consent should be granted, or whether the conditions imposed are reasonable, should be determined by the Minister of Health. The provision should not apply to the Manchester Ship Canal.

Consent should not be required to a new opening for the discharge of effluent from the sewage disposal works of a local authority if the work has been approved or authorized by the Minister, or if he has consented to a loan to meet the cost. A local authority should be required to notify a River Board, in advance, of any local Inquiry into such proposals. (Paragraphs 69 and 70.)

Notice of changes in liquid effluents

(10) Four weeks' notice should be given to the River Board of any proposals which involve radical changes in the volume, nature or rate of discharge of any liquid effluent being discharged into a stream (paragraph 72).

Solid matter

(11) The provisions relating to solid matter should deal with all solid matter except offensive or injurious matter which would be within the scope of the provision proposed in recommendation (2). They should follow in principle Section 43 of the Act of 1938, and should also prohibit the placing of offensive or injurious matter on the banks of a stream so that it may drain or pass into the river (paragraphs 51 and 53).

(12) An offence should not arise from deposit of solid matter from a mine or quarry if the Court is satisfied that no other site for disposal is reasonably practicable and that all reasonable steps have been taken, within a reasonable cost, to prevent solid matter from entering the stream (paragraph 52).

(13) The Court should be empowered, on the application of the River Board, to make an Order requiring a person convicted of an offence in respect of solid matter to remove it within a reasonable period, and authorising the Board, in his default, to undertake the removal and recover the cost (paragraph 54).

Solid matter in suspension

(14) The provisions dealing with solid matter should not relate to suspended solid matter, unless the Court is satisfied that the suspended matter which has been allowed to pass into a stream is obstructing or is likely to obstruct the due flow of the stream (paragraph 55).

Tidal waters

(15) Full powers for the prevention of river pollution should apply to tidal waters only where so determined by Order of the Minister of

Health, after a local Inquiry. The Minister, in exercising this power, should not be restricted to "sanitary grounds" but should be able to take any relevant circumstances into consideration (paragraph 121).

(16) The Minister of Health should have an additional power, by Order, and after local Inquiry, to extend particular provisions of the law to tidal waters, and to prescribe, where appropriate, the standard to be complied with. He should be able to take all the circumstances into account.

An application for such an Order should state the provisions proposed to be applied, and any standard proposed: notice of the application should be given in the manner recommended for applications for confirmation of byelaws fixing standards (paragraph 123).

Before making an Order applying the law to tidal waters, the Minister of Health should consult the Minister of Transport on questions affecting navigation and harbours, and the Minister of Agriculture and Fisheries on questions which concern his Department (paragraph 124).

Other Recommendations

Supplementary provisions

(17) A River Board should be empowered to make byelaws, subject to confirmation by the Minister of Health, to prescribe standards of temperature at which liquids may be discharged to a stream. The procedure for making and confirming the byelaws should follow that recommended for byelaws prescribing standards for liquid effluents. The powers should not apply to the Manchester Ship Canal. Byelaws should not be confirmed without prior consultation with the Minister of Transport and the Minister of Agriculture and Fisheries as in recommendation (16). Section 15 of the Electricity (Supply) Act, 1919, should be amended to provide that an Order made by the Minister of Fuel and Power, fixing the temperature of the return of abstracted water to a stream, shall not conflict with any byelaws made by a River Board (paragraph 137).

(18) A byelaw fixing a standard of temperature for a discharge should not be confirmed until the Minister of Health is satisfied that a proper survey of the stream or part of a stream has been completed (paragraph 138).

(19) A River Board should be empowered to make byelaws (under the procedure recommended in paragraph 92 for prescribing standards of effluents) to control innocuous discoloration. If no byelaws are made, innocuous discoloration should be deemed to be not "offensive or injurious" for the purpose of the recommendation in paragraph 58 (paragraph 141).

(20) The Minister's consent to proceedings should not in any case be required if it is alleged that the person concerned has suitable means of preventing pollution and has failed to make use of them (paragraph 145).

(21) The sludging out of mill dams, weirs, ponds, etc., without the consent of the River Board, should be an offence; if it is alleged that consent has been unreasonably withheld, the question should be determined by the Minister of Health (paragraph 149).

(22) Persons cutting or responsible for cutting weeds or other vegetation in a stream should be required to remove them at once.

The deposit of weeds, grass or other vegetation in a stream should be prohibited. Contravention of these provisions should involve liability to penalty (paragraph 150).

(23) A River Board should be empowered to make byelaws, subject to confirmation by the Minister of Health: (*a*) to prohibit the washing or cleansing of cloth, wool, leather or skin in a stream; (*b*) to control the washing of animals in any specified part of a stream if the Board consider that it is likely to be harmful to the stream (paragraph 153).

(24) A River Board should have power to inspect vessels to see if offensive or injurious matter is passing or can pass from them into a stream, and should have power to require owners of unseaworthy or leaky barges used for the carriage of offensive or injurious matter to repair them or discontinue their use; the powers should not be exercisable in a harbour frequented by seagoing ships and under the jurisdiction of a harbour authority (paragraph 156).

(25) A River Board should have power to complain to the Minister of Health that a local authority have not carried out their powers or duties to cleanse earth-closets, privies, ashpits or cesspools in any part of their district which is liable to flooding. The Minister should have power to call on the authority for an explanation, and if necessary to make an order binding on the authority and enforceable either by the Minister or by the Board (paragraph 158).

Proceedings

(26) The right of a person aggrieved by an offence under the Act of 1876 to take proceedings himself, subject to the restrictions in the Act, should be abolished (paragraph 163).

(27) The right of a person interested to apply to the Minister of Health to direct a River Board to commence proceedings, in cases where the Board have failed to apply for consent to proceedings, should be abolished (paragraph 164).

(28) The procedure for notice of proceedings should provide for one month's notice by the River Board of intention to take proceedings, with an opportunity for an alleged offender to appear before the Board: the Board should be required to notify the person concerned if, after hearing him, they decide to take proceedings, and to notify the Minister of Health if his consent to the proceedings is necessary; the Minister should have power to hold a local Inquiry but should be required to inform the Board within three months whether he gives or withholds his consent; the River Board should have power, on application from the local authority or person concerned, to allow time for works or acts to abate pollution of the stream; the applicant should have a right of appeal to a Court of Summary Jurisdiction if his application is refused, and proceedings should not be taken against a local authority or person whose application for time has been granted (paragraph 169).

(29) The above procedure should apply to offences arising from non-compliance with byelaws prescribing standards of temperature for liquid discharges, but otherwise should not apply to offences under the supplementary provisions recommended (paragraph 170).

(30) The provision in Section 6 of the Act of 1876 giving the right of a further hearing before the authority in certain cases, should be repealed (paragraph 110).

(31) A River Board should have power to take proceedings against an employee for an offence, either in lieu of or in addition to proceedings against the responsible employer (paragraph 171).

(32) Procedure for offences should be before a Court of Summary Jurisdiction or by indictment if a substantial maximum penalty is prescribed: the Court should have power to impose penalties for a first offence, a higher maximum penalty for a subsequent offence, and a further penalty for every day on which an offence is continued after conviction: the Court should also have power (in lieu of or in addition to a penalty) to make an Order requiring the offender to abstain from committing an offence, including power to make conditions, to suspend or rescind any Order, and to give directions for carrying an Order into effect: provisions for reference to "skilled parties" and for acceptance of a "certificate granted by an Inspector of proper qualifications" should be discontinued: a River Board should be able to take proceedings in the County Court if they do not seek penalties: and the customary provision should be made for appeal to a higher Court (paragraph 183).

Salmon and Freshwater Fisheries Act, 1923

(33) Sub-section (2) of Section 8 should be repealed (paragraph 189).

Public Health Acts

(34) Section 6 of the Public Health Act, 1936, should be amended to empower the Minister of Health to form a united district for sewerage and/or sewage disposal, without an application from any proposed constituent authority (paragraph 192).

Section 28 of the Public Health Act, 1936, should be amended to empower the Minister of Health to require the communication of a sewer of one authority with a sewer or sewage disposal works of another authority, to such extent, at such points and on such terms as he may consider reasonable (paragraph 192).

Inter-departmental scientific committee

(35) We also recommend that an inter-departmental scientific committee be formed to advise on the tests to which standards for polluting liquids should be related, and on the fixing of standards of temperature for controlling heated discharges (paragraphs 94 and 139).

202. This ends our review of the law relating to the prevention of pollution of rivers and streams. We have not attempted to suggest the precise legal form in which our recommendations should be given effect; that is a matter for parliamentary draftsmen.

We are confident that the revised powers we propose will enable River Boards to maintain and improve the condition of the waters under their control, with proper regard to the various interests. We wish, however, to stress our view that while it is essential that River Boards should have adequate powers, compliance with the law in the majority of cases will best be ensured by friendly consultation and discussion between the officers of the River Boards and representatives of the various interests in the river. Such consultation has been the general practice with existing authorities concerned directly with the prevention of pollution and has been of great value. Far-reaching improvement must, as we have already said, be gradual, but we think that by consultation standards of practice will be built up by which substantial improvements will be secured by the friendly co-operation of all parties.

203. We desire to place on record our sense of deep obligation to Dr. A. Key, Ph.D., D.Sc. and to Dr. B. A. Southgate, D.Sc., Ph.D., F.R.I.C., F.Inst., S.P., Mr. A. Titherley and the other assessors who were appointed by the various Government Departments concerned. Their scientific and other knowledge was of great value and materially assisted us in arriving at the recommendations which we have put forward.

We have also been ably assisted in our deliberations by our Secretary, Mr. W. G. Honnor, of the Ministry of Health. He has shown a wide knowledge of the problems before us and of the relevant statutes, and we desire to express our cordial appreciation of the valuable services which he has rendered to us, particularly in connection with our Report.

S. R. HOBDAY (*Chairman*)
JOCELYN BRAY
J. CHASTON
C. W. ELLEN
H. JOHNSON
M. KISSANE
CECIL NEWMAN
ERIC W. SCORER
E. SIMS-HILDITCH
N. F. S. WINTER

W. G. HONNOR,
Secretary.

APPENDIX A

(see paragraph 3)

LIST OF EVIDENCE

1. WRITTEN AND ORAL EVIDENCE

Organisation.	*Witnesses.*
Association of Drainage Authorities.	Mr. W. J. S. Bew.
	Mr. R. C. Treadgold, F.R.I.C.S., M.I.Mun.E., M.T.P.I.
Association of Municipal Corporations.	Mr. G. H. Banwell.
	Mr. J. H. Edmondson, M.I.Chem.E., A.M.I.M.E.
	Councillor J. D. N. Nicholson.
British Electricity Authority.	Mr. C. Bottrell, A.M.I.E.E.
	Mr. C. J. Hornsby, F.C.C.S.
	Mr. H. J. Howland.
	Mr. R. L. Rees, M.A., F.R.I.C., M.I.C.E., M.Inst.F.
	Mr. F. Shakeshaft, A.M.I.E.E., M.Inst.F.
British Field Sports Society.	Mr. H. D. Turing.
British Waterworks Association.	Mr. G. U. Houghton, M.Sc., F.R.I.C.
	Mr. L. F. Millis, O.B.E., B.Sc. (Econ.), Barrister-at-Law.
	Mr. N. J. Pugh, C.B.E., M.I.C.E., M.I.W.E.
	Mr. H. G. Ramsay, M.I.C.E, M.I.W.E.
Canal Association.	Mr. C. M. Marsh, B.Sc. (Eng.), M.I.C.E.
	Mr. W. H. Pryce, O.B.E.
Catchment Boards' Association.	Lt.-Col. E. T. L. Baker, O.B.E., T.D.
	Mr. G. Dallas, C.B.E., J.P.
	Mr. J. Hirst, A.F.C.
	Mr. G. E. Walker, M.A., LL.B.
Central Landowners' Association.	Lord Portsmouth.
	Mr. F. F. Taylor, F.L.A.S.
Council for the Preservation of Rural England.	Mr. H. G. Griffin, C.B.E.
	Mr. W. R. Hornby-Steer, M.A., LL.B.
County Councils Association.	Dr. W. A. Bullough, C.B.E.
	Mr. A. Marsh.
Dock and Harbour Authorities' Association.	Mr. R. H. Bransbury.
	Mr. J. A. Cashin, A.M.I.C.E., A.M.I.Mech.E.
Federation of British Industries.	Mr. G. W. Andrew.
	Mr. C. Lea.
Lancashire Rivers Board.	County Alderman T. A. Edwards, J.P., F.R.G.S.
	Mr. W. P. Hazeldine.
	Mr. A. H. Jolliffe, O.B.E., M.C.
	County Alderman Percy Lee, J.P.
	Mr. F. Whalley.
Lee Conservancy Board.	Sir Thomas Keens, D.L., J.P.
	Mr. W. L. Ives, LL.B., Barrister-at-Law.
	Mr. F. W. Swain, A.M.I.S.E., M.Inst.S.P.

Organisation.	*Witnesses.*
National Association of Fishery Boards.	Major A. T. R. Houghton, M.A., M.C. Mr. C. U. Peat. Major J. Inglis Spicer, M.B.E.
National Coal Board.	Mr. A. Grounds. Mr. G. Hall. Mr. D. Hicks. Sir Geoffrey Vickers, V.C.
National Farmers' Union.	Mr. G. Gibbard. Mr. J. F. Phillips. Mr. H. Woolley.
Pure Rivers Society.	Mr. H. W. Moggridge. Mr. C. A. M. Skues.
Rural District Councils Association.	Mr. T. Dymond Hockings. Mr. J. J. McIntyre, O.B.E.
Thames Conservancy Board.	Col. G. S. Field, O.B.E. Mr. G. E. Walker, M.A., LL.B.
Urban District Councils Association.	Mr. V. Seaton-Gray, M.B.E. Mr. D. J. Jones, O.B.E. Mr. H. S. Haslam. Mr. J. Poole.
West Riding of Yorkshire Rivers Board.	Mr. H. F. Atter, O.B.E. Alderman C. W. Beardsley, O.B.E., J.P. Mr. J. H. Garner, B.Sc., F.R.I.C., M.I.Chem.

2. WRITTEN EVIDENCE ONLY

Organisation

Association of Sea Fisheries Committees.	Institution of Gas Engineers.
Institution of British Launderers.	Ramblers Association (Southern Federation).

APPENDIX B

(*see paragraph* 49)

Lancashire County Council (Rivers Board and General Powers) Act, 1938

SOLID MATTERS

Section 43. Every person who—

(*a*) puts or throws or causes to be put or thrown or to fall; or

(*b*) knowingly permits to be put or to fall or to be carried; or

(*c*) causes or knowingly permits to be put in such a position as to be liable to fall or to be carried by floods;

into any stream within the district of the Board the solid refuse of or the sweepings from any factory manufacturing process brickyard mine pitshaft

quarry shop house farm or road or any bricks gravel sand soil ashes cinders or clinkers or any building or other rubbish or any sludge or any solid sewage matter or any vegetable or other garbage or offal or the carcase or a portion of the carcase of any animal or any other solid matter whatsoever whether in a dry or wet state shall be guilty of an offence against this Act:

Provided that notwithstanding anything in this section no person shall be guilty of an offence under this section for doing or causing to be done any of the following acts:—

(1) Constructing or maintaining in or across any such stream any building weir dam or other permanent work with necessary temporary coffer-dams which but for the passing of this Act he would have a legal right to construct or maintain ; or

(2) Pitching or depositing stones or any other suitable materials (not likely to be washed or carried away by the stream or current rising to the line of an ordinary flood) at the side or on the bank or in the bed of any such stream for the express and bona fide purpose of reclaiming land or of supporting or protecting the side or bank or bed of any such stream or of repairing the same or of erecting or repairing any bridge or any building drain sewer or watercourse upon or within the banks of any such stream or the slopes or walls thereof at or convenient to the point at which the same shall be so pitched or deposited ; or

(3) Putting into such stream any sand or gravel or other natural deposit which shall have flowed from or been deposited by the current of any such stream. Provided that the sand or gravel or other natural deposit so put as aforesaid does not interfere with the due flow or pollute the water of such stream ; or

(4) Pitching or depositing stones or any other suitable materials (not likely to be washed or carried away by the stream or current rising to the line of an ordinary flood) at the side or on the bank of any such stream for the express and bona fide purpose of filling up any areas affected by subsidence so long as such pitching or depositing does not cause substantial obstruction of the channel or pollute the water of such stream.

APPENDIX C

(*See Paragraph* 129)

Discharge of Heated Liquids into Streams

I. Effects of Temperature on Streams

There are probably few, if any, instances in this country of pure but heated water being discharged to an unpolluted stream, and causing so great a rise in temperature as to render the stream unsuitable for a domestic water supply or to make it incapable of supporting fish life. There are, however, many discharges of pure but heated water to streams already to some extent polluted and the consequence of such discharges are much more important ; some of them are described in the following paragraphs.

Effect on content of dissolved oxygen

When organic matter, contained for example in a sewage effluent or in such industrial wastes as those from dairies, beet sugar factories, and the like, is discharged to a stream, it undergoes oxidation at the expense of the oxygen dissolved in the water. The rate of oxidation increases with increase in temperature over the range ordinarily found in a river. Re-aeration of the stream is also affected to some extent by temperature but the net effect of a rise in temperature is to cause a reduction in the content of dissolved oxygen in the water. In some rivers and estuaries the water may be almost saturated with dissolved oxygen during the coldest part of the winter and almost devoid of oxygen during the hottest part of the summer. As an example, the following figures are given for the minimum content of dissolved oxygen in the estuary of the River Tees during a period of four years.

Temperature of the water		Minimum concentration of dissolved oxygen (per cent. of saturation)
(°C.)	(°F.)	
0– 7 ...	32–45	76
7–10 ...	45–50	66
10–13 ...	50–55	55
13–16 ...	55–61	46
16–19	61–66	31
19–21 ...	66–70	10

In this estuary the quantity of oxidizable matter discharged is substantially the same throughout the year. In the winter, however, the water contains sufficient dissolved oxygen to support fish life whereas in the summer the concentration is much too low. If the quantity of polluting matter discharged were much increased, then in the summer the water in the centre of the estuary might become completely devoid of oxygen—a state of affairs which might give rise to nuisance from the evolution of foul-smelling gases.

Effects on fish

In cold-blooded animals temperature is one of the main controlling factors of life. It affects all the vital processes and shows its influence in the activity, feeding, growth, and reproduction of the organism ; to this general statement fish are no exception. It is neither possible nor necessary to describe all the changes which alterations in the temperature of the environment could or might bring about, and this note is confined to the major phenomena induced by extreme conditions.

Fish, like all other animals, will die if the temperature of the medium in which they live is raised beyond a certain point, independently of any associated factors such as oxygen concentration or the increased toxicity of deleterious substances. The critical temperature naturally varies according to the species of fish, and tropical species can live in water warm enough to be rapidly fatal to arctic species. Experimental data on fishes native to, or naturalized in, this country are very scanty, but it has been shown that trout die in water at 25° C. (77° F.), pike at 30° C. (86° F.), and goldfish at 35° C. (95° F.). These same species have been found to live for prolonged periods at 22° C. (71.5° F.), 27° C. (80.6° F.), and 30° C. (86° F.) respectively. In these experiments the fish were brought to these temperatures very gradually, but it is commonly stated that the sudden transfer of fish from cold to warm water may be fatal although the temperature of the warm water may be below the lethal limit as experimentally determined. A change

from cold to warm water may be equally deleterious. It is said that goldfish which live in the condenser ponds of a power station at Nottingham invariably die if transfered to water at normal temperature. No precise data on this subject have been found, but it is well-known that by gradual acclimatization living organisms can tolerate conditions which they could not survive if they arose suddenly.

It is also known that in the case of trout, temperature changes can affect both breeding and the utilization of food. Trout eggs will not hatch if incubated in water warmer than 14.4° C. (58° F.). Trout given equal amounts of food grow more rapidly at temperatures below 15.5° C. (60° F.) than above. An increase in the extreme or mean temperatures of a body of water will undoubtedly affect in various ways the lower animals in a river, which form the food of many species of fish, but this subject has been very little studied, and it is not known whether, in the range in which the fish themselves can survive, the changes produced would be harmful, neutral, or advantageous in effect.

In a polluted stream a rise in temperature affects fish in a number of ways, all of them adversely. It has been mentioned that a rise in temperature causes a reduction in the proportion of dissolved oxygen in the water. The effect of this on the fish is reinforced by the fact that, as temperature increases, so does the minimum concentration of dissolved oxygen which a fish can withstand. It has been shown, for example, that for short exposures the minimum concentration of dissolved oxygen which trout could withstand was about 9 per cent. of the saturation value at a temperature of 6.4° C. (44° F.) but 22 per cent. at a temperature of 18° C. (64° F.).

Increase in temperature also increases the lethal effect of toxic substances to fish. For example a rise in temperature from 8° C. (46° F.) to 18° C. (64° F.) approximately doubled the toxicity of a small, constant concentration of potassium cyanide. Moreover the toxicity of a direct poison such as cyanide or phenol increases with a reduction in the dissolved oxygen content of the water such as occurs with rising temperature. The toxicity of potassium cyanide in a concentration of about 0.1 part CN per million and at a constant temperature was trebled by a reduction in the concentration of dissolved oxygen from 70 to 40 per cent. of saturation.

Thus taking all these factors into consideration the temperature of a polluted stream is of very great importance in relation to its capacity to support fish life and during the summer a rise of even 1°C. (1.8°F.) may have a very adverse effect.

Growth of "sewage fungus" and green plants

It is commonly observed that sewage fungus grows profusely in a polluted river below a discharge of warm but clean water. Controlled experiments on the growth of sewage fungus have been made and it is known that rate of growth increases rapidly with rise of temperature, the optimum temperature being given by some workers as 20° to 25°C. (68° to 77°F.) and by others as 30°C. (86°F.).

It is known also that in some waters into which warm water is discharged the growth of water weeds becomes excessive. No specific investigation of the problem appears to have been made, but this effect is probably due at least in part to the weeds having a prolonged season of growth. In the spring the favourable temperature allows vegetative growth to begin some weeks before it would in water at normal temperature, so that the evil effects of excessive weed growth begin sooner and last longer than they

otherwise would. Heavy growths of weed can so interfere with the flow of the stream as to cause quite extensive flooding of riparian land, a factor of considerable agricultural importance.

II. POWER STATION PRACTICE—DISCHARGE OF COOLING WATER

An ample cooling water supply is, of course, only one of the requirements of a power station, and the problem of finding a suitable site resolves into deciding which location gives the most favourable combination of all the factors to be taken into account.

The quantity of heat dissipated in the cooling water system of a large steam power station varies widely, depending upon the loading and the steam cycle conditions for which the plant is designed, which in a measure reflects the age of the plant. Some of the very old plants operating on comparatively low steam pressure, temperature, and vacuum conditions, dissipate in the cooling water system from 9,000 B.Th.U. to as much as 12,000 B.Th.U. per unit of electricity generated. The bulk of the plant being installed at the present time dissipates between 5,800 and 6,500 B.Th.U. per unit generated, and with some of the extra high pressure steam cycles designed to operate under good vacuum conditions, it is possible to reduce the exhaust heat to between 5,300 B.Th.U. and 5,500 B.Th.U. per unit generated. It is therefore clear that with modern plant there is a very substantial reduction in the heat dissipated in the cooling system compared with the older and less efficient plant.

Where there is a very large supply of cooling water available, the cooling system might be designed for a temperature rise of between 5.6° to 6.7°C. (10° and 12°F.) at full load, but where the quantity is likely to be restricted the designed temperature rise might be 7.8° to 8.3°C. (14° to 15°F.). Therefore, a power station rejecting 6,000 B.Th.U. per unit generated, designed for a temperature rise of 5.6°C. (10°F.) would require 60 gallons of water per unit generated, and this quantity would be reduced to 40 gallons for a temperature rise of 8.3°C. (15°F.). The cooling water requirements of a 100,000 KW power station would, therefore, be between 4 and 6 million gallons per hour depending upon the designed temperature rise. The capacity of a river, stream, or canal for direct cooling purposes is determined from the minimum flow conditions in the summer, taken together with the maximum summer temperature. It is in fact in the interests of efficient power generation to keep the amount of heat discharged in the cooling system to a minimum and it is for this reason that the upper limit of temperature discharge for design purposes is based on the maximum summer conditions.

It is usual to associate the number of circulating water pumps in a power station with the number of main generator units, so that the total quantity pumped will correspond to the requirements of the number of main units actually running at any time. In some cases the pumps are fitted with variable speed control so that the quantity can be varied according to the load on the unit. Advantage is often taken of very cold water temperature conditions in the winter to reduce the quantity pumped and to increase the temperature of the discharge, but this temperature would, of course, be considerably lower than the normal discharge temperature during warm weather conditions in the summer. For this reason it is preferable, if control of the effluent temperature is desired, to specify a maximum discharge temperature rather than a temperature rise.

Power stations may be broadly divided into three categories, three-shift (base load), two-shift (mid load) and single-shift (peak load) stations. The

average daily load carried by each of these groups of stations, expressed as a percentage of the maximum station output capacity, is approximately of the following orders for weekdays, Saturdays, and Sundays during the winter and summer months respectively.

	Weekday (per cent.)	*Saturday* (per cent.)	*Sunday* (per cent.)
Winter			
Three-shift	75–85	70–80	50–60
Two-shift	50–60	35–45	35–45
Single-shift	10–20	5–10	5–10
Summer			
Three-shift	65–75	60–65	40–45
Two-shift	35–45	30–40	30–40
Single-shift	5–15	5	5

Where there is insufficient water available for direct* cooling it is the practice to install cooling towers, either to augment, or in place of direct cooling. Cooling towers are expensive to construct and are extravagant in pumping power compared against a direct cooling system where it is possible to make use of siphon recovery, but they are the most efficient known means of artificially cooling the circulating water at a power station. Where cooling towers are used to augment direct cooling the usual practice is to use direct cooling when the water is available, and to bring the cooling towers into service at times when the water available is below the level appropriate to the station loading.

There are many power stations in the country where cooling towers are used exclusively for cooling purposes. In these instances the sites have a satisfactory combination of the factors required for a power station, but the water supply is not adequate for direct cooling. The cooling towers enable the water to be recirculated and the only additional water required in the cooling system is to make up the evaporation loss and to purge out the ponds under the towers to keep down the concentration of solids. Apart from the fact that cooling towers are inherently more expensive to construct and operate than the average direct cooling system by the nature of their function, the design cannot be such as to give a really pleasing appearance, and for this reason there is much opposition from planning authorities and local residents where it is proposed to construct cooling towers.

From all the foregoing, it is obvious that the problem in power station practice is how to dissipate the exhaust heat at the lowest possible temperature. Refrigeration of the cooling water for only a degree or so of temperature would still leave the problem of how to dissipate the heat, but on a larger scale owing to the gain in the refrigerator. There are, however, some isolated instances where a heat pump is being installed to up-grade some of the heat for heating the power station offices and stores. It is obvious, however, that such installations could only recover an insignificant amount of the total heat in the exhaust, and would have no appreciable affect on a cooling water discharge temperature.

There is no problem arising from the use of salt water or polluted fresh water for direct cooling purposes which has not as yet been capable of solution. It is usual, particularly with high pressure and temperature plants, to take

*As opposed to cooling in towers and re-use of the cooling water. The cooling, however, is not " direct " in the sense used in Part III of this memorandum since the water does not come into direct contact with gases or vapours.

very adequate precautions against leakage of cooling water in the condenser into the condensate section of the plant. With salt water, precautions are taken against mussel growth, seaweed accumulations, and silt erosion in the cooling system. In some isolated instances where the only source of water available is polluted fresh water, this supply is used for cooling tower make-up and a sedimentation and filtration plant has been installed to treat the water before it enters the cooling system in order to keep down the concentration in the cooling ponds. In most modern power stations the circulating water is chlorinated to keep down algal growth in the condenser tubes and in the pipework system. There are a number of power stations using sewage effluent for cooling tower make-up, and in these instances very careful attention is given to chlorination to ensure a small concentration of free chlorine throughout the circulating water system at all times to keep down the growth of bacteria.

III. POSSIBLE STANDARDS FOR HEATED WATER AND EFFLUENTS

Heated liquids discharged to streams include (1) water which has been used for indirect cooling, (2) water from direct cooling, and (3) waste water from certain processes of manufacture.

In indirect cooling the cooling water does not come into direct contact with the substances to be cooled. The cooling water may be passed through pipes immersed in a liquid which has to be cooled or it may be passed over the surface of pipes or a condenser through which the hot gases or liquid flow. Consequently the cooling water does not become polluted during use and the only factor to be considered is the influence of its heat content. The largest volume of water from indirect cooling is no doubt from power stations operated by the British Electricity Authority and by industrial firms. There are also discharges from such processes as the cooling of gas at gas works.

In direct cooling the water comes into contact with gases and vapours and, in addition to being hot, may be polluted when discharged. Large volumes of condenser water of this kind are discharged from most processes in which liquids are concentrated in vacuum evaporators—for example in the manufacture of sugar from sugar beet, from the concentration of sulphuric acid in pot stills, and from the concentration or drying of milk and milk products.

Industrial waste waters which are hot when discharged may include those from the pickling of steel, the washing of wool, the manufacture of cardboard, and many other processes.

Heated effluents from direct cooling systems and from industrial processes may be harmful because of their content of polluting material as well as because of their heat content; both would therefore need to be the subject of control.

In fixing standards for heated effluents the object would of course be to prevent the temperature in any particular river or waterway from exceeding a certain value which had previously been fixed as appropriate, taking into account the industrial needs of the district and the interests served by the river. If the volume and temperature of a discharge remains constant, then the temperature reached in the river would depend on the flow at the particular time and on the temperature of the water upstream of the intake. Regulations have sometimes been made which prohibit the raising of the temperature of a stream through more than a certain range or above a certain figure. If, however, the amount of heat output is large this may mean that the

manufacturer or authority responsible for the heated discharge may have to determine from day to day the rate of flow of the stream and its temperature and may then have to adjust the heated discharge accordingly so as to remain within the limit allowed. It has often been objected that this is a difficult thing for a manufacturer to do and it has been urged that any regulations made should apply to the discharge itself rather than to the effect it produces in a river. It seems clear that often it would be difficult for a manufacturer or authority to regulate industrial processes according to the state of the river below the discharge from a factory or power station, and that it might therefore be more convenient if regulations could be made in such a way that the manufacturer or authority did not have to observe the effects of a discharge in the river itself. Naturally, however, in framing these regulations the allowable temperature and heat content of the discharge would be arrived at after considering the minimum flow of the river which might be expected in a dry season and the maximum temperature at which it might reach the discharge point during hot weather.

In considering the possible effects of heated water or effluents on the temperature of a river both the temperature of the discharge and the total heat input may be important. It is of course true that at a considerable distance below the discharge, when the discharge has become thoroughly mixed with the river water, the rise of temperature caused will depend on the total input of heat and will thus involve not only the temperature but also the volume of the discharge. It takes, however, an appreciable time for a discharge to become thoroughly mixed with a river and there have been instances in which fish have been killed in the neighbourhood of an outfall through which hot water was being discharged. It is sometimes said that fish would naturally avoid such a place and swim into water in which they would not be harmed ; this, however, is not so, for it is known that fish will swim into water in which they are killed although they might as easily have swum into water which would have been harmless. The Committee might like to consider, therefore, whether in recommending bye-laws for heated liquids an upper limit of temperature for the liquid should be specified, irrespective of the volume discharged.

In addition to a regulation of this kind it would be necessary to limit the total quantity of heat added to the river by the discharge of heated effluents—that is to say to limit the product of the volume of water used and the rise in temperature effected in use. It has been pointed out by the British Electricity Authority that in certain power stations more electricity is generated, and the input of heat is thus greater, in the winter than in the summer. It would be of benefit to them if they were allowed a greater discharge of heat in cold weather than in hot weather. There seems no reason why this should not be done since it is plain that a river could tolerate the addition of more heat when its natural temperature is lower. Such a provision might be of benefit to other industries ; for example cooling water from beet sugar factories is discharged mainly during the cold months of the year.

It is clear that if a river has already reached the upper limit of temperature which is desired, further input of heat could not be sanctioned. The lower the temperature of the river below this upper limit the greater the input of heat which could be allowed. Thus the allowable input of heat (as measured by volume of discharge x temperature rise in the power station or factory) could be on a sliding scale, being zero if the temperature of the river ever reached the maximum allowable and increasing as the temperature fell below this value. The values might be calculated, for example, to allow a rise in

temperature of perhaps 1° C. (1.8° F.) when the initial temperature of the river was 17° C. (62.6° F.), 2° C. (3.6° F.) when the initial temperature was 12° C. (53.6° F.), and 4° C. (7.2° F.) when the initial temperature was 6° C. (42.8° F.). These values are merely put forward as illustrations and do not necessarily bear any close relation to those which would be satisfactory in practice.

Just as a survey of a river, including determinations of flow, chemical quality, rate of re-aeration, and rate of self-purification, would be necessary before fixing standards for the chemical quality of effluents discharged to it, so a survey would be required before laying down standards for the heat content of effluents. A survey of this kind would have to include determinations of the flow of the river, its natural temperature at different times, its rate of cooling and the degree and kind of pollution to which it was subjected, and would take into account the uses to which the water is to be put or is likely to be put. From this information could be calculated approximately the amount of heat the river could accept at different seasons of the year and byelaws could be framed, calculated to allow manufacturers to take full advantage of the heat-receiving capacity of the river or of given stretches of it, while safeguarding its condition. The byelaws would, of course, have to be drawn up in such a way as to be fair to all manufacturers discharging heated effluents and not, for example, so as to favour a factory situated upstream where the temperature of a river would be lowest. It may well be that in certain rivers it would be necessary to apply different standards to different stretches so as to divide the heat-receiving capacity of the whole river as fairly as possible between the various industries on its banks.

Some firms and authorities use water drawn from boreholes for cooling purposes and then discharge it to a river. In the warmer months of the year water from a borehole would usually be cooler than river water and firms using it would be able to take advantage of this and would be allowed to add a greater quantity of heat to it before discharge than they would if they had used river water. In the depth of winter, however, the advantage would probably lie with users of river water, which would usually be cooler than water from a borehole.

In industrial districts there are usually large numbers of very small discharges of hot water. There would no doubt be great difficulty in applying regulations to these very small volumes, the effect of which on a river might well be negligible. It may be, therefore, that if byelaws regulating temperature and heat input are proposed, the Committee might wish them to apply only to discharges having a flow greater than a certain specified volume per day.

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