Development of effluent guidelines and Environmental Protection Agency research and development program for edible oils industry[1]

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This paper describes the statutory basis for the establishment of effluent limitations guidelines and standards of performance for this industry including remarks on water quality standards. The Environmental Protection Agency's research, development, and demonstration program is presented. The specific objectives, solution required, activities, and best available treatment, zero discharge concept, and total elimination of discharges (elimination of multi-media pollution discharges) are discussed. The synopsis of two Environmental Protection Agency-industry sponsored demonstration grants is presented. The seven most frequently asked questions and their answers regarding the water pollution control act also are introduced. The Federal Water Pollution Control Act of 1972 directed that the U.S. embark upon major new efforts for controlling pollution at its source. The new Act provides for uniform effluent limitations for industrial categories and achievement dates. Congress set two interim dates of July 1, 1977, and July 1, 1983, by which different levels of treatment are to be reached. It is a timetable based upon advances in technology. For all dischargers, other then publicly owned treatment works, not later than July 1, 1977, effluent limitations are to be achieved which represent the application of the "best practicable control technology currently available." At the same time, all publicly owned waste treatment facilities must utilize "secondary treatment," and, if an industrial discharger sends its wastes through a publicly owned treatment works, certain "pretreatment standards" must be met. An additional requirement is that by the July 1977 date, effluent limitations may be imposed so that any state law will be met. Not later than July 1, 1983, effluent requirements must be met which represent the "best available technology economically achievable" and for publicly owned waste treatment facilities which represent the application of the "best practicable waste treatment technology." Any other applicable pretreatment standards also must be attained by that date. Special standards for toxic substances also must be observed from that date of promulgation of regulations covering such substances.

INTRODUCTION

The Federal Water Pollution Control Act of 1972 directed that the U.S. embark upon major new efforts for controlling pollution at its source.

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DESCRIPTION AND STATUTORY BASIS

The proposed regulations currently are being developed to establish effluent limitations guidelines and standards of performance and pretreatment standards for new sources for the edible oil industry point source category as required by Sections 304(b), 306, and 307(c) of the Federal Water Pollution Control Act. In addition, the preamble to the proposed regulations indicates that the Environmental Protection Agency (EPA) is issuing a technical report in fulfillment of the requirement of Section 304(c) to provide information on alternative treatment methods to implement standards of performance for new sources required by Section 306.

Table I is a summary of EPA's legal authority for issuing these regulations and the relevant factors to be considered in establishing effluent limitations guidelines for existing sources and standards of performance for new sources.

A major revision from prior legislation is the requirement that specific limitations must be applied to discharges. Limits are placed upon the amount of pollutants in discharged waste water or on the volume of waste water discharged or the number and amount of solid waste discharges. This is one of the Act's principal methods for attaining the 1983 and 1985 goals.

EFFLUENT LIMITATIONS

Prior pollution control statutes did not specifically provide for effluent limitations, until the 1899 Rivers and Harbor Act was interpreted as enabling the government to require such limitation. Recognizing the need for standard discharge limits within industrial categories, the Agency contracted for research and studies to determine what secondary treatment or its equivalent was for 22 basic industries. EPA'S enforcement personnel used these studies, in part, to develop a draft of effluent guidance for 20 industrial categories which contribute a high percentage of industrial pollution. This proposed effluent guidance received Agency-wide review and was commented on by industry technical personnel. The effluent guidance was distributed to the 10 EPA regional offices to be used as a guide in the development of conditions for Refuse Act permits.

The guidance has two separate categories of numbers. The first category of numbers represented the Agency's best determination of "best practicable control technology," a term present in the new Act and one which will be explored later. An industry has to apply to its discharges by January 1976 (as now applied, July 1977) treatment which makes use of the "best practicable control technology." If a discharger already had begun a sub-

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stantial treatment program which would be complete by July 1, 1974, a second level of less stringent limitations was applicable initially, with the more stringent numbers to be applied upon reissuance of the permit. In addition, social, economic, and other factors are to be considered in applying the guidance.

The new Act also provides for uniform effluent limitations for industrial categories and achievement dates. Congress set two interim dates of July 1, 1977, and July 1, 1983, by which different levels of treatment are to be reached. It is a timetable based upon advances in technology.

For all dischargers, other than publicly owned treatment works, *not later than* July 1, 1977, effluent limitations are to be achieved which represent the application of the "best practicable control technology currently available." At the same time, all publicly owned waste treatment facilities must utilize "secondary treatment" and, if an industrial discharger sends its wastes through a publicly owned treatment works, certain "pretreatment standards" must be met. An additional requirement is that by the July 1977 date, effluent limitations may be imposed so that any state law will be met. *Not later than* July 1, 1983, effluent requirements must be met which represent the "best available technology economically achievable" and for publicly owned waste treatment facilities which represent the application of the "best practicable waste treatment technology." Any other applicable pretreatment standards also must be attained by that date. Special standards for toxic substances also must be observed from the date or promulgation of regulations covering such substances.

The target dates are 1977 and 1983—they are the outside limits for compliance. The Act envisions that, in meeting effluent limitations, there will be stages of compliance, including attainment of levels of substantial improvement even before these dates. There will be imposed on discharges a schedule of remedial measures. This schedule will appear as conditions set out in a National Pollutant Discharge Elimination System (NPDES) permit.

BEST PRACTICABLE CONTROL TECHNOLOGY AND BEST AVAILABLE TECHNOLOGY

The Act charges the administrator with the task of publishing regulations providing "guidelines" for effluent limitations for point sources after he has consulted with appropriate federal and state agencies and other interested persons. These effluent limitations are the ones which will require the application of the best practicable control technology currently available for the 1977 target date and best available technology economically achievable for the 1983 target date. The administrator will identify three things in the regulations.

First, he will interpret and give meaning to the terms "best practicable" and "best available" when applied to various categories of industries. In defining "best practicable" and "best available" for a particular category, he is to take into account such factors as the age of the equipment and facilities involved, the process employed, the engineering aspects of the application of control techniques, process changes, and non-

TABLE I

Principal Statutory Considerations

Statutory basis	General description	Process changes	Cost	Process employed, age and size of equipment and facilities	Nonwater quality environmental impact and energy
Best practicable control technology currently available 304 (b)(1)(A) (Existing sources)	1. 1. Achieve by 1977 2. Generally average of best existing performance; high confidence in engineering viability 3. Where treatment uniformly inadequate a higher degree of treatment may be required if practicable (compare existing treatment of similar wastes)	Normally does not emphasize in-process controls, except where presently commonly practiced	Balancing of total cost of treatment against effluent reduction benefits	Age, size and process employed may require variations in discharge limits (taking into account compatibility of costs and process technology	Assess impact of alternative controls on air, solid waste, noise, rediation, and energy requirements
Best available technology economically achievable 304 (b)(1)(B) (Existing sources)	1. Achieve by 1983 2. Generally best existing performance but may include technology which is capable of being designed, though not yet in place; further development work could be required	Emphasizes both in-process and end-of-process control	Costs considered relative to broad test of reasonableness	Age, size, and process employed may require variations in discharge limits (taking into account compatibility of costs and process technology)	Assess impact of alternative controls on air, solid waste, noise, radiation, and energy requirements
Standards of performance best available demonstrated control technology 306 (New sources)	1. Achieved by sources for which "construction" commences after proposal of regulations. 2. Generally same considerations as for BATEA[a], except for more critical analysis of present availability	Emphasizes process changes	Cost considered relative to broad test of reasonableness	Not applicable	Assess impact of alternative controls on air, solid waste, noise, radiation, and energy requirements

[a]BATEA = best available technology economically achievable.

water quality environmental impact, including energy requirements. In assessing "best practicable control," the administrator is to make a balancing test between total cost and effluent reduction benefits. In some instances, this test may eliminate the application of technology which is high in cost in comparison to the minimal reduction in pollution which might be a factor. Cost is also a factor in determining "best available." "Best available" technology is the highest degree of technology that has been demonstrated as capable of being designed for plant-scale operation by 1983 up to, and including, no discharge, so that costs for this treatment may be much higher than for treatment by "best practicable" technology. Yet economic feasibility also will be a factor in interpreting "best available" treatment. Cost effectiveness for either standard is to be confined to consideration of classes or categories of point sources and will not be applied to an individual point source within a category or class.

Second, having interpreted "best practical" and "best available," the administrator is to promulgate guidelines which will be the formula for determining what "effluent limitations" are to be imposed on dischargers. In these guidelines, he is to identify the degree of effluent reduction attainable through the application of the best practicable control and best available technology in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants. These guidelines then can be applied in setting specific effluent limitations on dischargers.

Third, the regulations are to identify control measures and practices to eliminate the discharge of pollutants.

EFFLUENT LIMITATION FOR PUBLICLY OWNED TREATMENT WORKS

Not later than July 1, 1977, publicly owned treatment works must meet effluent limitations based on "information" which the Act requires the administrator to publish. The "information" is to describe the degree of effluent reduction attainable through application of secondary treatment. The information will be in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants.

The administrator also is required to publish information on alternative waste treatment management techniques and systems available, as the basis for the 1983 effluent limitations. The "information" issuances serve as the basis for determining the limitations.

PRETREATMENT EFFLUENT STANDARDS

In view of the Act's requirement that discharges from private point sources into publicly owned treatment works are to comply with applicable pretreatment effluent standards by 1977 and 1983, such standards have to be set by the administrator. He is to publish proposed regulations setting these standards and soon thereafter promulgate them. The pollutants covered are those which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such works. The regulations must specify a time for compliance not to exceed 3 years from their promulgation. The administrator is to designate the category or categories of sources to which such standards will apply. Pretreatment effluent standards may be more stringent for 1983 since the standards are to be updated from time to time.

NEW SOURCE PERFORMANCE STANDARDS

Most new factories, industries, etc., will be subject to national standards of performance. EPA had to publish a list of categories of sources which must include 27 major types of industry and then issue regulations establishing federal standards for performance for the new sources within each category. These standards are to ensure that new stationary sources of water pollution are designed, built, equipped, and operated to minimize the discharge of pollutants up to and including no discharges. The standards are to reflect the greatest degree of effluent reduction which the administrator determines to be achievable through application of the best available demonstrated control technology, process, operating methods, or other alternatives. "Best available demonstrated technology" has been described as those plant processes and control technologies which, at the pilot plant or semi-works level, have demonstrated that both technologically and economically they justify the making of investments in new production facilities.

At the same time, EPA promulgates new performance standards, it is to provide pretreatment standards for *newly* constructed point sources discharging into public treatment facilities.

WATER QUALITY STANDARDS

The new Act does not ignore the concept of water quality standards in 1977 and 1983 achievements. Water quality standards which were adopted and enforced under the old Federal Water Pollution Control Act (FWPCA) for interstate waters are continued in effect and can be updated, and new ones are to be established for intrastate water bodies where not previously established by the states. If water quality standards cannot be protected by the application of best practicable control technology for industries and secondary treatment for municipal wastes before 1977, then effluent limitations must be achieved which will protect water quality standards. Before 1983, if best available treatment and its equivalent for municipal facilities will not contribute to attainment of water quality which will protect public water supplies, agricultural and industrial uses, protection of a population of fish and wildlife, and allow recreational activites, more stringent effluent limitations are to be imposed.

An overall view of the conditions of the waters and of the discharges therein will be provided in a report which is to be prepared for Congress sometime in the near future. This water quality report will include an inventory of all point source discharges and will identify which navigable waters are of the quality, or can reach the quality by 1977 or 1983, that provides for protection of fish and shellfish populations and allows recreational activity.

CLASSIFICATION

The Standard Industrial Classification (SIC) was developed for use in the classification of establishments by type of activity in which engaged for purposes of facilitating the collection, tabulation, presentation, and analysis of data relating to establishments and for promoting uniformity and comparability in the presentation of statistical data collected by various agencies of the U.S. government, state agencies, trade associations, and private research organizations. The major standard industrial classifications are SIC 201 and 207.

RESEARCH AND DEVELOPMENT PROGRAM

Under the Division of Industrial Pollution Control, there is a program titled "Technology Research for the Elimination of the Discharge of Pollutants from the Meat, Fats, and Oils Industry."

OBJECTIVES SOUGHT

The main objective sought is to develop industry-wide applicable, viable pollution control technology for the industry which will provide a basis for establishing, improving, and implementing required effluent standards. The standards sought, levels of control desired, and implied technology re-

search (TR) leadtime requirements are as follows: (A) best practicable control technology (BPT) currently available by January 1974, (B) best available control technology (BAT) economically achievable by January 1979, (C) elimination of the discharge of pollutants (Zero) by 1985, and (D) elimination of multi-media pollution discharges (TOT) by 1985.

Although the identification may be modified by the Agency's definitions in the forthcoming effluent guidelines, for interim Office of Research and Development purposes, this industry is identified with those manufacturing operations whose products are included within SIC No. 201 and 207 (meat products and miscellaneous food preparation, including cottonseed oil, soybean oil, vegetable oils, table oil, margarine, and other edible fats and oils).

The above objective is to provide the viable technology necessary to restore and maintain the chemical, physical, and biological integrity of the nation's waters which are affected by the discharges from this industry. The establishment of this technology must become acceptable for implementation through the medium of national effluent standards and at a rate specified by the regulatory actions of the empowered state and federal agencies.

The form of solution required is a spectrum of integrated applied research, development, and demonstration activities culminating in engineering-scale demonstrations of technically and economically viable methods for waste water-multi-media pollution control. These activities will be translated for industry implementation through detailed technical reports, seminars, design guidelines, and national standards of performance. The relationship of each activity out to the national goal of elimination of polluting discharges will be identified and evaluated periodically in the form of progress seminars and state of the art assessments to the degree possible, given legislative time constraints and available resources.

GENERAL ACTIVITIES

General activites include the following: (A) assessment of ongoing EPA projects with respect to technical areas of investigation and identification of research problems in need of supplemental attention to be reported on a biannual basis; (B) provision for the evaluation and appraisal of all federal projects related to the Environmental Research Objective Statements (EROS); (C) promotion of timely Office of Research and Development project completion and issuance of final reports with special efforts to transmit results to guideline and standards activities; (D) documentation of the quantitative technology bases (economics, control effectiveness, contaminant concentration) from guidelines information for each point source classification, so as to provide a basis for technology comparison; and (E) development of an in-house assessment (in report form) of effluent limitations, so as to identify point sources with "below part" or primitive technology and technology which requires technical or economic optimization for July 1977 and July 1983 implementation.

BAT OBJECTIVE: LATEST COMPLETION DATE, JULY 1983

For research and development purposes, BAT will incorporate control effectiveness of 95-99% reduction of contaminants along with the resolution of special problems (selected pollutants). Technology research areas may include in-plant or process adjustments and end-of-pipe control techniques.

ZERO OBJECTIVE: LATEST COMPLETION DATE, JULY 1983

For research and development purposes, Zero will imply a level of control effectiveness which results in no "additive" pollutant discharge into a receiving body or closed loop system. The Zero concept generally applies to a plant processing line or operation and total industrial complex control as opposed to individual processing adjustments and innovations which fall under the BAT objective.

TOT OBJECTIVE: LATEST COMPLETION DATE, JULY 1983

For research and development pur-

TABLE II

Treatment Methods Used in Elimination of Pollutants

Pollutants	Treatments
Free and emulsified oils and greases	Gravity separation Coagulation and sedimentation Carbon adsorption Mixed media filtration Flotation Impressed current
Suspended solids	Plain sedimentation Coagulation-sedimentation Mixed media filtration
Dispersed organics	Bioconversion Carbon adsorption
Dissolved solids (inorganic)	Reverse osmosis Ion exchange Sedimentation Evaporation
Unacceptable acidity or alkalinity	Neutralization
Sludge obtained from or produced in process	Digestion Incineration Lagooning Thickening Centrifuging Wet oxidation Vacuum filtration

TABLE III

Treatment Control Costs

Treatment For zero discharge Total system plus	Capital cost	Direct operational	Waste reduction (cumulative percent) BOD5[a]	 COD[b]	 Oil and grease
Carbon adsorption	$100-300/1000 gal/day	$0.15-0.50/1000 gal			
Reverse osmosis	$300-600/1000 gal/day	$0.30-1.00/1000 gal		*99+ for all parameters	
Total recycle system					
Primary and secondary + carbon	$663-1653-1000 gal/day	$0.69-2.18/1000 gal			
Primary and secondary + reverse osmosis	$700-1710/1000 gal/day	$0.60-1.95/1000 gal			

[a]BOD_5 = biochemical oxygen demand.

[b]COD = chemical oxygen demand.

poses, TOT will imply technology development which integrates water, air, and solid waste management considerations resulting in a control practice having minimal environmental impact and exhibiting technical and economic viability. The control effectiveness of this technology for the water component will reflect BAT and Zero criteria. The special problem of sludges may be considered here if it is of major significance.

GENERAL TREATMENT METHODS

The edible oils industry, working with such organizations as AOCS, should coordinate, via a committee, statements of need for new or improved pollution abatement technology. These needs will serve as basic planning inputs into the EPA research and development program. This type of cooperative effort has been the cornerstone to a relevant program in other industrial-EPA research and development programs. This media operation has proved most beneficial to the respective organizations, as well as the general public.

EPA is interested in technology to solve the significant water pollution problems of the edible oil industry. In general, the treatment methods used to control or eliminate various pollutants in this industry are shown in Table II. From a theoretical viewpoint, it was estimated that zero discharge of pollutants might be accomplished by a system of carbon adsorption following activated sludge and sand or mixed media filtration or reverse osmosis with recycle reuse. The estimated capital and operational costs to accomplish this with the cumulative waste reduction is shown on Table III. The composite flow sheet for waste water treatment in this industry could look like that shown in Figure 1.

EPA INDUSTRIAL RESEARCH AND DEVELOPMENT PROGRAM

The main objective of total water pollution containment within any processing industry's complex is based upon the concept that water pollution abatement and water conservation are economically compatible, particularly for the long term. As water availability becomes more critical, the reuse of water will be dictated by economics, with attendant inherent treatment costs merely a normal operating expense. The EPA industrial pollution control technology program is, therefore, moving to provide industry with the tools necessary to implement and to accelerate this water reuse trend.

Since the trend toward water reuse already has commenced, EPA is continuing, through the industrial research and development program, to encourage creative application of new technology to attain the pollution controls necessary and the elimination of discharges.

A list of significant industrial pollution control research and developments involving the edible oil and related industries is given below.

Archer Daniels Midland Company, Decatur, Ill., has a waste water treatment demonstration with EPA. This project, a full-scale (over 1/2 mgd) development-demonstration project for emulsion breaking of the effluent waste waters resulting from soybean processing for oil, was to be undertaken. The project developed and installed the required additional facilities to break tight emulsions currently being discharged to a municipal sewer system. The existing system contains an oil separator-skimmer and 1 day retention lagoon. A two stage chemical system is being explored, and other physical and biological alternatives also are being evaluated. Also to be demonstrated is an ion exchange system for sodium removal and wash water recovery, as researched by the U.S. Department of Agriculture.

The total project costs will exceed $250,000. The federal share of this will be up to $106,677, primarily for engineering, design, sample taking, analysis, reports, and a portion of the operation and maintenance costs. The final report on this project will be published shortly.

A study in the food industry on water conservation and waste load reduction was conducted in a hog packing plant. The Sioux-Preme Packing Company plant in Sioux City, Iowa, represents a combination of unique design and good management. Innovations introduced in all phases of the hog slaughter operation have resulted in a savings of water, reduction of waste material generated, and increased by-product recovery. The result is a greater profit/animal and reduced waste treatment costs.

During the study period, 97% of the live wt kill could be recovered from various process operations. The 12.5% represented by the inedible by-products provides an estimated profit of 80 cents/hog.

The process water use, as measured by plant effluent, averaged only 37.4 gal/hog killed or 163 gal/1000 lb live wt kill. This represents ca. one-fifth of the industry average and is reflected in savings in power costs and in waste treatment. One of the devices that is responsible for much of the water conservation is the blood and scrap collector which transports inedible scrap to the processing area.

The auger and other modified devices, such as the stunner, scald tank, hair scrapers, and singe chamber display the inventiveness exercised in designing the process line. This unique equipment, coupled with the fact that 54 of the 62 employees are engaged in the production process, further demonstrates the concept of efficiency incorporated in the plant.

Collection and treatment of the in-plant waste water is accomplished effectively. For example, the barometric condensers are used to remove vapors from the rendering and blood drying process. Water for the condensers is obtained from the anaerobic lagoon which eliminates plant odors and places the waste load from the vapors in the lagoon. The circulation of lagoon water mixes the anaerobic system, and the heat increases the microbial metabolism, increasing treatment efficiency.

During the study period, there was no discharge from the final aerobic lagoon which provided the final polishing for the plant waste stream. However, the treatment efficiency, as measured by waste load reductions affected by the air flotation, anaerobic, and first aerobic lagoons, was 97% removal of total suspended solids and 98% removal of biochemical oxygen demand (BOD_5). There is no doubt that, in this situation, a profit motive

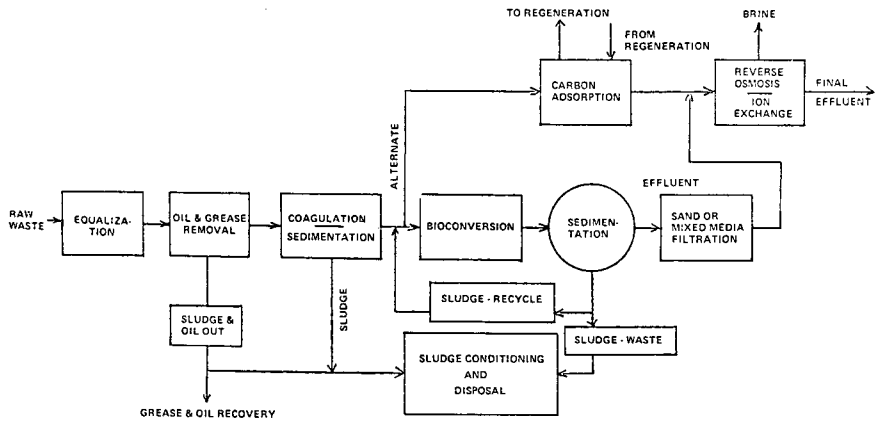

FIG. 1. Composite flow sheet of waste treatment.

is compatible with environmental concerns. There is an EPA report available on this project.

The Kraft Foods, Champaign, Ill., plant waste treatment system is described below.

Kraft Foods has had a margarine and salad dressings plant in operation in Champaign since the early 1960s. In 1968, the decision was reached to make a major expansion at the Champaign plant.

Kraft Foods' production facility includes the original oil plant in which margarine, salad dressings, and oil products are manufactured; the new facility which has been in operation over a year and in which macaroni-type products, process cheeses (slices and Velveeta-type), and natural cheeses in consumer size packages are produced; and an edible oil refinery which is operated by the Humko Operation of the corporation. It was proposed that the Urbana-Champaign Sanitary District provide sewerage service for the expanded plant at Kraft's expense, since the wastes to be discharged would be compatible with district waste water and be treated in a professionally operated treatment system. The district accepted the hydraulic load, but the company would need to provide pretreatment facilities to meet the specification of: 200 mg/liter BOD, 200 mg/liter suspended solids, and 100 mg/liter fats, oils, and greases covered in a proposed ordinance.

A biological treatment facility was designed on the basis of a projected 1980 production load.

The wastes from the cheese and oil production are collected in lift stations and pumped to a surge tank. The next step is flotation clarifier; grease skimmed from the surface of this unit then is conveyed to the grease tank. Sludge removed from the clarifier is passed on to the aeration basin eliminating the need for primary sludge handling facilities.

Effluent flows to the aeration basin. The discharge from the aeration basin then passes through the final clarifier and into the district system.

For controlling operations, arrangements have been made for collecting samples at various points throughout the system. An automatic, composite sampler located on the final discharge makes a continuous record on the load going to the district. Laboratory control results for the operation of these treatment facilities are run in the quality control laboratory.

The monthly maximum, minimum, and mean BOD_5 results on the influent for a 3 month period ending with October were respectively 5268, 1113, and 3223 mg/liter. Assuming the influent BOD_5 had remained in the same general range for the 6 week period under consideration, BOD_5 reductions would have ranged between roughly 90-98%.

The reduction in suspended solids resulting from passing the effluent through the plant ranged between 85.6-95.9%, while the chemical oxygen demand reduction ranged between 93-97.4%.

The work at Kraftco on the degrading of edible fats, oils, and greases in a plant effluent illustrates that these types of materials are rather readily degradable in biological treatment systems, as one would expect. The reductions from influent to effluent across the system are accomplished by a combination of the primary and secondary treatment processes in use. It is of interest to note that an average of 97.4% of the fats, oils, and greases were removed or degraded by the treatment system described.

Another EPA funded project was with Swift & Co., Oak Brook, Ill. This demonstration was entitled "Removal and Recovery of Fatty Materials from Edible Fat and Oil Refinery Effluents."

Under this project new full-scale equipment and modification to the existing standard waste treatment equipment were installed at Swift & Co.'s modern, high volume, edible fat and oil refining plant at Bradley, Ill., complete with necessary controls and instrumentation to study methods for removing and upgrading the fatty materials for resale. Details are described by Seng and Kreutzer (1).

FREQUENTLY ASKED QUESTIONS

It is appropriate to conclude this discussion with a series of questions and answers listed below.

What is the effect of the new Act on pending Refuse Act applications and permits?: Under the new Act, each application for a permit under the Refuse Act pending on the date of enactment is considered an application for a permit under the new Act. All permits previously issued under the Refuse Act are considered to be permits issued under the new Act.

What permit authority will be exercised over thermal discharges?: The administrator will be establishing effluent limitations on thermal discharges as part of the general effluent limitations and, for new sources, as part of the performance standards. If the owner or operator of a point source, after opportunity for public hearing, satisfies the administrator (or the state, where appropriate) that the effluent limitation proposed for a thermal discharge is more stringent than necessary to ensure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, the administrator (or state) may impose a different limitation which will still provide that protection.

Are industrial users of publicly owned treatment facilities required to obtain a permit; what control is placed on such indirect discharges? Individual industrial users of publicly owned waste treatment facilities are not required to obtain the NPDES permits. However, each municipal facility is required to include in its application for a permit a separate section for each major industrial facility which uses the municipal system. The municipal permittee is to require any industrial user of the system to comply with pretreatment standards and certain monitoring and reporting requirements. EPA or the state agency, as the issuer of the permit to the public facility, is to be notified by the public facility of any changes in the volume or constituency of the discharge from the industrial user.

Can a state ever apply standards or requirements to its permits other than the federally promulgated ones?: If the administrator gives his approval, a state may apply its own standards and regulations applicable to new source performance standards, sewage sludge disposal, and discharge monitoring and reporting thereof, as long as they are as stringent as the federally promulgated one. In addition, the Act provides that a state may enforce any effluent limitation, schedule of compliance, or any other requirement more stringent than federal requirements, and may enforce requirements in areas, such as facility design, to which federal jurisdiction and standards do not extend. These rights of the state to enforce more stringent standards do not depend upon the administrator's approval.

Does the scope of the new Act's jurisdiction include ground water?: To a limited extent, ground water is a subject of the new Act. State control over the disposal of pollutants into wells may involve the protection of ground waters. The federal government is charged with developing comprehensive programs for preventing, reducing, or eliminating the pollution of ground waters and underground waters.

Whereas the States are required to have the authority to issue permits to control the disposal of pollutants into wells, the federal government will exercise such control only where a well disposal is proposed as part of a program to control a discharge to navigable waters. The drafters of the new Act considered providing full authority to both the federal government and the states but determined that state law was or could be made sufficient to control deep-well disposals.

May individual exceptions be made

to the application of the "best available technology" requirement?: In addition to the variance relating to thermal dischargers, the administrator may modify the requirement for application of the "best available technology economically achievable" with respect to any point source for which an application is filed after July 1, 1977. The applicant must make a satisfactory showing to the administrator that such modified requirements will: (A) represent the maximum use of technology within the economic capability of the applicant and (B) will result in *reasonable further progress* toward the elimination of the discharge.

Are facilities operated by the federal government subject to regulation in the new Act?: Every federal department, agency, or instrumentality which has jurisdiction over any property or engages in any activity resulting in the discharge of pollutants shall comply with any federal, state, interstate, or local pollution control requirements to the same extent that any person must comply. The President can exempt an executive agency if it is in the paramount interest of the U.S. However, no exemption can be granted from the requirements of pretreatment or toxic effluent standards or the new source performance standards. Federal facilities will apply for and obtain NPDES permits only from EPA even after approval of a state program. Also, discharges from federal facilities do not require state certification as is required of other discharges for which EPA may propose NPDES permits.

The research, development, and demonstration program of EPA has been implemented to meet current and emerging needs for industrial water pollution control

The trend toward water reuse and recycle already has commenced. Acceleration of the trend could be provided through the application of advance waste treatment systems. Current and future environmental standards are expected to increase greatly the pressures to reduce dramatically, or eliminate altogether, pollutional loads and effluent discharges. In fact, the 1972 amendments make the elimination of discharge of pollutants to public water bodies a goal for 1985. The use of new technology for specific tasks in industrial pollution control already has been established.

To quote Russell E. Train, EPA administrator, in his remarks (2) before the National Press Club:

> We have heard it suggested that environmental programs will stop or slow down economic growth. Just the opposite is the case. It is pollution—not is control—that limits growth. The American people will not and cannot tolerate unrestrained activities that adversely affect the public health and welfare. Thus, the truth of the matter is that the real anti-growth forces—however unwittingly—are those who continually oppose environmental progress.

ACKNOWLEDGMENT

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REFERENCES

1. Seng, W.C., and G.M. Kruetzer, JAOCS 52:9A (1975).
2. Train, R.E., "Remarks," National Press Club, Washington, D.C., September 18, 1973.

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