MARINE EXTENSION BULLETIN
OF GEORGIA
NO. 2
MAR.
1976

Federal and State Waste Treatment Regulations Affecting Seafood Processors in Georgia

J. Owens Smith and Wayne A. Bough

Issued by the Georgia Sea Grant Program, University of Georgia, Athens, Georgia 30602

Federal and State Waste Treatment Regulations Affecting Seafood Processors in Georgia

J. Owens Smith

Marine Resources Law Associate
Marine Extension Service and
Institute of Government
Athens, Georgia 30602

and

Wayne A. Bough

Associate Marine Scientist
Marine Extension Service
Brunswick, Georgia 31520

This work is a result of research sponsored by the National Oceanic and Atmospheric Administration, US Dept. of Commerce, through the National Sea Grant Program.

This bulletin presents general answers to questions most commonly raised by seafood processors in regard to the disposal of processing wastes. For a definitive answer to a specific problem, readers are urged to consult with the Environmental Protection Division, Georgia Department of Natural Resources, 270 Washington Street, S. W., Atlanta, Georgia 30334.

Contents

LIST OF QUESTIONS

LIST OF TABLES

LIST OF FIGURES

Federal and State Waste Treatment Regulations Affecting Seafood Processors in Georgia

In 1972, Congress enacted the Federal Water Pollution Control Act Amendments of 1972 (1972 FWPCA), the most complex and broadly applicable water pollution control law to date. The purpose of this bulletin is to explain some of the important provisions of the Act which particularly affect the seafood industry in Georgia.

The 1972 FWPCA imposes strict wastewater treatment requirements on persons, corporations, municipalities or anyone who "discharge pollutants" into almost any waters in the nation. Since the 1972 FWPCA in its present form effects some basic changes in state approaches to water pollution control, an outline of the federal law should be helpful.

What important policy changes are to be accomplished by the 1972 FWPCA?

The policy of the 1972 FWPCA and its various programs is expressed in the beginning of the statute, as follows:

> The objective of the Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this Act—
>
> (1) It is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985 [§ 101(a)] . . .

Application of the federal regulatory scheme has been extended to virtually *all* waters by inclusion of very broad difinitions of the terms, "discharge of pollutant" and "navigable waters." "Navigable waters" are defined as "waters of the United States," and addition of any pollutant is prohibited. This classification is now made without regard for *navigability* as was the case in the past. Subsequent interpretation by EPA and courts has had the effect of extending federal jurisdiction to circumstances in which there is a connection to interstate commerce through *use* of the water rather than in the traditional sense through the water itself.

In addition to the 1985 goal of no discharge of pollutants, a new interim national water quality goal is set for 1983—the achievement of water quality which provides for "protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water." Although stated in terms of "goals," effluent limitations and water quality standards are set to attain such levels of stream cleanliness.

A U. S. Senate report clearly states another basic policy of the 1972 FWPCA:

> Unlike its predecessor [which relied heavily on water quality standards] which permitted the discharge of certain amounts of pollutants . . . , this legislation would clearly establish that no one has the right to pollute—that pollution continues because of technological limit, not because of any inherent right to use the nation's waterways for the purpose of disposing of wastes.

Some believe the 1972 FWPCA to be an entirely new regulatory scheme which radically departs from prior law. Preexisting state law, however, denies an absolute property right to place wastes in watercourses in the State of Georgia.

Since much of the wastes discharged from seafood processing facilities may be useful as feed for fish and other aquatic life, why cannot these wastes be returned to the water?

Unlike past programs which emphasized the assimilative capacity of a stream or its ability to absorb or dilute pollution, the 1972 FWPCA establishes a new direction for water pollution control efforts at the state and national levels. Out of the most intense debate ever held regarding protection of natural resources in the nation, one of the basic policies which emerged was that clean-up requirements would no longer be set on a case-by-case basis nor by inquiring into the effects, harmful or beneficial, of a discharge on a particular watercourse. Congress simply rejected this as a controlling philosophy of water pollution control. The quality of the nation's waters had deteriorated under various common law formulations of "reasonableness," and this condition was not significantly improved by the pre-1972 federal scheme based on allocation of waters to one of several uses and maintenance of such use through water quality standards requirements.

The relative costs and benefits of controlling a discharge are considered in very few instances under the Act, but no such variance provisions are available to seafood processors in Georgia under state regulations.

What, then, does the 1972 FWPCA require of seafood processors to end "discharge of pollutants?"

Section 301 of the Act sets deadlines for the achievement of certain levels of pollution control from all major sources of pollution. These deadlines are expressed in two control programs.

The first, a program of *technology based effluent standards* which requires application of increasingly higher levels of waste treatment, sets national minimum levels of pollution control for industrial and municipal sources of pollution based on the availability of pollution control technology. By July 1, 1977, industrial sources of pollution must achieve the "best practical control technology currently available" (BPCT), and municipal sources of pollution (publicly owned waste treatment facilities) must achieve secondary treatment.

By July 1, 1983, a second and greater degree of pollution control is required. Industries must use the "best available control technology economically available" (BAT), and municipal facilities must apply "best practicable waste treatment technology" (BPT). It should be emphasized that these technology based standards apply to the effluent being discharged in order to attain the ultimate goal of "no discharge of pollutants," which, again, reflects the new philosophy of no longer regarding streams and rivers as available for waste disposal purposes. These technology based standards insure that, if pollution can be eliminated, industries and municipal systems will be required to do so. Plants with similar processes and design will be categorized or grouped and will be required to comply with new federal minimum standards regardless of their location. This policy is designed to reduce the threat of industries moving from states which have tough standards to states with pollution control requirements less stringent than federal requirements. States have authority, however, discussed below, to require cleanup efforts more stringent than federal standards. Theoretically, this could have the effect of causing some relocation of dischargers.

Deadlines and the water quality "goals" are designed, among other reasons, to encourage development of pollution control systems that recycle wastes instead of discharging them into the nation's waterways.

The policy of achieving an end to pollution through application of technology based effluent limitations which focus on controlling the "quantities, rates, and concentrations of chemical, physical, biological and other constituents" at the "end of the pipe" is a new approach.

What effect does the 1972 FWPCA have on earlier state efforts to control pollution through a *water quality standards* approach?

Waste treatment requirements based on a desired level of water quality simply continue with modifications of some features of earlier federal law under which states adopted water quality standards for *inter*state waters. Under the 1972 FWPCA, however, if the water quality standards set by state or federal agencies for a particular river or stream require a higher level of pollution control from dischargers than the current national technology based standards, stricter limitations must be formulated and enforced. The FWPCA requires that any more stringent limitations required by current water quality standards must be achieved by the mid-1977 deadline. This part of the control program is discussed in greater detail below.

If an industry decides to send its wastes to a municipal waste treatment facility rather than construct its own treatment plant, what regulations apply to this alternative?

Industries that discharge wastes through municipal systems must meet an additional set of requirements called pretreatment standards. These standards insure that industrial wastes will not interfere with municipal waste treatment processes or pass untreated through such facilities. For instance, certain industrial chemicals destroy the biological activity of waste treatment plants that use bacteria to decompose wastes. Other wastes are not biodegradable and will therefore pass through treatment plants undecomposed.

The date of granting federal assistance for construction of municipal waste treatment facilities determines the amount and parts of the treatment works for which an industrial user will be charged a proportionate share, based on the amount and characteristics of effluent. Industries which discharge their wastes to treatment works for which federal assistance was granted after March 1, 1973 will be assessed user charges sufficient to pay for their proportionate share of the costs of operation and maintenance of such facilities. In addition, municipal recipients of these federal grants under § 201 of the 1972 FWPCA must adopt a system of charges to assure return of capital and operating costs from industrial users. The federal investment, which is 75% of construction costs, is to be recovered from industrial users in proportion to each industry's use. Calculation of this share is based on all factors which significantly influence the cost of the treatment works, including strength, volume, and flow characteristics.

Treatment works partially funded with federal assistance between July 1, 1970 and March 1, 1973 have varying reimbursement requirements. In general, the *non-federal* capital and operating costs must be recovered from industrial users. One coastal city uses this formula for calculating treatment charges (operating costs): $C_I = v_0 V_I + b_0 B_I + s_0 S_I$. The formula simply means that the user's charge for treatment is equal to volume (gals) multiplied by cost of treatment per pound of Biochemical Oxygen Demand plus weight of Suspended Solids multiplied by cost of treatment per pound of SS, where all costs are expressed in average unit costs. Average unit cost implies that the low volume user is charged at the same rate per gallon or per pound as a high volume user. Surcharges (additional charges) are made if a user's volume, BOD, or SS, or all three exceed established limits. The same city is recovering the portion of treatment works capital costs attributable to industrial use by requiring capital contributions based on percentage of *locally* funded treatment capacity used by an industrial user.

May a state require a greater degree of waste treatment than necessary to meet these federal technology based effluent standards?

Section 510 of the 1972 FWPCA specifically preserves the authority of states to decide how clean state waters shall be. In the case of some categories of seafood processors, Georgia's "water quality related effluent limitations" are substantially more stringent than federal regulations for the industry. The state program and its relationship to the federal law are discussed below.

In 1974 the EPA suspended issuance of federal permits under the National Pollutant Discharge Elimination System (NPDES) program when it was satisfied that Georgia's laws and regulations were adequate to meet all federal requirements under the Act. The Georgia Environmental Protection Division (EPD) began administering this permit program and is presently involved with seafood processors in Georgia to insure compliance with state and federal requirements.

What are some of the most important similarities between state and federal waste treatment requirements of the seafood processing industry?

Section 303 of the FWPCA of 1972 requires states to have approved water quality standards for *intra*state waters similar to those that had been adopted under earlier law for *inter*state waters. These standards have been adopted by the State in light of federal encouragement that the State set use designations for its waters based on recreational activity and the propagation of fish and wildlife.

Although the terminology, i.e., "water quality standards," is used in the 1972 and the earlier federal law, this control technique in the 1972 FWPCA is under much greater restrictions than were applied under prior law. For instance, a state cannot now effectively classify a stream for a relatively low quality use, i.e., industrial, *if* the result of such classification is to allow the discharge of pollutants which violate federal minimum effluent limitations, or if such classification would allow degradation of existing high quality waters.

These water quality standards are required to consist of two parts: (a) water quality criteria applicable to all waters within a state, and (b) a plan for assuring a step-by-step progression of activity leading to attainment of the water quality criteria adopted. Each standard consists of three parts: (1) a designation of use or uses for a particular body of water; (2) a set of criteria applicable to or necessary to insure fitness of the water for each use; and (3) a schedule of implementation or of compliance with agreed-upon activity, setting forth dates by which particular industrial or municipal dischargers are required to install and begin to operate pollution abatement facilities.

Before the 1972 FWPCA was enacted, implementation plans to bring dischargers into conformity with the standards were usually lacking in spceificity. Obligatory cleanup requirements were stated in general directives, such as a requirement to install secondary treatment or its equivalent. The application was often said to be speculative and depended primarily on a verbal understanding between state officials and the inudstry's engineers about how these standards would be attained. Such latitude for compliance has now largely been removed by legislated time deadlines.

The federal government also required adoption by the states of a "nondegradation" policy, although such requirement was never formally stated as a regulation. This policy was recently implemented as a regulation under Georgia's state law as follows [§ 391–3–6–.03 (b), Water Use Classifications and Water Quality Standards]:

> Those waters in the State whose existing quality is better than the minimum levels established in standards on the date standards become effective will be maintained at high quality; with the State having the power to authorize new developments, when it has

> been affirmatively demonstrated to the State that a change is justifiable to provide necessary social or economic development; and provided further that the level of treatment required is the highest and best practicable under existing technology to protect the existing beneficial water uses.

For implementation plans under the pre-1972 federal law, the general federal policy was to require secondary treatment of municipal dischargers and secondary treatment or its equivalent of industrial dischargers. This is precisely what Georgia has required for many years. Therefore, with the warning that there are now serious limitations on the State's authority to permit less stringent cleanup performance than technology based federal minimum standards, it can be seen that Georgia's EPD is merely implementing a statutory scheme which existed before the 1972 FWPCA. In regulations revised in June of 1974, after adopting varying criteria for several stream classifications, the EPD restated its long-held policy on "Treatment Requirements:"

> Notwithstanding the above criteria, the requirements of the State relating to secondary or equivalent treatment of all waste shall prevail. The adoption of these criteria shall in no way preempt the treatment requirements.

Such requirements are imposed on dischargers on a case-by-case basis presumably following a study of the peculiar characteristics of the drainage basin into which a discharge is proposed. For instance, an applicant will be allowed to discharge a given number of pounds of organic matter per day. The determination of daily discharge is based upon, among other things, how much oxygen will be required in the oxidation or decomposition of such wastes and on how many other such dischargers are using the basin.

An applicant will be put on a compliance schedule which is a plan for orderly progression from an existing position of violation of the rules to a point where his discharge has the physical, chemical, and volume characteristics required by law. If a permittee fails to accomplish a scheduled step or part of his plan, the EPD can at that moment issue an order to enforce the schedule and secure judicial enforcement if necessary.

Specific provision for the State's dominant role in water pollution abatement was included a second time in its rules regarding the "Degree of Waste Treatment Required." The EPD provided for federal minimum requirements and then restated the Division's intention for more strict cleanup:

> (a) All pollutants shall receive such treatment or corrective action so as to insure compliance with the terms and conditions of the issued permit and with the following whenever applicable:
>
> 1. Effluent limitations established by EPA pursuant to Sections 301 and 302 of the Federal Act.
> 2. Standards of performance for new sources established by the EPa pursuant to Section 306 of the Federal Act.
> 3. Effluent limitations and prohibitions and pretreatment standards established by the EPA pursuant to Section 307 of the Federal Act.
> 4. Notwithstanding the above, more stringent effluent limitations *may be required* as deemed necessary by the Division to meet (a) any other existing Federal laws or regulations, and (b) to insure compliance with any applicable State water quality standards, effluent limitations, treatment standards, or schedules of compliance [§ 393-3-6-.06 (4) (a) (1-4), Rules of Georgia Department of Natural Resources, Environmental Protection Division].

How can a discharger, whose waste must comply with EPA effluent standards and state requirements, know what and how much waste can be discharged?

Federal EPA effluent standards are now expressed as a specific "hard" number in lb/1000 lb or kilograms/1000 kilograms (kg/kkg) which relates to the wastewater of a particular plant. Once the mathematics is mastered, it is relatively easy to express the concentration of waste components, flow of wastewater, and processing rate of raw product as a "waste loading" or effluent standard. Figure 1 shows the formulas for calculation of waste loading as pounds of waste component per 1000 pounds of raw material or kg per kkg. The formulas for back-calculation from the effluent standard or waste loading into the more familiar milligrams per liter (mg/1) or parts per million (ppm) expression are shown in Figure 2. These calculations are helpful in translating EPA effluent standards into terms of state water regulations.

What are the federal effluent guidelines for seafood wastes?

The effluent guidelines adopted by the EPA for shrimp, crab, catfish, and tuna are shown in Tables 1-3. The guidelines adopted under the FWPCA to describe best practical control technology currently available (BPCT) for 1977 are shown in Table 1.

The several degrees of effluent control required by the 1972 FWPCA are best described by noting the factors which influence the definition of each level. Section 304(b)(1)(B) provides that in establishing BPCT, there must be "consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application." Thus, this standard will be set with some resort to a cost-benefit analysis. The technical makeup of an industry must be considered also. The EPA must consider " . . . the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes . . . and such other factors as the Administrator deems appropriate [§§ 304(b)(1)(B), (2)(B)]." These determinations will lead to subcategorization of industries in order that all plants in a given category may be treated uniformly. "Currently available" means requirements based on "the average of the best existing performance by plants of various sizes, ages, and unit processes within each industrial category."

The guidelines shown in Tables 1–3 for the daily maximum waste loads are generally three times that allowed for the monthly averages. In most categories the BPCT for 1977 was determined to be screening and "good housekeeping" in the plant. In other words, screening of wastewater and in-plant control of waste sources should be sufficient treatment to meet 1977 EPA effluent guidelines. Note, however, that such treatment is not sufficient for compliance with Georgia's regulations, which are implemented through the National Pollutant Discharge Elimination System (NPDES) permit program.

In determining the "best available technology" which must be applied to wastes by 1983, the EPA must determine what is economically achievable by considering the cost in some manner which may *exclude* a cost-benefit analysis as required for the 1977 level. This BAT standard may be established as the level of treatment which has been achieved by the best waste treatment performer in any industrial category. Congressional discussions during the enactment of the FWPCA make it clear that even these good performers can be disregarded and the requirements raised to a level demonstrated to be "available" at the pilot plant stage. The apparent harshness of this requirement, however, is softened by provision of a cost-based variance.

Guidelines describing 1983 best available technology economically achievable (BAT) are shown on Table 2. Additional treatments, such as lagooning, dissolved air flotation, chemical coagulation, and activated sludge, are recommended. Except for catfish, blue crab, and tuna, the 1983 guidelines show permitted levels for suspended solids and oil and grease that are approximately 80% lower than the 1977 effluent guidelines.

Additional treatments similar to those for 1983 are recommended in order to meet the *new source standards* shown in Table 3. "New sources" of pollutant discharges must meet the next most stringent cleanup requirements. A "source" is any building, structure, or facility for which there is or may be a discharge, and it is "new" if construction of it is begun *after* publication of regulations applicable to it. Cost-based variances are not allowed for new sources.

The EPA will establish, by rule, waste treatment standards of performance for certain categories of dischargers listed in the FWPCA. Seafood processors are one of the specified categories. Industries which comply with these more stringent new source performance requirements will be issued permits which shall remain in effect for 10 years while permits under the 1977 and 1983 standards may be issued for periods no longer than five years.

Are EPA guidelines for 1977 truly based on screening of wastewater?

In Georgia a much higher degree of treatment will be necessary than is required to meet EPA's 1977 guidelines. Table 4 shows EPA's 1977 and 1983 guidelines for Phase I subcategories, expressed as pounds of pollutant per 1000 pounds of raw material, and EPA's raw waste load, flow, composition, and production data given in their Development Document. The raw waste data taken from summary tables in the EPA Phase 1 report[1] on shrimp, crab, catfish, and tuna show the averages of all plants surveyed in a particular subcategory. These average data have been used, in illustrative manner, to back-calculate the composition of the wastewater discharged from an average plant when in compliance with 1977 and 1983 effluent standards. The mg/1 results shown in the starred (*) columns are not the equivalent of an effluent standard. Rather, these results characterize the waste composition of a plant in compliance with the EPA effluent standard for the specified conditions of flow and production. While the results of the mg/1 calculations will be different for particular plants, they show the differences between EPA effluent guidelines and state water quality and treatment standards. By looking at the mg/liter composition of the wastewater, it is easier to compare state requirements for secondary treatment and EPA's definition for secondary treatment which is 30 mg/liter suspended solids and 30 mc/liter BOD in the treated effluent. In the case of Phase I seafood wastes, 1977 standards are in fact based upon screening, for it is apparent that the 1977 effluent limitations are exactly the same as the screened raw waste load reported by the contractor.[1] For example, the average screened waste load reported for breaded shrimp plants was 93 lb suspended solids/1000 lb raw product; the average concentration of suspended solids was 800 mg/1. EPA determined that screening and good housekeeping represented best practical control technology for 1977 and adopted an effluent limitation of 93 lb/1000 lb on suspended solids and 12 lb/1000 on oil and grease. No limitation was set on BOD for 1977, but the average BOD load of screened breaded shrimp effluent was 84 lb/1000 lb which is based upon a BOD concentration of 720 mg/1 from a plant processing 6.2 raw tons/day and discharging 0.172 million gallons/day. Table 4 shows that the concentrations of BOD and suspended solids are expected to be 720 and 800 mg/1, respectively, after removal of solid wastes by screening. These high concentrations of suspended solids and BOD would be allowed under EPA guidelines but not under Georgia's requirement for secondary or equivalent treatment.

Except for catfish, blue crab, and tuna, and remote Alaskan plants, the 1983 guidelines show permitted levels for suspended solids and oil and grease that are approximately 90% lower than the screened raw waste load, and BOD guidelines for 1983 call for waste loadings which are approximately 80% lower.

Are state secondary treatment requirements more stringent than EPA 1983 standards?

Calculations shown in Table 4 on the mg/1(*) composition of wastewater from an average plant using best available technology (BAT) to meet EPA 1983 limitations indicate that the discharge of suspended solids and BOD would exceed the defined limits of secondary treatment. EPA has defined secondary treatment in the August 17, 1973 Federal Register as an effluent containing not more than a maximum monthly average of 30 mg/1 BOD and 30 mg/1 suspended solids. Their definition also includes fecal coliform bacteria, pH, and other special considerations.

By requiring seafood processors to connect to municipal systems for secondary treatment or to install their own secondary systems, the state requirements which are applicable now in Georgia exceed both the 1977 and 1983 treatment requirements imposed by EPA in their determination of best practicable and best available technology. In Georgia, the requirement of secondary treatment or its equivalent is based on a policy that this level of waste treatment is economically and technically achievable *and* is in the public interest. The requirement is applicable to all industrial wastes, including seafood processors, regardless of coastal or inland location.

Personnel of the Georgia EPD indicate that connection of a municipal treatment works is the preferred course of action for seafood processors. Through the permit system, the State has an effective tool to establish municipal treatment of the seafood industry's wastes. In order for an industry to meet the timetable or schedule of compliance in their NPDES permit, connection to the municipal treatment works may be necessary.

What are the economic differences between federal and state secondary treatment requirements?

Considerable economic differences are implied in waste treatment costs between the EPA effluent limitations that require only screening and the Georgia regulations which require secondary treatment. Whereas a screen may cost $70,000 for a large shrimp processor (400,000 gal/day wastewater and 6–10 tons/day raw product processed), secondary treatment is likely to cost 3 to 5 times as much as screening and, under Georgia regulations, is effective immediately.

Economic studies by North[2] (1974) indicate that a secondary treatment system for a large, automated shrimp processing plant of the size discussed above would require an initial investment of about $240,000 with a direct investment tax credit of $16,800, or a net after tax capital cost of $223,200. These costs were annualized on a capital recovery basis at $30,319 per year, (interest at 12 percent for twenty years) equivalent to about one cent per pound of shrimp processed. An additional operating cost of $17,142 per year (0.6 cents per pound of raw shrimp processed) would be incurred for a total cost of 1.6 cents per pound of deheaded, raw shrimp processed. The total first year cost, including $70,000 for a screening system, would be $340,000.

Whitaker[3] of the National Marine Fisheries Service has analyzed the economic impact of EPA's

1977 and 1983 effluent guidelines. Comparing his cost figures for southern shrimp for 1977 and 1983 gives additional indication of the potential impact of secondary treatment requirements which are more stringent than EPA's 1983 requirements. In terms of 1974 dollars, capital investment requirements for southern shrimp processors to comply with 1977 standards total $8,467,000 compared to $17,883,000 for 1983 standards. Comparable annual costs are estimated to be $1,111,000 for 1977 and $3,431,000 for 1983. Operating and maintenance costs are estimated at $149,000 for 1977 and $582,000 for 1983. Monitoring the performance of treatment systems is estimated to cost $115,000 for 1977 standards and $214,000 for 1983 EPA standards applicable to southern shrimp.

What are the economic implications when waste treatment requirements vary from one state to another?

Consider specifically the case of breaded shrimp. The 1977 EPA guidelines would allow the average plant shown in Table 3 to discharge an effluent containing 800 mg/liter suspended solids and 720 mg/liter BOD. Requirements for 1983, based upon a suspended solids limitation of 7.4 lb/1000 and 17 lb/1000 for BOD, would allow an effluent containing 64 mg/liter suspended solids and 147 mg/liter BOD. Reducing the concentration of pollutants in breaded shrimp waste to less than 30 mg/liter BOD would correspond to an effluent standard of 3.4 lb/1000 or approximately 95% removal of BOD. So the possibilities for economic variations are great. The State could accept EPA's guidelines which are based upon screening for 1977, or the State may, under authority of §510 of the Act, have its present requirement for complete secondary treatment. The difference in costs of these two treatments is nearly six-fold. The following data (Table 5) taken from Phase 1 development document by EPA[1] illustrate the differences between the different levels of treatment. Application of the 1977 guidelines based upon screening would produce an effluent containing 84 kg/1000 kg and for 8 ton/day plant would involve capital costs of $56,000. The 1983 effluent limitation on BOD of 17 kg/1000 would result in a cost of $222,000 for the 8 ton/day plant. To treat down to 30 mg/liter BOD (defined by secondary treatment) would require an effluent limitation of 3.4 kg/1000 kg. This level of treatment is comparable to EPA's most stringent level of 3.5 kg/1000 kg, costing $326,000 capital cost. Studies by North[2] have estimated the costs for secondary treatment of breaded shrimp wastes from a 10 ton/day plant to be $340,000. Thus, North's cost estimates are similar to the most stringent level considered by EPA. Seafood processors in states requiring complete secondary treatment or connection to municipal systems will either be paying or sharing in treatment costs that are 5-6 times as great as the cost for screening systems which are acceptable to those states adopting EPA effluent guidelines. Furthermore, processors in the more stringent states will be paying these added costs from now until 1983 or 8 years before processors in more lenient states will be required to install any additional treatment systems other than screening. Regional planning among neighboring states, as well as national planning, appears to be needed to minimize economic disparities within the same industry.

What are the state requirements affecting docks and packinghouses?

In general, the requirements are adequate screening of wastewater and solid waste disposal, with no domestic sewage included in the discharge. According to EPD (1975),[4] permits for the installation of a dock, bulkhead, or other physical structure or dredging activity in navigable waters must include public notice to allow relevant comments and certification that the faculty will not violate applicable water quality standards. Evaluation for certification requires part or all of the following information:

1. "A plan showing the location and size of any facility, existing or proposed, for handling any sanitary or industrial wastewaters generated on the property. If wastes are to be treated through the use of septic tank, it must be stated whether or not the system meets the standards of the local County Health Department. Otherwise, this office must approve the treatment method."
2. "A detailed plan of the existing or proposed project and adjacent property for which the Section 10 permit is being requested."
3. "A statement describing activities to be conducted on the property."
4. "A plan showing the location of all points where petrochemical products (gasoline, oils, cleaners) will be used and stored. Any above ground storage areas must be diked and there should be no storm drain catch basins within the diked areas. All valving arrangements on any petrochemical transfer lines should be shown."
5. "A contingency plan delineating action to be taken in the event of spillage of petro-chemical

products or other materials from the operation."

6. "A statement that any dredging will be done in a manner to minimize turbidity in the stream."
7. "A statement that any dredging will be done in a manner to minimize turbidity in the stream."
8. "If dredging is involved, plan and profile drawings showing limits of areas to be dredged, areas to be used for placement of spoil, locations of any dikes to be constructed, and typical cross sections of the dikes."
9. "A statement that there will be no oils or other materials released from the proposed operations which will reach the stream."
10. "A statement that all work performed during the construction of the facility will be done in a manner to prevent interference with legitimate water uses."

"In addition to the above, if the proposed project involves a dock which will be used by shrimpers and fishermen for the unloading of their catches, we also require information regarding the disposal of accumulated trash fish and other solids. Where the catches are sorted with fluming away of trash and rejects, we generally require the installation of at least a 40 mesh screen with solids disposal in an approved landfill or by byproduct utilization in a rendering plant."

What are the proposed EPA limitations on fish, oysters, and clams?

The effluent guidelines affecting Phase II seafood products were proposed in the Federal Register of January 30, 1975. As in the case of Phase I products (shrimp, catfish, carp, and tuna), 1977 guidelines are, in general, based upon good housekeeping and screening. Because the regulations affecting hand-shucked oysters are known to be of interest in Georgia, EPA's proposed guidelines for the Atlantic and Gulf Coast Hand-Shucked Oyster Processing Subcategory are presented in Table 6. The guidelines for 1977 and 1983 are applicable to plants producing more than 1000 lb/day of product (finished weight). The new source standards of performance proposed by EPA would be applicable to any size facility. The average raw waste load reported by EPA in the Phase II Development Document[5] for five hand-shucked oyster plants located on the East and Gulf Coasts is shown in Table 6 for comparison to the proposed guidelines. It is apparent that the guidelines proposed for 1977 by EPA could be met by effective screening and housekeeping.

Existing plants producing less than 1000 lb/day finished weight of oyster would not be affected by EPA limitations for 1977 or 1983, but will be required to meet Georgia's requirements. As discussed in the preceding question on docks and packinghouses, screening (40 mesh), solid waste disposal, and elimination of domestic sewage from the wastewater will be required by the Georgia Environmental Protection Division.

[1] Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Catfish, Crab, Shrimp, and Tuna Segment of the canned and Preserved Seafood Processing Point Source Category. EPA–440/1–74–020–a, U. S. Environmental Protection Agency, Washington, D.C., June 1974.

[2] Ronald M. North, Financial implications of waste management for the seafood industry. Seafood Waste Management Conference, Brunswick, Ga., March, 1974.

[3] Donald R. Whitaker. The economic impact of pollution abatement regulations on seafood processing. Fish Expo 74, Norfolk, Va. November, 1974.

[4] Wm. M. Jernigan, Program Manager, Industrial Waste Program, Environmental Protection Division, Georgia Department of Natural Resources. Personal communication, January 13, 1975.

[5] Development Document for Interim Final Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Fish Meal, Salmon, Bottom Fish, Sardine, Herring, Clam, Oyster, Scallop, and Abalone Segment of the Canned and Preserved Seafood Processing Point Source Category. EPA 440/1–74/041, Group 1, Phase II, Table 38, p. 151. U. S. Environmental Protection Agency, Washington, D. C., January, 1975.

Fig. 1. *Calculation of Waste Loadings as lb/1000 or kg/kkg*

$$\frac{mg/l^{a} \times mgd^{b} \times 8.345^{c}}{tons/day^{d} \times 2^{e}} = \frac{\text{lb waste component}}{\text{1000 lb raw material}}$$

$$\frac{mg/l^{a} \times cu.m/day^{f} \times 10^{-3g}}{kkg/day^{h}} = kg/kkg$$

[a]The concentration of waste component (BOD, suspended solids, etc.) determined by chemical analysis; expressed as milligrams per liter.
[b]Flow of wastewater measured in million gallons per day, gal per day ÷ 10^6.
[c]Factor to convert from metric to U.S. measure, mg/l × 8.345 = lb/mil. gal.
[d]Production data for tons raw material processed per day
[e]Converts tons to 1000 lb units
[f]Flow in cubic meters per day
[g]Composite factor:

$$mg/l \times \frac{10^{-6} Kg}{mg} \times 10^{3}\ l/cu.m \times \frac{cu.m}{day} = 10^{-3} \times Kg/day$$

[h]Production data in thousand Kilogram units per day

Fig. 2. *Calculation of Waste Concentration in mg/l or ppm from Waste Loading, Flow, and Production Data*

$$mg/l = \frac{lb/1000\ lb^{a} \times 2^{b} \times tons/day}{mgd^{c} \times 8.345^{d}}$$

$$mg/l = \frac{kg/kkg^{e} \times kkg/day^{f} \times 1000^{g}}{cu.\ m/day^{h}}$$

[a]Effluent limitation or production-based waste loading in lb waste component per 1000 lb raw product processed
[b]Converts tons to 1000 lb units
[c]Flow of wastewater in million gallons per day
[d]Converts lb/mil. gal to mg/l
[e]Effluent limitation or waste loading in kilogram waste component per thousand kilogram raw product
[f]Production data in thousand kilogram units per day
[g]Composite factor, see note g, Fig. 1.
[h]Flow in cubic meters per day

Table 1. *1977 Guidelines—Best Practical Control Technology Currently Available*

Subpart and Commodity	Recommended Technology	Effluent Limitations, lb/1000 lb raw mat. BOD5 d. max	BOD5 mo. avg	T. Susp. Solids d. max	T. Susp. Solids mo. avg	Oil & Grease d. max	Oil & Grease mo. avg
Blue Crab, conventional	screen	–[b]	–	2.2	0.74	0.60	0.20
Blue Crab, mechanized	screen	–	–	36	12	13	4.2
AK.[c] Crab Meat, non-rem.	screen	–	–	19	6.2	1.8	0.61
AK. Crab Meat, remote	grind	–	–	–[b]	–	–[b]	–
AK. Whole Crab&Sec., non-rem.	screen	–	–	12	3.9	1.3	0.42
AK. Whole Crab&Sec., remote	grind	–	–	–	–	–	–
Dun.&Tan. Crab, cont. states	screen & grease trap	–	–	8.1	2.7	1.8	0.61
AK. Shrimp, non-rem.	screen	–	–	320	210	51	17
AK. Shrimp, remote	grind	–	–	–	–	–	–
N.[d] Shrimp, cont. states	screen	–	–	160	54	126	42
S.[e] Shrimp, non-breaded	screen	–	–	110	38	36	12
Shrimp, breaded, cont. states	screen	–	–	280	93	36	12
Tuna	DAF[a]	23	9.0	8.3	3.3	2.1	0.84
Catfish	screen & grease trap	–	–	28	9.2	10	3.4

[a]Dissolved air flotation
[b]No limitation
[c]Alaskan
[d]Northern
[e]Southern

Table 2. *1983 Guidelines—Best Available Technology Economically Achievable*

Subpart and Commodity	Recommended Technology	Effluent Limitations, lb/1000 lb raw mat. BOD5		T. Susp. Solids		Oil & Grease	
		d. max	mo. avg	d. max	mo. avg	d. max	mo. avg
Blue Crab, conventional	screen, aer. lagoon[a]	0.30	0.15	0.90	0.45	0.13	0.065
Blue Crab, mechanized	screen, aer. lagoon	5.0	2.5	13	6.3	2.6	1.3
AK.[f] Crab Meat, non-rem.	screen, DAF[b]	5.0	2.0	1.3	0.53	0.21	0.082
AK. Crab Meat, remote	screen	–[e]	–	16	5.3	1.6	0.52
AK. Whole Crab&Sec., non-rem.	screen, DAF	3.3	1.3	0.83	0.33	0.12	0.048
AK. Whole Crab&Sec., remote	screen	–	–	9.9	3.3	1.1	0.36
Dun. & Tan. Crab, cont. states	screen, DAF	4.3	1.7	0.58	0.23	0 .18	0.07
AK.[g] Shrimp, non-rem.	screen, DAF	70	28	45	18	3.8	1.5
AK.[h] Shrimp, rem.	screen	–	–	270	180	45	15
N. Shrimp, cont. states	screen, DAF	68	27	12	4.9	9.5	3.8
S. Shrimp, non-breaded	screen, DAF	25	10	8.5	3.4	2.8	1.1
Shrimp, breaded cont. states	screen, DAF	43	17	19	7.4	2.5	1.0
Tuna	DAF, chem. coag.,[c] act. sludge[d]	2.2	0.62	2.2	0.62	0.27	0.077
Catfish	screen, grease trap, aer. lagoon	4.6	2.3	11	5.7	0.9	0.45

[a]Aerated lagoon
[b]Dissolved air flotation
[c]Chemical coagulation
[d]Activated sludge
[e]No limitation
[f]Alaskan
[g]Northern
[h]Southern

Table 3. *New Source Standards*

Subpart and Commodity	Recommended Technology	Effluent Limitations, lb/1000 lb raw mat. BOD5		T. Susp. Solids		Oil & Grease	
		d. max	mo. avg	d. max	mo. avg	d. max	mo. avg
Blue Crab, conventional	screen, aer. lagoon[a]	0.3	0.15	0.9	0.45	0.13	0.065
Blue Crab, mechanized	screen, aer. lagoon	5.0	2.5	13	6.3	2.6	1.3
AK[e] Crab Meat, non-rem.	screen	–[d]	–	16	5.3	1.6	0.52
AK. Crab Meat, remote	screen	–	–	16	5.3	1.6	0.52
AK. Whole Crab&Sec., non-rem.	screen	–	–	9.9	3.3	1.1	0.36
AK. Whole Crab&Sec., remote	screen	–	–	9.9	3.3	1.1	0.36
Dun.&Tan. Crab, cont. states	screen, DAF[b]	10	4.1	1.7	0.69	0.25	0.10
AK. Shrimp, non-rem.	screen	–	–	270	180	45	15
AK. Shrimp, remote	screen	–	–	270	180	45	15
N.[f] Shrimp, cont. states	screen, DAF	155	62	38	15	14	5.7
S[g] Shrimp, non-breaded	screen, DAF	63	25	25	10	4.0	1.6
Shrimp, breaded, cont. states	screen, DAF	100	40	55	22	3.8	1.5
Tuna	screen, DAF	20	8.1	7.5	3.0	1.9	0.76
Catfish	screen, grease trap, aer. lagoon[c]	4.6	2.3	11.0	5.7	0.90	0.45

[a]Aerated lagoon
[b]Dissolved air floating
[c]Aerated lagoon
[d]No limitation
[e]Alaskan
[f]Northern
[g]Southern

Table 4. *Comparison of EPA Summary Data for an Average Plant with 1977 and 1983 Effluent Limitations Expressed as lb/1000 lb, mg/1, and % Reduction*

Commodity	Parameter	Flow mgd	Prod'n. tons/day	Raw Waste Load lb/1000 lb	Raw Waste Load mg/1	1977-BPCT lb/1000 lb	1977-BPCT mg/1*	1983-BAT lb/1000 lb	1983-BAT mg/1*	1983/1977 % Reduction
Gulf Shrimp, can.	SS	.208[a]	18.4[a]	38[a]	800[a]	38[b]	800[c]	3.4[b]	72[c]	91
	O&G	.208	18.4	12	250	12	250	1.1	23	91
	BOD	.208	18.4	46	970	–	–	10	212	78
Breaded Shrimp	SS	.172	6.2	93	800	93	800	7.4	64	92
	O&G	.172	6.2	–	–	12	104	1.0	9	92
	BOD	.172	6.2	84	720	–	–	17	147	80
West C. Shrimp, can.	SS	.125	8.7	54	900	54	900	4.9	82	91
	O&G	.125	8.7	42	700	42	700	3.8	63	91
	BOD	.125	8.7	120	2,000	–	–	27	450	78
Ak. Froz. Shrimp	SS	.310	17.6	210	2,900	210	2,900	18	245	91
	O&G	.310	17.6	17	230	17	230	1.5	20	91
	BOD	.310	17.6	130	1,800	–	–	28	381	79
Tuna	SS	.987	185	11	511	3.3	148	0.62	28	81
	O&G	.987	185	5.6	244	0.84	38	0.077	3	91
	BOD	.987	185	15	699	9.0	404	0.62	28	93
Catfish	SS	.03	5.6	9.2	400	9.2	400	5.7	248	38
	O&G	.03	5.6	4.5	200	3.4	148	0.45	20	87
	BOD	.03	5.6	7.9	340	–	–	2.3	99	71
Blue Crab, conv.	SS	.00067	2.3	0.74	620	0.74	620	0.45	370	39
	O&G	.00067	2.3	0.26	220	0.20	169	0.065	53	68
	BOD	.00067	2.3	5.2	4,400	–	–	0.15	124	97
Blue Crab, mech.	SS	.046	5.3	12	330	12	330	6.3	174	48
	O&G	.046	5.3	5.6	150	4.2	113	1.3	36	69
	BOD	.046	5.3	22	600	–	–	2.5	69	89
Ak. Crab, froz&can.	SS	.09	10.4	6.2	170	6.2	170	0.53	15	91
	O&G	.09	10.4	0.81	22	0.61	16	0.082	2	87
	BOD	.09	10.4	9.6	270	–	–	2.0	55	79
Ak. Wh. Crab&Sec.	SS	.058	13.1	3.9	210	3.9	210	0.33	18	92
	O&G	.058	13.1	0.56	30	0.42	23	0.048	3	89
	BOD	.058	13.1	6.0	320	–	–	1.3	70	78
West C. Dun. Crab	SS	.025	5.5	2.7	140	2.7	140	0.23	12	91
	O&G	.025	5.5	–	–	0.61	32	0.07	4	88
	BOD	.025	5.5	8.1	430	–	–	1.7	90	70

[a]Taken from Development Document for Catfish, Crab, Shrimp, and Tuna. EPA–440/1–74–020–a

[b]Federal Register 39(124):23134–23156(1974), June 26. Effluent guidelines for 1977 and 1983 (monthly averages).

[c]Calculated from Effluent Standard, flow, and production as shown in Fig. 2 (applies only to specified conditions of flow and production).

Table 5. *Breaded Shrimp: Treatment Efficiencies and Costs (Table 113 from EPA, 1974[1])*

Treatment Alternatives	Effluent BOD kg/kkg	Costs 1971 $ Capital Costs			Daily O & M Costs		
(Processing Rate)		(22tpd)	(8tpd)	(2tpd)	(22tpd)	(8tpd)	(2tpd)
Present	105	0	0	0	0	0	0
S	84	104,000	56,000	25,000	26	14	6
S, IP	67	183,000	99,000	44,000	26	14	6
S, IP, DAF	17	407,000	222,000	97,000	104	56	25
S, IP, DAF, AL	4.6	476,000	259,000	113,000	127	69	30
S, IP, DAF, EA	3.5	599,000	326,000	142,000	153	84	36

S = screen; GT = grease trap; AL = aerated lagoon; IP = in-plant changes; LI = land irrigation; EA = extended aeration; DAF = dissolved air flotation; HRTF = high rate trickling filter; AS = activated sludge

[1]Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Catfish, Crab, Shrimp, and Tuna Segment of the Canned and Preserved Seafood Processing Point Source Category. EPA-440/1-74-020-a, U.S. Environmental Protection Agency, Washington, D.C., June 1974.

Table 6. *EPA Effluent Limitations Guidelines Proposed for Atlantic and Gulf Coast Hand-Shucked Oyster Processing Subcategory Compared to Raw Waste Load*

		Effluent Limitations, lb/1000 lb finished product					
		BOD_5		T. Susp. Solids		Oil and Grease	
Guidelines	Recommended Technology	d. max	mo. avg	d. max	mo. avg	d. max	mo. avg
Raw Waste Load[a]	screened		14.9		13.6		0.665
1977[b]	good housekeeping, screen	–[c]	–	19	15	0.77	0.70
1983[b]	in-plant improvements, screen, activated sludge with extended aeration	2.5	2.3	4.5	3.6	0.45	0.15
New Source Standards[b]	same as 1983	2.5	2.3	4.5	3.6	0.45	0.15

[a]Development Document for Interim Final Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Fish Meal, Salmon, Bottom Fish, Sardine, Herring, Clam, Oyster, Scallop, and Abalone Segment of the Canned and Preserved Seafood Processing Point Source Category. EPA 440/1-74/041, Group I, Phase II, U.S. Environmental Protection Agency, Washington, D.C. January, 1975. Data shown are average values for East and Gulf Coast hand-shucked oyster plants (HS02–HS06), Table 38, p. 151.

[b]Environmental Protection Agency. Federal Register 40(21):4581–4619, Jan. 30, 1975.

[c]Not applicable.