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SOME FUNDAMENTALS ON WATER POLLUTION FOR INDUSTRY *

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From the beginning of recorded time, man and his communities have been dependent on the characteristics, nature of occurrence, and availability of natural waters. He has used natural waters as sources of water supply for his personal and domestic needs, for his stock, for irrigation of his lands, for the fire protection of his communities, and for the operation of his industry. He has used them as sources of supply of food, as sources of power, as routes of commerce, as centers for recreation, as objects of beauty for commercial or domestic exploitation, and as drains for his wastes.

The abuse of the utilization of natural waters as drains for the wastes from various domestic, commercial, agricultural or industrial activities results in objectionable pollution and may seriously interfere with the usefulness of the waters for other purposes. The adverse effects of pollution may involve hygienic, economic, aesthetic, and legal considerations. In the case of industrial pollution, a fifth consideration may be added. This consideration is public relations.

Industrial establishments may be involved in all of the water pollution considerations mentioned above.

Hygienic Considerations

Hygienic considerations include the potential bacterial contamination by sanitary wastes of domestic water supplies, natural ice, shellfish and fish,

waters used for recreational purposes, farm produce by flood or irrigation, or milk supplies by indirect means. Some specific industrial wastes may contain bacterial contamination that endangers farm-stock water supplies and also thereby indirectly endangers domestic milk supplies.

In addition, industrial establishments may discharge wastes that create tastes and odors in domestic water supplies, and thereby drive customers to unsafe but more palatable sources. They may also contain toxic ions or chemicals. Offensive conditions may be created which affect the public comfort or health, and which impair the use of the natural waters for recreational purposes.

The hygienic considerations are the most important of all, and must be given serious thought in solving pollution problems. Despite the humanitarian and possibly the economic importance of the hygienic phases of water pollution, the necessity of meeting certain standards of waste water quality or certain standards of stream quality have not been well demonstrated.

Public policy generally has been to close bathing beaches rather than to require sewage treatment, because public officials did not know how to evaluate pertinent economic and sociological factors. It has been possible to get by with gross contamination in numerous cases without knowingly causing loss of life or directly accountable economic loss.

Thus it has been difficult to define minimum standards of cleanliness.

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Although public health engineers established maximum limits of the bacterial contamination of waters to be used for public water supply, they set the stage for a questionable precedent when they concluded that complex and costly water purification plants were a more effective and more economical safeguard to public health than sewage treatment. Consequently, deplorable conditions have been permitted to exist.

Economic Factors

Industrial pollution may create conditions that will cause economic loss. Deterioration in water quality due to pollution may necessitate capital expenditures for new supplies or treatment facilities, or increased operating costs for domestic, industrial, or agricultural water supplies; it may damage structures; it may destroy fish and other useful aquatic life; it may impair the usefulness or desirability of riparian property; and it may, due to silt and sludge settling, cause loss of pondage storage capacity and increase costs of maintaining navigation channels.

Unfortunately there is little specific information available on the overall economics of pollution and pollution abatement. Most interests are predominantly local, and most factors are evaluated on the basis of contemporary economic or financial considerations at the local level without recognition of the more complex aspects of sound, economical public policy.

Indifference to the long-term economic aspects of the conservation of natural resources has led to gross waste in numerous cases because it was cheaper to waste than to conserve. This past indifference to the broad economic aspects of water pollution now places public authorities in the unenviable position of requesting large expenditures for waste treatment facilities without a good background on this important aspect of the problem. The

localized type of thinking makes it possible to establish, understand, and sympathize with financial burden at this level, but makes it difficult to appreciate community problems and welfare.

Although there is willingness to acknowledge that it is not equitable to discharge wastes that will cause economic loss to a downstream neighbor, there has been inclination to salve the conscience with the thought that the pollution has existed for years without complaint, that an upstream neighbor is also causing pollution, that competitors and associates are doing the same elsewhere, and anyway, it is cheaper to treat polluted waters than industrial wastes. It has been felt that industries, which possibly would have to shut down if burdened with the costs of waste treatment, were more important than a "few" fish, and should not be endangered by insistence on pollution abatement. This last item is one phase of the pollution abatement problem concerning which there appears to be a change in thinking.

Wildlife enthusiasts are trying to place a dollar value on hunting, fishing and related recreational activities. Frank DuFrense of the U. S. Fish and Wildlife Service has estimated that the capitalized value of the nation's wildlife resources is about \$14,000,000,000. That, is big business. The important petroleum industry is capitalized at only \$18,000,000,000.

It is also estimated that the 1947 expenditures for hunting and fishing equipment, travel, etc., in the United States will equal or exceed \$3,000,000,000. That also is big business. In 1946 in Pennsylvania alone about \$920,000 was paid by 567,000 persons for the privilege to fish. The Board of Fish Commissioners had an income of more than \$1,600,000. Statistics demonstrate that the numbers of fishermen and the amounts of money they

are willing to spend in pursuit of their sport are increasing continuously.

Thus, on the basis of economics, it may be necessary to alter some basic notions. The potential economic importance of clean streams is further illustrated by the fact that considerable sums are also spent in boating and bathing activities, and on vacation excursions to resorts on lakes and streams.

Property Depreciation

The most comprehensive study of the influence of pollution on land use, value, and earnable income was made by the Interstate Sanitation Commission on New York Harbor. Although most waterfront properties increased in assessed valuation over a period of years, changes in use could be correlated with pollution conditions.

In general, unpolluted waters were conducive to residential and recreational uses of waterfront properties. As pollution increased there was a tendency to substitute industrial and commercial establishments for the residences and, as the pollution became worse, finally to use the property for lower grade establishments such as storage yards, coal yards and building material yards which employed relatively small numbers of people.

The influence of pollution resulted in closing some of New York's shore amusement park and bathing areas. This resulted in considerable loss in transportation fares, amusement income, etc. In one case trolley fares to an amusement area dropped from a favorable summer to winter fare ratio of 18.3 in 1911 to a ratio of 1.07 in 1928. In another area, amusement licenses dropped from a peak of 21 in 1930 to none in 1936. In still another case the weekly payroll of one property dropped from a peak of \$5,200 in 1925-26 to \$65 in 1932-37.

In one area land values in nearby blocks increased 87.7 per cent from 1913 to 1937, while the amusement

area increased only 7 per cent. During the same period land improvements in nearby blocks increased in value by about twelve times, while improvements in the amusement area fell 40 per cent. The results of this study demonstrate the adverse effects of pollution on land values.

Effects on Navigation

The economic losses due to silting is well reflected in experience with the Schuylkill River. The U. S. Army Engineers estimate that potential savings in dredging costs can justify a federal investment of about \$12,500,000 to prevent further silting of the lower Schuylkill River with culm.

It is unfortunate that more information on the economic aspects of pollution are not available. If more information were at hand the need for pollution abatement might have been more convincing to hard-headed businessmen long ago.

Aesthetic Values

Industrial pollution may create conditions offensive to the eye and the sense of smell. It is impossible to evaluate such conditions economically. However, a reasonable sense of values relative to good housekeeping and legitimate civic pride should certainly motivate the establishment and maintenance of minimum standards of cleanliness. Unfortunately, this has not been the case.

Losses Through Litigation

Gross pollution may interfere with the rights of other riparian owners. If losses result from such gross pollution the pollutor may be sued for damages. One suit against a single industrial establishment claimed damages of \$1,000,000, and instituted injunction proceedings to close permanently a \$32,000,000 plant.

There have been relatively few large civil suits so that fear of having to pay

high damages has not provided general incentive to abate pollution. In addition to civil suit for damages, industrial establishments are subject to fines, imprisonment of their officers, and injunction, for violation of the law. In this regard, experience has demonstrated that governmental agencies administering anti-pollution laws are inadequately staffed to keep up with activities in their areas, they are inherently reasonable and lenient, and their enforcement powers are no better than the will of the political administration to prosecute. Thus numerous states have excellent anti-pollution laws and gross stream pollution.

Political Aspects

This situation also is changing. It is changing because there are now enough people in the United States who want clean streams that they could, if aroused, alter political elections. In 1946, 567,000 persons bought fishing licenses in Pennsylvania and 11,068,717 bought fishing licenses in the entire United States. That same year 678,228 persons bought hunting licenses in Pennsylvania and 9,854,313 bought hunting licenses in the entire United States. There were 1,725,505 duck stamps purchased in the United States in the fiscal year 1944-45. In the state of Pennsylvania 135,000 persons are affiliated with the Pennsylvania Federation of Sportsmen's Clubs.

There is more evidence of the trends of the times than the numbers of those interested in recreation involving wildlife. There are at least two states in which conservation and stream pollution were important issues in gubernatorial campaigns, and one in which they were issues in an attorney general campaign. In one state conservation and stream pollution abatement was aggressively advocated by one gubernatorial candidate. He won the election by a majority of over 500,000 votes. It is foolish to infer that the

more than 550,000 fishermen in that state were responsible for the election of that governor, but it is questionable if future gubernatorial candidates in that state will overlook their potential vote.

In the other state a man twice elected to the governor's house aroused the ire of sportsmen. An organized campaign by sportsmen's clubs contributed to his defeat at the polls. In the third state an attorney general candidate promised the prosecution of an aggressive pollution abatement program. This candidate is now the attorney general and is keeping his campaign promise.

Conservation could become a factor in national elections. The last two presidential elections were won by less than 5,000,000 popular votes. There are more than twice this number of fishermen in the U. S.

Statistically, wildlife enthusiasts could control the balance of political power. The strength of such groups is in evidence by the fact that nine different states either passed new anti-pollution laws or strengthened old laws in the year 1945, and that thirteen additional states have acted similarly since that date. In addition, federal legislation is being sponsored.

Industrial Public Relations

The industrialist should take his cue from hard facts and the trends of the times. At this time, practically every major industry needs the good will of the public and is expending considerable effort and money on public relations. Here is a golden opportunity. The industrialist can perform a public service and at the same time help himself by actively and seriously working toward stream pollution abatement. It is not enough that he comply with the minimum requirements of the Sanitary Water Board, and then wait for them to arrive at a new set of specifications. There is much to be learned, much to be standardized, millions of

dollars to be saved through research and exchange of know-how, and considerable public good will to be gained by an honest, intelligent and aggressive attitude on the part of industry to abate stream pollution.

Today industry in Pennsylvania is engaged in pollution abatement activities by governmental order. This is poor public relations. Pollution abatement is inevitable. Therefore such activities should be converted into an asset by intelligent, aggressive and prompt action. Pollution abatement activities are for the common good and are non-competitive. Thus there is good cause for industrial co-operation and little excuse for opposition to mutual assistance.

The various trade associations are doing a reasonably good job, but the most aggressive of them are but scratching the surface. They can be of considerable assistance in solving typical problems specific to their industry, but it is questionable if they can afford to involve themselves in the solution of local problems.

What is really needed is organization at a local level composed of tech-

nical representatives of the various industries. Such an organization could disseminate and encourage the exchange of knowledge of mutual interest to all industry in the area, could collect basic data, could assist governmental agencies in establishing and evaluating treatment standards and standards of water quality, and could subsidize basic research.

By virtue of their objectives, diversified membership, and national affiliations, the local and regional units comprising the Federation of Sewage Works Associations are desirable organizations for industrial support. However, time is short, aggressive action is needed, and credit for accomplishments, if credit is due, must go to the industrialists. Only industrial wastes sections or committees of these associations can meet these requirements.

Industrialists, as a group, are moving toward the objectives here suggested. Whether such a movement will be independent or affiliated with some existing organization is up to industrial leaders and interested organizations.