

## THE DISPOSAL OF WASTE LIQUORS.\*

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One of the privileges, or perhaps one should say the penalties, attached to the office of chairman of a Sectional Committee of this Society, is the preparation of an address for the opening meeting of the Session. Such addresses deal either with the progress of the Section or of the Society, or more usually with a subject of specific interest to the chemical industry. The question of sewage disposal as a whole is apparently barred by reason either of surfeit, so far as this Section is concerned, or because the subject has been in the past decidedly contentious, and it would be manifestly unfair to deprive the general body of members of a certain measure of enjoyment by taking advantage of the fact that no discussion of the chairman's address is allowed. It was, therefore, necessary to find a subject with which the author was not entirely unacquainted, and which at the same time might prove of fairly general interest to those actually engaged in the industry. The question of the disposal of waste liquors resulting from manufacturing processes appeared to be the most promising, and it is therefore proposed to treat it in a brief and general manner, with the idea of more or less defining the position of the manufacturer in relation to (a) the question of rivers pollution, and (b) to local authorities. The subject thus falls naturally into two divisions, viz. :—

I. The discharge of waste liquors into natural water-courses, and

II. The discharge of waste liquors into sewerage systems.

I. At the present time control over the character of waste liquors discharged into water-courses is effected by (a) action at common law by riparian owners below stream, and (b) action by the district sanitary authority, which may be the local authority, the county authority, or certain joint rivers boards which have control over rivers and streams in particular water sheddings, and which have authority to take proceedings under the Rivers Pollution Prevention Acts or certain special Acts.

Evidently control under (a) is most variable, and is entirely dependent on infringement of water rights held by riparian owners below stream, so that actual damage of the water-course must have taken place sufficient for it to be established beyond doubt that the riparian owner in question has been prejudiced before action may be taken successfully.

In comparing the nature of control effected by riparian owners and sanitary authorities several differences are exhibited. A riparian owner would have ground for action if the discharge above stream of waste liquor into a water-course had given rise to one or more of the following effects, viz. :—(i) Material increase in the hardness of the stream water; (ii) appreciable increase in the amount of iron in solution; and (iii) the presence of colouring matter; any one of which might very possibly affect prejudicially the riparian owner in the course of his manufacturing processes, whereas it is extremely problematical whether the sanitary authority would be allowed to take proceedings on any of these grounds. On the other hand, sanitary authorities are not impeded by any question of prescriptive right, as such claim would be no defence against proceedings taken under the Rivers Pollution Acts.

In discussing the right of action by controlling agents, the question of what constitutes a polluting

liquor arises. There is no legal definition, and, moreover, all authorities are agreed on the extreme difficulty of fixing any chemical standard which could be applied equitably to all classes of industrial waste, especially having regard to the means of their purification. In fact, one might go further and say that most authorities are agreed that, if not impracticable, it is certainly undesirable to establish a definite legal standard.

Although certain broad principles may be applied to the consideration of what should not be allowed in waste liquors discharging into natural water-courses, such as (i) excessive suspended matter; (ii) highly putrescible matter; (iii) material acidity or causticity; (iv) sulphides or other readily oxidisable compounds; (v) free chlorine or other sterilising agents; the writer is in agreement with the view generally accepted, and more or less recommended by the Royal Commission on Sewage Disposal, viz., that pollution is best determined by the ascertained effect on the water-course itself.

The inspection and examination of the water-course, above and below the point of discharge of waste liquor, for this purpose, includes careful observation or determination of (a) the condition of bed of the stream; (b) any difference in the flora and fauna; and (c) chemical examination of the stream water, with especial reference to any increase in the amount of organic matter capable of undergoing fermentation. This is usually ascertained by determining (1) the dissolved-oxygen content of the water, or (2) the amount of dissolved oxygen absorbed by the various samples of stream water when diluted with aerated water and incubated in a filled bottle for a definite period. In detecting pollution effect the latter test is much more sensitive than the determination of oxygen absorption from acid permanganate.

This method of determining pollution is, of course, liable to be interfered with by trade wastes which have a bactericidal effect on the watercourse, and obviously is also inapplicable in the case of a watercourse already seriously polluted, otherwise considerable advantages would be enjoyed by manufacturers on the lower reaches of streams, and improvement in the character of a polluted water-course could only be effected gradually from its source downwards. In such cases, a certain standard purity of stream water has to be assumed and the effect of the specific waste liquor judged by consideration of the questions of dilution and of the amount of fermentable matter contained in the waste liquor.

As stated previously, control dependent on the action of riparian owners is unsatisfactory. Unfortunately, it must be admitted that this also applies to the control exercised by practically all sanitary authorities, as legal proceedings for pollution are greatly hampered by restrictions and by saving clauses in the various Acts of Parliament concerned, which, according to Maclean Wilson and Calvert, may be summarised as follows, viz. :—

I. Rivers authorities have no power to act in the case of a new undertaking which it is known must discharge polluting liquor, i.e., they must wait until pollution actually occurs.

II. They must obtain consent of the Ministry of Health before taking proceedings, and this often means a local inquiry by the Ministry.

III. After such consent has been obtained, two months' notice must be given to the offender of the intention to take proceedings.

IV. No provision is made for preventing mismanagement of purification works already constructed, except by repeating the above legal processes.

It is thus apparent that considerable simplification is needed to ensure satisfactory progress in the matter of rivers pollution. Moreover, it is generally accepted that the various sanitary

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authorities throughout the country have by no means adopted a uniform standard of action; in other words, specially-constituted rivers boards take a more serious view of their responsibility in the exercise of powers concerning rivers pollution than certain county councils, which by the Local Government Act, 1888, have the power of enforcing the Rivers Pollution Acts, with the result that manufacturers throughout the country are not accorded equal treatment.

In making this statement no reflection is made on the county council or other sanitary authority in question, as such authorities have usually no staff, or, if any, quite an inadequate one, to supervise the discharges of waste liquor within their area, whereas the joint rivers boards have an inspection staff capable of effecting adequate control.

The writer has, therefore, no hesitation in saying that the time is long overdue when effect should be given to the recommendation of the Royal Commission on Sewage Disposal with respect to the formation of additional rivers boards and the establishment of a central rivers authority to co-ordinate, encourage, and assist in various ways the operation of such boards.

The establishment of such an authority on right lines should ensure more uniform treatment of manufacturers throughout the country in respect of the character of waste liquors discharged, and at the same time effect a general improvement in the character of water-courses in industrial areas. In the opinion of the writer, there is plenty of room for improvement in this respect, without affecting materially the interest of the chemical industry as a whole.

II. Generally speaking, the question of admittance of manufacturers' trade waste into public sewers is governed by (a) Section 7 of the Rivers Pollution Prevention Act, 1876, which states that every sanitary or other local authority having sewers under their control shall give facilities for enabling manufacturers within their district to carry the liquids proceeding from their factories or manufacturing processes into such sewers: Provided that this section shall not extend to compel any sanitary or other local authority to admit into their sewers any liquid which would prejudicially affect such sewers, or the disposal by the sale, application to land, or otherwise, of the sewage matter conveyed along such sewers, or which from its temperature or otherwise may be injurious from a sanitary point of view; provided also that no sanitary authority shall be required to give such facilities as aforesaid where the sewers of such authority are only sufficient for the requirements of their district, nor where such facilities would interfere with any order of any court of competent jurisdiction respecting the sewage of such authority; and (b) Sections 16 and 17 of the Public Health Acts (Amendment) Act, 1890, which read thus:—

Section 16: (1) It shall not be lawful for any person to throw, or suffer to be thrown, or to pass into any sewer of a local authority or any drain communicating therewith, any matter or substance by which the free flow of the sewage or surface or storm water may be interfered with, or by which any such sewer or drain may be injured.

(2) Every person offending against this enactment shall be liable to a penalty not exceeding ten pounds and to a daily penalty not exceeding twenty shillings.

Section 17: (1) Every person who turns or permits to enter into any sewer of a local authority or any drain communicating therewith (a) any chemical refuse, or (b) any waste steam, condensing water, heated water or other liquid (such water or other liquid being of a higher temperature than 110° F.) which either alone or in combination with the sewage causes a nuisance or is dangerous or injurious to health, shall be liable to a penalty not

exceeding ten pounds and to a daily penalty not exceeding five pounds.

Sections 15 and 21 of the Public Health Act, 1875, provide that the local authorities shall build sewers adequate for the effectual drainage of their district, and that the owner or occupier of any premises within the district shall be entitled to cause his drains to enter the sewers, but it has been held (Local Government Board Inquiry, June, 1898) that there is no obligation on the local authority to provide sewers large enough to accommodate manufacturers' trade waste. Further, it has been held by the Court of Appeal in *Brook, Ltd. v. Meltham Urban District Council* (1903, 2 K.B. 780) that Section 21 of the Act does not give manufacturers right of access to the sewers of the local authority.

In addition to the above-mentioned general Acts of Parliament, many local authorities have obtained private Acts conferring upon them special powers with regard to the reception of trade waste into their sewers. Briefly, these special powers include provisions for (a) power to require preliminary treatment whereby trade effluents shall comply with certain regulations embodied in a common law agreement between the authority and the manufacturer, e.g., Manchester Corporation (General Powers) Act, 1902; and (b) power to levy special charge on manufacturers, additional to the ordinary sewerage and sewage disposal rate of the district, for which, of course, they are liable, with or without preliminary treatment of the waste liquor prior to discharge into the sewers, e.g., Halifax Corporation Act, 1905, part II.; Huddersfield Corporation Act, 1906, part II.

The question of disposal of manufacturers' waste liquor was referred in 1898 to the Royal Commission on Sewage Disposal, which in its Third Report (1903) made certain recommendations that may be summarised as follows, viz.:—

That in their opinion the law should be altered so as to make it the duty of the local authority to provide such sewers as are necessary to carry trade effluent as well as domestic sewage (incidentally, this was already held to be the case in Scotland), and that the manufacturer should be given the right, subject to the observance of certain safeguards, to discharge trade effluents into the sewers of the local authority.

That the local authority should frame regulations which should be subject to confirmation by a central authority.

The above recommendations were qualified by stating that cases may arise in which the local authority should be either wholly or partially relieved from the afore-mentioned responsibility.

That whereas, in general, no special charge should be made on the manufacturers where the regulations with respect to preliminary treatment are complied with, the local authority should be empowered to make a special charge where the manufacturer is unable to comply with these regulations. Power should also be granted to make a special charge even when preliminary treatment is adopted, where there are exceptional circumstances as regards volume, quality, or otherwise. The actual amount of such charge to be fixed by agreement between the manufacturer and the local authority, or in default of such agreement, by reference to a superior authority.

That all manufacturers should be treated alike, those already discharging into the sewers and new connexions.

It was finally recommended that differences between local authorities and manufacturers with respect to (a) variation of the general regulations respecting preliminary treatment to meet particular cases, (b) amount of special charges to be imposed on particular manufacturers; (c) the question whether the preliminary treatment adopted by manufacturers complies with regulations, should

be referred to the Rivers Boards controlling the particular area (these were recommended to be formed throughout the country), with right of appeal by either party to the central authority, which the Commissioners also proposed should be established.

Effect, however, has not yet been given to these recommendations. Although no general Act of Parliament has since been passed dealing with this matter, the above-mentioned private Acts of Huddersfield and Halifax were passed by agreement between the local authorities and manufacturers. In these Acts the local authority accepts responsibility for the reception of trade waste into the sewers, subject to certain provisions, and existing connexions are subject to the same conditions as connexions made subsequent to the passing of the Acts.

It will be seen from the foregoing that the general Acts of Parliament do not define very clearly the position of the manufacturer in relation to the local authority, and consequently there is a decided lack of uniformity in the treatment of manufacturers throughout the country with reference to the disposal of their waste liquor by discharge into public sewers, having regard to the various private Acts enforced by certain local authorities.

In certain instances manufacturers' trade waste, especially where old connexions exist, is admitted to sewers without any control whatever and without any special charge; in other cases preliminary treatment is required without special charges, and in several districts the manufacturer is charged varying amounts for the privilege of discharging waste liquors into the sewers, either with or without preliminary treatment.

In special cases manufacturers have been called upon to bear part of the capital expenditure on sewage-purification works of the local authority as well as an annual charge, additional to the ordinary sewerage and sewage disposal rate levied throughout the district.

As the result of a fairly extensive experience of the subject, the writer offers the following suggestions with the view of affording an equitable settlement of this important question of the relative responsibilities of the local authorities and manufacturers, which it will be seen, in general, follow on the lines recommended by the Royal Commission on Sewage Disposal:—

(1) That, subject to certain reservations, it is the duty of the local authority to accept responsibility for the admission of trade effluents into its sewers.

(2) That all trade effluents should conform to standard regulations framed by the local authority and confirmed by a joint committee of the local authority and manufacturers in the district, or, failing agreement, by reference to a central authority.

(3) That there shall be no differential treatment as between manufacturers already discharging waste liquors into the sewers and those applying for new connexions.

(4) That the local authority shall be empowered to make a special charge (agreed upon as under (2)) when the character or volume of waste liquor, even after compliance with the general regulations, would affect the nature of the total sewage flow of the district as to increase materially the cost of its purification.

The writer is of opinion that the local authority should have power to prohibit, without recourse to complicated legal machinery, the discharge of waste liquors into sewers where they may (a) give rise, either alone or in combination with the sewage itself, to conditions dangerous to the life or health of workmen engaged in the sewers; (b) create serious nuisance; and (c) so alter the character of the sewage as to disorganise any practicable type of sewage purification plant.

In view of actual experience these points are considered of the first importance. Usually, under present conditions, danger to health or even loss of life actually has to occur before action is or can be taken; and more than one instance may be cited where sewage purification plants have been rendered practically inoperative as the result of certain improper discharges into the sewers. The local authority should certainly have the right to guard against such occurrences, without having to wait for danger or damage to happen.

Naturally, there is considerable difference of opinion on the question of special charges for the reception of trade waste into public sewers. Inasmuch as the admission to the sewers of by far the majority of trade wastes, even after preliminary treatment, must increase in varying degrees the ultimate cost of the purification of the sewage, the general ratepayer naturally holds the view that such increase in cost should be borne by the manufacturer as a legitimate trading charge. On the other hand, the local authority must have regard to the advantages accruing to its district by the establishment of industries in which the production of waste liquor is unavoidable.

Although the writer is fully aware of the difficulties attending control of preliminary purification plant, and, moreover, has the knowledge that several authorities possessing private Acts giving them the power to require preliminary treatment, have preferred, in view of the above difficulties, to adopt a scale of special charges for the reception into their sewers of crude trade waste of varying character, as being the simplest way out, it will be seen that he is of opinion that only in certain cases should special charges be made for the reception of trade effluents into the sewerage system.

His experience leads him to believe that if the proposed regulations are conceived in a reasonable spirit, the majority, at any rate, of manufacturers will appreciate fully their responsibility in the matter. Provision should be made, however, for guarding against inadequate control of any preliminary purification plant, and penalties should be imposed for wilful neglect of such plant. Briefly, the general regulations referred to would, of course, include provision against effluents, whose discharge into sewers is not prohibited, and also with regard to (a) equalisation of flow, (b) limit of temperature, (c) limit of amount of suspended solids, and (d) acidity. Regulations framed on these lines would permit of effluents containing dye-liquors or heavily charged with oxidisable matter of varying character, and it is in respect of the amount and character of such matters that the question of special charge would arise. It is clear that a satisfactory solution of this vexed problem calls for the hearty co-operation of both local authorities and manufacturers, between whom it is of the utmost importance that amicable relations should be established.

In conclusion, the writer would urge manufacturers, in their own interests, to give more serious consideration than is usually given to the subject under review. He considers that this question of the disposal of waste liquor should be definitely treated as an integral portion of any manufacturing problem, if not equally important as such matters as water supply or transport facilities. Although it would be foolish to suggest that in the majority of cases actual profit may be anticipated from a closer attention to the character of the waste liquors discharged from any manufacturing process, it is well known that this has often proved to be the case. Moreover, it is seriously contended that a closer study of the nature of the resultant waste liquor will assist materially in the efficient control of the manufacturing process itself.