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PRINCIPLES IN THE CONTROL OF ACID MINE-DRAINAGE

Research and study into the causes of acid mine-drainage, of preventing it, and of ameliorating its pollutional effects, have been going on for a number of years. Many individuals, agencies and institutions, in addition to the mining industry, have given much time to this problem. As yet there is no positive or complete solution known, but means have been found for helping the situation in many instances, and research and study are continuing.

In the meantime, certain fundamental principles which can be applied in the control of acid mine-drainage from coal mining and related operations have been recognized. These principles form the basis for the control measures contained in *ORSANCO* Resolution 5-60.

A copy of *ORSANCO* Resolution 5-60 is included with these Principles. It was adopted after years of study and extensive deliberations by the *ORSANCO* Engineering Committee and the Coal Industry Advisory Committee. It has been approved by both the Commission and the industry. The coal industry in the Ohio River watershed is now required to carry out the provisions of Resolution 5-60.

A study of the principles upon which the control measures contained in *ORSANCO* Resolution 5-60 are based will not only help to understand those measures, but will also help in carrying them out.

THE PROBLEM

Coal mining is one of the great industries of this country, but even before a single ton of coal was mined, water pollution from "coal drainage" was noted by early explorers. They documented it in their records, predicting the presence of ample quantities of coal by streams that were "..... so impregnated with bituminous and sulphurous materials as to be frequently nauseous to the taste....." (The First Century and a Quarter of the American Coal Industry, Howard N. Evansen, Waverly Press, Baltimore (1942), Pg. 169).

Acid drainage is a natural occurrence which has been greatly increased by the mining process. Just as certain materials associated with the outcrop coal

measures came in contact with other natural elements to cause pollution before mining, so do they come in contact with these elements in the mining process, and in far greater quantity. The elements which cause water pollution when associated with certain materials in the coal measures are two of the most common and essential in nature - air and water.

If we could completely eliminate either air or water from coal mining operations there would be no acid mine-drainage. This has so far proven to be impractical of accomplishment by either physical or chemical means. Some control can be exercised over these elements, however, and another factor involved in the development of acid mine-drainage provides an opportunity for this control. That factor is time.

The production of acid is not an instantaneous process. The rapidity of its formation varies with different acid-producing materials, but the amount of acid contributed by a given material is related to the length of time that material is exposed to air and water; however, complete submergence under water will prevent exposure to air, thereby eliminating acid production.

THE FUNCTIONS OF AIR, WATER AND TIME IN PRODUCING ACID MINE-DRAINAGE

Oxidation of the acid-producing materials associated with coal mining is necessary for the formation of mine acids. Oxygen is a part of the chemical composition of these acids which is lacking until the material is exposed. There can be no acid, therefore, until exposure of the acid-producing materials to air.

Oxidation begins on the exposed surface of the materials, and proceeds according to the rapidity with which it can break down the other elements. Water, in the form of moisture in the atmosphere, hastens the process. As oxidation continues, acid is formed, and the parent materials are disintegrated to expose new surfaces to oxidation and further acid formation. Thus time becomes an important factor in the amount of acid formed. The longer the acid-producing materials are exposed to the atmosphere, the greater the amount of acid which will be formed.

Water invades almost every mine in the form of rain or snow, surface run-off or underground percolation. Sooner or later it passes through the mine or over or through mined material, becomes mine-drainage, and eventually mingles with other outside waters. Its quality at any time is the net result of the materials dissolved in it and the reaction of each upon the others. When the water comes in contact with acid material in the mine, it leaches the acid from them. If the acid thus picked up is greater than the ability of the water to neutralize it, the water will be acid in character. In this manner, water becomes acid mine-drainage. Thus, *as water passes through the mine, or over or through mined materials, and comes in contact with acids, it dissolves them and becomes their transport agent.*

Generally speaking, the longer water remains in contact with acid materials, the more acid it will pick up and transport.

"ACID-PRODUCING" IN RELATION TO "ACID-NEUTRALIZING" MATERIALS

Not all materials exposed during the mining process are acid-producing. Some have acid-neutralizing properties. *Both acid-producing and acid-neutralizing materials occur in all coal measures, although the amount and character of each may vary considerably from mine to mine.*

All coal measures contain sulfur. It may be organic, sulfate or sulfide sulfur. Only the sulfide sulfur, occurring as the mineral "pyrite," forms acid if exposed to oxidation. Thus, *all coal mines have acid-producing potentials, even though all coal mines do not produce acid mine-drainage.*

Acid-neutralizing materials, or alkalis, occur in almost all earth strata, even those containing acid-producing materials. These alkalis are also present in all coal measures in varying amounts and are exposed by the mining process. So it can be concluded that all coal mines have acid-neutralizing potentials.

Acid and alkali waters react with and neutralize each other. In the case of mine-drainage, the result of this action depends upon the amount of each present. The character of the drainage from any given mine, therefore, depends upon the amounts of acid and alkali that dissolve in the water as it passes through the mine. Even in so-called acid mines, *the exercise of control to decrease the production of acid and increase neutralization by alkali, will have a beneficial effect upon the character of the mine-drainage.*

In no case should the principle of neutralization of acid water be substituted for acid prevention principles.

MEASUREMENTS AND NEUTRALIZATION OF MINE ACIDS

When we see the word "acid," we generally think of a concentrate which will destroy cells and tissue, and we think of an extremely caustic substance when we see the word "alkali." We often forget that fruits, vinegar and carbonated beverages are acids, and that baking soda, limestone and household ammonia are alkalis.

Most matter is either acid or alkaline. Some acid or some alkali does not necessarily mean an unnatural or undesirable condition. Therefore, *control of acid mine-drainage need not require the attainment of completely neutral conditions in all cases.*

Acids and alkalis are opposites which are defined in terms of their ability to act with and neutralize each other. When they are dissolved in water, the water is either acid, alkaline, or neutral. This character, or condition, of water can be indicated by a measurement known as "pH," a term devised by the chemist to indicate the concentration of hydrogen ions in solution in water. When the concentrations of hydrogen and hydroxyl ions are equal, the water is neutral, or pH 7. The greater the hydrogen ion concentration, or the more indication of acid, the lower the pH below 7. The greater the hydroxyl ion concentration, or the more indication of alkaline character, the higher the pH above 7. *The pH measurement is used to indicate the acid or alkaline character of water, and warn of possible extremes.*

In efforts to control the acidity of acid mine-drainage, the amount of neutralization needed to change the acid character cannot be measured by pH, since it is only an indication of the degree of acid or alkaline condition. The terms "acidity" or "alkalinity" are used to define quantity, and, in general, an equal quantity of the opposite character would be necessary to attain a neutral condition. *The determination of the amount of neutralization necessary to control the acid character of a given mine-drainage is a laboratory procedure.*

Dilution may offer a means of ameliorating the pollutional effects of acid mine-drainage. If the added water is alkaline, some degree of neutralization can be expected. Dilution alone will not change the total amount of acid, but it will reduce the concentration, which can result in ameliorating its pollutional effects. The principle of utilizing the assimilative capacity of the stream is involved in the recommendation that acid mine-water be released to streams during periods of high flow. *Dilution to ameliorate the pollutional effects of acid mine-drainage should be practiced whenever feasible.*

THE COMPLEXITY OF ACID MINE-DRAINAGE

Acid mine-drainage is not a simple dilute solution of pure acid. As has been pointed out, all of the soluble materials with which it has come in contact have affected its quality. Even the acids it has picked up are not simple solutions. They have been formed by the oxidation of pyrite into any one of a series of iron sulphate salts, or from aluminum sulphate salts, which the water has dissolved and diluted and which may be acted upon further by other material which the water may contact. *Acid mine-drainage is variable and extremely complex. Whenever possible, prevention is preferable to treatment.*

While acid mine-drainage is not necessarily harmful when consumed by man or animals, it is often harmful to fish and other aquatic life. It usually degrades water quality for many uses and must be regarded as a serious source of water pollution. It is polluting if it causes a condition in the receiving stream which adversely affects the treatment procedure of a municipal water supply, causes excessive expense by other industries, is harmful to fish and other aquatic life, or has deleterious effects upon other users of water. We can conclude, therefore, that EVERY PRACTICAL EFFORT MUST BE MADE TO PREVENT THE PRODUCTION OF ACID MINE-DRAINAGE AND TO AMELIORATE ITS POLLUTIONAL EFFECTS.

SUMMARY

- (1) Acid drainage is a natural occurrence which is generally increased by the mining process. (Ref. 1, 3, 4. See Appendix III).
- (2) If we could completely eliminate either air or water from coal mining operations there would be no acid mine-drainage. (Ref. 7).
- (3) The amount of acid contributed by a given material is related to the length of time that material is exposed to air and water; however, complete submergence under water will prevent exposure to air, thereby eliminating acid production. (Ref. 2).
- (4) Oxidation of the acid-producing materials associated with coal mining is necessary for the formation of mine acids. (Ref. 3, 4, 6, 7, 9).
- (5) As water passes through the mine, or over or through mined materials, and comes in contact with acids, it dissolves them and becomes their transport agent. Generally speaking, the longer water remains in contact with acid materials, the more acid it will pick up and transport. (Ref. 1).
- (6) Both acid-producing and acid-neutralizing materials occur in all coal measures, although the amount and character of each may vary considerably from mine to mine. All coal mines have acid-producing potentials, even though all coal mines do not produce acid mine-drainage. (Ref. 2, 4, 5).
- (7) The exercise of control to decrease the production of acid and increase neutralization by alkali, will have a beneficial effect upon the character of the mine-drainage. In no case should the principle of neutralization of acid water be substituted for acid prevention principles. (Ref. 8, 13).
- (8) Control of acid mine-drainage need not require the attainment of completely neutral conditions in all cases.
- (9) The pH measurement is used to indicate the acid or alkaline character of water, and warn of possible extremes. (Ref. 10, 11).
- (10) The determination of the amount of neutralization necessary to control the acid character of a given mine-drainage is a laboratory procedure. (Ref. 10).
- (11) Dilution to ameliorate the pollutional effects of acid mine-drainage should be practiced whenever feasible. (Ref. 4, 14).
- (12) Acid mine-drainage is variable and extremely complex. Whenever possible, prevention is preferable to treatment. (Ref. 1, 3, 4, 10, 11).

GUIDE TO PRACTICES IN ACID MINE-DRAINAGE CONTROL

(Some Operating, Planning and Administrative Techniques
Relating to the Practical Application of
ORSANCO Resolution No. 5-60)

The following material is intended to be explanatory of the five measures contained in Resolution 5-60. This material is presented as a guide to operators and an aid to administrative agencies in applying the provisions of Resolution 5-60. This material is not necessarily complete, nor is it intended to limit the application of Resolution 5-60. It is believed, however, that it covers most of the known practical techniques in acid mine-drainage control. As progress is made in the application of such control techniques, revision and expansion of this material may be required. The application of these techniques has to be fitted to the wide variations in local conditions which characterize coal mining.

It is to be noted that attention should be given to over-all planning of mining operations to facilitate application of good drainage practices.

CONTROL MEASURE I (a)

"Surface waters and ground waters shall be diverted where practicable to prevent the entry or reduce the flow of water into and through workings."

The application of this measure obviously requires that in every mine an effort must be made to determine the source of all mine drainage. In underground mines such water may come from water-bearing strata overlying or underlying the coal, from cracks to the surface, from adjoining mines or mine workings, or from shaft, drift or slope openings.

Where the source of mine drainage can be determined, every practicable effort should be made to shut off the water source. In some cases cracks to the surface can be plugged by filling the cracks with earth. In some cases it may be practical to seal such cracks by grouting methods. Where surface water is being admitted by shaft, slope, drift, or other mine openings, water should be diverted around such openings, or other measures taken to prevent the flow into the mine.

In strip mining the same principles should be applied. Control Measure "I (a)" would require that wherever practicable, diversion ditches be maintained above the highwall to minimize run-off water from entering the pit.

In an area where mining operations encounter other mine workings, or mine pits, precautions should be taken to prevent entry of water from such encountered mine workings or mine pits into or through such mining operations. Measures should also be taken to control the discharge of such water into the drainage system affected in accordance with Control Measure III of Resolution 5-60.

CONTROL MEASURE I (b)

"Water that does gain entry to the workings shall be handled in a manner which will minimize the formation and discharge of acid mine-drainage to streams."

This provision requires that mine drainage be controlled within the mine to minimize the distribution or flow through or over acid-producing materials. To accomplish this, mine drainage should be removed as quickly as possible from acid-forming materials, or accumulated in sumps or other storage facilities for removal, as near as practicable to the point of entry into the mine. Local depressions in the floor which permit the accumulated water to spread out over a relatively large area are not suitable sumps. Wherever practicable mine water should be conducted in pipes rather than ditches, unless such ditches can be kept free from acid-producing materials. Where such water cannot be handled in pipes, or suitable ditches, by gravity flow, local pumping stations or suction pick-up stations should be employed. These techniques can be applied to both underground and strip mines. In both underground and strip mines, good housekeeping practices should be followed with respect to accumulations of crushed coal or other acid-producing materials. Acid is formed on exposed surfaces and acid-producing debris is capable of producing large quantities of acid. Where flowing or standing mine water is permitted to contact such debris, it may become contaminated

with a relatively large quantity of acid. It should be remembered that such good housekeeping practices are also important from the standpoint of mine safety.

CONTROL MEASURE II

"Refuse from the mining and processing of coal shall be handled and disposed of in a manner which will minimize discharge of acid mine-drainage therefrom to streams. Where acid-producing materials are encountered in the overburden in stripping operations, these materials shall be handled so as to prevent or minimize the production of acid mine-drainage, taking into consideration the need for stream pollution prevention and all economic factors involved."

A refuse pile shall mean any deposit of any waste coal, rock, shale, culm, boney, slate, clay and related materials, associated with or near a coal seam, which are either brought above ground or otherwise removed from the mine in the process of mining coal, or which are separated from coal during the cleaning or preparation operations, provided, however, that a refuse pile shall not mean overburden from strip mining operations or rock from mine shafts and mine tunnels.

In order to reduce acid formation in refuse piles and to reduce infiltration of water into the pile, refuse should be compacted. Where the "size consist" of the refuse is such as to prevent effective compaction, a suitable size consist should be obtained by crushing or other suitable means as necessary.

The run-off from the area surrounding the refuse piles should not be permitted to infiltrate the piles. If such run-off must pass through the piles it should be contained in a suitable conduit. Run-off water from the area surrounding refuse piles should be diverted around the piles by suitable ditches or conduits.

Probably the most effective protection against the formation of acid by refuse piles is permanent submergence under water.

Refuse piles may be made in strip pits or other depressions and covered by suitable non-acid producing material.

Refuse should not be used for road surfacing or other filling operations where it will produce acid drainage.

In the process of surface mining the practice of selective placement of materials is followed whenever practical, for the purpose of stabilizing the banks. The practice should also include the placement of acid-producing materials, when possible, where such materials will not be exposed even when the surface of the bank is graded. Pit cleanings and waste coal materials should be placed where they will not become exposed.

CONTROL MEASURE III

"Discharge of acid mine-drainage to streams shall be regulated insofar as practicable to equalize the flow of daily accumulations throughout a 24-hour period."

Equalization of the flow of mine drainage may be accomplished in various ways, such as:

- A. The pumping equipment can be designed or adjusted to suit the flow at any given location.
- B. The discharge from the mine may be accumulated in a lagoon or other suitable reservoir, and released at a controlled rate into the stream.
- C. In case of accidental or unusual discharge from the mine which may cause pollution, notification should be given to the proper control authorities as provided in *ORSANCO* Resolution No. 14-59, adopted September 30, 1959, amended January 12, 1961.

CONTROL MEASURE IV

"Upon discontinuance of operations of any mine all practicable mine-closing measures consistent with safety requirements, shall be employed to minimize the formation and discharge of acid mine-drainage."

Effective application of this provision will require that careful planning of underground mine openings to the surface be carried out so as to avoid, wherever practicable, locations that would render sealing ineffective. The plan of the mine workings, including the openings to the surface, should be recorded on appropriate mine projection maps, and such maps should be made available to pollution control administrative agencies.

It should be recognized that mine sealing by the use of bulkheads is not effective in preventing acid mine-drainage unless the coal seam and other acid-producing strata and materials are submerged. This presents a serious problem in mines, the workings of which lie above the natural drainage elevation.

Where practicable, such bulkheads should be designed to be water-tight seals and so constructed as to withstand the water and earth pressure which may be imposed upon them.

Upon the permanent abandonment of strip pits, or the completion of auger mining, all acid-producing refuse should be removed, buried, or submerged, the face of the coal seam in the bottom of the pit

should be covered or submerged and proper provisions for handling water should be established.

CONTROL MEASURE V

"Under appropriate circumstances, consideration shall be given to the treatment of acid mine-drainage by chemical or other means in order to mitigate its polluttional properties."

Under certain conditions, circumstances may develop which are appropriate for the application of chemical or other treatment of acid mine-drainage, as a temporary measure.

As scientific and practical progress is made on the chemical or other treatment of acid mine water, such developments should be considered for application.

CASE HISTORIES IN THE CONTROL OF ACID MINE-DRAINAGE

Mining is not an ordinary industry. Its basic difference is that it is continually moving into new conditions. Even the most carefully engineered mine is subject to day by day adjustment to meet these changing situations.

Many of the water and water quality problems acquired by the mining industry are also unusual. Since they are largely the result of the conditions encountered, they vary from mine to mine and may also vary from day to day. They are a part of the problems of mining. As such, the operating personnel of any particular mine, if they are competent to do so, are in the best position to determine and apply the most practical procedures for the solution of the problems.

The control measures embodied in *ORSANCO* Resolution 5-60 recognize these factors. The degree to which they are given consideration by those charged with the administration and enforcement of the measures will undoubtedly depend upon the initiative taken by each individual mine or mining company in conscientiously applying them in their day to day operations.

The Principles and Guide to Practices contained in this publication are general in their application. Specific procedures cannot be recommended for any and all conditions. However, certain procedures which have proven successful in one mine under certain conditions may be applicable to another mine under similar conditions, be adaptable to other conditions or serve to create an idea which would lead to an applicable procedure. For this reason a section on Case Histories has been included.

It is intended that additional Case Histories will be prepared from time to time and added to the manual in accordance with the following outline:

Control Measure I (a)

Determination of the source of mine water from:

- 1a-1 Water-bearing strata overlying the coal
- 2 Water-bearing strata underlying the coal
- 3 Cracks to the surface
- 4 Adjoining mines and mine workings
- 5 Shaft, drift or slope openings

Efforts made to control water inflow by:

- 6 Filling surface cracks with earth

- 7 Grouting methods
- 8 Diverting surface water around openings
- 9 Sealing openings
- 10 Maintaining diversion ditches above high wall
- 11 Diverting stream water flows from surface mining operations

Control Measure I (b) - (Accumulation and removal of mine drainage)

- 1b-1 Acceptable underground water drainage
- 2 Unacceptable underground water drainage
- 3 Other underground water storage facilities
- 4 Piping of mine drainage underground
- 5 Piping of mine drainage in surface mines
- 6 Underground water drainage ditches free from acid-producing materials
- 7 Surface water drainage ditches free from acid-producing materials
- 8 Unsuitable drainage ditches
- 9 Local pick-up or suction stations for feeding central water disposal system
- 10 Good housekeeping techniques with respect to acid-producing materials, both surface and underground

Control Measure II - (Coal refuse disposal)

- 2-1 Compaction of coal refuse in a refuse pile
- 2-2 Crushing or other control of coal refuse size consist
- 2-3 Channeling of run-off water away from coal refuse pile
- 2-4 Piping of water under or through coal refuse pile
- 2-5 Inundation of coal refuse
- 2-6 Burial of coal refuse in strip pits and/or other depressions
- 2-7 Covering and seeding coal refuse pile
- 2-8 Conditions resulting from improper use of coal refuse for road surfacing

Control Measure III - (Mine drainage discharge equalization)

- 3-1 Adjustment of pump size to fit discharge requirements
- 3-2 Adjustment of pump discharge to fit discharge requirements
- 3-3 Controlled release from lagoon or reservoir

Control Measure IV - (Mine closing measures)

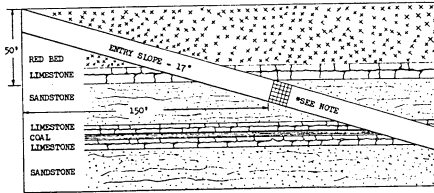
- 4-1 Mine working plans
- 4-2 Mine sealing which inundates the coal seam and other acid-producing strata
- 4-3 Watertight seals
- 4-4 Removal, burial or submergence of acid-producing refuse in strip or auger operations

- 4-5 Covering of coal faces in surface mining
- 4-6 Submergence of coal faces in surface mining

Control Measure V - (Chemical treatment of acid mine-drainage)

- 5-1 Emergency circumstances requiring chemical treatment for protection of downstream water quality
- 5-2 Emergency circumstances requiring chemical treatment within mining operation

USE OF DYES TO LOCATE SOURCE OF MINE WATER



*NOTE: HATCHED AREA SHOWS WHERE EXCESSIVE WATER SEEPAGE OCCURRED.
SEE FRONT VIEW DIAGRAM FOR DETAILS ON CHEMICAL GROUTING.

Figure 1. Side View-Entry Slope

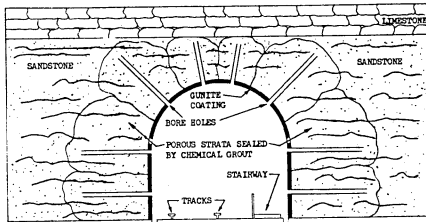


Figure 2. Front View-150 Feet Down Entry Slope
(Vertical Depth - 50 Feet)

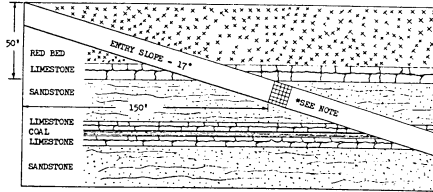
MINING METHOD: Underground mining.

LOCATION: Western Pennsylvania, Upper Freeport Seam.

RESULTS ACHIEVED: Location of underground aquifer severed by slope into mine established so that leakage into mine could be prevented and eliminated subsequently by chemical grouting. (See case history describing "Chemical Grouting to Prevent Inflow of Water" - Case History No. 1a-7).

DESCRIPTION: Water leakage occurred along the plane of intersection of the mine entry with water-bearing strata. Water containing a fluorescent yellow-green dye (Calcocid Uranine) was pumped into bore holes at selected locations near the suspected source of water leakage. Time lapse between injection of dye into bore hole and appearance of dye in water entering mine was measured and later used to (a) establish exact location of water-bearing strata, and (b) establish gel-times required for subsequent sealing off the water leakage by chemical grouting.

CHEMICAL GROUTING TO PREVENT INFLOW OF WATER



*NOTE: HATCHED AREA SHOWS WHERE EXCESSIVE WATER SEEPAGE OCCURRED.
SEE FRONT VIEW DIAGRAM FOR DETAILS ON CHEMICAL GROUTING.

Figure 1. Side View-Entry Slope

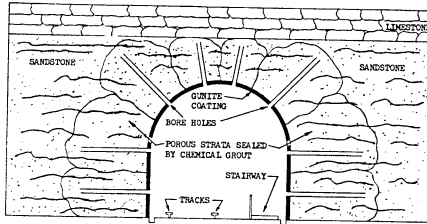


Figure 2. Front View-150 Feet Down Entry Slope
(Vertical Depth - 50 Feet)

MINING METHOD: Underground mining.

LOCATION: Western Pennsylvania, Upper Freeport Seam.

RESULTS ACHIEVED: Inflow of water into mine stopped. This in turn eliminated severe icing conditions on the walls and ceiling of the mine slope near the entry. This resulted in improved safety conditions and in substantial savings in time and material. The method would be useful to control mine drainage.

DESCRIPTION: Water leakage occurred along the plane of intersection of the mine entry with water-bearing strata. Holes were drilled in the roof and ribs of the entry. First, water containing Calcocid Uranine dye, a fluorescent yellow-green color, was pumped into these holes to locate the leakage; then chemical grout was pumped into the holes to seal off the water.

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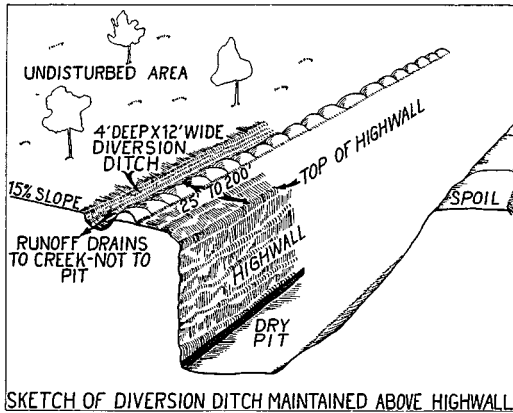
No coal seams were encountered in the drilling. The rock types present were typical of strata overlying coal measures and included claystone, fossil shales and fine-grained sandstones.

American Cyanamid Company's AM-9 is a dry-powder mixture of two acrylic monomers that is applied as an aqueous solution. When catalyzed a cross-linked polymer is formed that renders soil and rock formations impermeable to water.

Because solutions of AM-9 retain the same density and viscosity as water until the point of its instantaneous gelation, they could be pumped into the areas located by the dye in the same time intervals. The gel-time of the grout was set so that the leaky channels would be completely sealed.

The use of 220 gallons of 10 percent AM-9 pumped into 15 bore holes was sufficient to eliminate the entry of water into the roof and ribs of the mine.

DIVERSION DITCH MAINTAINED ABOVE THE HIGHWALL



MINING METHOD: Surface.

LOCATION: Western Kentucky Coal Field, Ohio County, Kentucky.
Carbondale Formation. Seam No. 9.

RESULT ACHIEVED: Surface water prevented from entering active pit to prevent flooding and formation of acid water.

DESCRIPTION: Contour diversion ditch dug above highwall around pit. Water diverted to stream. Cost of constructing a 4 ft. deep diversion ditch at this mine was approximately \$3,200 per mile. Work done with a tractor-bulldozer. The terrain was lightly wooded and gently rolling topography.

PLAN VIEW SHOWING TYPICAL SUMP ENTRY FOR WATER STORAGE

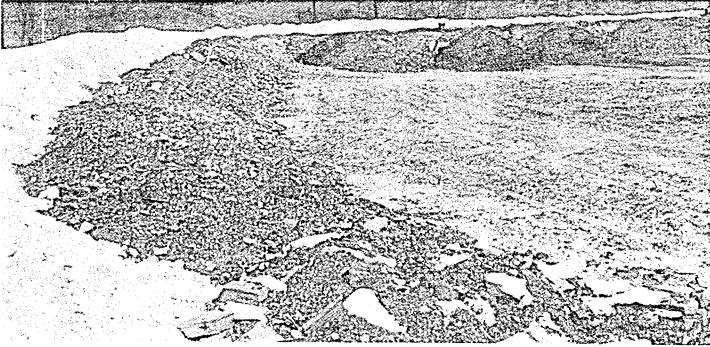
MINING METHOD: Mechanized underground mining.

LOCATION: Western Pennsylvania, Pittsburgh Seam Coal.

RESULT ACHIEVED: Water is not allowed to accumulate in working areas, thereby keeping the water from prolonged contact with acid-forming material in the mine. Storage sumps and regulated pumping equalize the mine water discharge over a 24-hour period.

DESCRIPTION: Gathering or main sumps are provided in the mine by driving separate sump entries or by digging up the bottom. This practice does not permit water to accumulate in low gob areas where acid-producing surface areas would be exposed to the water. Pipes instead of ditches are provided to conduct the water by gravity to these sumps wherever possible. These large sumps provide detention and prevent surges of mine water from entering a stream. By regulated pumping the discharges are equalized over a 24-hour period.

COMPACTION OF COAL REFUSE TO MINIMIZE ACID DRAINAGE



Coal refuse disposal showing coal refuse deposited behind a clay face wall and on top of a previously deposited layer of coal refuse which has been leveled and thoroughly compacted by the directed travel of refuse trucks.

MINING METHOD: Underground mining - wet coal preparation.

LOCATION: Western Pennsylvania, Freeport Seam Coal.

RESULT ACHIEVED: Coal refuse deposited in this location does not produce appreciable acid drainage. Much of the rainfall on the pile flows off over the surface rather than through refuse material.

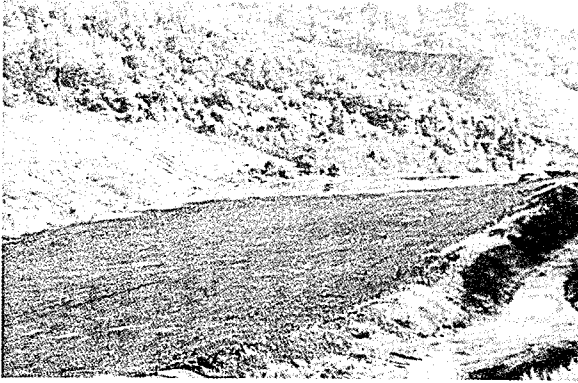
DESCRIPTION: The coal refuse deposited on this pile contains a relatively large amount of acid-producing material, and when deposited in a haphazard fashion can produce appreciable quantities of acid drainage. The refuse is produced in a coal preparation operation and has a top size of about 4 inches with sufficient fine material for good compaction. Additionally, the refuse shows excellent weathering characteristics so that exposure to atmospheric conditions for a few months will soften the refuse and aid compaction.

In the construction of this refuse pile a face wall of earth is deposited about 4 feet high at the outer edge of the pile. The back of the pile is sealed against
(over)

a hillside from which vegetation is cleared before refuse is deposited on it. Refuse is hauled by truck from the preparation plant and deposited in 10-ton piles adjacent to each other so that a layer thickness of 36 inches will be realized when the pile is leveled and compacted. These piles are permitted to weather for a period of 3 to 6 months before they are leveled and initially compacted with a bulldozer. Further compaction of refuse is achieved by directing the travel of loaded trucks carrying clay or refuse over the entire surface. Successive layers are similarly constructed.

The upper surface of each layer of the refuse pile is sloped into the hill so that rainfall on the refuse will flow off quickly with a minimum of penetration into the refuse pile and without disturbing the clay seal. Water draining off the refuse pile has been found occasionally to be slightly acid; this, however, is dissipated when it is mixed with a flow of surface water from the hill above the pile so that the flow of water from the property is not acid.

CHANNELING RUNOFF WATER AWAY FROM COAL REFUSE PILE



Coal refuse disposal showing drainway to carry surface water around refuse pile.

MINING METHOD: Underground mining - wet coal preparation.

LOCATION: Northern West Virginia, Pittsburgh Seam Coal.

RESULT ACHIEVED: Surface water is diverted around the coal refuse pile rather than flowing over and through it.

DESCRIPTION: Coal refuse is deposited in a layer and compacted. A drainage channel is maintained alongside the coal refuse pile so that surface water from the drainage area above the pile is conducted around the pile and into the stream below the refuse pile. By this technique water which would otherwise flow over and through the refuse pile is prevented from contact with the refuse and the acid-producing materials contained therein.

COVERING AND SEEDING COAL REFUSE PILE

Vegetative cover established on covered refuse pile to minimize erosion.

MINING METHOD: Surface

LOCATION: Western Kentucky Coal Field, Hopkins County, Kentucky.
Carbondale Formation, Seams 9, 11 and 12.

RESULT ACHIEVED: Acid water runoff from refuse pile to stream minimized.

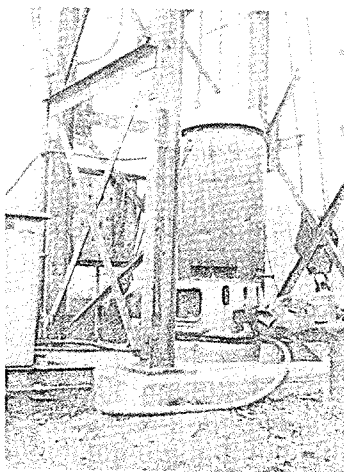
DESCRIPTION: Old refuse pile in valley, compacted and graded on 23.2 acres.
Cost of covering 23.2 acres of coal refuse with average of 3 ft.
of overburden materials and soil:

Cost Breakdown	Per Acre	Total
Dirt Moving	\$343.06	\$7,959.06
Establishment of Vegetative Cover	95.73	2,220.97
	<u>\$438.79</u>	<u>\$10,180.03</u>

The spoil and soil used for covering the refuse pile were available immediately adjacent to the refuse dump which reduced the costs of earth moving. The covering material was moved with a self-propelled scraper pan and leveled off with a road maintainer. The covering material was native acid soil of sandstone origin and spoil. It was heavily limed with a lime-spreader truck, fertilized and drill-seeded to Balboa rye and Kentucky 31 fescue. Later on in the late winter it was also seeded to Korean lespedeza.

ADJUSTMENT OF PUMP DISCHARGE TO FIT DISCHARGE REQUIREMENTS

*Deep Well Pump Installation
Drawing Water from Mine
Sump 370 Feet Below*



MINING METHOD: Mechanized underground mining.

LOCATION: Western Pennsylvania, Pittsburgh Seam Coal.

RESULT ACHIEVED: Water seeping into the pool contacts less gob and picks up less acid and iron. The pH of the discharge has changed from 6.0 to 6.7 and the iron content from about 200 mg/l to the neighborhood of 50 mg/l.

DESCRIPTION: Abandonment of the existing borehole discharges on retreat sections allowed a large pool of water to form and threatened to inundate the main haulage area. Two deep well pumps were installed in a borehole 370 feet deep. At the outset of the operation of these pumps the level of water was at elevation 760 and the area covered was quite large. The iron content of the water was prohibitive and discolored the receiving stream for a distance of ten miles. Several methods of pumping were tried, varying the time and interval of pumping periods. Finally, the pumps were operated continuously and the water level was lowered to elevation 710. This diminished the area covered by water and improved the water quality. The seepage water is of an alkaline nature and since this area is abandoned and has no circulating air currents, the exposed gob area apparently does not oxidize rapidly. Today the stream is discolored for a short distance below the discharge point and from there on the stream is clear and contains an abundance of aquatic life.

APPENDIX I

ORSANCO RESOLUTION NO. 5-60, ACID MINE-DRAINAGE CONTROL MEASURE (Adopted January 14, 1960, and amended January 10, 1963)

WHEREAS: By resolution adopted on the 6th day of April, 1955, the Ohio River Valley Water Sanitation Commission promulgated a statement of policy and procedures for the control of industrial-waste discharges into waters included within its jurisdiction by the terms and provisions of the Ohio River Valley Water Sanitation Compact; and

WHEREAS: Waters of the Ohio River Valley Water Sanitation District are being polluted by acid discharges from coal mining and related operations, hereinafter referred to as "acid mine-drainage," contrary to the language and intent of the Ohio River Valley Water Sanitation Compact; and

WHEREAS: It has been demonstrated that the conscientious application of certain principles and practices will, under certain conditions, alleviate the pollution from acid mine-drainage;

NOW, THEREFORE: In furtherance of the policy and procedures as above set forth and for the general purpose of contributing to the achievement of the objectives specified in Article I of the Ohio River Valley Water Sanitation Compact;

BE IT RESOLVED: That the following measures are hereby adopted by the Commission for the control of acid mine-drainage pollution in the Ohio River Valley Water Sanitation District and pursuant to the statement of policy and procedures are to be followed by the signatory states:

- I. (a) Surface waters and ground waters shall be diverted where practicable to prevent the entry or reduce the flow of waters into and through workings.
- (b) Water that does gain entry to the workings shall be handled in a manner which will minimize the formation and discharge of acid mine-drainage to streams.
- II. Refuse from the mining and processing of coal shall be handled and disposed of in a manner which will minimize discharge of acid mine-drainage therefrom to streams.

Where acid-producing materials are encountered in the overburden in stripping operations, these materials shall be handled so as to prevent or minimize the production of acid mine-drainage, taking into consideration the need for stream pollution prevention and all economic factors involved.

- III. Discharge of acid mine-drainage to streams shall be regulated insofar as practicable to equalize the flow of daily accumulations throughout a 24-hour period.

(over)

- IV. Upon discontinuance of operations of any mine all practicable mine-closing measures, consistent with safety requirements, shall be employed to minimize the formation and discharge of acid mine-drainage.
- V. Under appropriate circumstances, consideration shall be given to the treatment of acid mine-drainage by chemical or other means in order to mitigate its polluttional properties.

Nothing stated in this control measure shall be construed to relieve any municipality, corporation, person or other entity from responsibility for compliance with existing federal, state and local laws and regulations.

APPENDIX II

ORSANCO RESOLUTION NO. 14-59, NOTIFICATION OF SPILLS AND ACCIDENTAL DISCHARGES

(Adopted September 30, 1959, and amended January 12, 1961)

WHEREAS: Spills and other accidental discharges of sewage, industrial wastes and other substances which are contrary to the language and intent of the Ohio River Valley Water Sanitation Compact and are in violation of the treatment standards and other regulations duly promulgated by the Ohio River Valley Water Sanitation Commission are likely to occur from time to time, notwithstanding efforts to prevent them; and

WHEREAS: Such spills and discharges are likely to have such a deleterious effect upon the quality of the waters of the Ohio River Valley Water Sanitation District as to cause serious damage to or to impose unwarranted burdens upon the users thereof;

BE IT RESOLVED: That, in order to minimize the adverse effect which the above-described occurrences may have upon users of waters within its jurisdiction, the Ohio River Valley Water Sanitation Commission does hereby establish the following procedure for the dissemination of information with regard to such occurrences among agencies, municipalities, corporations, persons or other entities which or who may be affected thereby:

1. Each and every municipality, corporation, person or other entity which or who may cause or be responsible for any spill or accidental discharge into any of the waters of the Ohio River Valley Water Sanitation District of sewage, industrial waste or other substance of such character and in such quantity as to be unsightly or deleterious to the quality of such waters shall give immediate notification thereof by telephone to the water pollution control agency of the state in which such spill or discharge may occur;
2. Such notification shall set forth the time and place of such spill or discharge, the type or types and quantity or quantities of the material or materials included therein, action or actions taken to stop such spill or discharge and to minimize the polluting effect thereof, the measure or measures taken or to be taken in order to prevent a recurrence of any such spill or discharge and such additional information as may be requested by the state agency;
3. It shall be the responsibility of each industrial establishment or other entity discharging directly to a stream to have available insofar as practicable and reasonable the following information pertaining to those

(over)

substances that are employed or handled in its operations in sufficiently large amounts as to constitute a hazard in case of an accidental spill and discharge into a public stream:

- (a) Potential toxicity in water to man, animals and aquatic life,
 - (b) Details on analytical procedures for the quantitative estimation of such substances in water,
 - (c) Suggestions on safeguards or other precautionary measures to nullify the toxic effects of a substance once it has gotten into a stream;
4. A written verification of such report shall be submitted upon request of the state agency;
 5. Whenever any such spill or discharge may affect interstate waters which are within the jurisdiction of the Ohio River Valley Water Sanitation Commission, the state agency receiving the notification to be given as above provided shall promptly relay the information contained therein to the Ohio River Valley Water Sanitation Commission by telephone in order to permit it to alert downstream state agencies and water users which are or who may be adversely affected by such spill or discharge;
 6. Nothing herein shall relieve any municipality, corporation, person or other entity from responsibility for complying with the terms, provisions and conditions of the Ohio River Valley Water Sanitation Compact or with treatment standards and other regulations promulgated under authority thereof or from responsibility for complying with any federal, regional, state or local statutes, ordinances or regulations which may be applicable.

APPENDIX III

REFERENCES

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2. Braley, S. A., *The Oxidation of Pyritic Conglomerates*. Mellon Institute Research Project No. 370-6, Nov. 1960.
3. Moulton, E. I., et al., *Acid Mine-Drainage Problem in Ohio*. Eng. Exp. Sta., Ohio State Univ. Bull. 166. (Pages 5, 13, 37).
4. Brant, R. A., and Moulton, E. I., *Acid Mine-Drainage Manual*, Eng. Exp. Sta., Ohio State Univ. Bull. 179. (Pages 1, 8, 11, 34).
5. Tracy, L. D., *Mine Water Neutralizing Plant at Calumet Mine*, Mining and Metallurgy I, 29-30, 1920.
6. Temple, K. L., and Koehler, W. A., *Drainage from Bituminous Coal Mines*, W. Va. Univ. Exp. Sta. Research Bull. No. 25 (1954). (Page 9).
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9. Burke, S. P., and Downs, R. *Oxidation of Pyritic Sulfur in Coal Mines*, AIMME, Tech. Pub. No. 769 (1947) Trans. AIMME, 130, (1938).
10. Braley, S. A., *Evaluation of Mine Drainage Water*, Mining Eng., Jan. 1957.
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12. Braley, S. A., *Mine Acid Control, A New Approach*, Coal Age, March 1957.
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14. Braley, S. A., *An Evaluation of Mine Sealing*, Special Report, Mellon Institute, Feb. 1962.

APPENDIX IV

REGULATORY AGENCIES OF THE SIGNATORY STATES

ILLINOIS	Technical Secretary State Sanitary Water Board Springfield, Illinois 62706
INDIANA	Technical Secretary Indiana Stream Pollution Control Board 1330 West Michigan Street Indianapolis, Indiana 46207
KENTUCKY	Executive Director and Chief Engineer Kentucky Water Pollution Control Commission 275 East Main Street Frankfort, Kentucky 40601
NEW YORK	Director Bureau of Water Resources Services Division of Environmental Health Services New York State Department of Health 84 Holland Avenue Albany, New York 12208
OHIO	Chief Sanitary Engineer Division of Sanitary Engineering Ohio Department of Health Columbus, Ohio 43215
PENNSYLVANIA	Sanitary Water Board P. O. Box 90 Harrisburg, Pennsylvania 17120
VIRGINIA	Executive Secretary State Water Control Board 415 West Franklin Street Richmond, Virginia 23220
WEST VIRGINIA	Executive Secretary State Water Resources Board 1709 Washington Street, East Charleston, West Virginia 25301

STATUS OF MINE DRAINAGE TECHNOLOGY

by
E. A. Zawadzki

Attachment B

to
Testimony of James F. Boyer, Jr.

before
Committee on Public Works,
U.S. House of Representatives

April 23, 1968

Bituminous Coal Research, Inc.
350 Hochberg Road
Monroeville, Pennsylvania

STATUS OF MINE DRAINAGE TECHNOLOGY

by
E. A. Zawadzki

The problem of pollution of water by "mine water" is at least as old as the mining industry itself.(1, 2)* Research on the formation, composition, treatment and abatement of mine water is a relatively recent historical event. The earliest attempts to do something about the problem of mine drainage pollution were, in fact, diagnostic rather than remedial, home remedies rather than application of scientific principles.

I. FORMATION AND CHARACTERISTICS OF MINE DRAINAGE

A. Source of Mine Drainage - Acidic Water:-Acid mine drainage results from the dissolution of oxidation products of pyrite in normally alkaline ground water and the subsequent dissolution of other minerals in the resulting acidic solution.

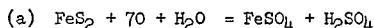
Pyrite is a mineral having the molecular composition FeS_2 . It is metallic in luster, hard, and is usually found imbedded in coal seams and associated strata. Pyrite changes readily by oxidation to limonite, hydrous iron oxides of the formula $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$.(3) The oxidation products of pyrite also include soluble salts such as FeSO_4 , $\text{Fe}_2(\text{SO}_4)_3$, H_2SO_4 , SO_2 , and probably others.

The actual mechanism of pyrite oxidation in bituminous coal mines has been studied by many investigators; that chemical oxidation plays an important role in acid water formation cannot be disputed. The essential elements for reaction are

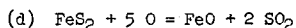
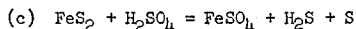
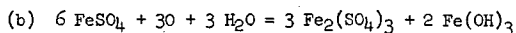
* Numbers in parentheses refer to literature listed at end.

present. It is believed, however, that chemical oxidation is not the only means whereby acid forming constituents are produced from pyrite. Electrochemical and biological processes also have been cited as pyrite oxidation reactions.

1. Chemical oxidation of pyrite:- The following reactions describe the chemical oxidation of pyrite in the presence of water:



This reaction has been reported by many workers. (4, 5, 6) In addition to (a) several subsequent reactions (7) may occur. These can be described as follows:



Garrels and Thompson, 1960 (8) studied the oxidation of pyrite by iron sulfate and this led them to the conclusion that "pyrite is apparently oxidized by ferric ion to ferrous ion, hydrogen ion, and sulfate ion. The first step in the oxidation process, however, may be to produce molecular sulfur." They represented the overall reaction as $8 \text{H}_2\text{O} + \text{FeS}_2 + 14 \text{Fe}^{+3} \rightarrow 15 \text{Fe}^{+2} + 2 \text{SO}_4 + 16 \text{H}^+$.

The exact mechanism of the reaction is still in doubt. The various interactions between pyrite, oxygen, water, and the various oxidation products have not been studied in detail. Moulton, 1957 (9) in a review of the mine drainage problem in Ohio, says that "many fundamental questions which are directly pertinent to a competent solution of the problem remain unanswered."

2. Electrochemical oxidation of pyrite:- Berzelius, 1821 (10) speculated that "it seems highly probable that the falling asunder of ordinary pyrites arises from the electrochemical action of electronegative bisulphuret which is here and there mixed with it in small particles."

More recent work at Johns Hopkins University, 1962 (11) has provided an insight into the electrochemical oxidation of pyrite. Pyrite conducts electricity and exhibits potentials in aqueous solutions. It is not surprising then, that the oxidation of pyrite in coal mines in the presence of water be considered electrochemical in nature. Clark, 1965 (12) defines an electrochemical reaction as a chemical oxidation reduction reaction "in which the oxidation reaction (anode reaction) and the reduction reaction (cathode reaction) are in general, occurring at different locations on the conducting material (pyrite)." The oxidation reaction involves the oxidation of pyrite to Fe^{+2} . The reduction reaction involves the reduction of Fe^{+3} and/or dissolved oxygen. The complex system of pyrite oxidation by electrochemical reaction also involves the generation of S gas and soluble sulfur species.(13) The theoretical considerations have been set forth by Clark, however, as far as is known, no practical evaluation of the theory has been made.

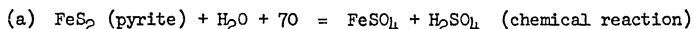
3. Bacterial oxidation of pyrite:- The oxidation of pyrite by bacteria has been studied in depth by many workers. Temple and Koehler (14) have made an excellent review of the progress achieved.

The bacterium isolated as the active organism in coal pyrite oxidation is thio-bacillus thiooxidans.(15) T. thiooxidans has been found in all acid mine waters tested for its presence. Moreover, it is found in abundance at the site of acid formation in the mine. T. thiooxidans is a member of the group of autotrophic bacteria, distinguished from other living forms by the fact that they utilize the chemical energy from the oxidation of inorganic compounds and obtain all the "element for this growth and metabolism from inorganic sources."(14) This bacterium oxidizes sulfur or sulfur ion in pyrite to sulfate. Significant laboratory data have substantiated the hypothesis that T. thiooxidans is an active pyrite oxidizing agent.(14)

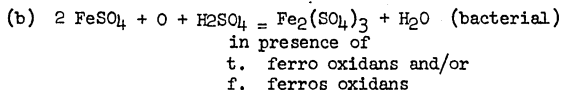
4. Overall concept of acidic water formation:- The conclusions reached by most investigators is that the oxidation of pyrite with the subsequent formation of acid

mine water is a combination of chemical, electrochemical, and bacterial oxidation.

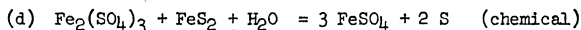
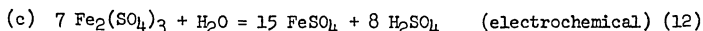
The possible mechanisms are as follows:



This is probably the initial step in the production of acid and the rate at which it proceeds is variable and depends on such factors as pyrite properties and composition, temperature, and pH of the water.



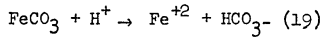
This second step involves the bacterial oxidation by an iron oxidizing bacterium.



in presence of t. thiooxidan

It is quite likely that the reaction mechanisms are more complicated than stated above. It is likely that additional intermediate reaction products such as SO_2 and H_2S occur depending on reaction conditions. Nonetheless the overall reaction as stated involves, initially, the oxidation of pyrite to soluble ferrous sulfate and sulfuric acid. That little "free" sulfuric acid is found is probably due to the reactions between other soluble mineral species and H_2SO_4 .

B. Source of Mine Drainage--Alkaline Water:-- The problems associated with mine drainage are not restricted to acidic mine water. Alkaline water may also be discharged from mines and may be of such composition as to contain high quantities of iron which can be undesirable. Alkaline mine water results from the following reactions: (1) the dissolution of soluble iron bearing minerals, such as siderite, in slightly acid water.



or (2) by the neutralization and dilution of an acidic mine water with an alkaline ground water or (3) by the neutralization of an acidic mine water by contact with limestone and/or other basic materials.

The components of unaerated alkaline mine water include HCO_3^- , $\text{CO}_3^{=}$, CO_2 , H_2CO_3 , Fe^{+2} . Alkaline water containing iron which has been aerated usually contains little or no iron in solution. Most of the iron present appears as a colloidal suspension.

C. Characteristics of Mine Water

1. Iron Content - The principal iron species (5) which are found in mine water are believed to be Fe^{+2} , Fe^{+3} , $\text{Fe}(\text{OH})_2(\text{s})$, and $\text{Fe}(\text{OH})_3(\text{s})$.

Fe^{+2} is usually associated with the oxidation products of pyrite which have been leached from the mine by ground water. The principal soluble oxidation product is FeSO_4 . However, FeSO_4 hydrolyses and oxidizes to form various hydroxides, some of which are also soluble. Fe^{+2} in mine water is also associated with FeCO_3 . Natural ground water leaching such minerals as siderite will contain Fe^{+2} . It is believed the FeCO_3 dissociates and ionizes and is in equilibrium with Fe^{+2} , $\text{CO}_3^{=}$, HCO_3^- .

Fe^{+3} in mine water occurs in solution under specific conditions. At low pH, <3, Fe^{+3} is in solution. At higher pH, Fe^{+3} will be found in solution only as part of complexes formed with organic chelates, phosphates, and other anions. In the absence of chelating agents, Fe^{+3} should not be found in significant quantities in solution in mine drainage above pH 3.

a. Solubility of Iron - The principal iron species, Fe^{+2} and Fe^{+3} , form hydroxides which are insoluble. The solubility product (20), K_{sol} , for $\text{Fe}(\text{OH})_2$ at 25 C in "slightly basic media" is 5.25×10^{-14} . The distribution of soluble Fe^{+2}

and insoluble $\text{Fe}(\text{OH})_2$ at various pH levels is shown in Figure 1, where percent composition is plotted versus pH. Figure 1 was constructed according to methods described by Sillin.(22) The factor limiting concentration of Fe^{+2} in solution is the equilibrium concentration at any pH. Table 1 gives the distribution of the various forms in which Fe^{+2} occurs at various pH levels.

TABLE 1. EQUILIBRIUM COMPOSITION FOR THE SYSTEM $\text{Fe}^{+2} - \text{Fe}(\text{OH})_2$ AT VARIOUS pH VALUES, EXPRESSED AS FRACTION OF TOTAL Fe^{+2} PRESENT

pH	Fe^{+2}	$[\text{Fe}(\text{OH})_2]_s$		$[\text{Fe}(\text{OH})_2]_a$	$[\text{FeOH}^+]$
		1	2		
5.0	.999	.000005	.000005	$.020 \times 10^{-8}$	.000002
6.0	.903	.047	.047	.000002	.002
6.5	.485	.253	.255	.00002	.0068
7.0	.087	.454	.457	.00002	.0019
7.5	.0094	.493	.496	.00002	.0013
8.0	.00095	.496	.499	.00002	.0002
9.0	.00001	.498	.501	.00002	.00002

s = solid

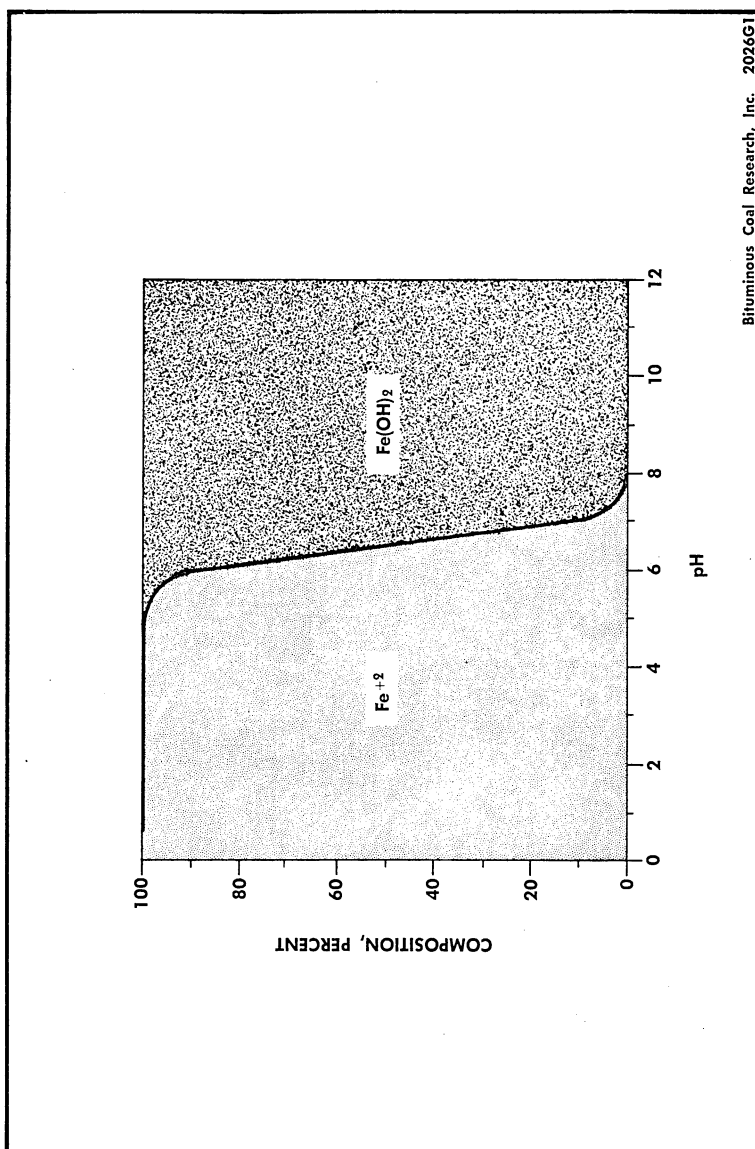
1 = $\text{FeOH}^+ + \text{OH}^- \rightarrow \text{Fe}(\text{OH})_2$

2 = $\text{Fe}^{+2} + 2 \text{OH}^- \rightarrow \text{Fe}(\text{OH})_2$

a = aqueous

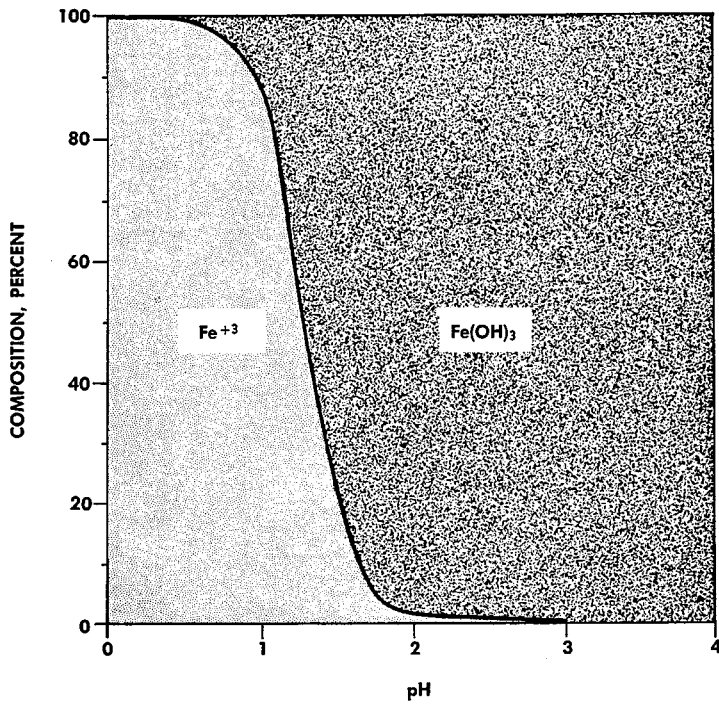
From these data it appears that about 50 percent of the $\text{Fe}(\text{OH})_2$ formed at any pH is due to the intermediate reaction $\text{FeOH}^+ + \text{OH}^-$ while the remaining 50 percent is formed directly from $\text{Fe}^{+2} + 2 \text{OH}^-$.

Fe^{+3} is also found in mine water and as described earlier, is soluble only under special conditions. Like Fe^{+2} , the solubility can be determined from a consideration of the various equilibria involved. Figure 2 is a distribution diagram



Bituminous Coal Research, Inc. 2026G1

Figure 1. Distribution of Fe^{+2} and Fe(OH)_2 as a Function of pH



Bituminous Coal Research, Inc. 2026G2

Figure 2. Distribution of Fe^{+3} and $\text{Fe}(\text{OH})_3$ as a Function of pH

showing the percent composition versus pH. Table 2 gives the distribution at equilibrium of the various forms in which Fe^{+3} occurs at various pH levels.

TABLE 2. EQUILIBRIUM COMPOSITION FOR THE SYSTEM $\text{Fe}^{+3} - \text{Fe}(\text{OH})_3$ AT VARIOUS pH VALUES, EXPRESSED AS FRACTION OF TOTAL Fe^{+3} PRESENT

pH	Fe^{+3}	FeOH^{+2}	$\text{FeOH}^{+2} + 2\text{OH}^- \rightarrow \text{Fe}(\text{OH})_3 \text{ a}$	$\text{Fe}^{+3} + 3 \text{OH}^- \rightarrow \text{Fe}(\text{OH})_3 \text{ s}$
1.00	.8677	.0321	.0134	.0868
1.25	.1947	.4049	.0535	.3466
1.50	.0979	.1144	.4784	.3092
1.75	.0213	.0140	.5859	.3787
2.00	.0085	.0031	.1324	.8558
3.00	.000008	.00003	.1339	.8659

In addition to the above, $\text{Fe}(\text{OH})^{+2}$ and $\text{Fe}(\text{OH})_{3\text{a}}$ are also reported. The overall solubility of Fe^{+2} and Fe^{+3} in mine water is determined by many factors, none of which can be evaluated as an isolated variable, however, for both Fe^{+2} and Fe^{+3} the limiting solubility at any pH is the solubility satisfying the equations:

$$K_{\text{sol}} \text{Fe}(\text{OH})_2 = [\text{Fe}^{+2}] [\text{OH}^-]^2 \text{ and}$$

$$K_{\text{sol}} \text{Fe}(\text{OH})_3 = [\text{Fe}^{+3}] [\text{OH}^-]^3$$

as shown in Table 3.

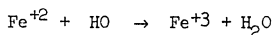
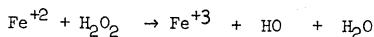
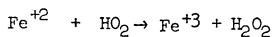
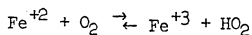
TABLE 3. SOLUBILITY OF $\text{Fe}(\text{OH})_2$ AND $\text{Fe}(\text{OH})_3$ FROM K_{sol} AT 25 C

$K_{\text{sol}} \text{Fe}(\text{OH})_2 = 5.25 \times 10^{-14}$; $K_{\text{sol}} \text{Fe}(\text{OH})_3 = 1 \times 10^{-38}$ (Also 10^{-40} is reported.)

pH	Fe^{+2} , ppm	Fe^{+3} , ppm
1		56000
2		560
3		0.56
4		0.00056
5		
6	29400	
7	294	
8	2.94	
9	0.0294	

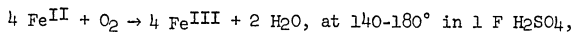
b. Oxidation of Ferrous Iron - Weiss studied the mechanism of the ferrous

oxidation and concluded that the reaction proceeded according to the following mechanism:



The above reactions are not balanced with respect to H^+ and, therefore, do not show the possible dependence of reaction rate on this variable.

Huffman and Davidson, 1956 (23) found that "the reaction



proceeds by simultaneous bimolecular and termolecular reaction paths:

$$-d(\text{Fe}^{\text{II}})/dt = k_b(\text{Fe}^{\text{II}})P_{\text{O}_2} + k_t(\text{Fe}^{\text{II}})^2P_{\text{O}_2}.$$

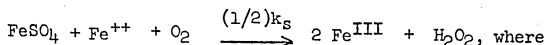
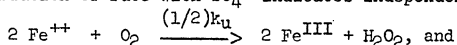
At 159°, $k_b = 1.93 \times 10^{-3} \text{ atm}^{-1} \text{ sec}^{-1}$, $k_t = 1.60 \times 10^{-3} \text{ M}^{-1} \text{ atm}^{-1} \text{ sec}^{-1}$;

the respective activation energies were measured as 13.4 (± 2) and 16.3 (± 2) kcal.

At 30.5°, only the termolecular path is observed (contrary to the predictions of the high temperature activation energies);

$$k_t = 2.78 \times 10^{-6} \text{ M}^{-1} \text{ atm}^{-1} \text{ (1 F H}_2\text{SO}_4\text{)}.$$

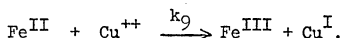
The variation of rate with SO_4^- indicates independent reactions,



$$k_u = 1.4 \times 10^{-6} \quad k_s = 3.1 \times 10^{-5} \text{ M}^{-1} \text{ atm}^{-1} \text{ sec}^{-1}, \text{ and}$$

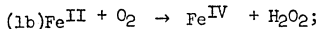
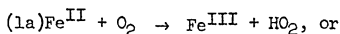
$$K_{\text{FeSO}_4} = 1.1 \text{ M}^{-1}.$$

The reaction rate increases a small amount with increasing pH. Catalysis by Cu^{++} follows the rate law $-d(\text{Fe}^{++})/dt = 4k_g(\text{Fe}^{\text{II}})(\text{Cu}^{++})$ and is probably initiated by



In 0.23 F H_2SO_4 , 0.35 F Na_2SO_4 , $k_g = 1.9 \times 10^{-3} \text{ M}^{-1} \text{ sec}^{-1}$.

The rate-determining step for the bimolecular path is presumably either:



for the termolecular path it is $2 \text{ Fe}^{\text{II}} + \text{O}_2 \rightarrow 2 \text{ Fe}^{\text{III}} + \text{H}_2\text{O}_2$.

There is evidence that the bimolecular path, the termolecular path and the Cu^{++} catalyzed path are all accelerated by complexing anions, X, and to an extent depending on the affinity of X for Fe^{+++} . Furthermore, strong complexers favor the occurrence of the bimolecular path."

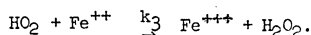
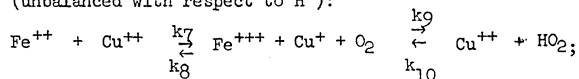
At a given pH, the rate of reaction decreases in the series pyrophosphate, phosphate, chloride, sulfate, and perchlorate.

Cher and Davidson, 1955 (24) examined the kinetics of the $\text{Fe}^{+2} - \text{O}_2$ system in phosphoric acid solution. They observed that the rate law for the Fe^{+2} , O_2 reaction in H_3PO_4 , NaH_2PO_4 solutions (1.0 - 1.1 M) is:

$$-d(\text{Fe}^{++})/dt = k(\text{Fe}^{++})\text{Po}_2 (\text{H}_2\text{PO}_4^-)^2, \text{ where}$$

$$k = 4.5 (\pm 0.3) \text{ atm}^{-1} \text{ mole}^{-2} \text{ liter}^2 \text{ hr}^{-1} \text{ at } 30^\circ.$$

The activation energy is 20 (± 2) kcal. There is some heterogeneous reaction on a glass wool surface, but it is believed that the above rate data apply to the homogeneous reaction. There is no inhibition by added Fe^{+++} . A one-electron reaction mechanism with the rate-determining step, $\text{Fe}^{++} + \text{O}_2 \rightarrow \text{Fe}^{+++} + \text{HO}_2$, is consistent with the results. The marked catalytic effect of added Cu^{++} can be explained by the reactions (unbalanced with respect to H^+):



At 30° , $\mu = 1 \text{ M}$, $(\text{H}_2\text{PO}_4) = 0.434 \text{ F}$, $(\text{H}_2\text{PO}_4^-) = 0.302 \text{ F}$, $\text{Po}_2 = 150 \text{ mm}$,

$k_7 = 1.0 \times 10^3 \text{ M}^{-1} \text{ hr}^{-1}$, $k_9/k_8 = 5.1 \times 10^{-2} \text{ M atm}^{-1}$, and $k_{10}/k_3 = 23$."

Stumm and Lee, 1961 (25) report that the rate of ferrous iron in bicarbonate solutions follows the law $-d[\text{Fe}^{\text{II}}]/dt = k[\text{Fe}^{\text{II}}]\text{Po}_2[\text{OH}^-]^2$.

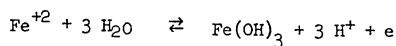
Thus, the oxidation of ferrous iron is directly related to the available oxygen, the presence of complexing anions, and the concentration of various catalytic materials, such as Cu^{+2} .

Lamb and Elder, 1931 (26) also report catalytic activity due to platinum black and charcoal.

2. Aluminum, Manganese, Calcium, Magnesium Content:- In addition to iron, four other major cations occur, namely, aluminum, manganese, calcium and magnesium. Trace elements may also be present. Aluminum and manganese are found in mine water due to the dissolution of minerals in the strata in contact with acid mine water. Calcium and magnesium are major cationic components of most ground water, due to dissolution of limestone, dolomites, and magnesites.

Aluminum and manganese are significant mine water components in that they form insoluble hydroxides at pH levels obtained during mine water treatment.

3. Total Acidity:- Total acidity is defined (27) as the amount of standard base required to titrate a sample of mine water to pH 8.3 after removal of dissolved CO_2 . The total acidity does not indicate the acid condition, i.e., the $[\text{H}^+]$ of the mine water, but reflects the potential total quantity of $[\text{H}^+]$ which is liberated during the oxidation and hydrolysis of various cations in solution. For example,



represents the overall reaction involved in the oxidation of ferrous iron to ferric iron and the subsequent hydrolysis of the Fe^{+3} ion. Al^{+3} and Mn^{+2} are two other mine water components which contribute to acidity. The relative acidity of each of the mine water constituents is as follows:

H^+	1 ppm of H^+ = 49 ppm of acidity as H_2SO_4
Fe^{+2}	1 ppm of Fe^{+2} = 1.75 ppm of acidity as H_2SO_4
Fe^{+3}	1 ppm of Fe^{+3} = 2.625 ppm of acidity as H_2SO_4
Al^{+3}	1 ppm of Al^{+3} = 5.44 ppm of acidity as H_2SO_4
Mn^{+2}	1 ppm of Mn^{+2} = 1.78 ppm of acidity as H_2SO_4

4. pH:- The negative logarithm of the hydrogen ion activity is the theoretical definition of pH. In practice pH is defined by the approximate relation

$$\text{pH} = -\log_{10} [\text{H}^+].$$

It is measured by a pH meter usually using the calomel-glass electrode system.

Although pH is a useful parameter in assessing the quality of mine water, it does not establish the true pollutional potential of a water. The following data relate pH to sulfuric acid acidity:

<u>pH</u>	<u>Acidity as H₂SO₄, ppm</u>	<u>pH</u>	<u>Acidity as H₂SO₄, ppm</u>
2	490	5	0.49
3	49	6	0.049
4	4.9	7	0.0049

The accurate measurement of pH in the field is complicated by the many variables affecting the measurement such as temperature, variability of composition, and dissolved gases.

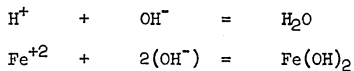
II. TREATMENT OF MINE DRAINAGE

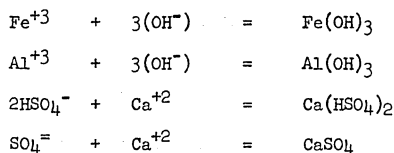
The principal methods studied for the treatment of mine drainage are designed primarily to neutralize the acidity and to remove the iron to satisfactory levels. The recent summary by Barthauer, 1966 (27) lists the methods which have been evaluated experimentally. Application of any of the methods as economically and technically practical processes has yet to be achieved. Table 4 lists the methods described by Barthauer.

TABLE 4. LIST OF PROCESS FOR THE TREATMENT OF MINE DRAINAGE

- A. Lime neutralization.
- B. Limestone and dolomite neutralization.
- C. Potassium permanganate process.
- D. Sodium hydroxide neutralization.
- E. Ammonium hydroxide neutralization.
- F. Sodium sulfide treatment.
- G. Ozone treatment.
- H. Bacteriophage process.
- I. Demineralization processes.

A. Hydrated Lime System:--The neutralization of mine water by $\text{Ca}(\text{OH})_2$ involves the following chemical equilibria:





The overall equilibrium expression for the reactions has not been developed as yet. Consideration must also be given to the H^+ due to $\text{Fe}^{+2} = \text{Fe}^{+3}$ reaction. The extent of reaction to form various hydrates and other species should also be considered.

It is not be chance that most efforts to develop a mine water process involve lime neutralization. Lime is generally available, has a high basicity, and the cost, while high, is less than all other bases except limestone and waste material.

The basicity (28) of lime is measured by determining the total neutralizing power (TNP) by titration with standard acid. Pure CaCO_3 has a TNP of 106, CaO has a TNP of 178, and $\text{Ca}(\text{OH})_2$ has a TNP of 135 (assuming 100 percent purity).

The reactivity of lime is related to method of preparation and surface area. Whitman (29), for example, found "highest reactivity and fastest rate of dissolution with the finest hydrates of largest surface area.

The cost of lime (30) is as follows:

- (1) Lime, chemical, hydrated.....\$19.25/ton f.o.b.
- (2) Lime, chemical, quicklime.....\$15.50/ton f.o.b.

The theoretical requirements of lime and hydrated lime for neutralization of sulfuric acid are:

- (1) Lime--1 pound of lime (CaO) will neutralize 1.75 pounds of acid.
- (2) Hydrated lime--1 pound of $\text{Ca}(\text{OH})_2$ will neutralize 1.32 pounds of acid.

The research conducted on developing a method of mine water treatment using lime have been summarized by many authors. The review by Glover, 1967 (31) is the basis for the following discussion.

Crichton, 1928 (32) discussed the application of the hydrated lime process to acid mine drainages and reported that estimates of the costs of treatment ranged from 15 to 25 cents/1,000 U.S. gal. Kaplan, 1936 (33) reported attempts to prepare marketable by-products such as rouge from acid mine drainage but no reports of the full-scale application of these proposals have been seen. During the period from 1930 to 1946, reports on the treatment of acid mine drainage by lime were singularly absent from the technical literature.

The treatment of acid mine drainage by lime to produce water for coal preparation plants (breakers) was reported by Bilharz, 1949 (34); he described the use of lime for the treatment of an acid mine drainage from metalliferous mines the Tri-state Field. These drainages contained 6,000 mg/l of iron and 2,000 mg/l of zinc in solution. During subsequent years, many publications appeared on the handling, selection and application of lime to acid wastes, particularly to steel pickle effluents, but these reports did not add to the fund of knowledge concerning the treatment of acid mine drainage.

Braley, 1951 (35) reported the results of pilot plant studies of acid mine drainage neutralization processes and found that although lime gave a rapid and complete reaction, the sludge settled very slowly. It was concluded that treatment with lime or any other alkali would not be practicable because of the "economic and other difficulties involved," but cost estimates were not provided to support this conclusion.

The treatment of acid mine drainages in the Witwatersrand, South Africa, was described by F. C. Johnson, 1952.(36) These drainages contained sulphuric acid,

ferrous, ferric, manganese, nickel, magnesium and calcium sulphates, chlorides and dissolved silica. The treatment was largely conducted underground, the precipitated contaminants being left in underground sumps. The objects of the treatment were to limit erosion and corrosion of the mine drainage equipment and to supply water for process and dust suppression purposes. The scale of the operations may be judged by the reported use of over 15,000 tons of lime by the Rand group of mines in the year 1951.

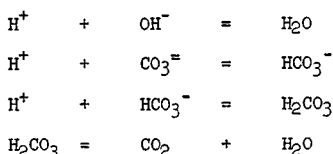
The use of lime in the purification of acid mine drainages from lignite mines in Eastern Germany was described by Rummel, 1959 (37), Kadner, 1961 (38) and revealed that some 80,000,000 Imp. gal of acid mine drainage were being treated each day in the Niederlausitz. The successful application of lime to the treatment of acid drainage from an abandoned coal mine which had been intercepted by strip workings was reported by Brant, 1960. (39) The neutralized drainage was passed through ponds which successfully removed the precipitated metal salts.

During the last few years, a detailed investigation of the lime process for acid mine drainage treatment has been made during the project known as "Operation Yellowboy" which was sponsored by the Commonwealth of Pennsylvania. The objectives of this work were described by Maneval, 1965 (40) and results of the tests have been reported by Girard, 1966 (41), and Charmbury, 1967. (42) The applicability of lime treatment to at least one acid mine drainage has been confirmed, and the costs of treatment in this one case were \$1.09/1,000 U.S. gal, equivalent to a cost of 5.2 cents/short ton on the coal produced.

Lime or hydrated lime neutralization processes have several major drawbacks. These include cost of reagent and the production of a voluminous sludge which is difficult to separate and handle subsequently. For these reasons, research has been conducted by many workers to evaluate the use of limestone as a neutralizing agent.

B. Limestone and Dolomite Systems:--Limestones and dolomites are naturally occurring carbonate minerals. The ratio of Ca to Mg varies. Stones with a high Ca content are classed as limestones, CaCO_3 . A dolomite has a composition by weight of 54.3 percent CaCO_3 and 45.7 percent Mg CO_3 . Limestones and dolomites from different beds have different physical and to some extent, chemical properties.

The chemical equilibrium involved in limestone neutralization include the following:



The pH of limestone in distilled CO_2 -free water varies between 8 and 9. However, due to equilibria between acid mine water constituents and also due to CO_2 content of the treated water, the pH of the resulting solution is between 6 to 7.5. With rigorous aeration, pH values as high as 8 have been reported.(45)

1. Early Work--The first reported application of limestone to acid mine drainage treatment was at the Calumet Mine, Westmoreland County, Pennsylvania, in the year 1916. The process was described by Tracy, 1921.(44) Calcium carbonate limestone was mixed in powder form with an acid mine drainage and the precipitate was thickened by sedimentation and finally dried on a steam drum. The object of the process was to prepare water for industrial purposes and iron oxide for gas purification and for use as a pigment. The process of acid mine drainage in a tank filled with marl was reported by Mason, 1922 (45), and Travers, 1928b (46) was granted Patents relating to the use of porous limestone for the treatment of acid mine drainage. In this process, the bulk of the acidity was removed by limestone and the neutralization was completed by lime.

The treatment of an acid mine drainage by limestone was reported by Braley, 1951. (35) The costs of limestone were reported to be \$3.60/short ton of sulphuric acid neutralized, compared with \$10.20 for hydrated lime and \$20.16 for soda ash (sodium carbonate). The limestone tests were conducted in a wooden flume containing about 5 tons of 1 x 2 in limestone and the contact time was varied between 10 minutes and 60 minutes. Under these conditions, about half of the acid present in the acid mine drainage was neutralized. In a further experiment, 1,500 lb of 1 x 2 in limestone was mechanically agitated with the acid mine drainage and this test also was considered to be unsuccessful, since the reaction time required to neutralize one pound of acid increased from 4 hours at the first run to 28 hours at the thirty-eighth run. Braley concluded that, "although acid mine drainage can be chemically treated with lime or other alkalis to neutralize the acid, such a method is not practical or feasible because of the economic and other difficulties involved."

In a report on the treatment of acid mine drainage in the Witwatersrand, F. C. Johnson, 1951 (36) stated that lime was the preferred reagent since the low activity of limestone required that an excess be used, and the inadequate mixing facilities of the inbye treatment plants led to the loss of much of the reagent used. Limestone was stated to have the further disadvantage that it did not remove ferrous salts from the solution. The treatment of plating and other acid wastes in beds of calcite grit was reported by Lukas in 1955. The pH value was raised sufficiently to permit the discharge of the wastes to public sewers. The feed rate to the calcite beds was 26 U.S. gal/min sq ft and the costs were stated to be 17 cents/1,000 U.S. gal.

A study of the mechanism of the interaction at the interface of ferric oxide hydrates, calcium sulphate, and calcium carbonate in the limestone neutralization of mine drainage was reported by Ohyama, 1957. (47) Brant, 1960 (39) reported that

limestone cribs built into a surface stream containing an acid mine drainage soon lost their effectiveness and lime had to be used to achieve neutralization.

The results of the above-reported investigations seem to indicate that acid mine water neutralization by limestone is not practical. The most recent research efforts in this area are more promising.

2. Results of Recent Work:--Deul, et al, 1967 (43) demonstrated a laboratory-scale technique for limestone treatment of a wide range of mine waters. Limestone treatment was accomplished "using a small cement mixer as a simple reactor to provide abrasive agitation of limestone and mine water." Process variables "must be defined" before the development of the process is complete. This work is currently in progress.

Glover, 1967 (37) developed a continuous upflow expanded bed process using fine limestone grit. The process is believed to be acceptable providing that "a supplementary method of removing ferrous salts from the acid mine drainage" is found.

As of the writing of this report, only one full-scale application of limestone treatment is in operation, and this on an experimental basis.

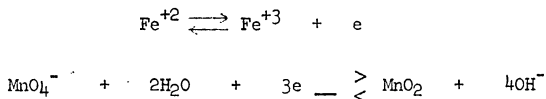
The Rochester and Pittsburg Coal Company, Indiana, Pennsylvania, is currently using a rotating drum reactor followed by a settling basin for the treatment of 200,000 gpd of mine water containing 50 ppm of ferric iron. Evaluation of the process is in progress.

The problems associated with limestone neutralization involve the following:

1. Coating of the limestone particles with CaSO_4 (a reaction product).
2. Non-reactivity of limestone with ferrous iron.

Research is needed to find solutions to these problems.

C. Potassium Permanganate Systems:--The chemical reactions involved in the treatment of Fe^{+2} with potassium permanganate are:



The use of KMnO_4 has been evaluated experimentally by Barnes & Tucker Coal Co., 1966 (48) for treatment 1.44×10^6 gpd of alkaline water being discharged from the Lancashire No. 15 mine. The iron content of the water averages 20 ppm with a fluctuation of 1.6-64 ppm. The permanganate is being evaluated as a chemical oxidant for Fe^{+2} . Reported cost of the KMnO_4 is 25-40 cents/lb. At 20 ppm iron, the reagent cost/thousand gallons is reported at \$0.026. The maximum possible reagent cost at 64 ppm Fe is \$0.083/M gal. This is equivalent to \$122.00 per day. Capital cost of the complete system has not been reported, however, the total cost includes cost of:

1. KMnO_4 storage tank.
2. 20 x 20 ft, 14,000 gal capacity mixing tank.
3. 6 x 40 x 150 ft, 270,000 gal capacity settling pond.
4. 40 x 40 ft, 1,150 sq ft filtering area, sand filter.
5. Auxiliary pumps, meters, piping.

Construction of the experimental unit has been completed. In addition to the above-reported equipment, two large holding ponds have also been added. Results of the initial experiences with permanganate have not been published.

D. Sodium Hydroxide Neutralization System:--The reactions of NaOH with mine water constituents are basically identical with the $\text{Ca}(\text{OH})_2$ reactions. NaOH is a much stronger base than $\text{Ca}(\text{OH})_2$ and has the advantage of being added as a liquid rather

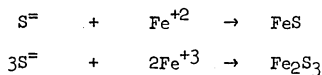
than solid (slurry). NaOH costs \$60/ton f.o.b. NaOH reacts with mine water constituents to form metallic hydroxides and Na_2SO_4 . The resulting water is soft as compared to the water resulting from lime neutralization. The relative merits of soft versus hard water discharged into a stream must be evaluated on the basis of end use of the water.

Only one full-scale (49) evaluation of NaOH treatment of mine water has been reported. A large midwest coal producer has been treating water impounded in abandoned coal strip mining pits for use as the water supply for its coal preparation plant. The resulting treated water was of such character as to affect the operation of the froth flotation operation in the plant. It is believed that the water treated with NaOH adversely affected the formation of the froth. The NaOH treatment was stopped.

E. Ammonium Hydroxide Systems:-- NH_4OH reacts with acid mine water similarly to NaOH and $\text{Ca}(\text{OH})_2$. Widespread uses of NH_4OH is not expected due to high cost \$92/ton and to the potentially hazardous affect on fish.(50)

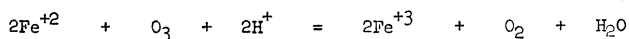
One full-scale treatment plant using anhydrous NH_3 for treating strip pit water is known.(51) The plant operates on a closed loop cycle.

F. Sodium Sulfide System:--The reactions involved in the treatment of mine water with sodium sulfide include the following:



Both ferrous and ferric sulfides are insoluble and can be separated from water. In addition, the use of sodium sulfide will simultaneously neutralize the treated water. Bituminous Coal Research, Inc., under a grant from the Appalachian Commission, issued June 26, 1967, has initiated an evaluation of the use of sulfides as a potential mine water treatment. No data are available as yet.

G. Ozone System:--The reaction of ferrous iron in acid solution with ozone is:



The reaction products are dependent on pH and iron concentration. Ozone is a powerful oxidizing agent, like KMnO_4 its principal function is to oxidize ferrous iron to ferric, consequently, ozone must be used in conjunction with a suitable neutralizing agent.

The application of ozone treatment to acid mine drainage has been studied by Rozelle, et al, 1965.(52) Results of initial work indicate that the rate of oxidation is independent of the iron concentration and temperature, but dependent on the rate of addition of ozone. It was also observed that ozone appears to have a "catalytic effect" on the oxidation of Fe^{+2} at low pH values. Work on actual mine water samples indicated that Mn^{+2} is also oxidized by ozone, thereby increasing the ozone demand. No cost data were given. The work is still in progress.

H. Bacteriological Oxidation System:--The oxidation of Fe^{+2} by the bacterium *ferrobacillus ferro-oxidans* was studied by Leathen.(6) Other iron oxidizing bacteria have also been observed.(8) Glover (31) has reported on an activated sludge process for Fe^{+2} oxidation. The process involves the following operations:

1. Flow balancing system.
2. Biochemical oxidation tanks.
3. Sedimentation tanks (sludge).
4. Active sludge recycle tanks.
5. Limestone, grit neutralization.
6. Iron sludge sedimentation.
7. Iron sludge filtration.

Glover reports that the above-described process is applicable to mine drainage which contains more than 10-20 ppm of dissolved iron and a total acidity of more than 25 ppm. Temperature limits are 0-35 C. As far as is known the process has never been evaluated on a large scale. No full-scale biochemical processes have been built for treating mine water.

I. Demineralization Processes:--The processes generally classed as demineralization process are the many saline water conversion process for producing potable water.(53) Two of the processes have been evaluated experimentally as mine water treatment processes. Westinghouse Electric Corporation, 1965 (54) has evaluated the application of flash distillation to mine water treatment. General Dynamics Corporation, 1966 (55) conducted a 20-day evaluation of the reverse osmosis process for the Office of Saline Water.

Details of each of the various processes will not be presented herein, however, all of the demineralization processes have two general characteristics in common and these will be discussed briefly.

All of the saline water conversion processes provide as a product potable water, that is water of such quality that it can be used for drinking water. More generally, these processes produce fresh water from salt or brackish water.(53) Salt or sea water is defined as water containing approximately 35,000 ppm of dissolved solids. Brackish water is defined as water ranging from 1,000 ppm to 35,000 ppm of dissolved solids. Fresh water contains less than 1,000 ppm of dissolved solids. It is interesting to note that the Westinghouse and General Dynamics tests were conducted on water which would be classed as brackish by the above definitions. Many mine waters are now being used as drinking water supplies as discharged with normal water treatment practice applied. These water supplies are generally "polluted" acid mine water.

With the exception of ion exchange processes, all of the saline water conversion processes produce a "brine" concentrate, which in the case of mine water would be a concentrated mine water which must still be treated prior to discharge. Schroeder, et al, 1966 (56) have evaluated all of the saline water processes as mine water treatment processes. The conclusions made from the report are: (1) saline water conversion processes theoretically can be applied to mine water treatment to produce potable water, (2) the cost of the treatment of mine water by the saline water processes range from \$0.36/1,000 gal to \$3.05/1,000 gal depending on feed rate, operating factor, and water composition.

Schroeder concluded that "saline water conversion processes...would not have application to acid mine waters except in cases where a municipality needed an additional supply of potable water meeting Public Health standards."

J. Bacteriophage Systems:--Phages are a group of bacteria-specific viruses capable of dissolving (lysing) growing bacteria. Most heterotrophic bacteria are susceptible to bacteriophage. Utilization of such a virus in preventing the formation of acid mine water by bacterial oxidation of pyrite is a concept developed by the MSA Research Corp., 1965.(57) Preliminary results have not been conclusive. Data obtained thus far indicate that bacterial oxidation of pyrite is inhibited by phages; however, incompletely. Work is being continued to attempt to obtain greater virulence in phages.

III. SLUDGE HANDLING AND DISPOSAL

No discussion of treatment of mine drainage, whether such treatment be neutralization, oxidation, demineralization or any combination of these, is complete without consideration of the facets of sludge removal. These might include conditioning, dewatering, drying, materials recovery and disposal. Industry has often found the economic disposal of sludge from their waste treatment processes to be one of the most difficult problems encountered. As experience and research in the treatment of mine water develops, it is becoming increasingly evident that the disposal of these waste products will emerge as a major problem.

In the lime neutralization process the resulting sludge, mostly hydrated iron oxide, is allowed to settle in large basins or lagoons. If the lagoons are used for de-watering and drying, subsurface drainage must be provided and they must periodically be taken out of service while removal of the concentrated sludge is accomplished by hydraulic dredges, draglines, or bulldozers for final disposal. Otherwise, the sludge is pumped from the lagoon bed with suitable apparatus and the solids discarded. These solids are insoluble in water and can be buried without danger that they may redissolve to any considerable extent and again contribute to contamination of streams. In the mining areas, land suitable for construction of sludge ponds and burial of solids is often not available due to the steepness of the terrain where suitable land is available. It has been assumed that burial costs will amount to \$1.00 per ton on the basis of the dry solids.(58)

Unfortunately, the precipitated material retains significant quantities of water, in some cases up to 98 percent, so that disposal involves handling not only of the solids but large quantities of water. Mechanical means of reducing the amount of water in this sludge by the use of clarifiers and filters, particularly

sand filters, and chemical means using flocculation aids which would change the nature of the precipitant for example with respect to the degree of hydration, should be examined.

A report (59) submitted to the Coal Research Board of the Commonwealth of Pennsylvania on subsurface waste disposal in relation to acid mine water recommends construction of a pilot injection well to provide data to further evaluate this disposal method for acid mine water.

A truly economical solution to the temporary treatment of this water would be a process resulting in a useful product. In 1930, Kaplan (60) developed a method on a laboratory scale for recovering paint pigments of varying colors from acid mine drainage, but the cost for recovery of the by-products on a commercial scale was too high and the process has never been industrially developed.(61) Consideration was also given to processing sludge to provide a feed for blast furnaces. It was feared that impurities present in the solids would make the product unsuitable.
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STATEMENT OF ROBERT E. BURT, DIRECTOR, AIR AND WATER RESOURCES,
CALIFORNIA MANUFACTURERS ASSOCIATION

Mr. Chairman and Members, The California Manufacturers Association (CMA) representing virtually all major manufacturers with plants in California, has a vital interest in water quality legislation. The CMA has supported and will support all legislative efforts necessary to eliminate pollution. The following comments are divided into two parts, those which refer to bills as they are now before the committee and those which refer to areas where administration of existing law would seem to call for some Congressional clarification that might eventually be embodied in one of the subject bills.

I

COMMENTS ON S. 2760, H.R. 15906 AND H.R. 15907

In these bills as written, CMA desires to comment upon only one general aspect: control of shore establishments. Our fundamental point is that we believe the controls authorized should be related to the problem which is under discussion: spillages. Those proposed extend much, much further. Under S. 2760 as it passed the Senate, the Secretary of the Interior is authorized control of any discharge to navigable waters which contains any oil materials whatsoever. Since oil materials are present throughout our industrial civilization, the authority would apply to virtually *all* discharges to public waters including most public sewage discharges. The Secretary is authorized to issue regulations governing all such discharges and to direct cleanup. H.R. 15906 would extend similar authority to amelioration of the effects of *all matter* discharged to navigable waters.

On the basis of past performance, we feel sure that the effect of the bill will be to single out oil, and every discharge which contains any oil whatsoever and remove it from state jurisdiction wherever navigable waters go. This effect seems certain from the past record of how the Secretary of the Interior has interpreted his authority in the area of water quality control. Speaking bluntly, we fear that this authority would most likely be used against the manufacturing community.

We can understand the case for more effective action against spillages, but we strongly object to superseding the system of state controls, based upon federally approved water quality standards, which is now just getting well established.

As a suggestion, the authority granted could be directed against the basic problem cited, spillages, by excluding secretarial action with respect to any discharge which fails to lower the quality of the receiving waters below some reasonable standard. An amendment to accomplish this intent might be stated:

"Action under this section is excluded in any case where:

(a) the discharge does not cause the quality of the receiving waters to be degraded below the standards established under Section 10 of Public Law 660;

(b) the receiving waters do not have standards established under Section 10 of Public Law 660, and the discharge does not cause the appearance of visible oil or grease on or in the receiving waters or on the bottom, the shore, rocks, channel banks or structures."

We do not hold any particular brief for the general standard cited in (b) above. It is quoted from a typical standard established in industrial waters in California, that for harbors in Los Angeles county.

To adopt an amendment such as the foregoing would give full authority to attack the problem of spillages, while not superseding the established program of state control of routine discharges.

If it is desired to include "all matter" under the law, then it would seem appropriate to define spillage in the law in some such language as that used on Page 15 of the Oil Pollution Report to the President (where it cites the nature of changes needed in present law): . . . "discharges of pollutants which represent a substantial and imminent danger to health and welfare . . ."

II

COMMENTS ON IMPLEMENTATION OF EXISTING LAW

The Water Quality Act of 1965 was landmark legislation in every sense of the word, and, as passed, had the support of the CMA. We wish to comment briefly on two aspects of the implementation of this law.

Among other things, the law provided for Secretarial approval of water quality standards for "coastal waters." Under HEW a definition of coastal waters was established which seemed in accord with the intent of Congress: "Those waters of the marginal sea which are seaward of the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters." When the FWPCA was moved to interior, this definition was superseded by one which included the same waters plus "all inland waters subject to the ebb and flow of the tides."

We respectfully request that Congress make clear its intent in this matter, preferably by amending the law.

The Secretary of the Interior has also interpreted his mandate to enhance the nation's water quality by issuing a guideline to the effect that the quality of all water, everywhere, must be at least maintained. Where an area is already developed, such a standard could normally be defended. Where it is desired to retain the virgin character of a wild river, this guideline also makes sense. For the great majority of other cases, it does not. Simply put, its effect would be to force almost all new development into areas already possessing industry and population. In areas where there are now well developed industry and population centers, the new plant or residential development coming in knows that its discharges which reach public waters will be controlled and treatment will be required, but can still be sure that discharges will be authorized. Similar development efforts going into an area where there is now very little population and industry will be faced with the requirement to meet far higher standards for their discharges to public waters than they would in a developed area. This would add more difficulty and, in many cases, could cause abandonment of such planned development.

In response to a storm of criticism and some outright defiance, this guide line has been modified to provide for development where the Secretary of the Interior specifically approves each and every case in detail. This is still intolerable.

Neither the statute nor the record makes clear what the intent of Congress is in this case. We respectfully request that the Congress provide guidance.

CMA suggests that a reasonable approach would be for the state to notify the Secretary of cases where they will allow development to lower the existing water quality. If, within 90 days, the Secretary desires, he may call for hearings in the same manner provided in the law for cases where he disagrees with state standards.

This would provide a safeguard against any true degradation while avoiding delay and routine Federal bureaucratic control of a state's internal development.

AMERICAN WATER WORKS ASSOCIATION, INC.,
2 PARK AVENUE, NEW YORK, N.Y.,
WASHINGTON OFFICE: 1042 NATIONAL PRESS BLDG.,
Washington, D. C., April 19, 1968.

HON. GEORGE H. FALLON,
Chairman, Committee on Public Works,
House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: At your suggestion, the American Water Works Association, on behalf of more than 20,000 members concerned with improving water service to the public, is happy to comment on the provisions of H.R. 15907, on which your Committee is conducting hearings. In general, we will comment on the sections of the bill related to the public water supply business in which AWWA has special competence. In addition, it should be pointed out that in a large and growing number of communities water supply and pollution control facilities are jointly administered, so that water utilities have a direct interest in the wastewater field.

Generally, AWWA is in full accord with the intent and provisions of H.R. 15907. This bill includes some provisions for assuring competent managers and

for financing of local utilities which AWWA policy strongly supports. We are fully in accord with the intent of provisions of this bill to stimulate construction of water pollution control facilities and make available additional matching funds for such construction. We especially commend those provisions which require mandatory certification of wastewater operators, to provide the reservoir of trained manpower so essential to obtain full efficiency of the more sophisticated treatment facilities which will be necessary to abate the pollution of streams and lakes in the United States.

AWWA also favors the provision that the Federal Government take some steps to be sure that its funds are invested prudently and in such a manner that the utility can work toward a self-sustaining basis and provide a financial base which will allow the local entity to finance future expansion and assure itself of the ability to pay for the quality of management and operation necessary to improve service to the public. In fact AWWA has a policy (attached) which recommends that the operation, maintenance, and capital funds of the utility be treated as a "sacred fund" rather than being mixed with or made a part of the general fund operation. Many municipal utilities have had their earnings diverted to other uses so that funds for future expansion and construction were not available when their need became apparent. AWWA feels further that establishment of the wastewater operation as a community utility, like the water utility, will improve its image as a service organization, making it better able to sell adequate rates based on service rendered, thus increasing the ability of the local entity to meet future demands without the necessity of continuing Federal support.

As AWWA sees the intent of this bill, it is to assist the local entity with its backlog of needed construction, but it is even more important, we feel, that the legislation set the pattern for a healthy, financial condition of the local entity. If we can create, by this Federal support, a healthy industry it will be a most profitable investment for the Nation. If, however, the pattern is not set for such utility-type approach, it is our opinion that Congress will find it necessary to meet this crisis again and again in the future as citizens become accustomed to unrealistically low rates for the service rendered.

AWWA also commends the provisions of the bill which provide for increased research and development and for training of wastewater utility personnel. Although many water pollution problems are open to apparent solution by provision of simple, well-established techniques of primary treatment for both now and the future, we do not at this time have adequate data on the secondary treatment and tertiary treatment required in many parts of the country. Putting wastewater to beneficial use again is of primary interest in many areas of our country. We realize that much work has been started in these areas by the Federal Water Pollution Control Administration, but its continuation and acceleration are essential if we are to avoid spending the monies involved in this bill on treatment facilities which will not be adaptable to the problems of the future. Conventional secondary treatment in many cases is patently unable to meet the requirements of an expanding urban population and the residual pollution loads of the streams affected. The research and application grants that are envisioned in this law will be a valuable investment on the part of the Federal Government in that they promise that the capital funds necessary for pollution control will be spent wisely and on a planned basis to develop facilities that can be integrated without financial loss into plants of tomorrow.

We wish to suggest that the 5,000 investor-owned water utilities in the United States (and the growing number of investor-owned wastewater utilities) should be considered in this program and offered some of the research advantages and assistance in meeting new criteria that are offered to publicly owned utilities. To do this, we would suggest that the provisions of Section 6 paragraph (d) of the bill make the investor-owned water or wastewater utility eligible for research and demonstration grants and that assistance to these agencies in terms of tax concessions in areas of water pollution control be considered.

We are indeed happy to see this move toward a comprehensive approach to the management, financing, and technical aspects of the problem considered in a single bill. Members of AWWA have long advocated that the Federal grant program provide means by which the capital obligations issued by a local entity, through revenue bonds or general obligation bonds, be enhanced by a Government guarantee or by long-term Government loans that would improve the ability of the local entity to sell the maximum amount of revenue bonds at the lowest interest rate for construction of these needed facilities. We would subscribe

basically to the approach which is taken with HUD's Housing Assistance Administration, whereby the bonds of the local entity are guaranteed by the Federal Government over and above the maximum local issues which can be marketed at reasonable interest rates. We cannot agree, however, that the measures proposed in Section 2 and especially the provisions of Section (f) (3), whereby the tax exemption status of a local issue affected by Federal grant under this law is removed, will be helpful in achieving the purpose of the bill. Such action will, we believe, confuse the financial picture at the local level and result in some increase in the interest rates even on other tax-exempt issues.

This provision of the Act also will have the net result of reducing the amount of grant available to the local utility, inasmuch as it will have to pay higher interest rates on the balance of the issue not always entirely offset by the interest rebate provided for under Section (f) (1) (B). The use of a rebate based on the average interest rate of outstanding marketable obligations of the United States will not take into consideration the variations in credit ratings among local entities. A city with Class AA bonds will receive the same interest rate as a city with Class B bond so the Class AA city will be penalized and the Class B city will receive a better interest rate than it deserves. The restriction in this paragraph will not allow a reduction greater than one-fourth—that is $1\frac{1}{2}$ points in the case of a 6-percent bond—which could impose an added penalty on a local entity with adequate financial resources.

When the cost of administration of what must be an extremely complex funding and refunding operation by the Federal Government in payment of these interest rebates is taken into consideration, it is difficult for us to see how either the Federal Government or the local entity will profit. In fact, the confusion and uncertainty that will result from the application of this type of rule will, we are sure, tend to be a deterrent to the program as a whole and become unduly expensive to the local entity.

Many utilities will undoubtedly be tempted to defer action as the possibility of complications in other financial arrangements are faced, and will seek assurance that future tax-exempt financing will not be adversely affected or, if it is, that some relief from this requirement can be obtained. We feel it will be better under these conditions to accept a somewhat smaller grant in connection with Government-guaranteed tax-exempt bonds and preserve our present financial status.

Cordially,

HENRY J. GRAESER, *President.*

FINANCING AND RATES

A STATEMENT ADOPTED BY THE BOARD OF DIRECTORS ON JAN. 25, 1965

AWWA believes that the interests of the public and of individual customers of water supply systems serving the public can be served best by self-sustained, utility-type enterprises, adequately financed, and with rates to the public and customers based on sound engineering and economic principles designed to avoid discrimination between classes of, or individual, customers.

IDEAL STANDARDS

To this end, AWWA establishes, as an ideal toward which each water supply utility should strive, the standards set out in the paragraphs that follow:

1. Each water supply utility serving the public should deliver water meeting, as a minimum, the USPHS Drinking Water Standards, adequate in quantity for all sanitation and other domestic use, safe and desirable for industrial and commercial use, and adequate for fire protection service.

Its services should be on an uninterrupted basis with a minimum of fluctuations in pressure.

In addition to meeting USPHS standards, the water furnished should be as free of objectional taste and odor, color, turbidity, and staining elements, and as noncorrosive and practicable under the local conditions.

2. Such a water supply utility should receive sufficient gross revenue from those using the service to enable it to pay all operating and maintenance expenses, all fixed charges on capital investment, employ and compensate trained and competent personnel for operating and maintenance functions, and have sufficient funds to develop and perpetuate its system in accordance with sound technical and economic principles.

3. Each water supply utility serving the public, if owned or operated by a municipality or other governmental entity or agency, should have its funds maintained in separate accounts from those of other municipal or governmental agencies or functions and not diverted to uses unrelated to the public water supply. Reasonable payments in lieu of taxes or for services rendered may be made.

4. Each water supply utility serving the public should adopt a system of accounting based on sound and recognized accounting principles and conforming with the legally established system of accounting prescribed for it, if any. In the absence of such a legally prescribed system, it should be based upon the latest NARUC system for water utilities with such minor modifications as may be required to adapt that system to the circumstances of the particular situation.

5. Each water supply utility serving the public should recommend or establish rate schedules which are designed to apportion equitably the total cost of water service among all classes of customers and types of service.

6. Each water supply utility serving the public should base its charges on metered consumption of water and such fixed charges as are required. Rates may also include charges based on demand, load factors, fire use, peak rates of use, seasonal use, and similar items.

STATEMENT OF HON. HAROLD T. (BIZZ) JOHNSON OF CALIFORNIA, BEFORE THE COMMITTEE ON PUBLIC WORKS, U.S. HOUSE OF REPRESENTATIVES, IN SUPPORT OF S. 2760, H.R. 15906 AND H.R. 15907, APRIL 23, 1968, HON. GEORGE H. FALLON, CHAIRMAN

Mr. Chairman, I want to thank you and the other members of this committee for allowing me to submit these brief remarks on the water pollution control legislation on which we will be receiving testimony today. I am pleased to have taken part in the fine work that this committee has been doing. We all share the same desire to do everything possible to end the pollution of this Nation's rivers, streams, and lakes. Our water resources are far too valuable to be wasted and despoiled when we have the means at hand to prevent such a catastrophe.

The State of California and the Second Congressional District have a tremendous stake in the far-reaching national water pollution control program that is now underway. Vast areas of California are short of water for all uses—municipal, industrial, agricultural, recreational. The California Water Plan is evidence of the importance of water to the State and its commitment to the campaign for clean water. But maximum benefits require quality protection.

California shares problems of water quality and waste disposal and treatment with many parts of the country; however, we are also faced with water resource problems unique to California—such as San Francisco Bay and Delta, and Lake Tahoe.

Lake Tahoe, one of the clearest and deepest fresh water lakes in the world, is being threatened by the prolonged discharge of sewage from the local public utility district. We cannot and should not allow a priceless natural resource with such rare and unspoiled beauty to become carelessly and irreparably fouled. I would hope that the States of California and Nevada will reach a timely agreement on a strong and effective Lake Tahoe bi-state compact to insure that the Lake's purity and natural beauty will be preserved. I intend to press for congressional consent to such a compact, and will extend every effort to that end.

The Nation's other natural lakes are similarly threatened with ruination by municipal sewage, industrial wastes, runoff from animal feedlots, irrigation runoff, and pollution from other sources that pours into their waters and accelerates their normal aging process. These pollutants cause an over-growth of rank vegetation that chokes the lakes, smothering fish, restricting navigation and recreation, and often hampering the intake of public water supplies. S. 2760 would direct a stepped-up research and demonstration effort that would demonstrate new techniques for controlling pollution. It would further the efforts to preserve Lake Tahoe and to restore Lake Erie, Lake Michigan, and other polluted lakes, large and small.

The Clean Water Restoration Act of 1966 authorized \$3.4 billion over a period of four years for grants to help communities to build the waste treatment plants necessary to meet the high degree of water quality that is being called for in the water quality standards for the interstate waterways of all States. For this current fiscal year, the Congress has appropriated an amount of only \$203 mil-

lion, the budget request, as compared to an authorization of \$450 million. The fiscal year 1969 budget request is \$225 million, as compared to the authorized amount of \$700 million.

What this means for California is that the State's share of the Federal grant money will be substantially reduced. California's prospective allocation under the full authorization, \$35,278,600, was reduced to \$13,912,000 under the current appropriation—less than 40 percent of the amount we had hoped to receive. In fiscal year 1969, California will be eligible for only \$15,814,200 under the President's budget request, as compared to the \$56,895,300 we could have received under the full authorization.

In my own Second Congressional District, the need for funds for waste treatment works construction continues, in part, because of the lack of Federal money. As of March 31 of this year, there were a total of 17 Second District projects pending which totaled over \$16 million in eligible costs and for which more than \$5 million is requested in Federal funds.

The nationwide program will lose the momentum we have generated if waste treatment plant funding is not intensified. It is for this reason that I support the enactment of the "Water Quality Improvement Act of 1968" which provides for an alternate approach to financing the Federal share of the cost of constructive waste treatment works. Under this approach, the Federal Government could enter into long-term contract commitments to make principal and interest payments to State and local bodies or their designees to meet the construction costs of these plants.

The Second District of California had received, as of March 31, 1968, Federal grant assistance totaling \$5,123,598 to aid in construction of 30 projects costing a total of \$17,814,051 (eligible costs). In addition to the financial assistance provided to the Second District by the Federal Water Pollution Control Administration, we have also received financial aid for waste treatment facilities from the Department of Agriculture's program of assistance to rural areas (Farmer's Home Administration) and the Economic Development Administration of the Department of Commerce.

Last month, the mammoth oil spill from the tanker OCEAN EAGLE, in San Juan Bay, Puerto Rico, served to dramatize once again the need for the Congress to take immediate action to protect our waters and shorelines from devastating oil discharges. This accident occurred off the coast of Puerto Rico. Our own California coastline is by no means free from the threat of damage by oil. In a recent year (1966), there were 58 reported oil spills from vessels, shore installations, and unknown sources in San Francisco Bay. For the same year, 175 such spills were reported for the Los Angeles-Long Beach area, and 125 for San Diego Bay. Although none of these spills reached the huge proportions of the Puerto Rican spill this March, they have caused immeasurable damage to the precious estuarine and coastal areas of California. Our coastal areas and waterways also need protection from hazardous substances other than oil—chemicals, industrial wastes, fly ash, and other harmful pollutant—which may be discharged accidentally or otherwise and may inflict severe damages to shorelines and other property.

The "Oil and Hazardous Substances Pollution Control Act of 1968" is an outgrowth of the joint Interior-Transportation report to the President on their study of pollution by oil and other harmful substances. The legislation is designed to carry out many of the report's recommendations. It would extend the area in which the discharge of oil would be prohibited to the waters of the contiguous zone and would provide for the cleanup and would provide for the cleanup of large discharges of other pollutants. This Act directly complements the oil pollution provisions of S. 2760, and similar legislation sponsored in the House of Representatives, which greatly enhance the enforcement authority of the Federal Government and give the Secretary of the Interior added cleanup authority once a spill has occurred.

S. 2760 would also further our present efforts to develop techniques for the effective control and elimination of acid and other mine water pollution. I heartily endorse favorable action on these bills.

Wastes from watercraft and related facilities are a serious form of water pollution, not yet properly controlled by existing law. Legislation pending before this Committee will take important steps to control pollution from these vessel sources, by authorizing the Secretary of the Interior to set standards for the sewage discharged from boats in navigable United States waters.

In conclusion, Mr. Chairman, I am hopeful that the hearings held by this committee during these next three days will focus attention on the seriousness of the water pollution problem that faces our Nation today, and the importance

for us, as Members of the Congress, to provide the means with which we can continue our efforts to preserve and protect the quality of our Nation's waters.

At this point, I would like to insert the remarks of a telegram I have received from Mr. W. R. Gianelli, Director of Water Resources of the State of California. Thank you.

SACRAMENTO, CALIF., April 23, 1968.

HON. HAROLD T. "BIZZ" JOHNSON,
Member of Congress, House Office Building,
Washington, D.C.

Your letter of April 8, 1968, invited our comments on California's position before the House Public Works Committee hearings on water pollution April 23, 24, and 25. We understand the basic purpose of the hearings is to consider several bills on oil pollution control and grants for water pollution control demonstration projects (S. 2760, H.R. 15906, H.R. 15907).

The State Water Resources Control Board has commended on the subject bills to Representative Don H. Clausen. Their comments include suggested technical revisions to those portions of the bills dealing with oil pollution and support lake eutrophication studies. We concur with the State Water Resources Control Board in support of the proposed provisions for demonstration grants in the field of correction of natural as well as man-made water quality problems in lakes. California is a very suitable recipient of such grants, especially for immediate studies of eutrophication in Clear Lake and Lake Tahoe. California is already moving ahead in such studies. In addition to the immediate bills before the committee, we are concerned with several water quality and water pollution matters.

The definition of coastal waters in Federal Water Quality Action of 1965 has been construed by the Department of the Interior for purposes of water quality standards to include all waters subject to the ebb and flow of tides under this definition the Federal Government includes the Sacramento-San Joaquin Delta. California submitted its standards for this area under protest of this definition. I strongly believe that the intrusion of Federal standards in Thikea is unwarranted and urge the definition of coastal waters for purposes of this act be restricted to saline water, which would exclude the Delta. We believe the principles behind the controversy of water quality standards in the Sacramento-San Joaquin Delta should be examined. The release of vast quantities of stored water to repel solidty intrusion for support of minor diversions must be considered in relation to economic facts.

Since California is an arid region, where water is definitely a limited resource, we must look beyond water quality standards to the water use functions they support. The function must represent the highest and best use of water. It must represent a reasonable and not wasteful use.

It must be the most economical means of providing for the designated use the Federal water pollution control administration has totally failed to perceive these points of feasibility. The adoption of water quality standards along the lines currently being espoused by the FWPCA could wreak havoc with the State's water resources development program.

Further, should the Federal government adopt standards which are incompatible with State policy, a serious breach in Federal-State water resource planning and development relations could occur. The federal agencies would be compelled to plan for the development of water supplies to meet those standards.

We would be forced to oppose the Federal plans because of the incompatibility with the California water plan, and our planning policy for the optimum development for the water resources of the State.

W. R. GIANELLI,
Director of water resources.

Mr. McCARTHY. That concludes our hearing for today. The committee stands adjourned until 9:30 tomorrow.

(Whereupon, at 5:10 p.m., the subcommittee recessed, to reconvene at 9:30 a.m., Wednesday, April 24, 1968.)

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS—1968

WEDNESDAY, APRIL 24, 1968

HOUSE OF REPRESENTATIVES,
COMMITTEE ON PUBLIC WORKS
Washington, D.C.

The subcommittee met, pursuant to recess, at 9:43 a.m., in room 2167, Rayburn Building, Hon. John A. Blatnik, presiding.

Mr. BLATNIK. The House Public Works Committee will please come to order to meet in open session continuing public hearings on H.R. 15906, and H.R. 15907, by Mr. Fallon and Mr. Blatnik, and sundry bills, about two dozen of them, on very important aspects of water pollution programs.

GOVERNOR ROCKEFELLER WELCOMED

We are certainly privileged again, and of course we feel honored and very pleased, to have the distinguished Governor of the State of New York with us this morning as a lead-off witness.

Governor, I would like again to say publicly what I have said privately many times, that certainly the Chair personally, and I know the committee, feels an obligation with a great sense of gratitude for the leadership you have given on the State level, which far too long was one of our weakest spots. With the legislation in which Congress authorized States to take the initiative in establishing standards on a joint effort with the Secretary of Interior, the States are moving along admirably and most encouragingly in this very difficult field.

There is nothing less than enormous all-out joint effort across the board following the Federal Government, the State governments, certainly the municipalities, large and small, and may I again repeat that it has been the municipalities that have certainly carried a major share of the burden of what is now thoroughly a national program. These municipalities have carried the major burden and is measured in terms of physical output and physical effort.

I believe much of your testimony this morning will be addressed in that area.

Governor, you are recognized to open the hearings this morning.

Mr. CLEVELAND. On behalf of the minority, we would like to welcome Governor Rockefeller. He has appeared before this committee before, and he has written a distinguished record in connection with this very serious problem of the abatement of water pollution.

The way I would like to put it, Governor, I know you will not object to the way I put it, is that New York is doing almost as good a job as New Hampshire! I know the Governor will not mind that, because he spent 4 years in New Hampshire at Dartmouth College.

The point I want to make is simply that the leadership the Governor has brought on a national level, through his very dramatic steps which have been taken in New York, has really helped us here at the national level in fighting this particular battle.

Mr. BLATNIK. Governor Rockefeller.

THE "WATER QUALITY IMPROVEMENT ACT OF 1968"

STATEMENT OF HON. NELSON A. ROCKEFELLER, GOVERNOR OF THE STATE OF NEW YORK; ACCOMPANIED BY DR. HOLLIS INGRAHAM, COMMISSIONER OF HEALTH; JOSEPH H. MURPHY, COMMISSIONER OF TAXATION AND FINANCE; AND RONALD W. PEDERSEN, PROGRAM ASSOCIATE, EXECUTIVE CHAMBER, STATE OF NEW YORK

Governor ROCKEFELLER. Mr. Chairman, Mr. Cleveland, and gentlemen: I appreciate what was said, Mr. Chairman, about New Hampshire. I was only sorry they did not recognize it 4 years ago. [Laughter.]

May I say that I have with me the Commissioner of Health, Dr. Hollis Ingraham, on my right; the Commissioner of Taxation and Finance, Mr. Murphy, also on my right; and Mr. Ronald Pedersen, a member of my staff sitting with me on my left.

I would like to say that the citizens of the State of New York, Mr. Chairman, are very grateful to you and to the members of your committee for the leadership in this field, which has resulted in our being able to undertake a program of major significance to the future of the State. And so it is in that spirit of gratitude and appreciation that I am delighted to have the opportunity of being here again before you, on your invitation, to testify on H.R. 15907, the proposed Water Quality Improvement Act of 1968.

If I may go through a little of this material I have, and then go informally to any questions.

This subcommittee and the Senate Subcommittee on Air and Water Pollution have been greatly responsible for the increased national awareness of the need to take prompt and comprehensive action to combat water pollution.

CONTRACT APPROACH CONSTRUCTIVE

A year ago, when I appeared before this subcommittee, I pointed out that recommended appropriation of fiscal 1968 was only 55 percent of the authorization, and, in my opinion, woefully inadequate.

At that time I also recognized, however, the difficult fiscal situation faced by the Federal Government.

I observed that consideration might therefore be given to new mechanisms which would make it possible for the Federal Government to finance its share of constructing sewage treatment plants at a more rapid rate.

H.R. 15907 provides for such a mechanism.

The bill provides that the Federal Government, in addition to continuing the basic grant program, can contract with State and local agencies for the Federal share of construction costs and pay over a period of the public bodies principal and interest payments amounting to the Federal share of the bonds sold by public agencies to finance sewage plant construction.

The bill also provides for a Federal guarantee of bonds covering the State or local share of the treatment facilities.

In view of demands on Federal revenues at this time, a debt service approach is a creative way for the Federal Government to more quickly meet its commitment to clean waters before pollution overwhelms us.

BILL'S VALUE ERODED BY CERTAIN PROVISIONS

The potential value of this legislation, however, is eroded unnecessarily and unwisely, in my opinion, by certain provisions. These provisions could severely penalize a State such as New York, which has underway a program to solve the problem as quickly as possible.

I would like to focus on four major provisions which I feel can cause serious concern:

First, the requirement that, under debt service contracts, the interest on the State and municipal bonds be subject to Federal taxation.

Second, the requirement that there be "user charges" for a project to be eligible for the Federal debt service program.

Third, the limitation under the debt service program of 10 percent per State.

Fourth, the elimination of the prefinancing provision so that it would not apply to either the existing program or the new debt service mechanism.

Now if I could take these up in detail.

TAXABLE STATUS OF BONDS

1. The taxable status of State and local bonds. Under the proposed new debt service program, interest from the bonds issued by local or State agencies to finance the construction of sewage treatment plants would be taxable.

This in my opinion is neither necessary nor desirable.

One of the arguments apparently advanced in favor of taxing municipal sewer facility bonds seems to relate to the present municipal bond market. Additional tax-exempt bonds, according to this argument, would worsen market conditions and further increase interest rates.

Problems which may exist in connection with the total municipal bond market, however, are much more closely related to the general state of the economy than to the question of the tax exemption for such bonds.

In this connection, I would like to submit for the record data from the U.S. Securities and Exchange Commission and the U.S. Department of Commerce on proceeds from new securities and average yields since 1960.

(The information referred to follows:)

GROSS PROCEEDS FROM NEW SECURITIES OFFERED FOR CASH IN THE UNITED STATES¹

	1960	1961	1962	1963	1964	1965	1966	1967
In millions of dollars								
Grand total.....	25,468	31,773	28,222	30,252	34,030	37,836	42,502	65,670
Corporate ²	8,081	9,426	9,016	10,872	10,865	13,720	15,561	21,954
Noncorporate.....	17,387	22,347	19,206	19,380	23,165	24,116	26,941	43,716
U.S. Government.....	7,906	12,253	8,590	7,213	10,656	9,348	8,231	19,431
Federal agency.....	1,672	1,448	1,188	1,168	1,295	2,731	6,806	8,180
State and municipal.....	7,230	8,345	8,558	10,107	10,544	11,148	11,089	14,288
Foreign governments.....	395	220	554	772	480	460	513	1,281
International.....	110	16	183	0	153	201	85	380
Nonprofit institutions.....	74	66	133	120	126	228	217	155
Municipal industrial development bonds.....	41	72	84	133	193	212	504	1,390
PERCENT								
Corporate as percent of grand total.....	31.7	29.7	31.9	35.9	31.9	36.3	36.6	33.4
U.S. Government as percent of grand total.....	31.0	38.6	30.4	23.8	31.3	24.7	19.4	29.6
State and municipality as percent of grand total.....	38.4	26.3	30.3	33.4	31.0	29.5	26.1	21.8
Municipal industrials as percent of grand total.....	.16	.23	.30	.44	.57	.56	1.19	2.12
Municipal industrials as percent of State and municipalities.....	.57	.86	.98	1.32	1.83	1.90	4.55	9.73

¹ Includes corporate and noncorporate bonds. Excludes preferred and common stock.² Breakdown by industry is available.

Source: Statistical Bulletin; U.S. Securities and Exchange Commission and tabulations by Investment Bankers Association.

PERCENT YIELDS ON NEW BONDS OFFERED FOR CASH IN THE UNITED STATES, 1960-67

	1960	1961	1962	1963	1964	1965	1966	1967 ¹
Domestic corporate bonds average.....	4.73	4.66	4.62	4.50	4.57	4.64	5.34	5.82
Domestic municipal bonds (bond buyers 20 bonds).....	3.51	3.46	3.14	3.18	3.20	3.28	3.83	3.96
U.S. Government bonds.....	4.01	3.90	3.95	4.00	4.15	4.21	4.66	4.85

¹ Unweighted average of monthly averages.

Source: Survey of Current Business, U.S. Department of Commerce, February 1968; Business Statistics, U.S. Department of Commerce, 1965 edition.

Governor ROCKEFELLER. The data indicate that the volume of taxable bonds sold has increased at a more rapid rate than the sales of tax-exempt bonds, and that the interest on tax-exempt bonds has not increased as rapidly as the interest rate on corporate taxable bonds.

Thus, it would appear that eliminating the present tax exemption for clearly public purpose bonds—such as those for pollution abatement purposes—is not really reaching the basic factors affecting municipal bond market conditions.

Furthermore, the marketability of municipal bonds would be jeopardized if the tax exemption were removed.

Smaller communities in particular might well be seriously affected, as well as the bonds of such agencies as the New York Pure Waters Authority, created at my recommendation in 1967 to assist municipalities finance and construct sewage systems and treatment facilities.

Federal legislation removing the option for tax-exempt bonds would threaten progress of the entire water pollution abatement program.

I would like to add parenthetically if I may, Mr. Chairman, that eliminating the tax-exempt feature of State and municipal bonds has been an objective of the Treasury Department for some 20 years

for reasons which I understand, but do not agree with. And I cannot help but feel, if I can say so very strongly, that there is in this bill an attempt to get the camel's nose under the tent or the foot in the door with establishing the principle that tax exemption can be eliminated. I do not think this is the place, if I may be so bold as to say, to try and do it under a program which is of such tremendous importance, which has been given so much support by the Congress. I do not think this is the place to debate and undertake a new concept in the whole area of tax-exempt bonds.

I would like also to say that State and local governments are having a very tough time as it is getting the money to finance needed facilities and activities. If we want to preserve government close to the people and the strength of our Federal system, we have got to find ways that funds can be put in the hands of local governments so that they can take initiative.

In our own State, the Federal Government collects 68 percent of all the taxes; the State collects 14 percent of all the taxes that are collected; and the local government, 18 percent.

We have gone a long way on the 14 percent. One of the features that has been useful to us is the tax-exempt bonds which makes it possible for us have a certain advantage.

A second reason for the proposed elimination of tax exemption seems to stem from the contention that the amount of Federal tax revenue derived from the interest earned on taxable municipal bonds would be greater than the cost of the proposed subsidy to meet the difference between the interest rate for a tax-exempt and a taxable bond.

In other words, Treasury would make money out of this proposed program as it is presently presented in this legislation. It would get more money back from the taxes on the bonds sold than they would put out in paying the differential.

Yet, the possible advantage of a relatively minor improvement in Federal revenues is far outweighed by the far-reaching ramifications of this proposal to eliminate the tax exemption. Such action would seriously curtail the ability of State and local governments to meet their problems.

If this should occur, there might well be increased demands on the Federal Government to provide funds to meet problems which State and local governments are now working to solve, and thus negate the improvement in Federal revenues.

Most importantly, taxation of bonds for a clearly public purpose such as water treatment facility construction would impair the long-standing precedent of tax immunity which State and local bonds have traditionally enjoyed.

Since the apparent two reasons for this drastic change in public policy seem to have little merit, at least from my point of view, I am deeply concerned that the main reason for inclusion of this provision in a bill to further meet pollution abatement needs is really an initial attempt to erode the traditional immunity from Federal taxation of the obligations of the States or their subdivisions.

A number of bills before Congress and a proposed Treasury regu-

lation would deny an income tax exemption to the interest on industrial development bonds.

I am aware that there have been abuses arising from the indiscriminate use of industrial development bonds. I support appropriate action to prevent these abuses.

I am strongly opposed, however, to any blanket denial of this exemption that could be applied indiscriminately to obligations that deeply affect the public interest.

To deny this exemption would seriously curtail the potential for Federal-State-local cooperation and would go far toward denying to the States and their localities the flexibility needed to meet the problems which confront them today.

For example, should such action be taken, and be upheld by the courts, it is quite likely that a major program established this year in New York for dealing with the agonizing problems of the core city areas could be jeopardized.

I refer to the creation of the Urban Development Corporation and the Urban Development and Research Corporation, which have both just been passed by our legislature. Both contemplate using obligations which would assist the private sector of the economy to accomplish a vital public purpose—locating and expanding in core areas.

I would like to make again, if I might, a parenthetical statement. We are facing problems of a magnitude today, particularly in our cities where some 75 percent of the population now reside in the metropolitan areas, which are beyond the financial capacity of government, whether it is Federal, State government, local, or all put together, and therefore we have got to find means of attracting private capital back into these areas. The use of tax-exempt bonds can be, and in my opinion is one of the major ways of cooperating with private enterprise to get them to undertake the necessary actions to solve some of the social problems of our communities.

These proposals at the Federal level are also a threat to the continued tax exemption of obligations issued by States and their political subdivisions to provide other facilities which deeply affect the public interest.

I realize that neither of these problems is the direct concern of this Committee, but the proposed bill before you does raise the question of denying an interest exemption on bonds of the States or their political subdivisions—a question which has ramifications far beyond those of financing sewage treatment facilities.

The proposed denial of a tax exemption in H.R. 15907 would be for an obligation which has a clear and undeniable public purpose—the construction of sewage treatment facilities to eliminate water pollution. No less clear and undeniable, however, is our pressing and overdue obligation to eradicate—once and for all—the problems of city core areas.

At a time when the Nation requires the maximum possible cooperation among governments at all levels, and the maximum possible contribution by the private sector of the economy, curtailing the fiscal effectiveness of States and municipalities is an unwise course.

The purpose of the Federal water pollution control program is to eliminate pollution. I agree that new steps may be needed at this time

to permit the Federal Government to meet its share of the cost more quickly.

A Federal program designed to achieve a specific functional purpose should not be used, however, as a vehicle to eliminate or test the possibility of eliminating the tax exemption for municipal and State bonds—a drastic change in public policy.

USER CHARGES

2. User charges. Under the proposed legislation, a municipality issuing bonds under a debt service contract must establish user charges sufficient to amortize construction costs, provide for operation and maintenance, and build a reserve for expansion and replacement.

While I am not opposed to the principle of user charges—in fact I think there is a great deal of merit in the use of user charges—this provision concerns me for several reasons.

It is inappropriate for the Federal Government to mandate the specific way in which a local government should meet its commitment to pay for and operate a sewage treatment plant.

User charges may not always be the most equitable or wisest way to support such projects. In some cases a combination of a user charge, assessments, and the property tax is most equitable and efficient.

Local governments need flexibility in fiscal matters more than at any other time in history. I believe it unwise for Congress to restrict the financial flexibility of local government in this way.

There is also a serious question whether the full cost of operating and replacing sewage treatment plants as well as their initial construction, as called for in the user charge proposal, should be borne directly and entirely by just the municipality concerned, regardless of the revenue source.

Those who may benefit most from treatment facilities are not necessarily in the immediate community but are perhaps downstream, even in another State.

The proposed bill seems to provide that the user charge also be sufficient to cover replacement and expansion needs of the plant. While the bill is not clear on this point, the concept must be treated carefully.

New York law, for example, prohibits the use of reserve funds for expansion when the original system is paid for by benefit assessment.

This theory is sound—those paying for present benefits should not also have to pay for the benefits of future generations.

User charges sufficient to cover amortization, operation, and replacement would be very substantial. They could be a major deterrent to a community seeking to enter into a contract with the Federal Government, even though the community had other fiscal resources adequate to meet its commitments.

In addition, the bill provides that the Secretary may waive the requirement for user charges “if such charges would not serve to improve the financial capability and efficiency of the waste treatment system.” This provision is not clear.

I would like to comment that in general, the more discretion that is placed in the hands of administrators rather than clearly spelled out

in the law by the Congress, the more confusion there is, the more delay there is, and the more maneuvering that goes on. Often the delay resulting from this kind of negotiation on an administrative basis, first through the regional office which takes maybe 6 months, then going to Washington for perhaps another 6 months, and then differences are balanced out, and by that time we have lost a year or so. The uncertainties in this kind of administrative judgment, I think, lead to confusion rather than to speed of action.

Also I think there is some question as to principle.

Even with clarification of the proposed legislation however, it seems to me that basic concepts are being jeopardized.

The user charge provisions as a whole should be eliminated and replaced by a general provision requiring the Secretary to obtain necessary assurance that the locality will meet its financial commitments.

3. Ten percent maximum debt service contracts per State. H.R. 15907 provides that contracts in any one State in any 1 year shall not exceed 10 percent of the total amount available for contracts in that fiscal year.

I am opposed to any ceiling which is arbitrary and not related to needs. Ceilings often tend to discriminate against those States in which needs are greatest. In other words, a small State can get 10 percent of the total, can go way beyond its actual percentage in terms of need; whereas a large State which has needs equal to or beyond the 10 percent cannot. I would like to give an illustration as to what effect this would have in New York State.

While the bill does provide that any contract funds not obligated within a particular year shall be available in the next fiscal year without regard to the 10 percent per State limitation, this could delay the start of approved projects.

The 10-percent limitation also raises a very practical question in the case of large sewage treatment plants.

In New York City, one project alone is estimated to cost \$220 million. Under the 10-percent limitation, New York State could receive in fiscal 1969 a contract allotment of \$47.5 million.

Under the grant program, New York could receive approximately \$17 million. Thus, the total available to the State would be \$64.5 million, but the Federal share of this one plant would be \$121 million.

The 10 percent per State ceiling should be removed. If there are to be limitations, however, they should be related to need and speed.

4. Prefinancing. In 1965 and again in 1966, I called for Federal encouragement of State and local action by authorizing Federal reimbursement from future allocations if States and localities pre-financed the Federal share of the cost of constructing municipal sewage treatment plants. Your committee was most understanding and most responsive to this concept.

H.R. 15907, however, eliminates this provision. It would not provide for reimbursement for projects initiated after July 1, 1968.

When Congress approved the prefinancing provision in 1966, it recognized that States and localities should not be penalized for demonstrating initiative. The proposed legislation would penalize the State of New York for adopting a pure waters program to quickly eliminate water pollution. And there are some four, five, or six other States which now have similar legislation before their legislative bodies.

New York anticipates approval of \$534 million worth of projects during the coming Federal fiscal year. We expect these projects to be eligible for the full 55-percent Federal share established by law.

A 55-percent share of New York State's \$534 million program for Federal fiscal 1969 would be \$294 million—42 percent of the total nationwide authorization of \$700 million. Obviously, New York State could not realistically expect to receive 42 percent of the total authorization.

In fiscal 1970, however, when the Federal authorization goes to \$1 billion, New York State's construction program will decrease to \$375 million.

In 1971, with a Federal authorization of \$1,250 million, New York's program needs are estimated at \$325 million. In 1972, the last phase of New York's 6-year program, to clean up all the pollution of our waters, needs will further decrease to approximately \$140 million.

In other words, because the State of New York has acted to meet its needs now, its construction requirements are peaking in Federal fiscal 1969, well before the nationwide peak provided for by the authorizations enacted by Congress.

Retention of the reimbursement provision will advance the national goal of abating pollution as quickly as possible and at the lowest cost possible. I say the lowest cost possible because construction costs are rising very rapidly. It is prudent fiscal management to meet the needs as quickly as possible.

It is consistent with congressional intent to have the Federal Government share in the cost of constructing approved sewage treatment works.

It is essential that a prefinancing provision be included in this pending legislation. Such a provision should apply to all projects approved by the Secretary of the Interior as eligible for Federal assistance, whether or not such assistance is available at the time of approval.

These then, gentlemen, are four major objections to H.R. 15907 in its present form. It is absolutely essential that they be corrected if the effort to eliminate water pollution is to progress as rapidly as possible.

Efforts of States such as New York would be seriously jeopardized by provisions in this proposed bill.

ACCOMPLISHMENTS OF THE NEW YORK PURE WATERS PROGRAM

Now if I may just give for one moment here a review of where we stand in New York so that you can see the effectiveness of your present program of encouraging State action on a rapid accelerated basis.

New York State is achieving dramatic steps toward its goal to clean up all of its waters by 1972. The people's overwhelming approval by a 4-to-1 mandate of the pure waters bond issue in 1965 is being vigorously implemented.

As of April 1, we have in process 273 local sewage treatment works projects with a total cost of over \$1 billion.

An important reason for this rapid progress is that since 1962 New York has had a program of 100-percent State aid for locally initiated comprehensive sewage planning studies on an areawide basis.

In addition, the State is providing one-third of the cost of operating and maintaining sewage treatment plants.

To spur industry to construct treatment facilities, we grant real property tax exemptions and a 1-year depreciation writeoff.

We have streamlined our enforcement machinery—98 percent of all pollution is under abatement schedules. Either through voluntary agreements or legally enforceable orders, construction timetables establish dates for operation of required treatment works by our deadline in 1972.

We have established model standards of water quality. The Secretary of the Interior has approved standards for each of our river basins. In fact, New York was among the first States to have its standards approved.

We are installing a statewide network of automatic water quality monitors to give a record of the water quality four times every hour.

When pollution exceeds the standard, immediate action can be taken. Two pilot monitors have been in operation for over a year. On March 30, contracts were let for installation of 10 additional monitors.

We have established the New York State Pure Waters Authority to assist municipalities in establishing sewage treatment and solid waste disposal facilities. It can help finance, mobilize scarce technical skills, and effectuate areawide service systems.

And finally, we are engaged in a program of water pollution control research amounting to more than \$500,000 annually.

In short, New York is carrying out the most active, comprehensive water pollution control program in the Nation.

Such initiative and effort and that of other States must be stimulated, not threatened or undermined.

Unwise changes in Federal policy could threaten the momentum and capability of State and local governments, in cooperation with the Federal Government, to carry out effective programs to end water pollution. This has been the constant objective of this committee and the leadership of this committee and the Congress, and in my opinion has resulted in the effective work that is now being done nationwide.

Thank you very much sir.

GOVERNOR ROCKEFELLER'S TESTIMONY COMPLIMENTED

Mr. BLATNIK. Thank you, Governor, for a very thought-provoking statement, especially as relates to the financing area. You say it so modestly to us that it is not our primary specialty at all. But we do have talent and experts in this field that we have to call upon to help us. Your objections to it are very well reasoned, very persuasive, I can understand that.

I merely say at the outset that I do not expect much difficulty in working out a more flexible arrangement which we can maintain, the

prefinancing aspect, in which you were instrumental in recommending to this committee, which was incorporated into Federal law in recent amendments; and at the same time perhaps utilizing the bonding program, contracting procedures, recommended by the Secretary.

I think the Secretary's or the administration's bill in trying to provide for a Federal guarantee of the entire bond, I think its intent is good.

Governor ROCKEFELLER. I do, too.

Mr. BLATNIK. As I understand it, that is their intent, to improve the capability or to minimize the difficulties the municipalities would have of getting such bonds and working up such arrangements; while the Secretary feels that the use of taxable rather than taxexempt bonds would also be significantly cheaper for the Federal Government, even with the interest subsidy.

You feel, however, that the possible advantage of a relatively minor improvement in Federal revenues, as you state, would be far outweighed by the impediments and difficulties that this proposal would impose on relationships in financing the program between the Federal Government and the States.

So I assure you that your testimony and your reasons on the financing will be given very serious consideration. We shall mouth this over and digest it as we get into executive session and seek other points of view on that particular aspect.

I was particularly pleased on the latter point of your testimony on the progress made in your State, which has already peaked on a construction program—peaked way ahead of most States in the country, and your monitoring program and many other areas.

Congressman Jones is very familiar with it.

I have more questions, but in the interest of time—and I know your schedule is a heavy one and you are to leave soon for other commitments—may we begin, if we can keep our questions rather to the point, and I would like to give every one an opportunity.

We will start at the right.

Mr. Jones.

Mr. JONES. Governor, it is a pleasure to have you once again. I certainly want to commend you and your administration in taking the leadership that you have displayed in making a real attack on an enormous problem. It has spilled over throughout the country, and there is new enthusiasm on behalf of the people being engaged in cleaning up our streams.

I was particularly impressed with your comments on the bonding arrangements. I can very well recall the community in your State, the Webster community, and they have just a small village, and they were able to construct facilities and contracts with Xerox Corp., and they made a splendid arrangement. It has been observed by communities throughout the country.

Under the proposal as you have discussed, the village would lose their capabilities, having engaged in that type of contract were the tax exemption feature removed. And it seems to me that the observation you have made certainly is worthy of continuation as they have in the past.

I think that probably we would be making a mistake in trying to tinker with the tax laws in an abatement program.

It is always good and it is refreshing to know that we have the splendid leadership of you and your administration.

Governor ROCKEFELLER. Thank you.

Mr. BLATNIK. Mr. Kluczynski.

Mr. KLUCZYNSKI. Mr. Chairman, I have no questions. I am sure that the great Governor has all the answers at his fingertips. It is always a pleasure to have the Governor from the great State of New York appear before this committee. Your testimony will be very helpful to the committee when we sit down and try to write this bill.

Again I want to say it is a pleasure to have you before us again. You are doing a wonderful job, and keep up your good work.

Governor ROCKEFELLER. Thank you, sir.

Mr. BLATNIK. Mr. Cleveland.

Mr. CLEVELAND. Governor, we are very grateful for your testimony. I think you have put your finger on at least one aspect of this legislation, although it was brought up here by Secretary of Interior as a water pollution abatement bill, there is a haunting suspicion that at least some sections of it were written by the Treasury Department. Some people on this side of the aisle have long felt that one of the routes, and there are many routes, toward achieving our objectives is to give private industry tax credit or a substantial deduction insofar as they build these facilities. And I fail to see that in the bill, but perhaps in executive session we can suggest it.

Another thing that interests me, Governor, is many States have a legal limit in the amount of interest that they can pay on their obligations. And as I understand it, New York is 5 percent.

Governor ROCKEFELLER. That is right.

Mr. CLEVELAND. Under this legislation then you would undoubtedly be unable to even participate because surely New York State, as good as your credit is in the current bond market, if the tax-exempt feature was removed, you would probably have to pay a good deal more than 5 percent to borrow money?

Governor ROCKEFELLER. We would have to get an amendment from the legislature, which I think we could get to be perfectly frank. The law was just amended for New York City, which had to go for a higher rate even on the tax-exempt bonds. I think it is a very good point.

Mr. CLEVELAND. And another thing that I note, in conclusion, your insistence on user charges as the method of financing the local level. I believe that the user charge would not be a tax deduction to the average citizen; whereas if the method of financing were a tax to local municipal authority, this would be a tax exemption. So once again we find the fine hand of the Treasury in Mr. Udall's bill.

Governor ROCKEFELLER. Very good point.

Mr. CLEVELAND. Thank you for your testimony.

Mr. BLATNIK. Mr. Harsha.

Mr. HARSHA. No questions.

Mr. BLATNIK. Mr. Dorn.

Mr. DORN. Mr. Chairman, I have no questions. I do want to commend the distinguished Governor for his contribution in our delibera-

tions here over the years. He has been an outstanding leader in this field and in the entire Nation. We are grateful, and I am sure I speak on behalf of the members of this committee, when I express my deep appreciation to you for your help to us and for the country in this very critical field.

Governor ROCKEFELLER. You are very generous. Thank you, sir.

Mr. BLATNIK. Thank you.

Mr. Cramer.

Mr. CRAMER. I will yield to the gentleman from New York.

Mr. GROVER. Mr. Cramer, thank you for yielding.

Governor, some 2 years ago you provided the leadership which led us to a great breakthrough in this field. Congressman McEwen and I had the privilege of working with you in our New York State Legislature in other landmark legislation—and we look forward to a continuing relationship.

Thank you, sir.

Mr. CRAMER. I am delighted to see you here, Governor, to comment on this subject and others. You are always most welcome, and certainly being very helpful to us by pointing out some of the weaknesses of the approach being made, some of which we have been discussing for a few days.

There are two or three fields where this plows new ground as far as the Federal Government. You put your finger on one of them, that is, taking away of the tax exemption, and it is a condition for getting Federation money. I know of no precedent for that; do you?

Governor ROCKEFELLER. No.

Mr. CRAMER. Secretary Udall could not think of one yesterday. Of course—and I say this to the gentleman from New Hampshire—maybe we will have Treasury up later. Maybe they know some precedents. I do not know of any precedents. Do you, Governor?

Governor ROCKEFELLER. No.

COST OF CONTRACT PROGRAM

Mr. CRAMER. Second, the basic concept of bond issue deficit financing by the Federal Government for public works purposes, I think, is something that we are going to have to examine extremely carefully. Of course it has the interesting result of not coming under the debt limit, so I guess the Treasury did have a fine hand in this matter after all.

I can understand the desire to maybe accomplish that through this sort of a procedure. However, when we look at the figures in terms of actual construction, it leads me to ask the question: Is this the intelligent approach for the Federal Government to start on a deficit financing bond issue approach, having the alternative of tax increases or direct appropriations? And looking at the issues, according to the testimony yesterday, under this bill in a 3-year period the Federal share would be about \$2.275 billion. Of course the Federal Government also guarantees the local share, is that not the way you understand the bill?

Governor ROCKEFELLER. That is right.

Mr. CRAMER. And we received some additional interesting information yesterday that the authorization supposedly to be limited to \$2.2 billion did not include the interest, which would be about another 120 percent or so, meaning about \$2.5 billion more—not construction money—but carrying charge money.

That was the testimony of the Secretary and the Bureau of the Budget.

Governor ROCKEFELLER. I did not realize that.

Mr. CRAMER. So actually it did not include the \$900 million for the 3-year interest subsidy. So there are just a few oversights as it relates to how much money that is really included in this bill. And I did not know whether you realized or appreciated it. We are not talking about \$2.2 billion authorization. We are talking about \$2.2 billion, plus the \$2.5 billion interest, plus \$900 million for interest subsidies.

So we are actually talking about \$5.8 billion—nearly \$6 billion of authorization in this bill that on the surface appears to be \$2.2 billion.

And out of that \$6 billion, plus the \$2 billion guarantee which is added in, the Federal Government under this bill for 3 years could be responsible for \$8 billion.

What bothers me is what construction do we get out of it? What actual building do we get out of it? So far as the Federal share is concerned, we get \$2.2 billion. I just wonder if under those circumstances it is really intelligent to go into this type of program, which of course will be expanded and long range and so forth. This is just a start, a drop in the bucket. And I wonder if it is really intelligent to take that approach as compared to direct appropriation approach, when we consider what construction results we get.

We also have a problem of balancing the budget. Would you care to comment on the alternative approaches?

EFFECTS OF THE BOND APPROACH

Governor ROCKEFELLER. If I could, I would like to comment on one of the statements you made in the beginning, that is the Federal Government going into bond financing as against annual appropriation and the inflationary pressure of that, because it is outside the debt limit.

I think it should be pointed out that when the Federal Government runs a deficit and sells Treasury notes that has maximum inflationary pressures, because it creates a credit base and is not taking savings from private individuals, but is handling this operation with the banks; and therefore, this is the most inflationary possible method of financing as far as the country as a whole is concerned.

When bonds are sold by State or municipalities, they are sold to private buyers; and it takes savings which would be spent for some other purpose, so that it is much less inflationary than running a large deficit. I think myself that if the Federal Government, either through the guarantee or through interest and amortization payments as a concept, I think it is imaginative, I think it would be far less inflationary than a comparable amount spent out of a straight deficit of the Federal Government.

Now, you get in some other questions there, which I was not aware of, that this was not limited to the \$2.5 billion, but that the interest was not included and something else was not included, and you could go up to \$8 billion. This I was not aware of.

I might say that I think Treasury, because we have been discussing it with them and so forth, is opposed to the concept of prefinancing. We talked to them about the possibility of using pre-financing in connection with mass transportation projects and model cities projects, so that we could go on with some of these jobs, which at the moment are really just promises. And they have finally come to the conclusion that they are opposed to prefinancing.

This leaves much wider latitude in the local government. It removes Federal control over the pace and speed and the rest of it in approval of projects, except in principle.

And I think really it gets back to what the chairman said that Treasury feels that it would be considerably cheaper to the Government as a whole to use this method of taxable bonds with the Federal paying the difference in the interest rate. I think probably there is no question but that is true. It would be cheaper for the Government as a whole; but it puts the control in the Federal Government.

It removes the flexibility of independent action by local government, and I think strikes a very serious blow at the whole concept of the federal system, which is Federal, State, and local shared responsibility with maximum initiative and ability to deal with local problems at the local level. I think that to me is the most serious phase of this whole question: Is the removal of this basic flexibility of local government.

MR. CRAMER. I am very intrigued with your continued strong support for State and local government responsibility.

Governor ROCKEFELLER. Yes, sir.

NO STATE ALLOCATION FORMULA

MR. CRAMER. And States' rights. And as evidence in this context, one aspect that disturbs me that I would like to have your comment on is: There is no allocation formula in this proposal as compared to the present law.

Governor ROCKEFELLER. That is right.

MR. CRAMER. New York's guarantee, as you suggest, is \$16 million or \$17 million out of the \$275 million appropriation—or \$225 million, is it not, appropriation? New York gets, what did you say, \$17 million?

Governor ROCKEFELLER. Under the total action of the formula, it comes out to \$17 million.

MR. CRAMER. But under this bill, the difference between what we appropriate and the \$700 million, if they exceed the \$700 million ceiling—and they do not have to if they do not want to—there is nothing mandatory in this as you read it, is there that they will be limited even to the \$2.2 billion?

MR. PEDERSEN. No, I do not think so. That is not clear.

MR. CRAMER. So there is no limit really of \$2.2 billion. But out of the difference of \$225 million appropriation request and the \$700 mil-

lion ceiling, supposedly there is that \$475 million for this bonding program, right?

Governor ROCKEFELLER. Right.

Mr. CRAMER. But New York has no guarantee of getting any portion of that under the bill as written?

Governor ROCKEFELLER. That is exactly right.

Mr. CRAMER. The only limitation at all is 10 percent maximum, which you obviously have reason to question coming from one of the largest States.

AN OPEN-ENDED COMMITMENT

Governor ROCKEFELLER. Of course it is a new concept really here where the Department of Interior would have the right to issue guarantees. These would be obligations on the Congress over which, as I read the law, the Congress would have no control. For the first time you are just going in the opposite direction in the welfare programs, and you put a ceiling on aid to dependent children, the number of children, which is the first time since 1935 where these open ended arrangements have had a ceiling put on them, so in a sense this is inconsistent with the action taken in the welfare field where you are stopping open ended commitments and want to get a fixed obligation here.

This is opening a new open end commitment and removing Congress' capacity to determine the amount for any one year to be spent.

Mr. CRAMER. As a matter of fact the Treasury Department becomes so adamant to this approach that they just give us the grant program—

Governor ROCKEFELLER. I think so.

Mr. CRAMER. And they have no obligation to continue the grant program if they want to absorb the full \$700 million for the bond issue program, as I read it.

Governor ROCKEFELLER. It really gets down to this whole question of how much it is worth to them to get rid of tax-exempt bonds as a basic philosophy and concept.

Mr. CRAMER. My Chairman has informed me that our time is up. I thank you very much, Governor.

Governor ROCKEFELLER. May I just say one thing, Mr. Chairman—

Mr. BLATNIK. Yes.

Governor ROCKEFELLER. —in relation to a remark that the Congressman made.

I believe in States' rights very strongly, but I also believe that in order to preserve them, States must assume their responsibilities.

Mr. CRAMER. With that I agree, yes.

Governor ROCKEFELLER. This proposed legislation would prevent us very importantly from assuming our responsibilities.

Mr. CRAMER. I was not taking issue with you. I was complimenting you.

Governor ROCKEFELLER. Thank you, sir.

Mr. BLATNIK. Mr. Clausen.

Mr. CLAUSEN. Thank you, Mr. Chairman.

NEW LEGISLATION AN OPPORTUNITY TO STRENGTHEN SMALLER
COMMUNITIES

Once again we appreciate your comments, Governor Rockefeller. One of the greatly growing problems as I see it in the country is this trend toward urbanization. And as a result, it has in effect created a source of brain drain in the rural communities of America to a point where some 70 percent of the people live on 1 percent of the land.

Many of us are very concerned about this. And I am sure that you would share this concern.

In this legislation I believe we have an opportunity to do something about it. I think there is an opportunity for us to establish the kind of allocation so that local units of government can move forward in providing the type of sewage treatment facilities necessary in order to accommodate industry should industry want to decentralize. May I have your comments on this? Do you agree with what I am saying?

Governor ROCKEFELLER. I think we have found that has already been true under the present legislation; but I do not know how it would work out under some of the features of the new legislation.

Now, a community can expand its sewage system and its sewage treatment plant to include the requirements of a local industry. Thus, the financing can be undertaken by government, getting the benefits that government is providing through the Federal aid and the State aid, where there is State aid and the tax exemption. This becomes an attractive feature in bringing in industry or holding an industry, which is otherwise faced with a very high charge on preparing and installing its own treatment facilities.

I recommended, 2 years ago, I think, that the Federal Government give tax exemption, or 1-year writeoff rather, because it does not tax on real property. 1-year writeoff against income on the installation of any sewage treatment facility. This would be very helpful. I do not think such a writeoff has been granted yet.

Therefore, this other feature which you are talking about is a very important one and does permit local communities to be competitive with a city where the city is already handling the waste of the industry, which is located in the city.

Mr. CLAUSEN. As you know, there has been an arbitrary cutoff in this legislation for communities 125,000 and above. These would be the only ones to be really considered. And so there are some of us that feel that this is really an oversight and should be corrected.

Would you agree with this point of view?

Governor ROCKEFELLER. I think really it is trying to compensate for what was in the original bill, which was a penalty against the larger cities.

Frankly, the legislation in the original form, in the prior years, was discriminatory against big cities, because half the money had to go to communities under a certain size. There was also a per plant limit, and I think that on one of the big plants in New York City,

about \$17 million was received out of a total cost of about \$230 million, something like that, or \$208 million.

So I think in a way this present proposal may be designed to compensate for a previous situation; but I agree with you. I can see no reason why they all should not be on a the same basis.

Mr. CLAUSEN. I think this is the point that I want to make because you might aggravate the problem by offering more incentives to the so-called larger urban areas and lose the one opportunity that I believe we have to in effect decentralize this country.

Would you agree with this?

Governor ROCKEFELLER. Well, it certainly is an opportunity. I think there are others. I think the whole Federal highway program is very helpful too in getting money for these important highways that tie in these smaller communities and make them a part of the total.

But I agree with you that there is no reason why all communities should not be on the same basis.

Mr. CLAUSEN. Thank you.

Mr. BLATNIK. Mr. Howard.

Mr. HOWARD. I wish to join the others in thanking you for appearing here and for your fine statement concerning the proposed Federal legislation.

We in New Jersey look upon your program for water pollution abatement with a good deal of respect and admiration. And I notice that it will end in 1972. And many of us hope to be seeing you administering and operating this program in New York State to its culmination. [Laughter.]

Governor ROCKEFELLER. I probably will. [Laughter.]

Mr. BLATNIK. Mr. McCarthy.

Governor ROCKEFELLER. Can I say, Mr. Chairman, I only hope that I live to see the day when New Jersey cleans up its waters on the Hudson River.

[Laughter and applause.]

Mr. BLATNIK. Mr. McCarthy.

Mr. MCCARTHY. Thank you, Mr. Chairman.

Governor, as a Democrat from New York, of which you are the Republican Governor, let me say publicly that I have been very impressed with the dynamic role you played in the mobilization of the State, Federal, and local resources, to attack this tremendous problem of water pollution.

EFFECT OF PREFINANCING CUTOFF

Yesterday in a colloquy with the executive secretary of the Michigan Water Resources Commission, it was brought out that the prefinancing provision which you advance so vigorously, and which we followed through in putting into law, has been the foundation on which at least nine States—New York, Michigan, Ohio, Illinois, Wisconsin, New Hampshire, Vermont, Maine, and Pennsylvania—constructed or are constructing a full-scale pollution attack.

Now, this official, Mr. Oeming, told us that if the prefinancing provision is eliminated starting this July 1 no less than 229 of Michigan's

336 pollution abatement projects will be knocked out of any Federal aid.

The reasons for this are twofold. One, these 229 projects are communities of less than 125,000; and, secondly, because obviously there will not be enough cash available in the grant program.

My question, Governor, is: How many of New York's contemplated projects would lose Federal aid if the prefinancing provision is dropped July 1?

Governor ROCKEFELLER. As far as New York state is concerned, the public authorized a bond issue of \$1 billion, half of which is for prefinancing the Federal share; and probably—being completely candid here—the State would go ahead on this program.

However, it is the local governments who have to sell bonds and who would not—and particularly those under 125,000 population—some communities get prefinancing and there would not be the opportunity for in my opinion to shift these programs to conform to this new law.

I think we would have a stalling of a large percentage of our program in New York, primarily by local government. If we had to force them through the courts by legal action to go ahead, even though they were not going to get any of this back on prefinancing, I think it would take years for us to do it.

It would have a disastrously disrupting effect. Of the \$534 million in projects planned for 1969 we expect to prefinance about \$250 million.

Mr. McCARTHY. So that half would be knocked out, eventual reimbursement, if the prefinancing provision were dropped?

Governor ROCKEFELLER. They would all be knocked out, except the State would go ahead with its share; but the local governments would not, because they would then be caught in a bind. So it would in a sense be the same as Michigan. There are both sides of it. In New York the State has the funds. It would be very expensive to the State.

Mr. McCARTHY. Yesterday in another colloquy with the Secretary of Interior, I advanced the proposition that he consider an optional feature to retain the present financing feature, as the chairman indicated we might this morning, and then offer states that route or the bonding route. His response was that we might be able to work that out. I think there is a lot of sentiment on this committee for retaining the prefinancing provision.

Governor ROCKEFELLER. Mr. Congressman, do you know whether that would include permitting under those projects which were prefinanced the use of tax-exempt bonds? Because if we had to go to taxable bonds and pay the higher interest rate, one, we would be held up by the law as was pointed out that we do not have the right to sell over 5-percent interest; and, secondly, the cost would be far greater

and therefore the amount of bond authorization we have would not cover it.

Mr. McCARTHY. Well, that is another side of it. Certainly your testimony has been very important this morning. I know that we will get into that phase of it, too.

Governor ROCKEFELLER. Thank you.

Mr. McCARTHY. Thank you, Mr. Chairman. Thank you, Governor.

Mr. BLATNIK. Mr. McEwen.

Mr. McEWEN. Mr. Chairman, it is good to welcome the Governor here.

In view of the fact that I have an opportunity to see him often, I shall not take long. I heard the comment of my dear friend from New Jersey, Mr. Howard. Let me say, Governor, it was a pleasure to work with you in Albany and that the water is lovely down here, and I would be happy to work with you anywhere, sir. [Laughter.] Thank you for being here today.

Governor ROCKEFELLER. Thank you very much.

Mr. BLATNIK. Mr. Duncan.

Mr. DUNCAN. No questions.

Mr. BLATNIK. Mr. Schwengel.

Mr. SCHWENGEL. Governor, it is good to see you here again. I join with all of those who pay tribute to your testimony and offer my thanks for giving us the benefit of the experience you are having in New York and contributing to those around you.

Just recently I read again your book on the Federal system. And I note from your testimony, I note from your record, that you are carrying through on what you talked about in a series of lectures culminated in that very fine book. And it is a very fine contribution to political literature of our country.

IMPORTANCE OF RESEARCH

I am especially interested in research. And especially in this area I note that you have commented on research.

Do you agree with me that research ought to be a continuing part of this program, because as we move into technical aids and as we develop all the new chemicals for all of our production facilities and our industries, and I am thinking now especially of the farm area where we depend so much on chemicals for fertilizer, and so forth, that we ought not to strengthen that aspect of this bill and give a lot more thought to the possibilities of research and what it can give us in the way of other and better answers to many problems that are going to plague us in the future?

Governor ROCKEFELLER. I certainly would agree with you on that. We have felt that research was important in terms of both control to be more understanding, as you say the use of chemicals and so forth, what their impact is in effect, plus what the possibilities are for developing new methods of purifying the water that would be far less expensive in terms of capital investment, and therefore that could save large capital investments by developing some new methods of cleaning up the waters, removing the pollutants.

Mr. SCHWENGEL. Further, on that point, Governor, you are aware of the very fine research that we had in the highway system, one in New Jersey, one in Illinois where the fact was that industry cooperates, State and local communities cooperate, and the Federal Government cooperates, and we have a joint effort there and it has been a magnificent contribution.

Would you think it might be advisable for us to consider this kind of thing so that we can more truly—for research and pollution—more truly reflect the need and the changes and the special needs of areas in the community?

Governor ROCKEFELLER. Dr. Hollis Ingraham is in charge of this. I would be glad to have him comment on that if you would permit me.

Dr. INGRAHAM. Part of the Governor's program was to intensify research activities. And as his arm, the Government, was concerned with that, we have been contracting with universities to carry on research in algae control, looking for better methods of treatment, looking for methods of reducing phosphates, taking care of chemicals you mentioned, and in addition to that we are also carrying on research within the department, our Division of Laboratories and Research. And we have recently made an arrangement with the Department of Correction to establish a pilot program in one of the institutions where it will be a combined training program for inmates and an opportunity for research activities in various methods of sewage treatment.

So we feel that this is very definitely something that needs to be intensified at this time.

We are able unquestionably to clean up the streams of the State without any trouble, so that they are in very good shape. However, there are certain problems that are bothering us. The wastes from paper plants need more investigation. There is the problem of taking care of the enrichment of our lakes, a very serious problem, and one that needs to be attacked very vigorously.

Governor ROCKEFELLER. So in other words if a small effort relatively speaking can be productive, certainly a cooperative effort, Federal, State, with private, would certainly be beneficial.

Mr. SCHWENGEL. That would be another way to carry forward the solution by using what you have called the Federal system. I am glad to have your comment on that.

SOIL CONSERVATION

One other thing, you will recall from the history of your State and the history of your country there was another great New York Governor who laid out the pattern for conservation. And I am very interested in conservation, and I am keenly aware of the fact that in the Midwest we are losing millions of tons of the best soil we have every year floating down the river. And I have a feeling the resolution of this problem will relate to the problem of solving pollution. We now know how to contain our soil. We know how to prepare watersheds. We are not moving very fast on that. But we had a better program. And in addition to the completion of the watershed program, that would help in resolving the Government pollution problem. Is that right?

Governor ROCKEFELLER. Exactly.

Mr. BLATNIK. Mr. Denney.

INDUSTRIAL DEVELOPMENT BONDS

MR. DENNEY. Governor, I was quite interested in your testimony on page 3 with reference to the tax exemption industrial development bonds. I know that you and your staff are aware of the fact that the FEC also has a proposed regulation to remove the exemption of political subdivisions. And it seems to me we are getting into the program here where the Federal Government is trying to say the political subdivisions have come to Washington to get your financing. And this bothers me.

Now, you say on page 3 that you are aware of the indiscriminate use in industrial development bonds and you support appropriate action to prevent these abuses. Now, I take it that you do feel that the industrial development bonds to a certain limitation should have a tax-exempt status, because it helps especially in rural areas, small communities, to bring industry in.

Could you comment about what appropriate action would you support to prevent these abuses?

(Mr. Dorn assumed the Chair.)

Governor ROCKEFELLER. Well, I think the basic concept of the tax-exempt bond is that it should be used for a State or local governmental purpose, and not just to help a private industry get a competitive advantage over another industry, that it must be for some clear objective, that is an objective accepted by the people as a purpose, social purpose. For instance, you have a slum area where there is high unemployment to help attract an industry back into that area where they can give blue collar employment, where the people are now being supported by welfare relief.

MR. DENNEY. In other words, industrial development bonds would set up industry in areas where there is unemployment, then it has a definite basic purpose in our financial structure?

Governor ROCKEFELLER. Yes.

MR. DENNEY. Is it not true also, and I suppose your staff has studied this, that we are violating a constitutional decision where we are saying that one political subdivision cannot tax another? Here we are considering legislation that should be in the Ways and Means Committee, rather than here, and we are saying that the Federal Government will tax a political subdivision bonds, and to me this is absolutely contrary to the very basic constitutional question that has been the rule of law in this country since its founding.

I appreciate your coming here, Governor.

MR. DORN. Thank you.

MR. McDONALD.

MR. McDONALD. Governor, the members of this committee are well aware of the good work that you have accomplished for New York in this water pollution problem. We are very pleased that you have come here today and shared your experience with us.

CONCEPT OF FEDERAL SYSTEM INVOLVED

Governor ROCKEFELLER. You are very kind. I appreciate the opportunity. I think this is a very important question, that is both in relation

to water pollution and the fundamental concept of the federal system in the area of tax-exemption. And I said in my statement there if the courts do not knock it out, because I question it myself, whether there is not a constitutional question—but who knows what the courts will do?

Mr. DORN. Thank you, Mr. Macdonald.

Mr. Hammerschmidt, I believe at the moment you have two Governors Rockefeller. So we are delighted to have you question the Governor.

Mr. HAMMERSCHMIDT. Governor, I join others in welcoming you to the committee today. I am certainly pleased with the tone of your statement, but certainly not surprised; because as our acting Chairman, Mr. Dorn, says, I have a genuine pleasure of working with another Governor Rockefeller.

Governor ROCKEFELLER. Thank you, sir.

Mr. HAMMERSCHMIDT. And I think this same ideology is reflected here. And that is, your statement reveals your feeling that constructive legislation can be written to accelerate this much needed program, and yet I know that you speak out in what I consider very wisely in protecting a certain philosophy of government, as it pertains to possible physical encroachment on the exemptions to municipalities and other entities of government, and also to the user charge which would certainly inhibit the flexibility of local government.

Governor ROCKEFELLER. That is right.

Mr. HAMMERSCHMIDT. And I congratulate you for your very helpful testimony here this morning.

Governor ROCKEFELLER. Thank you very much.

Mr. DORN. Thank you, Mr. Hammerschmidt.

The Chair would like to ask the distinguished Governor of New York if his opposition to the taxation of State municipal bonds here today, if that also includes municipal bonds for industrial expansion?

Governor ROCKEFELLER. As long as bonds are for a clearly stated governmental purpose or objective, there is no reason to remove the tax exemption. I can understand Treasury's concern that this could get to a point where any industry could go looking for tax-exempt bonds, and it would not invest its own money any more, and that this would then destroy a very important segment of Federal revenue and a legitimate one.

I think that this really is a philosophical question relating to our concept of government and the federal system as against a central governmental structure, which exists in many countries.

Mr. DORN. Thank you, Governor. I quite agree, because some of the States in the Union, whose economies are perhaps a little bit weaker than your great State, have found industrial development very advantageous. Revenue bonds have been of great assistance to smaller communities, and have helped slow the trend toward urbanization, which is one of our great problems in this country today. So, I commend you.

Mr. Miller from Ohio, one of our very fine members of the committee.

Mr. MILLER. I wish to compliment the Governor on his fine statement.

INTEREST RATES ON LOCAL BONDS

I would like to ask when we consider that the bond money comes from the private money market, and we are speaking now of that share of possibly 70 down to 45 percent, supply and demand will control this interest rate.

Governor ROCKEFELLER. Sure.

Mr. MILLER. We have now a bill, as I understand it, that would pledge the full faith and credit of the Federal Government behind many of the programs that would be put forth by the larger cities. My question is, Do you feel that this would drive up the interest rates to those communities that would tend to help themselves and not be a part of the Federal programs, and therefore they would be somehow restricted or penalized for going it alone because they could not be a part of a Federal program?

Governor ROCKEFELLER. Mr. Miller, may I call on Joe Murphy, who is very familiar with this whole problem in the money market. He is the commissioner of taxation and finance. And if it would be all right with you, I would like to get his professional reaction. Would that be all right, Mr. Chairman?

(Mr. Blatnik resumes the chair.)

Mr. BLATNIK. Yes.

Mr. MURPHY. It seems to me that this would probably not be the problem with this situation any greater than it is today, because we have had a variance in interest rates and in volume of Government bonds, U.S. Government, which have remained about the same over a period of several years. And only in 1963 did our municipal bonds comprise one-third of this total.

Governor ROCKEFELLER. His question was—a Federal guarantee on a municipal bond would probably result in a lower interest rate because of a better credit risk with a Federal guarantee, would that have an adverse effect on the interest rate—if I understood your question—an adverse effect on the interest rate of a community that wanted to go on its own without taking the Federal guarantee.

Mr. MILLER. And naturally, the supply and demand does say where the money would go; and is it possible that it would be pulled away from the smaller communities under 125,000 population, where they must have a higher interest rate?

Governor ROCKEFELLER. Maybe I could comment on that this way. We have experienced in our own State that there are small communities who cannot sell bonds at a reasonable rate—some cannot sell them at all because their credit is not good enough and others have to pay a very high rate which is almost prohibitive. That is why we set up the pure water authority which is a public-benefit authority that can go in and contract for the community or for a group of communities.

So we have tried to meet this by providing a vehicle that these communities could use to get around this problem of their lack of good credit or credit standing.

I would say if, with the guarantee, municipalities were to sell a lot

more bonds, that it might drive interest rates up by the very demand that you mentioned. But if the local community had a good credit rating, they would not go up probably any higher than the group as a whole. In other words, it would just be supply and demand, as you say.

I do not think it would be very adverse, except for the community that has a poor rating. And I think there is some need, and I would feel that maybe this authority that we have set up could have very useful implications for other communities, other States, to help those communities that need it.

SOLID-WASTE MANAGEMENT

There is a very interesting byproduct in that. We gave the authority power to handle solid wastes and I think this is going to turn out to be the biggest thing that this corporation has. It is now studying solid waste problems in New York City with some of our suburban counties. All of these communities have got a terrible problem of what to do with garbage. They cannot burn it because of air pollution; they cannot dump it because of water pollution. We may end up with this corporation handling most of the solid waste in the State and using it for fill, construction, compact it, encase it, so it will not pollute the area, and it could be quite an exciting new development as a byproduct of the pure-water program.

Mr. MILLER. Thank you.

Mr. BLATNIK. Governor, we thank you and your staff of experts with you very much for the more than generous time you have given us. We are very anxious to assist the municipalities and to assist the States and I think we can work something out, get a combination, flexible combination of many of these proposals before us so it will be realistic and workable.

Thank you very much, Governor.

Governor ROCKEFELLER. Mr. Chairman, I would like to say as a citizen we are very fortunate that there are men like those gathered in this room who are giving the kind of detailed care and consideration to these kind of national problems and the leadership in solving them.

I am very grateful to you and your associates as a citizen.

Mr. BLATNIK. Thank you very much. Let us please have order. Those standing either retire to the rear of the room or make yourselves comfortable. We appreciate the cooperation of the very splendid audience we had this morning. We want to make you comfortable in every way possible.

Time is running out with quite a few witnesses before us.

Next we will hear our colleague, member of the House from Massachusetts, Mr. Hastings Keith.

Congressman, thank you for your patience in waiting. Let the record show you have been here all morning long listening to the testimony and the subsequent interrogation of the Governor of New York.

THE OIL AND HAZARDOUS SUBSTANCE POLLUTION CONTROL ACT OF 1968

STATEMENT OF HON. HASTINGS KEITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MASSACHUSETTS

Mr. KEITH. Thank you very much, Mr. Chairman.

Mr. BLATNIK. Mr. Keith, proceed at will.

I notice you do have a prepared statement.

Mr. KEITH. I have a prepared statement. I would like to scan it quickly for you and then make a very short comment.

Mr. BLATNIK. Do you want to read it? Whatever may be your desire. It can appear in the record in its entirety.

Mr. KEITH. I will be happy to read it if your schedule permits.

Mr. BLATNIK. Yes, please.

Mr. KEITH. Mr. Chairman, I would like to add my strong endorsement to H.R. 15906, the Oil and Hazardous Substance Pollution Control Act, which I feel is essential to protect every coastal community in the Nation from the possibility of devastating oil pollution. My district includes the shoreline running from the outskirts of Boston, down to and including all of Cape Cod. It also has the shoreline south of the cape to the fishing port of New Bedford. We know from first-hand experience how vulnerable our shore communities are to pollution of their fish and shellfish resources, their resort beaches, wildlife habitats, and scenic retreats.

Almost 1 year ago today, Mr. Chairman, I visited the scene of history's worst oil pollution disaster. The supertanker *Torrey Canyon*, carrying 120,000 tons of crude petroleum, went aground off the coast of England, and blackened over 100 miles of the Cornwall shoreline. I was a Member of the congressional delegation which attended an emergency meeting of IMCO, the International Maritime Consultative Organization, which was called to discuss the legal and technical questions arising from this disaster.

Upon my return, I filed my report to the Congress which, among other measures, called for improved Government machinery to cope with offshore oil pollution, both of the small-scale "routine" kind, and large-scale disasters like the *Torrey Canyon*. Since that time, Mr. Chairman, Cape Cod and the entire New England coastline have suffered from repeated pollution incidents which have caused minor and major damage to valuable coastal resources.

Last month, as you know, the United States was confronted by its first major oil pollution disaster, in Puerto Rico's San Juan harbor. The oil carrier, *Ocean Eagle*, broke in two on submerged reefs in the mouth of the harbor, spilling a large portion of its 6-million-gallon cargo over 11 miles of the Western Hemisphere's finest resort beaches. I visited the scene of this incident in an effort to judge our Government's ability to cope with a serious oil spill, in the light of the *Torrey Canyon* experience.

AMENDMENTS TO ADMINISTRATION BILL PROPOSED

My conclusion, Mr. Chairman, was that new authority, new governmental machinery, and new technical means were urgently needed

to deal with this constantly growing threat. H.R. 15906 provides, in my opinion, the basis for these vital improvements. My companion bill, H.R. 16559, calls for two amendments to the committee's bill, and I would like to call your attention to these changes.

COVERAGE SHOULD EXTEND TO PORTIONS OF THE HIGH SEAS

First, my bill would broaden the geographical area of the Secretary's cleanup responsibilities, to include portions of the high seas outside the 12-mile zone designated in H.R. 15906. Subsection (j) on page 7 of my bill says that:

The Secretary may also remove or arrange for the removal of oil discharged in any manner into the high seas outside the contiguous zone if such oil may lead to pollution of the navigable waters of the United States or the waters of the contiguous zone, or if such oil threatens damage to valuable resources on or above the Continental Shelf.

Any large-scale oil spill, Mr. Chairman, would pose a serious threat to fisheries resources which lie far beyond the 12-mile area contemplated by the committee bill, and should be within the authority of the Secretary to ameliorate. The Georges Banks fishing grounds, which extends some 200 miles off the coast of Cape Cod and which produce 12 percent of the world's total fish catch, are extremely vulnerable to pollution resulting from tanker traffic, and they should be included within the protection of this legislation.

I should point out, Mr. Chairman, that this proposed amendment does not extend any of the penalties or liabilities in the bill to ships operating on the high seas, and thus does not involve any international legal complications.

RESPONSIBILITIES SHOULD BE ASSIGNED IN ADVANCE OF EMERGENCY

The second improvement to which I would like to draw your attention is in subsection (k), also on page 7 of my bill. Paragraph (1) says that the Secretary shall, "immediately upon enactment of this section, and where appropriate, delegate to other Federal agencies the authority for planning, directing, controlling, and coordinating the removal of such oil" from the affected waters and shorelines.

The reason for this change is that the committee bill, on pages 6 and 7, paragraphs (1) and (2), is somewhat vague in stating just how and when the Secretary shall delegate the clean-up responsibility to the other agencies which will have the actual operating authority. We should not wait until an accident has occurred and the oil is on the water, to designate the agency which will take action. This is indeed the fatal weakness in the present law, and we should not repeat it in the new program.

My amendment would require the Secretary to make immediate arrangements for the assigning of responsibility well in advance of an emergency. Machinery would be set up and contingency plans would be made for coping with oil spills, avoiding the need for last-minute improvising.

In Puerto Rico, Mr. Chairman, I found that the government authorities on the scene were confused about their authority to act, and that emergency preparations were virtually nonexistent. Despite any studies or reports that have been made since the *Torrey Canyon*

disaster, supplies to combat the pollution were not readily available, and local Coast Guard authorities were forced to take charge on an ad hoc basis, with any guidance.

For example, Mr. Chairman, when I visited down there as did Mr. Howard of your committee, and I asked at a meeting which had been assembled for the purpose of discussing this problem, I said "Well, who is in charge?" And the Captain of the Coast Guard said, "Well, I guess I am." And he said that only after some thought.

TIME TO ENACT AN EFFECTIVE LAW

To conclude, Mr. Chairman, I strongly support the provisions of H.R. 15906, and I respectfully urge the adoption of the two amendments which I have outlined. It is time that the Congress enact a truly effective antipollution law, and it is essential to give this needed protection to coastal communities whose valuable and irreplaceable coastal resources are in constant danger of serious pollution damage.

Mr. Chairman, the various agencies of our government have been studying this at least since the *Torrey Canyon* disaster, studying it vigorously and perhaps at times very feverishly, to develop standard operating procedures for dealing with such disaster. We need to assign responsibility, we need to find techniques and procedures, and we need to get the kinds of equipment that can deal with these problems.

But as in many areas of Federal activity, when the last emergency occurred, that of the Puerto Rico, little evidence was offered that any progress had been made.

I mentioned in my prepared statement the Coast Guard's lack of real knowledge as to who was in charge.

We must understand the problem. There is an inadequate standard operating procedure in existence at any echelon of government not paying attention to the needs, as I pointed out in my report when I returned from the *Torrey Canyon* disaster, for sealanes and for shore guidance systems. They are still in the trial and error stage on techniques.

When we got down there to Puerto Rico, as Mr. Howard will tell you, they were experimenting on the scene, experiments which should have taken place in the interim since the *Torrey Canyon* disaster. And they did not even have a good supply of nontoxic detergents available.

Now, I noted in a statement furnished me by the American Petroleum Institute that they have announced their support of legislation attempting to deal with this. But their statement, although it is good, is negative in nature. They have in fact initiated a clean seas program. But in spite of this, the incidence of shoreline pollution has increased.

In their statement, they emphasize their interest in protecting themselves from the damages that could be assessed. They should, on the other hand, it seems to me, be encouraging their membership to adopt measures to prevent the kinds of incidents that will if not curtailed cause the insurance rates which they suggest to be required to be so prohibitive that the independent companies will be unable to compete.

And so, Mr. Chairman, we have a present and potential danger about which we can do something. It is a true piece of consumer legislation in its present form and like several other pieces of consumer legislation, it costs very little and it may save a great deal.

I strongly support the administration approach to this problem and urge your expeditious action on it.

I think you very much for the opportunity to testify.

Mr. BLATNIK. Congressman, I want to commend you for a very concise, pertinent, and very informative statement, based on personal experience. It is obviously very intense personal interest and participation.

COSPONSORS OF H.R. 16559

I want the record to show that the Congressman, as he has mentioned, is author of H.R. 16559 and is joined by his colleagues, Mr. Boland, Mr. Bates, Mr. O'Neill, of Massachusetts, and Mr. Halpern, Mr. Halferman, Mr. Dulski, Mr. McLeod, Mr. Blackburn, so you have quite a team supporting the two amendments, which I think are very, very well taken, plus other aspects that you raised.

These and others will be given very detailed and full consideration in what we hope will be an effort to come out with sort of an omnibus bill, the financing section, the oil pollution aspects, the clean lakes program; we will hear testimony in just a minute on that by Mr. Henry and other very important areas of the comprehensive water pollution abatement program.

We learn more as we go along. We have learned a lot in these past 10 years, especially in recent years. We appreciate the special efforts which you have obviously made to prepare your statement to be with us here this morning and make your presentation.

Mr. KEITH. Thank you, Mr. Chairman.

I would hope that you would not delay action on this particular bill until such time as you have completed the overall approach.

Mr. BLATNIK. Thank you, Congressman.

Mr. HOWARD. Mr. Chairman.

Mr. BLATNIK. Mr. Howard.

Mr. HOWARD. I would just like to state that I certainly agree with Congressman Keith. I think that his testimony certainly is one of the most important that we have had and will have in discussing, considering, this bill. I know that the Congressman from Massachusetts is probably one of the foremost experts in the oil pollution field. I thought I would be active myself in attempting to track down this problem, but wherever I went I found that Congressman Keith and I were overlapping in our visits. In Cornwall I found his tracks on the beaches; he had been there before I had arrived. I believe that his interest and his area is very much the same as many of us who represent seashore areas.

I want to thank you for coming and making this statement and to assure you that when we get into Executive Session, your two amendments will have as strong a champion in the Executive Committee as I can make it.

Mr. KEITH. I thank the gentleman from New Jersey, and I trust he agrees with me that this problem is divisible and should be broken into two parts and the oil pollution of the seas resolved more promptly, because of its relative simplicity.

Mr. HOWARD. I certainly agree.

Thank you.

(At this point Mr. Dorn assumed the chair.)

Mr. KEITH. Thank you, Mr. Chairman.

Mr. DORN. May I say to my distinguished colleague, I too think it a very fine statement and a fine study of water pollution problems. We are grateful for your sharing your views with the committee in this splendid statement this morning.

I might say the cooperation of men like my colleague will enable Mr. Blatnik to get this legislation passed, unanimously accepted by Congress.

Thank you.

Mr. KEITH. I cannot say too often the importance of dealing with this particular segment. It is so simple of solution to proceed with the administration bill as it pertains to the pollution by oil of tankers that run aground. And it should not wait, because it is cheap but good legislation.

Mr. DORN. Well, if I understood my colleague's testimony correctly, it polluted 120 miles from shorelines, just this one ship.

Mr. KEITH. Well, that is a little longer than the actual amount of shoreline that was polluted, but the potential is there, and certainly 120 miles of shoreline across our eastern seacoast has been polluted since the *Torrey Canyon* disaster, not all of it in Puerto Rico.

Mr. DORN. Thank you.

Mr. KEITH. Thank you.

Mr. CRAMER. Mr. Chairman.

Mr. DORN. Yes. The gentleman from Florida.

Mr. CRAMER. I have had a chance to take a look at this statement. I think Mr. Keith has mentioned very constructive suggestions.

I, too, am most interested, as some other members of the committee, in this water pollution problem. We have a number of sunken tankers off the coast of Florida, and so forth. We have had the recent experience in Puerto Rico.

LEGISLATION WOULD NOT APPLY TO CASES OF UNKNOWN VIOLATOR

However, the bill as drafted, I think, maybe has another weakness, and that is we seem to have oil slick problems off of Hawaii, but they do not know the cause.

The bill as drafted by the administration, as I understand it, would not cover that situation at all. It is only where you have a known violator, perpetrator, and a remedy against him.

Mr. KEITH. That is true. There are certain problems that are beyond our scope. And this might perhaps be comparable to the "act of God" kind of hazard. But at least where the culprit can be found, my bill, as supported by the study that is contained as a result of my visit to the *Torrey Canyon* disaster, provides a way to establish responsibility and take other action than just corrective after the incident has occurred.

Mr. CRAMER. Thank you very much.

JURISDICTION BEYOND THE 12-MILE LIMIT

Mr. HARSHA. Mr. Chairman, before he leaves the witness seat, I would like to ask him some questions, if I may.

First, I want to congratulate you for your leadership in this field, but I am a little concerned about this 3-mile/12-mile-and-beyond jurisdiction. How do you propose to get jurisdiction to control the 12-mile limitation?

Mr. KEITH. The administration bill does not go beyond the 12-mile limit because they were concerned, I believe, about the assessment of liability, the action that I referred to by the American Petroleum Institute where they stress the liability for the damage that may result from offshore pollution. And just because they cannot find the guilty party or cannot get compensation for an action that took place beyond the 12-mile limit does not mean that we do not have a responsibility for those people who are affected by the shore floating within—by the oil that floats within the 12-mile limit. And if we can get out there and take corrective action prior to the oil coming to the shoreline, we may protect the shoreline itself. And I believe we should be interested in that problem out there as well as inshore.

Mr. HARSHA. But do we have jurisdiction out there?

Mr. KEITH. Nobody else has any better jurisdiction and if we can prove a present danger; nobody else is going to object to our taking action.

Mr. HARSHA. Thank you.

Mr. CLAUSEN. Will the gentleman yield?

Mr. HARSHA. I do not have the floor.

Mr. DORN. Mr. Clausen.

Mr. CLAUSEN. First of all, I do want to compliment the gentleman for again appearing before this committee on the matter of interest as expressed in his testimony.

But I believe he has certainly touched on a very serious point, and that is the question of jurisdiction over many matters. This is just one of them beyond the 3- and the 12-mile limitation. And I think that the Congress and the appropriate committees of the Congress are going to have to give some more serious consideration to the jurisdictional question so that in the future we can deal with the problems that do exist out there. And so I just want to compliment the gentleman again for taking the time to present his point of view as one of the members who represents a coastal district.

Thank you very much.

Mr. DORN. Thank you, Mr. Clausen.

Any further questions?

Thank you, Mr. Keith.

Our next witness is my good personal friend, Congressman Hanley, from New York. I served with him on the Veterans Committee.

We are glad to have you, Mr. Hanley.

LAKE POLLUTION CONTROL

STATEMENT OF HON. JAMES HANLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. HANLEY. Thank you very much, Mr. Chairman, gentlemen of the committee.

As I walked into your crowded hearing room this morning, I thought: My, isn't it nice, all of these people have assembled to hear

my remarks on America's small lakes. And my ego was somewhat deflated as I observed who the witness was.

I am most grateful for the opportunity to testify this morning on a matter which I think is quite important and I am sure that all of you members who have exercised such a great interest in the problem of water pollution will agree.

On your calendar is H.R. 10751, a bill which I have introduced to amend section 5 of the Federal Water Pollution Control Act by directing the Secretary of the Interior to undertake a research and demonstration program for the improvement of the quality of the Nation's lake waters. I believe that such a program is needed.

NEED FOR A SPECIAL LAKE RESTORATION PROGRAM

The Government Operations Committee of the House issued a report in August of 1967 entitled "To Save America's Small Lakes." And at this point I would want to express my gratitude to Chairman Bob Jones, of the House Committee on Natural Resources, for his active interest in our particular problem. And I might say that this report and recommendations contained in this report have been endorsed by all 50 Governors.

This report makes a strong case for much greater attention to what is happening to our lakes, and it recommends the enactment of legislation to promote an expanded research and demonstration program to find ways to retard the degradation of our lakes and to promote their restoration. This report lays out the dimensions of the problem much more eloquently than I could.

We know that municipal and industrial wastes will inflict greater damage on a lake than on a stream. Now, this is particularly true where a lake is small and has a long detention period. Over the years, lakes which had served a number of purposes were unable to cope with the imposition of such wastes, and now their usefulness is severely limited.

The American people are looking toward water-related recreational facilities, and lakes which were once able to support many forms of water-related recreation are no longer visited. I want to see the Department of the Interior taking an active and ambitious role in the restoration of the water quality, and the usefulness of America's lakes.

Your committee has seen fit in the past to recognize the need for special legislative tools to cope with several of the special problems associated with water pollution control and abatement. The Department of the Interior is now promoting research and demonstrations in the areas of advanced waste treatment, joint municipal-industrial wastewater treatment, and the treatment of wastewater from combined storm and sanitary sewers.

It would seem to me that a special program dealing with the special problems of lakes would be a natural extension of this policy. The hydrologic characteristics of lakes suggest that water quality problems are going to persist even after the construction of sound municipal and industrial waste treatment facilities, particularly in cases where the lakes have experienced a long history of degradation. Even highly cleansed wastes will have a difficult time, when combined with

clean water from tributaries, in neutralizing the self-polluting condition of such lakes. In short, the condition of the receiving body will demand just as much attention as the waters which flow into it.

ONONDAGA LAKE

The Government Operations Committee Report, which I referred to earlier, comments on a lake situated within my congressional district. Onondaga Lake was described by the Federal Water Pollution Control Administration in 1966 as being the most serious pollution problem in the Lake Ontario Basin. It said, "Literally used up, its waters are extremely degraded, and in the south end in particular, the lake is an ugly eyesore." The south end of the lake lies within the city of Syracuse.

"To Save America's Small Lakes" comments favorably on a community consensus that the lake can and should be rehabilitated. Local government has already taken advantage of the opportunity to demonstrate the advantages of joint industrial-municipal waste treatment by applying for and receiving a grant under the section 6 program. I believe that this community intends to take the steps necessary to see that all wastewater entering Onondaga Lake is adequately treated. The great difficulty, of course, is to determine what treatment is adequate in view of the complex condition of the lake itself. It would be regrettable should many millions of dollars be invested in the construction of waste treatment facilities only to learn that the lake's usefulness will not be appreciably expanded. Our situation cannot be unique, and it is the purpose of H.R. 10751 to set in motion the kind of research and demonstration projects needed to find the answers before new facilities are constructed.

R AND D THE BASIS FOR ACTION TO IMPROVE LAKE WATERS

A body of water's usefulness is determined by its quality, and with certain lakes, the quality of wastewater is but one factor which will determine the quality of the lake's waters. Substantial investment in treatment facilities must be justified in terms of providing public benefits, and I believe that the expenditure of funds for facilities without taking into account other relevant factors will be wasteful. Unless we can know with a degree of certainty that our financial commitment is really going to bring about usable bodies of water, we ought to question the advisability of the commitment. To provide this degree of certainty is the principal reason why I have introduced H.R. 10751.

Of course, there is the difficulty in determining what should be the reasonable use of a certain body of water.

Obviously, some lakes will never again be able to support the full spectrum of water-related recreation, but they might be able to serve as a source of supply for industries and municipalities. They may also be able to support certain forms of fish and wildlife. It seems to me that the citizens of an area, in the last analysis, will make the determination as to the future uses of a body of water, and hopefully, their decision will be based on knowledge of what is feasible and what costs

are involved. This is why I believe that it is important to conduct the research and the demonstrations needed to discover, test, and cost out the approaches to improving the water quality of the Nation's lakes.

And if we were to prorate the amount of money we request in this authorization which would be \$10 million, on a 4-year basis, or a total of \$40 million, we are actually talking about approximately \$10 a lake. I am told that we have about 100,000 small lakes in America. So we are talking about an investment of but \$10 a lake, or a total of \$40 over a 4-year period to provide this Nation with the opportunity to best evaluate the best way of rehabilitating destroyed bodies of water, such as the one I referred to.

The Secretary of the Interior had the occasion to pay a visit to particular bodies just a month or two ago. He agreed wholeheartedly with respect to the necessity of this tool within our Federal structure to provide communities the opportunity to proceed with the costly rehabilitation process.

Gentlemen, again I appreciate the opportunity to appear before you this morning.

Mr. DORN. Congressman Hanley, on behalf of the committee, certainly on behalf of the chairman, I want to express to you our appreciation for a very splendid and timely statement. I can assure you that your bill, the one you introduced, will be very seriously and earnestly considered.

I might say, while you are still in the witness chair, that we are happy this morning in committee to have a group of young Americans with us from Briarcliff College, Briarcliff men in New York.

If your friends and visitors would just stand for a second, I would appreciate it. We are delighted to have you. Would you stand, up, please? [Applause.]

Mr. DORN. You have in the committee here Congressman McCarthy, from New York, Congressman McEwen down there, and Congressman Jim Hanley is in the witness chair. We have just had the great, distinguished Governor from New York. So we are happy on your visit here the first time to have so many friends on the committee with us today.

I might say Congressman Hanley's statement certainly should appeal to each of you, because this deals with tomorrow, cleaning up our streams and lakes so that you can use them.

Thank you so much for coming.

Any questions of Mr. Hanley?

Mr. CLAUSEN. Mr. Chairman, I just want to say I appreciate your statement, Mr. Hanley.

Mr. CRAMER. Very greatly.

EXISTING AUTHORITY FOR LAKE POLLUTION CONTROL PROGRAM

I would just raise the question for the committee's consideration. It appears to me the present language of the present law is actually broad enough to cover any body of water and of course the basin plans. You have to include all lakes for the basin planning aspects of it and the general grant authority for demonstration projects related to lakes or rivers. So I think it is an excellent objective, but I just wonder if the present law does not cover it?

Mr. HANLEY. In my guests for assistance on this matter several years ago, I was advised that the provision does not exist for this particular endeavor within the present law. This advice was given me both by the Department of the Interior and the other responsible segments of Government.

I might comment further that in conference with Secretary Udall on this, again he termed it competitive legislation, reflecting on the fact that up until this point we do not have such a tool within our framework, that we have devoted our efforts majorly to the field of antipollution and up to this point really have not needed this particular type of instrument.

Mr. DORN. Congressman McCarthy.

SMALL LAKE PROBLEM WARRANTS ATTENTION

Mr. MCCARTHY. Thank you, Mr. Chairman.

I would like to welcome our distinguished colleague from New York. I recall when I was a boy I used to go down with my family to Onondaga Lake, which at that time was a pristine, lovely lake, utilized for every conceivable recreational pursuit. And in recent years, in my visits to Syracuse, I really noticed the visible deterioration of the lake. And I must say that in my most recent visits, everybody is talking about the leadership that Congressman Hanley has provided. He is really the first one to come forward to mobilize an effort to save and restore Onondaga Lake.

It seems to me that if there is nothing in the present law to direct efforts to the smaller lakes, that we should give some serious thought to Congressman Hanley's bill and see if some of its provisions could not be enacted, because as he mentions, there are so many of these small lakes, and if we are overlooking them, I think we ought to dig into it.

I just want to assure my friend from New York, my very good friend, that I will have your bill with me and as we get into the mark-up sessions, hopefully we can focus on this problem of the small lake.

I want to thank you very much for your very valuable time.

Mr. HANLEY. I am greatly appreciative for the observation of my friend and colleague from Buffalo.

I liken this situation with that of an automobile engine which has been destroyed because of lack of oil or perhaps improper gasoline. Now, it is not going to do us any good to put oil in the crankcase or perhaps put premium gas in the tank. The engine has been destroyed. So before it is going to be usable again we have to take it apart and replace the affected parts and put it back together again. And so is the case with the destroyed body of water. This particular one, I might add, as you well know, is located actively in part within the confines of city limits. They have a population of approximately one-half million people. A lake $4\frac{1}{2}$ miles long by about $1\frac{1}{2}$ miles wide, which has been destroyed for about 6 years, and it seems so sad and pathetic. Here within close proximity of this type of population that a body of water that could be serving such a wonderful recreational purpose is lost.

Again, my appreciation for your observation.

Mr. DORN. Thank you, Congressman Hanley.

Mr. HANLEY. Thank you, Mr. Chairman.

Mr. DORN. I might say this Committee on Public Works has handled probably more legislation affecting you than any other committee of Congress, legislation covering water pollution, the Interstate Highway System, Appalachia, and so forth.

We have quite a renowned list of visitors this morning as witnesses. We have with us now the distinguished Commissioner Polanco-Abreu, from Puerto Rico, Resident Commissioner. He will be accompanied by an expert on marine biology.

Commissioner, we are very pleased to have you. Just go right ahead. You have some pictures here.

OIL POLLUTION CONTROL

STATEMENT OF HON. SANTIAGO POLANCO-ABREU, RESIDENT COMMISSIONER OF PUERTO RICO; ACCOMPANIED BY ORVILLE WATKINS, ADMINISTRATIVE ASSISTANT

Mr. POLANCO-ABREU. Yes; I do.

Mr. DORN. He would like to have these placed in his testimony. Very interesting.

Mr. POLANCO-ABREU. Mr. Chairman, members of the committee, I appreciate this opportunity to express views in support of legislation to strengthen the Oil Pollution Control Act of 1924 and the Federal Water Pollution Control Act. My bill, H.R. 16163, has objectives similar to those of H.R. 15906, by Chairman Fallon and the administration.

I would like to thank the Chairman and members of the committee for the interest they have shown in Puerto Rico's efforts to combat the massive oil pollution threat facing the San Juan area following the breakup of the Liberian flag tanker, *Ocean Eagle*, at the entrance to San Juan Harbor on March 3, 1968. I am sorry that Commonwealth Secretary of Public Works Mr. Lizardi, who has been directing our massive beach and shoreline decontamination campaign, could not be here as planned. Instead, with the committee's permission, I should like to submit for the record a report by his department's petroleum emergency office, a special "task force" unit established to meet the pollution emergency, and his recommendations based on Puerto Rico's experience to date.

With your permission, Mr. Chairman, I submit exhibit No. 1.

Mr. DORN. Yes; without objection.

("The *Ocean Eagle* Incident" by Lizardi follows:)

THE "OCEAN EAGLE" INCIDENT SUBMITTED BY THE PETROLEUM EMERGENCY OFFICE

Introduction

During the sixteenth century the San Juan Harbor was developed by the Spanish Crown due to its natural defensive features into their most notorious bastion in the Caribbean. The navigational difficulties and the heavy defensive fortifications eventually made this port a haven for the Spanish Main.

Four centuries later, the tremendous industrial development of the Commonwealth of Puerto Rico has transformed the old bastion into a port with an intensive commercial, industrial, and touristic traffic which reached approximately 3,350 ships in 1967. Most of the industrial traffic of the Commonwealth is generated by the petrochemical industry, which, due to the absence of petroleum deposits in the island must import its raw materials from other countries. This

activity poses a potential pollution hazard to the coastal waters around the island. Unless preventive measures are undertaken and a corrective emergency plan is developed, we are liable to experience another disaster of even larger magnitude than the *Ocean Eagle*.

Puerto Rico, just like other similar industrial communities on the coasts of the United States, share identical pollution dangers which in this age of technological advances are constantly increased by the construction of jumbo-size tankers and the increment in the volume of the petroleum traffic.

As in the case of the *Torrey Canyon* disaster last year, we have acquired some knowledge of how to deal with an emergency of this nature. The purpose of this report is to summarize our experience and respectfully suggest some measures which should be undertaken to prevent and correct the consequences of similar accidents in the future.

Description of the accident

The *Ocean Eagle*, a fifteen year old tanker registered under the Liberian flag, was owned by the Northland Shipping Trading Company of New York. The 12,065 ton tanker departed from Puerto La Cruz, Venezuela bound for San Juan, Puerto Rico with a reported cargo of 5.7 million gallons (US) of petroleum crude to be delivered to the Caribbean Gulf Refining Corp. of Cataño, Puerto Rico.

Hazardous climatologic conditions existed in the Atlantic Ocean near the northern coast of Puerto Rico from the second to the fourth of March, 1968. Swells of 4 to 15 feet high were reported in this area approaching from the northwest, while mild winds from a northeasterly direction were recorded in San Juan.

Under these unfavorable conditions in the dawn of March 3rd, 1968 the *Ocean Eagle* approached the 500 foot-wide entrance channel to the San Jan Harbor. According to the testimony of the ship's captain, the *Ocean Eagle* scraped its bottom several times about 7:00 a.m. in a few minutes after the port pilot had boarded the vessel. Immediately the crew observed steam, and petroleum leaking out through the sides of the ship and the order to abandon ship was given. Most of the 35 members of the crew abandoned the ship within an hour of the accident. They were rescued by the Puerto Rico Lighterage Company without loss of life or limb.

The *Ocean Eagle* split in two parts moments later. The bow section was aground at a distance of approximately 300 yards north of the harbor's entrance and the stern drifted into the channel impeding the access to the San Juan Harbor. Simultaneously, the petroleum leaking from the ship wreck began to spread into the San Juan Bay and along the northern shore of the city.

The unusual weather conditions that prevailed until March 4th, were responsible for the easterly drift of the oil slicks. After the swells had dissipated, the northeasterly Trade Winds gained strength and generated the wave action that moved some of the oil slicks back towards the west. In the meantime, the Golden Coast of San Juan, where most of the luxury hotels are located, was intensely contaminated by the petroleum. The damage was affecting the marine traffic, the commerce, the oil industry, the tourism, the flora, the fauna, and the esthetics of the city.

Description of the Operations

President Lyndon B. Johnson, who was in a weekend vacation at Ramey Air Force Base in Aguadilla, Puerto Rico, upon being informed of the *Ocean Eagle* accident ordered all federal agencies concerned to assist the Commonwealth of Puerto Rico in the emergency operations by all possible means.

The Acting Governor of Puerto Rico, the Honorable Guillermo Irizarry, immediately met with all the federal and commonwealth agencies directly involved with the accident to organize, plan, and coordinate all efforts to cope with the emergency. Responsibilities for the different operations were assigned at this meeting. These assignments were based on the individual duties, functions, and experiences of the agencies and the equipment and facilities available.

During the afternoon of March 3rd, the Acting Governor and the Secretary of Public Works made an aerial reconnaissance of the affected area to determine the extent of the damages. The largest concentration of petroleum was flowing into the San Juan Harbor and the oil slicks extended about three miles north

into the Atlantic Ocean. The beaches to the east of the harbor entrance were stained with a black film of petroleum up to a distance of five miles. Approximately one million gallons of crude were in the water and four and a half million gallons remained in the bow and stern sections of the tanker; moreover, the bow was still leaking petroleum at an alarming rate.

1. ACTIVITY OF THE FEDERAL AGENCIES

As soon as the *Ocean Eagle* accident occurred, those federal agencies which are authorized by law were immediately mobilized. The agencies concerned with the disaster were the U. S. Coast Guard, the U. S. Army Corps of Engineers, the U. S. Navy, and the Federal Water Pollution Control Administration. Their activities during the emergency can be summarized as follows:

A. Activities of the U.S. Coast Guard

By authority of Executive Order of the President of the United States No. 10173 as amended and the federal regulations which deal with port Authorities (Title 33, Code of Federal Regulation Part 6.04, Captain of the Port), the U. S. Coast Guard began the search and rescue operations of the *Ocean Eagle* at 7:20 A. M. on March 3rd, 1968. The vessel was first reported in danger about 500 yards north of Punta El Morro, the rocky head land to the east of the entrance channel. At 7:45 A. M., the Coast Guard cleared the port entrance and established a schedule to enter and leave the harbor.

The Coast Guard spread emulsifiers around the wreck acting under the Coast Pollution Law of 1961 which prohibits the dumping or spilling of oil in coastal waters. The emulsifiers were spread by tugboats and helicopters along the coast of San Juan to about 5 miles to the east of the entrance to the harbor. This activity was interrupted when the tugs were needed to pull the bow seaward. They were discontinued after a meeting where it was decided to eliminate the use of detergents.

When the oil began to spread at an alarming rate, the Coast Guard enlisted the other state and federal agencies concerned with the accident to share the duties of the operation. As a result, numerous agencies were involved in the activities to correct the problem; therefore, the Coast Guard cooperated with the other agencies in all aspects of the work.

The Coast Guard set-up a refuge for oil-soaked pelicans at their San Juan base. These birds were washed with a mild detergent and were treated with a mixture of mineral and castor oil. Fourteen out of the thirty five pelicans treated have survived.

The Coast Guard also built a 505 foot boom of wooden board with empty drums at both sides of the boat to float the boom. The purpose of the boom was to encircle the stern during the pumping operations, but it was never used. The boom was turned over to the U.S. Army Corps of Engineers who in turn, handed over the boom to the Department of Public Works.

The total cost of these activities has not yet been determined.

B. Activities of the U.S. Army Corps of Engineers and U.S. Navy

The Corps of Engineers assumed responsibility for the removal of the *Ocean Eagle* wreck under section 19/20 of the River and Harbor Act of March 3rd, 1899. This act gives the Corps the responsibility for the removal of all wrecks which are a menace to navigation. In addition the Corps assisted in minimizing the pollution problem at the request of the Federal Water Pollution Control Administration.

After the owners of the vessel had formally abandoned the ship on March 6th, the Jacksonville District, whose jurisdiction includes Puerto Rico, assumed the job of removing the bow and the stern. On March 8th, negotiations were initiated with the Murphy-Pacific Salvage Company for removal of the stern section. The contractors salvage vessel arrived the same day to begin salvage operations.

The U.S. Navy agreed to handle the removal of the bow section. The Navy salvage team tried to pull the bow section off the coral reefs, but after many unsuccessful attempts, this operation was abandoned in favor of removing the crude and refloating this section for deep water disposal.

Between March 14th and March 27th, nearly 2 million gallons of petroleum were removed from both sections of the tanker. The offloaded petroleum was transported by barge to the Caribbean Gulf Refinery docks.

After various inspections, the Corps decided that both sections of the ship could be made sufficiently water-tight to insure flotation and towing to deep water. Heavy seas hindered salvage operations for five days, but on April 4th the Navy towed the bow section to sea and sank it in 600 fathoms of water about 8 miles north-northwest off El Morro.

The Murphy Pacific Salvage Co. finished the dewatering, patching, and floating of the stern on April 9th. The following afternoon the stern was sunk in 600 fathoms of water, some 9.2 miles north-northwest off El Morro. The stern lies about $2\frac{1}{2}$ miles northwest of the sunken bow section.

After 38 days of around the clock work, the task was completed. Estimated cost of removing the crude oil, raising the two halves, and disposing them at sea was about \$700,000.00.

C. Activities of the Federal Water Pollution Control Administration

The members of the Federal Water Pollution Control Administration ad hoc disaster team worked mainly as technical advisors to the Department of Public Works, the U. S. Coast Guard, other federal and commonwealth agencies, and commercial establishments which asked for technical advice. An effort was made to try to coordinate the many diverse agencies which were concerned with pollution problem.

The FWPCA personnel maintained daily contact with the Coast Guard, Public Works, and other federal and commonwealth agencies. A FWPCA representative attended product demonstrations of the representatives from many chemical companies. Most contaminated beaches were inspected more than once to note pollution effects and changes. Aerial reconnaissance surveys were conducted with the Coast Guard and Department of Public Works.

The stern section was visited several times to inspect the pumping operations and evaluate the success of this activity.

The FWPCA representatives questioned the effectiveness of the detergents and warned the Department of Public Works about their harmful effect on marine life. They also inspected the beaches where detergents had caused quicksand condition along the shoreline.

2. ACTIVITY OF THE COMMONWEALTH AGENCIES

The task of cleaning and restoring the coastal waters and the beaches to their original condition was assigned to the Department of Public Works. A special unit was organized within the Department to perform these activities. The unit was designated as the Petroleum Emergency Office. The Office was staffed with specialized personnel recruited from the different bureaus of the Department. The principal objectives of this Office were: (1) the protection of the uncontaminated areas, (2) the elimination of the petroleum crude floating on the water, (3) the cleaning of the contaminated beaches, and (4) the removal of any precipitated crude from the bottom of the sea in bathing areas.

The first function of the Office was to prepare a comprehensive plan to cope with the problem. The coastal waters and beaches were divided into several sections according to their order of priorities and methods to treat each of these sections were carefully analyzed. Various aerial reconnaissance surveys were necessary to understand the magnitude of the problem and the trend of the petroleum movement. The plan was named "Operation Clean Up" and was executed immediately.

The next activity of the Office was to determine the most effective method to remove the petroleum from the water and the beaches. Since it was desirable to test all the available means either in the laboratory or in the field, both mechanical and chemical means were tested. Mechanical methods were tested in limited areas in the field, while chemical methods were tested in the laboratory for (1) solubility, (2) emulsion capacity, (3) adsorption capacity, (4) toxicity, (5) precipitation, (6) floating ability, (7) ease of recovery, (8) degree of activity, (9) emulsion stability, and (10) agglutination. The products were divided into four classes which were: (1) adsorbents, (2) solvents, (3) emulsifiers, and (4) combinations of the previous three. After most of the readily available products had been tested, a decision was reached to use only non-toxic adsorbents and mechanical methods to directly recover the petroleum crude from the water and beaches. However, this decision did not preclude the future use of any other products found more effective than the ones so far tested. New products continued to be tested in our laboratory for their corresponding evaluation.

A. Treatment of petroleum on the sea

The petroleum crude floating on the coastal waters was considered as the most critical condition encountered. Until these petroleum slicks were completely eliminated, the beaches were under a continuous pollution hazard. Fortunately, the final positions of the bow and stern to the west of the channel eliminated the danger of further contamination of the beaches. The physiography of the bay and a strong wave action from the north confined in the bay about two million gallons of the estimated 3.5 million gallons spilled by the ship. However, the petroleum that leaked out during the first four days after the accident, when the bow was located about 300 yards north of the channel, drifted as far as 30 miles east and 40 miles west. These slicks were reported floating up to a distance of about 10 miles offshore.

As previously stated, the use of detergents to break the slicks offshore was the immediate action taken by the government during the afternoon of the accident. Four days later, this procedure was abandoned after field and laboratory tests proved that the use of detergents harmed marine life, coagulated the petroleum into heavy balls which sank to the bottom in the near shore, and formed a quicksand condition in the beaches. To treat the petroleum in the sea a hydrophobic adsorbent called Ekoperl was used. The Ekoperl is a product of crushing, heating, and treating of perlite. This product was found to effectively adsorb the petroleum floating in the water and was not toxic to marine life. The process of collection in the sea was difficult; therefore, the mixture was allowed to float to the shores where mechanical collection was feasible.

The application of Ekoperl was conducted by means of boats and helicopters, and by hand from shore. The most effective method was by helicopter where the slicks could be easily located and rapidly treated. The turbulence generated by the prop-wash pushed down the powder into the water mixing it with the petroleum.

The location and treatment of a slick from a large boat was a tedious process. The rough wave action also impeded the operations and the offshore reefs restricted the movement of the boat to deep waters. However, after the large petroleum slicks were eliminated, treatment of slicks close to shore was initiated by the use of small boats with outboard engines. The use of the helicopter to perform this operation was exceedingly expensive, since the slicks were small and located at considerable distances from each other.

Throughout the treatment of the crude at sea, the difficulty of collecting the impregnated petroleum adsorbent was evident. The prediction of time and place where it was going to land was impossible due to the variations of the wind direction, tides, swells, and marine currents. Sometimes, the adsorbent landed on inaccessible shores or at times where the collection of the material was impractical. The time lapse between application and collection sometimes permitted the heating action of the sun and the beating action of the waves to separate the crude from the adsorbent before the collection was possible. Therefore, treatment of the near shore was intensified to facilitate the collection of the impregnated material.

B. Preventing the petroleum from reaching the beaches

Mechanical means were used to confine or keep the petroleum out of certain beaches. Plastic slick booms and wooden barriers were used for this purpose.

A twelve inch-plastic slick boom was used to confine the petroleum around the stern, but this boom proved to be ineffective due to the strong wave action and the fragileness of the construction. The petroleum escaped under and over these booms. The U.S. Coast Guard built a large wooden boom with boards of about four feet high and barrels attached to both sides of the boards to keep them floating in a vertical position. This huge boom was built to encircle the stern, but was never used for this purpose, since the petroleum was pumped out of the bow before completing the construction of the boom. The Coast Guard offered this boom to the Department for use in the protection of coastal areas.

A wooden barrier was built to close the bridges that connected the sea with the Condado Lagoon. This measure kept the lagoon practically clean of slicks. Rough wave action destroyed parts of this barrier and reconstruction was needed several times. Finally, the barrier was allowed to float freely over the surface of the water so as not to offer much resistance to wave action.

Based on satisfactory results obtained in the lagoon, wooden booms were built in the protected embayments such as the Caribe Hilton Hotel beach and the

San Gerónimo Beach. Once the petroleum was blocked from entering these embayments, the water and the beaches were cleaned with adsorbents. These booms were also set free by the rough wave action and had to be reconstructed.

C. Treatment of petroleum on the near shore

The general condition of the petroleum in the near-shore consisted of a film of crude floating on the water. The thickness of this film varied from about six inches in some localities inside the San Juan Bay to an extremely thin veneer in the Atlantic coast to the east and west of the entrance channel. In accordance with each particular condition and locality, a different approach to solve the problem was required.

In the case of the San Juan Bay, mechanical means were used exclusively until both sections of the ship were removed. The concentration of petroleum on the shores was so thick that direct pumping from the surface of the water recovered 45,000 gallons of petroleum per day. To ease the pumping operations, trenches were dug parallel to the shore line. The Change in tides and the wave action filled them with a mixture of crude and water. This operation was improved by skimming the petroleum from the approaching wave into the trench. The mixture was pumped into tanks mounted on trucks. The contaminated mixture was taken to the nearby Caribbean Gulf Refining Corp., where it was processed. When the separators of the refinery filled beyond their processing capacity, the mixture was disposed in the San Juan city dump.

The available conventional pumping equipment was initially used to extract the petroleum from thickly concentrated areas within the bay. The capacity of these pumps was adversely affected by the viscosity of the mixture, thus considerably reducing the rate of recovery. The method was greatly improved with the addition of a highly mobile 5,000 gallon-tank equipped with a vacuum pump. As the amount of petroleum floating in the water subsided, the pumps became ineffective and the operation was discontinued.

In those beaches where a thin film of petroleum was floating in the water, other methods had to be used. Small plastic booms were dragged over the water by means of boats pulling from each end. An adsorbent was evenly distributed along the center portion of the enclosure where the adsorbent came in contact with the petroleum. The crude floating on the surface was dragged to a locality on shore where extraction either by pumps or by men with buckets was possible.

The application of the adsorbent along the coast by dumping powder from a small power boat over thin slicks proved to be very effective in the bathing areas of the coast. The adsorbent was allowed to float to the beach where it was collected manually by the beach maintenance crews. These crews were equipped with wiremesh baskets and rakes to pick-up the adsorbents and seaweed impregnated with petroleum.

A wire-mesh sled was built to drag along the bottom of the sea shore for collecting the coagulated balls of petroleum. This sled was dragged parallel and perpendicular to the shoreline with the aid of a tractor. After raking the bottom several times with the sled, the sled was brought to shore where the contaminated material was collected.

A catamaran type power boat with a front loading scoop was constructed to skim the petroleum from the surface, of the water. The scoop was filled with fibers that adsorbed the crude. Although the use of this vessel proved to be satisfactory to collect the contaminated material and the petroleum, the utilization of the boat was limited to the waters of the San Juan Bay where a calm sea prevailed.

Chicken-wire cylinders were filled with adsorbent fibers and used close to the shore to collect the petroleum. These cylinders were floated into the petroleum slicks and absorbed moderate quantities of the crude. They were not used extensively because they were developed when the slicks were almost controlled.

A locally produced adsorbent named Puramar was also used to collect the floating petroleum. This product consisted of treated vermiculite to produce a hydrophobic-oleophilic material. The Puramar was only used during the late stages of the operation since it was produced at a much later date.

Mistron Vapor proved to be an excellent adsorbent for the finishing touches on the beaches. This product is talc that has been treated to produce a hydrophobic-oleophilic material. Mistron Vapor was extensively used in the bathing areas.

The Department is conducting an experiment with a biological method in a completely enclosed section in the San Juan Bay. The objective of this method

is to degrade the petroleum by using bacteriological action. The Department of Health is currently preparing cultures to determine if the bacteria to be utilized are of a pathogenous nature, for the protection of the public in any areas treated by this system.

D. Treatment of petroleum on the beach

The petroleum crude that reached the beach zone outside of the San Juan Bay, coated the sand and the rocky coasts with a thin layer of black-colored, paraffin-like substance that had lost most of the volatile fraction. This substance could be easily collected with hand shovels and scraped with wooden hand rakes.

The Department decided to collect the contaminated material manually instead of mechanically to avoid the excessive extraction of sand from the beaches which are suffering cycles of erosion. However, 8,000 cubic meters of contaminated sand were extracted and wasted in the city dump. A labor force of 270 men worked 10 to 12 hours a day, seven days a week collecting manually the contaminated sand, the black paraffin-like substance, the impregnated adsorbents, and the contaminated seaweed. These materials were grouped together into piles on the beach where a front loader picked them up and loaded 2½-ton trucks. These trucks delivered the material to the city dump.

A rake of cyclone fence wire was built to collect the seaweed and to smooth out the beach after cleaning.

The accumulation of petroleum on the beaches of the San Juan Bay was so intensive that a depth of more than twelve inches of the sandy shores was contaminated. On the sand surface the oily layer was up to six inches in thickness. This condition makes the reconditioning of these shores very difficult; the best method so far consisted of the removal of the contaminated sand, and its replacement by clean sand.

The rocks exposed along the shoreline were cleaned with adsorbents, but this procedure was too expensive. Therefore, other means were tried. A kerosene flame thrower was used unsuccessfully to burn the petroleum. A waxy coating covered the rock after the flame was applied and the pores and joints of the rocks were sealed by this wax. The use of sand blasting was considered, but the cost prohibited this operation for general use. The use of detergents has been disregarded to clean the rocks because of difficulties in operation, toxicity pollution problems, and high cost.

In areas where detergents were used close to the beach, a quick-sand condition has developed along the shoreline. This situation has created the necessity to excavate and replace the sand with material borrowed from another beach. In some localities the sandy material was deposited deep in the ocean to determine if it could clean itself by wave action.

Cost estimate.—The total cost of the operations performed by the Department can be summarized as follows:

1. Labor force (270 men)-----	\$106, 000
2. Rental of equipment-----	35, 500
3. Purchase of equipment-----	38, 000
4. Purchase of materials-----	51, 600
5. Payments of insurance-----	10, 900
6. Salaries (regular employees)-----	19, 200
7. Transportation costs-----	8, 000
8. Equipment (owned by department)-----	12, 000
9. Miscellaneous-----	5, 000

Total cost (as of Apr. 15, 1968)-----¹ 286, 500

¹ Rounded to 285,000.

The Governor has already assigned \$250,000.00 from the emergency fund for these purposes, but the Department is requesting an additional \$200,000.00 to continue the cleaning operation. It is estimated that final expenses of the Department will reach over the \$500,000.00 mark.

E. Activities of the other Commonwealth agencies

The Secretary of Public Works coordinated the activities of all the other Commonwealth Agencies. Their activities can be summarized as follows:

1. *Puerto Rico Ports Authority.*—The Authority assisted the Department of Public Works by providing transportation service with their patrol boats in the

San Juan harbor. They also cooperated with the agencies involved in the accident by allowing the use of their port facilities.

2. *Department of Justice.*—The Department of Justice initiated an investigation of the accident to determine who is liable for the expenses incurred by the federal and commonwealth agencies. A suit was filed in the San Juan Federal Court against the owners and insurers of the *Ocean Eagle*.

3. *Department of Agriculture.*—The fish and wild life Division set up a refuse for a colony of 150 pelicans that were found in the swamps to the southeast of the San Juan Bay. A lanolin base detergent was used to clean the birds. Of the 150, 80 were sacrificed due to their poor conditions and 70 were treated and sent to the Humane Society. Of these only eleven survived. Also a survey of the pelican colony in the bay was conducted. The survey revealed that there were about 500 pelicans before the accident, but only 100 remained alive after the accident.

The Division is also evaluating the effects of the detergents on marine life, but the results of this study is not yet available. At present, there is no fishing at the San Juan Bay, about 50 fishermen were affected by the disaster. Their boats and equipment were also ruined. These persons were provided with economic aid to compensate the damage of their equipment.

4. *University of Puerto Rico.*—The Department of Marine Sciences sent its staff of scientists to advise the commonwealth agencies. They set up a mobile laboratory of marine biology near the Condado beach area to conduct toxicity tests on the marine life. The *SS Carite*, the Oceanographic vessel of the U. P. R., was loaned to the Department of Public Works for the application of adsorbents in deep seas. A report of their activities was prepared and submitted to the Department of Public Works.

5. *Puerto Rico Economic Development Administration.*—The Department of Tourism kept the Department of Public Works informed of the beaches affected by the petroleum near the hotels. They also instructed the hotel to follow the procedures established by the Department of Public Works to deal with the problem.

6. *Parks and Recreation Administration.*—The Administration assisted in the cleaning of the beaches under their jurisdiction and cooperated informing the Department of Public Works of those beaches affected by the slicks.

7. *Department of Health.*—The Public Welfare Division provided aid with funds from the emergency budget to all those fishermen affected by the petroleum.

Conclusions and Recommendations

The accident of the *Ocean Eagle* seemed at first glance as a worse disaster than the accident of the *Torrey Canyon* off the coast of England last year. Although this vessel was carrying less cargo than the *Torrey Canyon*, its proximity to the coast and the fast split of the hull combined with the unfavorable weather conditions did not allow sufficient time for analyzing the problem. Fortunately, the final position of the bow to the west of the entrance channel considerably improved the situation.

The rapid success of the salvaging and cleaning operations, just one month after the occurrence of the accident, can be attributed to the following factors: (1) the quick mobilization and close administrative coordination exercised by the Federal and Commonwealth agencies, (2) the fast scientific appraisal of the problem, (3) the unique locations of the bow and stern confining most of the petroleum spilled inside the harbor, and (4) the nature of the composition of the petroleum crude.

The petroleum crude spilled by the *Ocean Eagle* had characteristics very different from the Kuwait oil crude spilled by the *Torrey Canyon*. The cargo of the *Ocean Eagle* consisted mostly of a paraffinic-bituminous base petroleum crude with a volatile fraction of only 32 percent. After 24 hours of exposure to the tropical sun light, the volatile portion had evaporated. This characteristic combined with the proximity of the hull to the shores ruled out the possibility of igniting the petroleum.

The laboratory tests and the field experiences eliminated the use of detergents before the marine life was affected to a great extent. Adsorbents proved to be the most effective method of dealing with the problem under the present circum-

stances. The best results were obtained with the following adsorbents: (1) Puramar 10, (2) Ekoperl 33, (3) Mistron Vapor, (4) Penetone, and (5) Polypropelane Fibers. Ekoperl was the most widely used adsorbent because it was available first, but the best results were obtained with Puramar 10.

The most effective methods to apply these products were with the helicopter in nearly all situations and small power boats when the slicks were close to shore. The use of goggles and masks were necessary when applying the Ekoperl, since irritation of the eyes and throat could not be overcome without their use. The products had to be spread flying into the wind when using the helicopter. These powders were inhaled by the radiator of the helicopter if they were spread with the wind or in a stationary position. About 50 sacs of Ekoperl were applied in less than 20 minutes during each flight. A close-by base of operations was a prerequisite to effectively use the helicopter.

Vacuum pumps proved to be the best methods of extracting the petroleum directly from the surface of the water when it had concentrated in thick ponds. These pumps were able to recover 45,000 gallons of crude and water per day. These pumps required little maintenance and were only plugged-up by the dirt that they sucked.

The use of mechanical means proved to be most effective in the collection of the contaminated material on the beaches. The use of adequate booms proved to be effective when skimming the petroleum in areas where calm seas prevailed. Allowing nature to degrade the petroleum on the rocks seems as the most practical way to solving this problem. The utilization of beach maintenance crews helped in keeping the removal of sand from the contaminated beaches as low as possible. Only 8,000 cubic meters of sand have been extracted. The removal of the petroleum from the beach as soon as possible seems advisable. This measure will reduce the possibilities of initiating an erosion cycle, the formation of a coquina (mixture of oil, shells, and sand), and the deposition of new sediments over the petroleum that will tend to bury it.

The application of detergents close to the beach might cause quick-sand conditions requiring the excavation and replacement of this material. Also, the organism that live on the shore are adversely affected. Laboratory and field tests proved that the toxicity of the detergents are up to 30 times more harmful to marine life than the petroleum slicks. Greater control must be exercised over the treatments applied by private enterprises. The use of detergents in bathing areas worsened the conditions in these sites.

A detailed knowledge of the weather, oceanographic, and geologic conditions of the area affected by the petroleum is required before corrective measures are undertaken. After the cause and reasons of the movement are determined, known measures and improvisations can be conducted. Scientific reasoning must be the base of any emergency plan. An unexpected change in the direction of the wind combined with the action of low tide, pushed the confined petroleum of the bay out to sea on March 19, 1968, when the beaches were practically clean. The beaches to the east of the entrance channel were once again contaminated. The sinking of the bow and stern about 8 miles offshore released again large quantities of petroleum which floated 60 miles west and landed on the beaches of Isabela. These problems could have been solved or minimized if sufficient knowledge of the weather and oceanographic conditions would have been available.

A tremendous problem was created by the great quantity of salesmen that invaded the Department during the first week after the occurrence of the accident. Since their respective products were unknown, laboratory tests were required to evaluate their qualities. Meanwhile, a state of confusion reigned over the operations. An inventory of all the available tests should be prepared to properly and quickly inform the personnel dealing with these emergencies.

An emergency plan should be prepared so that it can be easily adopted when an accident of this nature occurs. This plan should indicate the available personnel, equipment, materials, and products to deal with such an emergency. The responsibilities and duties should be clearly stated so that no time is lost to initiate the operations. A brief outline of the procedures to be followed should be prepared.

Adequate legislation taking the proper preventive measures should be approved. More control over the marine traffic should be exercised, if the reduction of these accidents is desired, especially over the construction of jumbo size tankers and "jumboizing" the smaller vessels.

The port of San Juan should be improved to reduce the possibilities of having another accident of this nature. Although navigation through the channel was possible on the dawn of March 3rd, 1968, we cannot disregard the difficulty of entering the harbor.

MR. POLANCO-ABREU. I strongly endorse Secretary Lizardi's recommendations and in particular the urgent need for acquiring greater scientific and technical know-how with which to combat the immediate effects of a massive marine oil spillage.

The only practical defense against this kind of menace today rests in the hands of the scientists. It was a recognition of this fundamental fact that was a consideration in the introduction of my bill.

It is important to clarify the liability of a vessel owner or operator. It is important to authorize the Federal Government to act immediately to counteract the pollution threat.

But a community afflicted with a massive maritime oil spillage is interested in only one thing. It is interested in cleaning up the mess as quickly and completely as possible.

PUERTO RICO EXPERIENCE INDICATES COMMUNITIES UNPREPARED

Based on Puerto Rico's experience, I believe that few maritime communities in the United States today are prepared to cope with an oil spillage of the *Ocean Eagle's* magnitude. And this 12,065-ton, 15-year-old ship was a small tanker by today's standards, to say nothing of tomorrow's standards.

The reasons for this lack of preparedness are simple. First, the terms of the disaster dictate the terms of the response. And the terms are as changeable as the sea, the weather, the nature of the pollutant, and the situation. Secondly, we have found that there is today no single mechanical method or safe, effective, economical and stable chemical that a community can stockpile in advance and that will work under all circumstances.

The ruptured tanks of the *Ocean Eagle* leaked nearly 3.5 million gallons of Venezuelan crude oil into the waters around San Juan during the month that the broken sections lay grounded at the harbor's entrance. Floating oil fouled the harbor and over 15 miles of resort beaches with a sticky, black, paraffinlike substance, ranging in thickness from a thin film to more than 6 inches deep in some places.

The *Ocean Eagle* turned Puerto Rico into a laboratory for testing the common—and not so common—methods of pollution control: Pumping and skimming the oil from the surface, containing the spill with various floating booms, applying chemical dispersants, detergents, nontoxic absorbents, and even a special catamaran-type oil-skimming vessel. All of these methods were tried with varying degrees of success. The objective was to prevent the oil slick from reaching shore and, failing in this, to remove the sludge.

Judging by the number of detergent salesmen who descended on San Juan, Federal and Commonwealth authorities must have tested nearly every known brand. Unfortunately, most of the products failed to be safe or effective. The use of detergents was discontinued when laboratory tests showed some to be as much as 30 times as harmful to marine life as the oil itself. Detergents, under the conditions found in Puerto Rico, also coagulated the petroleum into heavy balls which

sank to the bottom near the shoreline. Beaches saturated with detergents tended to turn into quicksand.

Attempts to clean oil-saturated rocks with a kerosene flame thrower were unsuccessful. By the time the oil had coagulated on the shores, it had lost its volatile agents and would not burn.

Concentrations of oil slick were so thick in some places that 45,000 gallons a day could be pumped from the surfaces of the water. Non-toxic absorbents spread by helicopter and small boats also proved effective. The oil-saturated absorbent was finally collected and trucked away for disposal. But the method is costly.

A force of 270 men working 10 to 12 hours a day, 7 days a week, was required to clean up the beaches. To add to their frustration, a shift in the weather brought oil that had floated out to sea back again to blight the many newly cleaned beaches.

The Commonwealth Department of Public Works as of April 15 had spent \$285,000 in cleaning operations. It is estimated that their final cost will run in excess of half a million dollars. The cleanup campaign and the testing of new compounds is still going on, and some oil is still leaking from the sunken hulls.

CONTINUING EFFECTS OF "OCEAN EAGLE" DISASTER

The side effects of the *Ocean Eagle* pollution will be felt for many months. The wreck, itself, curtailed ship traffic in San Juan Harbor for a time. Beaches from which oil-polluted sand was removed must be reconstructed. The Commonwealth Department of Agriculture believes that only 100 of a flock of 500 pelicans living in the San Juan Bay area have survived despite an intense effort to rescue and decontaminate oil-drenched birds. The effect of the oil and detergents on marine life is still under study. But San Juan Bay is closed to fishing. About 50 fishermen had their boats and equipment ruined by the oil and a program of economic assistance has been set up in their behalf.

I have no figures on the total cost to participating Federal agencies: the U.S. Navy, U.S. Coast Guard, U.S. Army Corps of Engineers, and Federal Water Pollution Control Administration.

Last year, 3,350 vessels used San Juan Harbor. About 25 tankers a month are using the facilities. During slightly more than 4 years preceding the grounding of the *Ocean Eagle*, 11 vessels were involved in mishaps within and at the entrance to San Juan Harbor. At this point I should like to offer for the record a report concerning these events furnished my office by the U.S. Coast Guard.

This is exhibit No. 2, Mr. Chairman.

Mr. DORN. Yes.

(Memorandum for Mr. Orville Watkins follows:)

DEPARTMENT OF TRANSPORTATION,
U.S. COAST GUARD,
Washington, D.C., April 18, 1968.

Memorandum for Mr. Orville Watkins, administrative assistant to Hon. Santiago

Polanco-Abreu, House of Representatives, Washington, D.C.

From: Commandant, U.S. Coast Guard.

Subject: Marine casualties, San Juan; information concerning.

1. In response to your concern about marine casualties occurring in San Juan Harbor and at its entrance the following information is provided on casualties occurring there prior to the SS *Ocean Eagle* incident.

a. *M/V Oriental Venus* (Liberian) : While this freight vessel was inbound on 6 September 1967, she grounded at 2113 one mile northwest of the San Juan Harbor entrance. The cause of the casualty was lack of local knowledge on the part of the master. When the master did not see the pilot boat, he decided to anchor. In maneuvering to do so, the vessel grounded.

b. *Rambank*: No record of this casualty. An inquiry will be made to the OCMI, San Juan to ascertain the circumstances.

c. *M/V Guadalupe* (Spanish Registry) : While this passenger vessel was outbound on 28 May 1966, she grounded at 0830 in the vicinity of Lighted Buoy No. 10, Anegado Channel, within the harbor. The cause of the casualty was confusion on the part of the helmsman due to both the master and pilot alternately giving order to the wheel.

d. *M/V Venus II* (Dominican Registry) : While this freight vessel was inbound on 15 December 1965, she grounded at 0925 in the vicinity of Lighted Buoy No. 7, Anegado Channel, within the harbor. The cause of the casualty was steering gear failure and when the master rang up full astern, the engineer on watch answered with full ahead.

e. *SS Loch Garth* (British Registry) : While this freight vessel was inbound on 31 August 1964, she grounded at 0940 in the vicinity of Lighted Buoy No. 8, Anegado Channel, within the harbor. The cause of the casualty was the master's error in identification of the buoy. Because of bird droppings on Lighted Buoy No. 8, the master identified it as Lighted Buoy No. 5. There was no pilot on board the vessel at the time notwithstanding the fact that the vessel was 1,300 yards inside the harbor entrance.

f. *M/V Scandia* (Danish) : While this freight vessel was inbound on 3 June 1964, she grounded at 2317 in the vicinity of Buoy No. 8, Anegado Channel, within the harbor. The cause of the casualty was both the master's inability to locate Buoy No. 8 and the pilot not being on board. The pilots normally board inbound vessels within the harbor and the report indicates that the pilot boat is inadequate to venture outside in any, but the best of conditions.

g. *SS Alcoa Commander*, O. N. 248327 : This casualty took place on 7 March 1964, near the Army Terminal 2.5 miles inside the harbor entrance and the cause was crowding by another vessel.

h. *SS Transcaribbean*, O. N. 247986 : While this freight vessel was inbound on 1 May 1963, she grounded at 0145, 400 yards west of San Juan Harbor Lighted Buoy No. 2 just outside the harbor entrance. The grounding resulted in the total loss of the vessel. The cause of the casualty was the master's failure to fix the position of his vessel while the vessel was being set to the west. There was no pilot on board the vessel notwithstanding her proximity to the harbor entrance.

i. *SS San Juan*, O. N. 242653 : This casualty took place on 11 February 1968, at the intersection of the Graving Dock Channel and the Army Terminal Channel approximately two miles inside the harbor entrance. The cause was restricted maneuvering room due to a dredge occupying a substantial part of the channel coupled with the size of the SS SAN JUAN. The vessel was inbound and there was a pilot on board.

j. *SS Catalina S* (British Registry) : While this vessel was outbound on 15 January 1963, she grounded at 2200 outside San Juan Harbor. The cause of the casualty was loss of the plant due to main and auxiliary feed pump failure. The vessel drifted into shallow water and the master failed to use his anchors. The casualty resulted in total loss of the vessel.

k. Oil Barge : No record of casualty.

It is hoped this information conveys a meaningful review of casualties in the area of San Juan Harbor. If the Coast Guard can provide any further assistance or if you wish to discuss this with me, it is our pleasure to suit your convenience.

M. A. WHALEN,
Rear Admiral, U.S. Coast Guard,
Chief of Staff.

RECOMMENDED ACTION TO COPE WITH THREAT TO SHORELINE AREAS

Mr. POLANCO-ABREU. The shipping traffic in San Juan Harbor is not great compared with major mainland ports. But with this rapid industrialization of Puerto Rico the threat of other "*Ocean Eagles*" also grows. The same is true for the shorelines which pass the "Jumbo" and "Supertankers."

As we in Puerto Rico learned, it takes only one mistake to produce a pollution crisis.

I am aware that the Federal agencies are searching for new products and methods of controlling pollution. But I believe that these efforts must be multiplied manifold before any port community can feel the slightest confidence about meeting a massive pollution threat.

To summarize my views, the *Ocean Eagle* incident created severe pollution problems for San Juan Harbor and contaminated beaches as far as the western tip of the island. The final effect on marine life has not been ascertained.

The oil spillage from this tanker proved that the stage of the art in dealing with this type of catastrophe is not sufficient to meet these problems. The threat of disasters to other tankers is continuous and is a concern to every shoreline community.

Cleanup operations have to be undertaken without delay, and liability for their costs should fix on the owner of the vessel, except in extraordinary circumstances.

Research on a broad scale to prevent contamination and to decontaminate should be pursued. The development of methods and systems of control is needed. New products to control pollutants without themselves contributing to the pollution should be developed. A comprehensive inventory of available chemicals and their characteristics should be compiled. In addition, there should be an inventory of local meteorological, oceanographic, and geological conditions on areas exposed to the threat of oil pollution accidents.

Funds on a national level should be immediately available. A plan of action to deal with an oil pollution emergency should be ready and should detail the division of responsibility between various Federal and local authorities.

Finally, Mr. Chairman, I should like to send later, for the record, an account of the *Ocean Eagle* incident by the Department of Marine Sciences, University of Puerto Rico.

Mr. DORN. Without objection that will be included in the record.

(The following was subsequently received for the hearing record:)

UNIVERSITY OF PUERTO RICO,
DEPARTMENT OF MARINE SCIENCES,
Mayaguez, Puerto Rico, April 29, 1968.

HON. SANTIAGO POLANCO ABREU,
Resident Commissioner,
Washington, D.C.

DEAR MR. POLANCO ABREU: Enclosed please find a preliminary report of our activities during the *Ocean Eagle* disaster. I regret that you were unable to reach me by phone. I would have liked to have appeared before the House Committee on Public Works.

Should there be any doubts about the enclosed information, please do not hesitate to ask.

Sincerely,

MAXIMO J. CERAME-VIVAS, *Director.*

REPORT BY DR. GRAHAM S. GIESE, PHYSICAL OCEANOGRAPHER

I spent seven days in San Juan in connection with the petroleum problem. March 4-5 were spent primarily surveying the situation and acting as an advisor to personnel of Obras Publicas concerning the physical factors affecting the distribution of the petroleum. March 11-12 were spent re-surveying the situation,

observing the cleanup operations, and making initial tests of the effectiveness of the commercial product, Eko-Perl. The remainder of the week, March 13-15, was spent working with Obras Publicas personnel aboard the R. V. Carite: first making field tests of Eko-Perl and later treating petroleum patches offshore of the harbor with Eko-Perl.

The following is a description of the distribution of the spilled petroleum as I observed it, together with a consideration of the factors affecting the distribution:

On the afternoon of March 4, the day following the break-up of the tanker *Ocean Eagle*. I first surveyed from the air the distribution of the spilled oil. A three-part pattern which was to continue development during the following two weeks was already apparent at that time.

Part of the oil spilled from the broken tanker at the entrance of San Juan Harbor was working its way into the harbor. During the following weeks a great deal of petroleum found its way into the harbor. Although it reached all parts of the harbor to some extent, including the Cane de San Antonio to the northeast, it was chiefly driven to the southwest by the prevailing northeasterly winds which caused large amounts of petroleum to accumulate along the shore at, and to the north and west of, Catano.

Another portion of the petroleum viewed from the air on March 4 had worked eastward along the coast. This material was transported by the alongshore currents resulting from the breaking of large swells generated by a storm in the Atlantic Ocean northwest of Puerto Rico. It is characteristic of such currents that their effects are limited to the zone of breaking waves and although the petroleum, which moved along shore to the east, considerably disturbed the tourist hotels along this shore, no great amounts of oil were transported by this means. During the next several days following the accident, the storm swells approaching from the northwest gradually diminished and the eastward transport of the petroleum ceased. During an observation flight on March 11, I saw very little oil east of Boca de Cangrejos and most of that which remained had been washed ashore.

The third portion of the escaped petroleum which was visible from the air on the afternoon of March 4 had worked offshore and somewhat to the west. A plume extended north from the harbor and another of Ensenada de Boca Vieja just east of Punta Salinas. These patterns presumably resulted from the tidal flushing of the harbor together with westward transport by the local northeast winds. This portion of the spilled oil posed a far greater threat than that which contaminated the already-polluted harbor or that small amount which had moved alongshore to the east. A week later, on March 11, I found that the plume off the harbor mouth extended several miles offshore, while long thin fingers of the oil spread back southwesterly from the plume, extending shoreward as far west as Punta Salinas. These streaks were apparently driven by the northeasterly winds.

OIL SPILL STUDY BY JOHN ZEIGLER

My participation in the oil spill study was primarily advisory. I attended meetings at Obras Publicas and expressed my opinion when it was asked for. I also talked about all phases of the operation with Pedro Gelabert and Sr. Cruz Pérez.

Of a specific nature I looked for some way to obtain a cheap scavenging material, particularly bagasse. The first experiments using bagasse by Mr. Scott failed because he used wet bagasse. We dried some and found that it would collect oil if placed directly on it but that it also collected water. I spoke with Dr. Goldberg about treatment of bagasse to make it hydrophobic and he said it should be easy to do. At any rate we did not press the use of bagasse because it was decided to use ecoverl. I continue to believe bagasse would work and be cheaper. I also was interested in the use of floating booms to keep oil from spreading onto specific areas. The booms I saw being used were working remarkably well.

Out of this disaster has grown my conviction that a major study of the longshore currents around Puerto Rico would be directly beneficial to the Commonwealth. The oil moved in directions along the coast opposite to the offshore prevailing set of the currents. These longshore currents move any kind of pollutant which gets in them.

Subject: Report re : Cruise C-68-4, of MRV Carite.

To: Dr. Máximo J. Cerame-Vivas, Dept. of Marine Science, CAAM.

From: Capt. Felix, MRV Carite.

Tue. 5 Mar. 68, 1500 hrs. Captain notified that the Carite was to depart immediately for San Juan harbor for work in relation to tanker "*Ocean Eagle*" disaster. At 1600 hours 5 Mar. 68 Captain arrived at vessel and began preparation for trip from Parguera, P.R. to San Juan harbor.

Wed. 6 Mar. 68 from 0700 hours to 1355 hours, the labor force at Magueyes Island, field station of Dept. of Marine Science, CAAM, assisted the vessels two man crew in loading equipment and supplies aboard. At 1355, 6 Mar. 68, vessel was cast off for Guayanilla bay, to take aboard 600 gals diesel fuel and 40 gal lube oil and 35 lbs. grease. At 1825 hrs. 6 Mar. 68, refueling was completed and vessel departed Guayanilla for Ponce. The Carite arrived at Ponce at 2025 hours and anchored for the night NNE of Ponce Dock.

Thur. 7 Mar. 68 0600 hrs. weighed anchor for San Juan, sea was choppy and small craft warnings up. At 2040 hours vessel had arrived in San Juan harbor and was anchored for the night on S. Side of channel in small craft anchorage area.

Fri. 8 Mar. 68. Vessel was made fast to wharf area on south side small craft anchorage to facilitate loading, unloading and visiting. At 0730 hrs. Dr. M. Cerame visited vessel to check equipment and orientate crew as to work to be expected. At 0915 hrs. Mr. R. Kieth Stewart, USDI, Fed. Water Pollution Control Adm., 5555 Ridge Ave., Cinc., Ohio, 45213, was taken by the deck hand in the bay area to do work in relation to the petroleum spill. At 1200 hrs. Mr. Stewart returned to Carite and released small boat and deck hand. The captain during the entire day made a number of small repairs on the main engine, finishing at 1700 hrs.

Sat. 9 Mar. 68. Crew of boat, consisting of Captain and one deckhand, remained aboard on stand by as had been requested. On this date the small maintenance jobs continued on the boat. At 1115 hrs. the following guests came aboard; R. Kieth Stewart, USDI, Fed. Water Pollution Control, John B. Glude, Bureau of Commercial Fisheries, Jack Pierce and Larry Ogren, U.S. Bureau of Sport Fisheries, Herbert and Sheila Austin, Inst. Marine Science, CAAM. From 1210 hrs. to 1515 hours two hauls were made with Otter Trawl in area N. of Cataño and several dredgings for sediments were made in the area of the Coast Guard pier. All guests left the vessel at 1515 except Pierce and Ogren who worked aboard until 1815 hrs.

Sun. 10 Mar. 68: Crew working aboard. Dr. Cerame and José González borrowed tender Lolly from 1530 to 1715 hrs.

Mon. 11 Mar. 68: At 1030 boat was prepared to depart for Parguera. At 1205 Dr. Giese and Zeigler visited for 15 minutes. At 1335 Dr. Cerame visited and requested delay of departure pending use by Obras Públicas in control of the oil slick. 1715 Dr. Giese and Mr. Anderson, Engr., visited boat. 2145 hrs. Dr. Cerame, Giese and Eger visited boat. Orders were to remain and work for Obras Públicas on 12 Mar. 68.

Tue. 12 Mar. 68. From 1520 hrs. to 1815 boat was working on oil slicks. Aboard were: Wm. Eger, John Glude, Rolf Juhl, Robt. C. Scott, Graham Giese, José A. González, Joseph P. Sharken, H. Schneider, Hamilton Ramírez, Roberto Díaz, Pedro Gelabert, Manuel Ayala, C. R. Isaac, Joseph Andrades.

Wed. 13 Mar. 68: 0715 Obras Públicas loaded boat with sacks of perlite (Ekoperl 33). At 0720 cast off for oil slicks outside sea buoys at El Morro. 0930 returned to dock. Boat loaded again. Dr. Giese sent to clinic due perlite dust in eye. At 0935 cast off for Puerto Nuevo area. Was spreading perlite in Puerto Nuevo Channel area when boat ran hard aground due to dust obscuring vision. 1235 was pulled off shoal by coast guard launch. 1250 made fast to dock again. 1300 to 1330 Dr. Giese and Dr. Cerame visited boat. Mr. H. Ramírez planned work in area off Levittown on 14 Mar. 68.

Thur. 14 Mar. 68: 0800 Dr. Giese aboard. 1040 boat completely loaded with perlite. Lisbeth Hyman and Bernardino Feliciano, Geologists, Obras Públicas, aboard with 3 laborers. At 1045 cast off; could find no oil outside harbor. 1300 docked again. 1725 to 1730 visited by Mr. Hamilton Ramirez and Pedro Gelabert, Obras Públicas and Mr. Edmond P. Lomasney, FWPCA, SE Region, 1421 Peachtree St. NE, Atlanta, Ga., 30309, regarding further use of Carite.

Fri. Mar 68: Departed at 0647 hrs., with Dr. Giese, Liz Hyman and Mr. Feliciano and 2 laborers aboard. Proceed to Point NNE El Morro 4 mi, thence off

Pt. Salinas, then returned to bay due to heavy seas precluding any work. Docked at 1000 hrs. Dr. Giese aboard at 1300 to 1330 again. 1700 hrs. Dr. Giese returned to boat with pickup truck driven by Marcos. Equipment to be returned to Magueyes was loaded at this time. 2200 hrs. Left Dr. Giese off at airport. Arrived Parguera 2330 hrs. and departed for Mayaguez.

Sat. 16 Mar. 68: No one aboard.

Sun. 17 Mar. 68: 2130 Capt. came aboard.

Mon. 18 Mar. 68: No work done in relation to oil slick. Crew and 2 men stood by with boat loaded.

Tues. 19 Mar. 68: No work done this date. Standing by.

Wed. 20 Mar. 68: 1405 H. Liz Hyman, Geologist, Obras Públicas, and 5 laborers boarded. At 1420 cast off and proceeded to an oil slick area appx. 2.5 mi., north of the Condado Hotel Area. Spread 126 bags perlite directly on slick. Slick was about 2 mi long and 300' to 500' wide, running on tide line E and W. Returned to dock 1645 hrs. All Obras Públicas people ashore.

Thur. 21 Mar. 68: MRV Carite and Crew departed San Juan 0845 hrs. and arrived Mayaguez 1915 hrs., same date.

Remarks

1. Vessel and crew were on standby basis 24 hours daily aboard the vessel except for Sat 16 Mar. and Sun. 17 Mar. 68.

2. Considerable damage was done to rubbing strips on both sides vessel due to inadequate dock.

3. Upper hull paint needs completely repainted due oil.

4. Both safety rails loose due to dock.

5. Three life preservers are missing.

6. \$300.00 worth of rope was damaged by petroleum.

7. One small anchor missing.

8. One carpenter hammer lost overboard.

Subject: Report of Observations During Cruise 4-68.

To: Dr. M. Cerame Vivas.

General:

The first and only really good test of the perlite dust on an oil slick was on Wed. 20 Mar. 68. Accompanied by Liz Hyman, geologist, Obras Publicas, cast off at 1420 hrs. and found an oil slick about 2.5 miles off the Condado Hotel section—directly north. This petroleum slick was approximately 2 miles long and 300' to 500' wide. Its formation was in an East and West direction parallel with the beach and meandered with the tide line. The petroleum was generally, fairly well concentrated, very thick and very heavy viscosity. There was no emulsification although there were small blobs floating independently of the main areas. The petroleum was held in formation on the tide line in the same way floating debris is held. Wind was from ENE at 15 to 18 mph. Sea swell was 4' to 6' and very few white caps. One hundred and twenty-six bags of perlite were dumped directly on the oil as boat proceeded at a speed of 2 to 6 mph. This application was then spread by wave action. The layer of dust in contact with the sea surface was held by the water and oil while the upper layer slid off, continuing to grow larger and larger in area as the layer became thinner due to this sliding action caused by the waves. This precluded the necessity of running the boat over the dust to mix it as was the case in the calm water inside the bay.

The light colored perlite dust turned a dark brown as it began to pick up the petroleum. After the complete load of 126 sacks had been spread a few passes over the area were made to observe the effects. The perlite apparently cleaned up the area thoroughly where applied. Remaining was an opalescent oil film which it seems that the perlite failed to hold. This was a very thin film of oil. Unfortunately only 126 sacks were aboard. This oil slick area could have been effectively covered with 300 to 350 sacks.

Criticism

1. A primary criticism of the operation was the lack of communications between airborne observers and surface craft hunting oil slicks.

a. C. B. Radios with similar crystals could have eliminated this situation completely.

2. A second fault was the apparent lack of a definite preconceived plan of operation, e.g.

a. The equipment required.

b. Number of men required.

c. Base of operations.

d. A coordinator available at all times.

e. Orientation of personnel involved as to what was to be done when and how.

Recommendation

Due to the expanding petrochemical industry in Puerto Rico and St. Croix I recommend as an extremely important step the following:

A study of winds, currents and natural features and phenomena of this area be made. It is a fact that there are no current charts of inshore waters around Puerto Rico existing today. To effectively control a petroleum spill one must be able to predict accurately the course of the spilled oil, its speed of travel over the surface and the effects upon it of various combinations of conditions of wind, weather, tides, currents and temperature. This is not now known which was quite apparent in the operation involving the *Ocean Eagle*. Spills occurring approximately 15 miles offshore can be predicted as to travel, etc., and a fairly good plot of their travel made as there is a fair amount of information available regarding the most influential elements. A result of such a study should result in some of the following:

1. What means of control would be most effective in a given location.

2. What means of control would be most effective under various combinations of conditions of sea and weather.

3. What materials and equipment will be required under the various combinations of conditions in the various areas.

4. What materials and equipment and in what quantities should be kept available by what agencies for such contingencies.

5. What agencies should be available for what job.

6. The funds for such a preconceived plan should be made available prior to necessity.

It is my opinion that, if we are to preserve at least in part, the beauty and present resources of the island, studies of the various effects and causes and their prevention and control should be made now. It is quite obviously too late to begin after a disaster to decide what to do. We have had a slight experience with the *Ocean Eagle*. In the San Juan area, the most important thing to do is to widen the harbor entrance at Punta del Morro, deepen the channel, eliminate the dog leg course in and out and establish sea buoys slightly further outside those now existing. A means of eliminating passing situations entering and leaving the harbor is extremely important. All ships awaiting pilots should, by local law, be required to leave—to much further off than is now the practice. On the south coast, studies of all these problems are also indicated as numerous critical conditions exist there also. The incident of the tug boat "Coral" was an indication of one such existing Logard. Should this have been a petroleum vessel the marine life in and about Parguera would have been irreparably damaged.

RESUME OF ACTIVITIES REGARDING "OCEAN EAGLE" BY WILLIAM H. EGER

March 6.—Arrived in San Juan late afternoon with Drs. Maximo Cerame and William Maddux (Dept. Marine Sciences, UPR). Arrangements for accommodations.

March 7.—Help set up mobile laboratory and acquire aquaria supplies for bioassay experiments. Conferred with Mr. Keith Stewart (Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio). Examination of extent of oil pollution in San Juan harbor in vicinity of U.S. Coast Guard installation with Dr. Cerame and Mr. Stewart. Observation of marine life killed in vicinity of La Puntilla.

Collection of detergent samples with Mr. Stewart, from those brands in use at that time. With Dr. Cerame, conferred with Coast Guard officials, especially regarding the use of detergents. Begin bioassay experiments on fish, continuing through the night with the assistance of Drs. Cerame, Maddux and graduate assistants Mr. and Mrs. Herb Austin.

March 8.—Continuation of bioassay experiments. Survey of damage in Condado lagoon and Punta El Boqueron area. Advisory meeting with Department of Public Works.

March 9.—Return to Mayaguez to teach Ichthyology class.

March 10.—Return to San Juan. Continue bioassay experiments with assistance of graduate assistants John Rees, Manuel Hernández and Andrew Rehm.

March 11.—Conduct field test on the affect of leaching of oil from absorbants. Aerial reconnaissance with Dr. Graham Giese and Mr. Manuel Hernández. With advice and assistance of Drs. John Ziegel and Graham Giese, the leaching experiments were expanded to include the effect of the natural surf on the absorbants after saturation with oil.

March 12.—With the assistance of Mr. Jose Gonzalez, a survey of San Juan harbor was made to determine the extent of marine life damage. Water samples were collected at various stations. Assist Mr. Hamilton Ramirez (Dept. Public Works) during observation of field tests from RV Carite on the effectiveness of the absorbants Ekoperl and bagasse. Return to Mayaguez.

DETERGENT BIOASSAY STUDIES ON FISH

Considerations

Because of the immediate need for preliminary results on which to base intelligent counsel, these experiments were generally not conducted for more than 18 hours for any one test, except where indicated. All tests, except one (the 27 p.p.m. series) were conducted at the Dept. of Marine Sciences temporary mobile laboratory on Condado. The 27 p.p.m. (parts per million) series was conducted at the Dept. of Marine Sciences laboratory at La Parguera using identical species of fish.

The fish used were all collected from the Condado Lagoon except those of *Abudefduf saxatilis* which were collected near Boca de Cangrejos. The sea water used in these experiments was collected at Boca de Cangrejos, where it was thought to be relatively free of contamination from oil or detergents. The temperature during the experiments ranged from 71–79° F. Control mortalities ranged from 0% to not more than 15% for the exposure times indicated in the table.

Results

Reference to the table indicates that all the detergents tested expressed toxicity. The toxicity is expressed in terms of percent mortality and percent loss of balance for various concentrations over exposure periods of at least 6, 12 and 18 hours. During the testing, observations were made as to abnormal behavior, change in respiration rate (ventilation), and ability to recover after exposure. Loss of balance is considered when fish no longer can right themselves due to the effect of the detergent. All detergents showed toxic affects on the fish at the lowest concentrations tested. Where death or loss of balance did not occur, there was observed varying degrees of stress apparently caused by the detergents. In some cases there was noted a species-dependent sensitivity.

Conclusions

1. These bioassay tests were, in effect, attempting to determine the toxicity on adult fish after limited periods of exposure to detergents. The adult stage does not represent the most sensitive or critical period of the fishes life cycle. Knowledge is badly needed regarding the long-term effect on all stages of the life cycle before we can intelligently determine the potential damage caused by adding foreign matter to the environment.

In order to eliminate experimental variables caused by keeping animals in captivity in the laboratory, routine bioassays are usually run for a period of 48 to 96 hours. This is thought to be a minimum standard to estimate toxicity and to also provide a better standard for comparison of results.

Substance tested	Species tested	Parts per million	6 hours	12 hours	18 hours	24 hours
Polycomplex A-11.....	E.a. ¹	100	100 (100)	-----	-----	-----
Do.....	A.s. ²	100	100 (100)	-----	-----	-----
Do.....	E.a.	27	57 (71)	100 (100)	-----	-----
Do.....	E.a.	10	33 (33)	33 (33)	33 (33)	-----
Do.....	A.s.	10	0 (0)	33 (33)	33 (33)	-----
Do.....	H.c. ³	5	0 (0)	0 (75)	0 (75)	-----
Do.....	E.a.	5	0 (0)	0 (0)	0 (0)	-----
Do.....	A.s.	5	0 (0)	0 (0)	0 (0)	-----
Do.....	A.s.a. ⁴	5	0 (0)	0 (0)	0 (0)	-----
Janslov-60.....	A.s.	100	100 (100)	-----	-----	-----
Do.....	A.s.	50	100 (100)	-----	-----	-----
Do.....	E.a.	27	100 (100)	-----	-----	-----
Do.....	A.s.	10	0 (0)	0 (0)	0 (0)	-----
Hemco No. 2.....	A.s.	100	100 (100)	-----	-----	-----
Do.....	E.a.	50	0 (30)	60 (86)	86 (100)	100 (100)
Do.....	E.a.	27	100 (100)	-----	-----	-----
Do.....	A.s.	10	0 (0)	0 (0)	0 (0)	0 (0)
Muratti.....	E.a.	100	70 (100)	100 (100)	-----	-----
Do.....	E.a.	50	100 (100)	-----	-----	-----
Do.....	E.a.	27	0 (0)	14 (29)	43 (43)	85 (85)
Do.....	E.a.	10	8 (8)	17 (25)	17 (42)	25 (58)
Product-20215.....	E.a.	27	29 (29)	29 (29)	57 (57)	57 (57)
Mangus.....	E.a.	27	0 (0)	0 (0)	0 (0)	0 (0)
Crude oil.....	E.a.	50	0 (0)	15 (15)	30 (30)	30 (30)
Ekoperl.....	E.a.	500	0 (10)	10 (10)	10 (10)	10 (10)
Do.....	A.s.a.	500	0 (0)	0 (0)	0 (0)	0 (0)
Pevatone.....	E.a.	1,000	100 (100)	-----	-----	-----
Do.....	A.s.a.	500	0 (0)	0 (0)	0 (0)	0 (0)
Minstron.....	E.a.	1,000	100 (100)	-----	-----	-----

¹ Eucinostomus argenteus—moharra.

² Atherinomorus stipes—silversides.

³ Herangula clupeiola—herring.

⁴ Abudedefduf saxatilis—sergeant major.

The results of the above experiments should, therefore, be viewed as expressing the very minimum in terms of toxicity. Thus, these same detergents would show equivalent toxicities at smaller concentrations (ppm) if the tests were run for the standard 48 or 96 hours. Even for the 18 hour tests there is seen a high level of toxicity.

2. Detergents usually consist of many substances forming a complex mixture. Different products use differing amounts of solvent (s) as a base for the mixture. Test concentrations are prepared from the concentrated product as it is sold on the market. This is considered to be a 100% solution and test dilutions are prepared accordingly. Because the different products contain widely varying percentages of solvents and because the solvents of each one product may vary considerably in toxicity, it is very difficult to accurately compare any two products. To circumvent this problem, it would be necessary to analyze each component of a given product independently as well as in its various combinations. This approach would be especially difficult because many ingredients of commercial detergents are considered trade secrets.

3. From a practical use standpoint, different detergents should not only be compared in terms of toxicity but also in terms of their relative effectiveness as a dispersent or emulsifier. Caution must be used here also since it is difficult to quantify the effectiveness of a detergent. Also, one a substance (eg. oil) is emulsified or dispersed, the oil itself may display new and different toxic effects on living systems which in an unemulsified state are not as apparent.

4. It is hoped that the above three considerations will be recognized as important ones before the use of detergents is proposed. There is a real need for research in this area so that we may be prepared to cope most effectively with future problems such as that posed by the *Ocean Eagle* disaster.

ABSORBANT STUDIES

Absorbing ability

Of the three products tested, Ekoperly and Pevatone appeared to be each initially as effective, while Minstron was less so. Pevatone, however, seemed to absorb most of the oil on the outside of its relatively large particles whereas Ekoperl, being more granular, seemed to allow much of the oil to diffuse into the granules. Minstron, with its very small particles, proved least effective since it did not form a stable complex with the oil.

Leaching ability

When the three oil-soaked products were placed in the sun on white paper or on sand, it was seen that oil had leached from all three absorbants. On an approximate volume basis it seemed that Minstron had lost the most oil while Ekoperl and Pevatone each lost about equal smaller amounts.

Pevatone seemed to me to be potentially less effective than Ekoperl because most of the oil taken up adhered to the outside of the large particles allowing oil to come off readily when contact was made with any other material. This would, perhaps, make it more difficult to gather the Pevatone and would probably result in some recontamination with oil on sand, rocks, boats, etc.

Field tests were also made on the extent of leaching due to the action of waves on the beach. Both Pevatone and Ekoperl were tested and while oil leached off of both products, comparative results proved inconclusive.

Toxicity Studies of Absorbants

Compare to the detergents, all absorbants tested were considerably less toxic. Since Ekoperl appeared to be the least toxic absorbant, and also the most effective in absorbing oil, it was the product recommended for use.

FIELD OBSERVATIONS OF FISHES

On March 12, 9 days after the grounding of the Ocean Eagle, a two hour survey by small boat was made of part of San Juan Bay. The area covered extended along the shoreline from the San Antonio Channel south around Isla Grande to the J. F. Kennedy bridge; then west and north to Punta Cataño. During this period the following fishes were found dead:

- 15 *Opisthonema oglinum*—arenque, sardina
- 7 *Trichiurus lepturus*—machete
- 6 *Gobioides braussonneti*—gobido
- 2 *Centengraulis* sp.—anchoa
- 1 *Sphyræna barracuda*—picua brava
- 1 *Polydactylus virginicus*—barbudo
- 1 *Mugil curema*—jarea
- 1 *Chloroscombrus chrysurus*—casabe

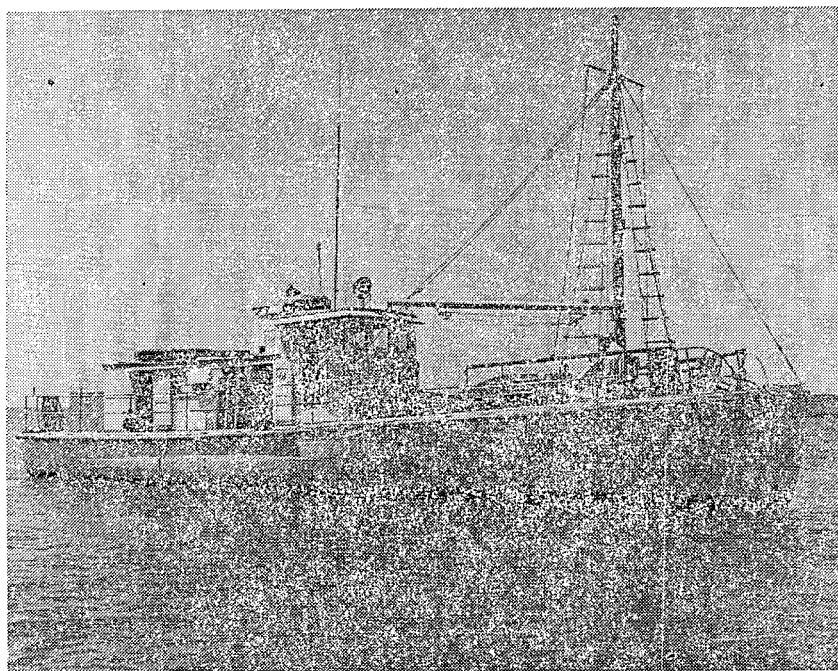
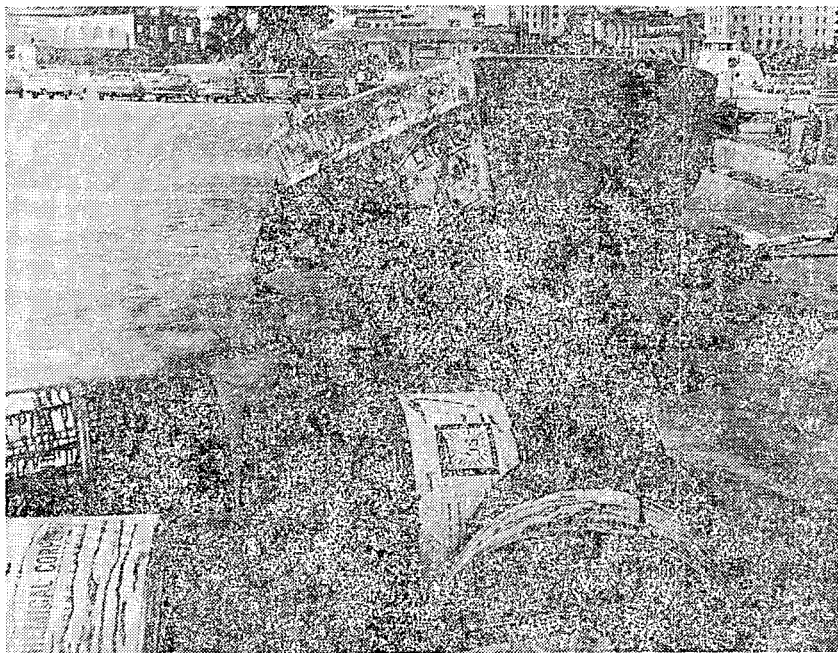
In addition, during this same period, the following fish were observed in a state of stress: *Sardinella anchovia*—sardina, cascarua *Strongylura* sp.—agujón.

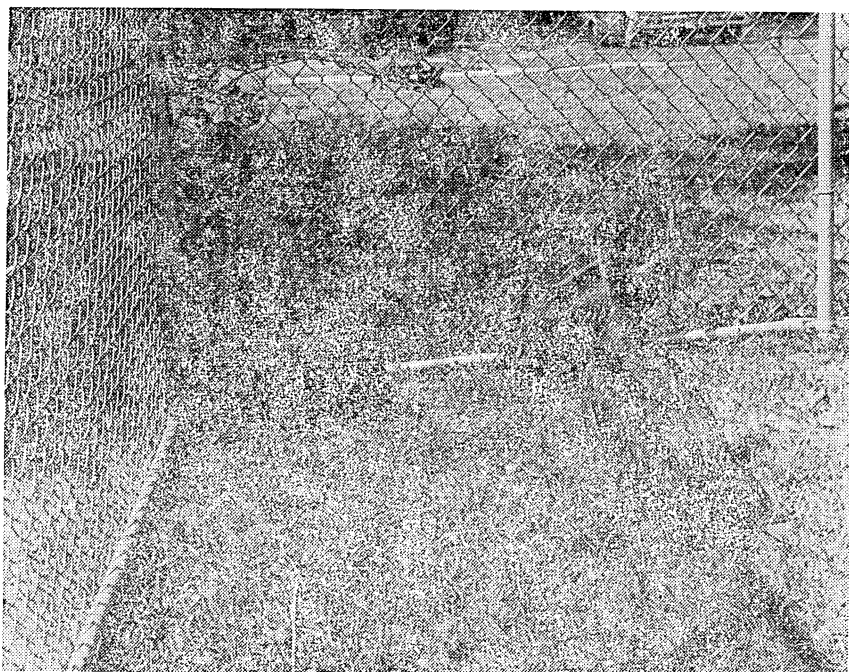
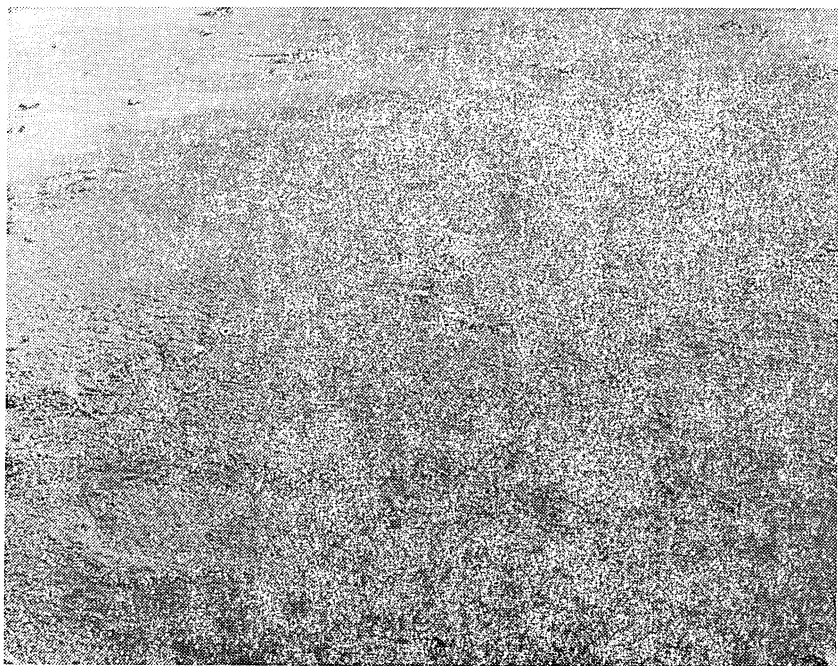
A few small schools of live *Opisthonema oglinum* were observed. Several fish in the school appeared to show evidence of lesions on the dorsum resulting in patches where the tissue underlying the skin could be seen. There were a greater number of fish of this species seen under the puente G. Esteves in the San Antonio Channel. The water here was relatively clear compared to the rest of San Juan Bay; probably because there is a good exchange of clearer water coming in from the NE via de Balneario Condado.

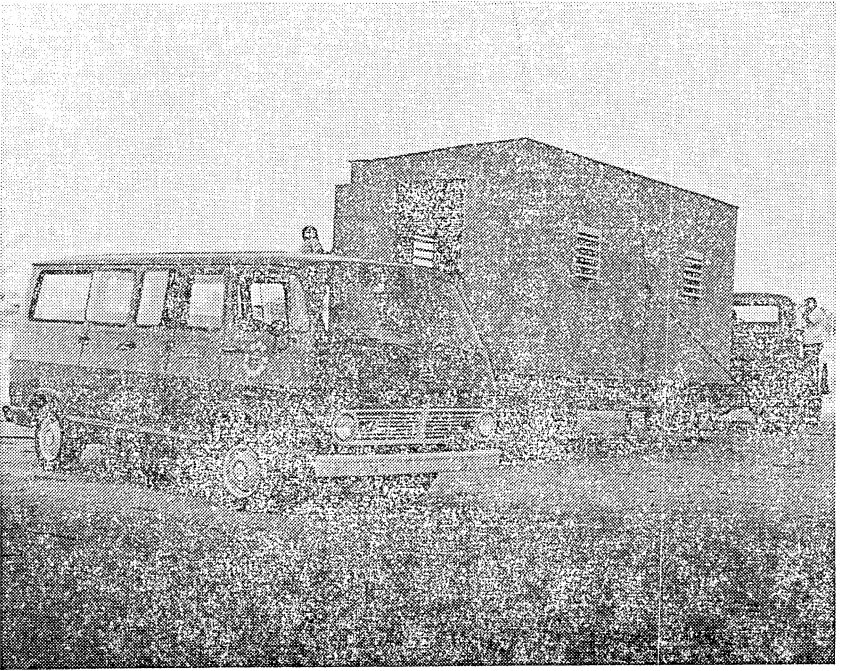
2. On March 22, 19 days after the grounding of the Ocean Eagle I observed very large schools of *Opisthonema oglinum* among the docks of the Club Nautico. The number of fish present was estimated to have been over 100,000. Based on photographs and sampling of the population, it is estimated that there was at least a 95% incidence of fish with abnormal lesions. The fish were in varying stages of stress, with many of them showing abnormal swimming behavior, loss of balance, and death. Examination of these fishes showed that some of the lesions had progressed to such an extent that the vertebrae, ribs or viscera were exposed. The internal anatomy revealed a general deterioration of tissue. A small percent (less than 5) of those fish infected, showed some signs of healing and regeneration of tissue around the lesions.

At the present time, the causative agent responsible for these gross lesions is not known. Possibilities being considered at present are:

1. Effect by a toxic component of oil from the Ocean Eagle.
2. Effect by a toxic component of one or more detergents used in clean-up operations during the Ocean Eagle disaster.
3. Effect caused by a fungus or bacteria. It is possible that a component from either the oil or one or more detergents caused a disruption of natural protective skin mucus lining or scales, thereby allowing infection to spread to the underlying tissues. This problem is presently being examined. This fish is of particular concern because it is the prime bait fish used by fishermen in the area.
3. The ten species of fish observed to have been either killed or adversely affected, probably due to the Ocean Eagle disaster, undoubtedly represent only a fraction of the total fish that ultimately were damaged. Of these ten species, nine are of direct commercial importance.







Mr. POLANCO-ABREU. Thank you very much, Mr. Chairman and members of the committee.

Mr. DORN. Thank you, Commissioner, for a very excellent statement. Any questions of the committee members?

Mr. CRAMER. I have a couple.

Mr. DORN. Mr. Cramer.

Mr. CRAMER. I am very interested in this problem.

Mr. DORN. Mr. Cramer represents the Caribbean area. He is from Florida.

GAPS IN LEGISLATION

Mr. CRAMER. I do not know whether the legislation before us at the present time, is the answer to the problem. Perhaps the gentleman, if he wishes, would like to comment on it.

In the first place, the remedy is against the ship. It is not much of a remedy if the ship is sunk.

Mr. POLANCO-ABREU. May I refer this question to my administrative assistant.

Mr. WATKINS. My name is Orville Watkins. I am administrative assistant to Commissioner Polanco-Abreu.

I would think the remedy would have to go beyond the ship, it would have to go to the owners of the ship who would presumably have more resources than the ship itself.

Mr. DORN. Speak up just a little bit, please.

Mr. WATKINS. Does that answer your question, sir?

Mr. CRAMER. Also, I wonder what happens in the situation where you have a ship that was sunk in World War II. Some of the oil

might cause pollution when the ship rusts out or what-have-you, corrodes out? A number of those are off the coast of the United States, a number of them off the coast of Florida, and a number of them are off the coast of New Jersey.

Mr. POLANCO-ABREU. That is true.

Mr. CRAMER. As I gather, this bill does not cover that situation.

Mr. WATKINS. That is correct, sir. Perhaps the Committee might want to take that into consideration in drafting what I suppose would be an omnibus bill to correct this situation.

Mr. CRAMER. Likewise, as I understand the bill, if you do not know the cause—that is, if you have not found the culprit—then there is no remedy at all.

Mr. WATKINS. That would appear so. And I would think that the Federal Government, in that case, might have made arrangements to do the cleaning, to repair damage, and to decontaminate.

Mr. CRAMER. Well, talking about setting up revolving funds, and these recoveries.

Mr. WATKINS. Right, sir.

Mr. CRAMER. But the uses of the recoveries fund itself are very limited. And it seems to me this Hawaii situation—they do not know what caused that—so there would be no remedy for the Hawaiian present beach contamination problem.

Mr. WATKINS. In that event I would think that the revolving fund could bear the cost of the cleaning up operations.

Mr. CRAMER. So it just seems to me that the bill does not have an application to many of these problems that now exist or may come into existence.

That is all I have, Mr. Chairman.

Mr. DORN. Thank you, Mr. Cramer.

Any further questions of the gentlemen?

Mr. CLAUSEN. Thank you, Mr. Chairman.

Once again I want to thank you gentlemen from Puerto Rico for appearing before the committee. He always makes a very fine presentation.

JURISDICTION ON THE HIGH SEAS

I wonder if it would be possible for you or your administrative assistant to direct yourself to the question of jurisdiction, how to handle matters of this type in those areas that are beyond the 3- or 12-mile limitation.

Now, this gets into the question of international law and not only do we have problems that deal with pollution but there are many other problems for those of us that represent coastal congressional districts, and of course you are in this category. I wonder if you feel that this might be taken up through the Organization of American States, hopefully to develop a position to extend the limitation of our Continental Shelf, or something like this. Could you direct yourself to this?

Mr. POLANCO-ABREU. Yes.

Mr. DORN. If you do not have the answer right with you, you can always present it for the record later.

Mr. POLANCO-ABREU. Even though I am a lawyer I am not a specialist in international law, but I would be willing to study this

part and submit a further statement in regard to this interesting question.

The problem that you raise, it is a crucial one.

Mr. CLAUSEN. Well, the gentleman and I have had some conversation in this regard, and I am hopeful that the Congress and the proper committees will give this particular problem the attention that I think it deserves, conservation of all matters. On the West Coast of California, we have people coming in and, in fact, destroying whatever conservation investment we have in fishery resources and that kind of thing.

Mr. POLANCO-ABREU. I perfectly agree with you gentlemen.

Mr. CRAMER. Will the gentleman yield?

Mr. CLAUSEN. I will be pleased to yield to the gentleman.

Mr. CRAMER. I just want to comment on the same subject. There is in existence an International Convention for the Prevention of Pollution of the Sea by Oil and they have entered into agreements pursuant to the Oil Pollution Act of 1961 and this involves a 50-mile offshore jurisdiction by agreement, and 100 miles off the coast of New Jersey, north to the Canadian border. So that this perhaps also helps answer the question of the 12-mile limit.

Mr. POLANCO-ABREU. Yes.

Mr. CRAMER. And it indicates that action is being taken in this field. And I think it would be well to place this memorandum in the record following the gentleman's testimony.

Mr. DORN. Without objection it will be included.

(The memorandum follows:)

EXACT FROM MEMORANDUM

In accordance with the International Convention for the Prevention of Pollution of the Sea by Oil, the Oil Pollution Act of 1961, 33 U.S.C. 1001-1015, prohibits discharge of oil or oily mixtures by seagoing ships of American registry, including tankers of over 150 gross tons and other ships of over 500 gross tons. This prohibition extends to a distance out to fifty miles off most coastal areas of the United States and out to 100 miles off the coast of New Jersey north to the Canadian border. Foreign vessels subject to the Convention that violates its provisions is prohibited zone areas off the United States lying outside the territorial waters of the United States are reported to the flag government through diplomatic channels. American vessels are subject to a fine not exceeding \$2,500 nor less than \$500, and persons who violate provisions of the Act are subject to the same fine, or to imprisonment, not exceeding one year, or to both.

Mr. CLAUSEN. I thank the gentleman for adding that to the record, because I think it will be helpful.

Mr. CRAMER. You might include this map too that indicates what the territorial agreement mileage is.

Mr. DORN. So ordered.

Mr. McEwen?

Mr. McEWEN. Mr. Chairman, Commissioner, I want to express to you my personal thanks for your assistance when I was recently in Puerto Rico.

Mr. POLANCO-ABREU. Thank you very much.

RESPONSIBILITY IN CASE OF OIL SPILLAGE

Mr. McEWEN. Yesterday, Mr. Commissioner, we had as a witness before this committee, Vice Admiral Trimble, of the Coast Guard. He

gave very interesting testimony concerning the *Ocean Eagle* incident at San Juan.

One of the things we were interested in, quickly, yesterday, as this testimony developed, was the question of responsibility in the case of one of these spillages. You, sir, have spoken to that subject here. It involves a number of State and local agencies.

Now, as Admiral Trimble's testimony developed on this incident in the San Juan harbor, the Coast Guard immediately had, one, a rescue operation to be performed, and then, number two, a mission for the safety of the harbor.

And it occurred at least to this one member, possibly the Coast Guard might be the agency, being No. 1, at the scene, the agency of the Federal Government most frequently found in coastal areas all over the country, might be the agency to assume the overall responsibility—not that there would not be need, of course, to bring in people from Federal Water Pollution Control Administration, all sorts of expertise, as you have mentioned.

I would be interested, Mr. Commissioner, in your comments on that, as to whether you feel there is a need for clear responsibility in some one department or agency to coordinate the efforts of all.

Mr. POLANCO-ABREU. Well, as far as I am concerned, I think that the Coast Guard should be the one that should be responsible in these cases.

Mr. McEWEN. I am interested in your observations. Thank you.

Mr. DORN. Mr. McCarthy.

Mr. MCCARTHY. Mr. Chairman, I just want to thank the Commissioner for a very incisive statement on this problem, which seems to be growing in intensity.

ATTITUDE OF THE OIL INDUSTRY

I just would like to observe, when I first came down here, I was rather dismayed at the attitude of industry in general toward pollution control. And I have been very pleased with the shift in attitude. For instance, the steel industry, which for a long time opposed pollution control legislation, came down here recently and actually testified in favor of our bills. And they have been a very constructive attitude, taking ads in the national magazines, and I know up our way the steel industry and other industries are really moving forward in a vigorous way.

I have not perceived this yet in the oil industry. They have made efforts, one, to weaken the Oil Pollution Act a couple of years ago, and to remove the excise tax on oil. But no vigorous support for any pollution control.

One of the results of the removal of the excise tax is that drained crankcase oil is virtually worthless, so in Buffalo, where we have what Murray Stein, of the Federal Water Pollution Control Administration, called the most polluted river in the world, Buffalo River, the most substantial is oil pollution and much of this is from the ordinary gas station which now in most instances simply flushes this drained

crankcase oil into the Buffalo sewer system and then, of course, it goes into the Buffalo River.

Now, they are concocting a program in Buffalo to cope with this. But the massive nature of it is such that it does not seem to me that it is going to get any place until this industry begins to police itself.

And I would hope that perhaps they could follow the lead of such progressive industries as the steel industry and the paper industry, and others, who have had long-standing problems with this, and take a constructive attitude.

It seems to me that the principle is established, at least it is admitted in many industries, that this is an industrywide problem. And that the costs should go into the product. Actually the consumer is going to pay for pollution abatement. But to resist these measures I think would be very negative and would not be in keeping with the constructive and progressive attitude that is displayed by so many industries. But thus far it has not been displayed by the oil industry.

Thank you, Mr. Chairman.

Mr. DORN. Thank you, Mr. McCarthy.

Mr. POLANCO-ABREU. Thank you very much.

Mr. DORN. You can just submit anything additional for the record, Mr. Commissioner.

Thank you very much.

Now, there is not a more devoted member of this committee than Mr. McEwen, from New York. I am going to ask Congressman McEwen to present to the committee our next witness.

Mr. McEWEN. Thank you very much.

Our next witness is Mr. David Knowlton, who is president of Knowlton Brothers Paper Co. I might say it is the third oldest paper company in America. They have been in operation in the present location for over a century and a half.

Mr. Knowlton is also a director of the American Paper Institute, and more immediately appears here today as chairman of the American Paper Institute's Air and Water Resources Committee.

Mr. Knowlton is an old friend of this committee.

Dave, it is nice to see you here before this committee.

I am sure, Mr. Chairman, what he has to tell us today will be most helpful.

THE "WATER QUALITY IMPROVEMENT ACT OF 1968"

STATEMENT OF DAVID C. KNOWLTON, CHAIRMAN OF THE AIR AND WATER RESOURCES COMMITTEE, AMERICAN PAPER INSTITUTE; ACCOMPANIED BY FLOYD O. FLOM, VICE PRESIDENT OF PUBLIC AFFAIRS, AMERICAN PAPER INSTITUTE

Mr. KNOWLTON. Thank you, Mr. McEwen.

Mr. DORN. Mr. Knowlton, we are particularly pleased to have you.

You can proceed any way you care to. If you would like to summarize, submit the statement for the record, you may do so.

Mr. KNOWLTON. Mr. Chairman, it would take about 20 minutes. I would prefer to give the whole statement unless you would direct me otherwise.

I will abide by your wishes.

Mr. DORN. Just go right ahead.

Mr. KNOWLTON. All right.

As Mr. McEwen said, I am David C. Knowlton, president of Knowlton Bros., Watertown, N.Y., a small paper manufacturer that ranks as the third oldest paper mill still operating on the same site in the United States. I am here this morning representing the American Paper Institute, of which I am a member of the board of directors.

I have asked Mr. Floyd Flom to sit with me. Mr. Flom is the vice president of public affairs of the American Paper Institute.

I am also chairman of the institute's air and water resources committee, which is charged with the responsibility of delineating and expressing the paper industry's position on matters within its purview.

As further identification I am immediate past chairman of the National Council of the Paper Industry for Air and Stream Improvement, an organization devoted to research and engineering problems in this area. I am also industry advisory member of the New York State Water Resources Commission, a position which I have held since the commission was created in 1962.

I am indeed grateful to Mr. Dorn, to Mr. Blatnik, and to the members of the Public Works Committee for this opportunity to comment on H.R. 15907, the proposed Water Quality Improvement Act of 1968.

PAPER INDUSTRY'S INTEREST IN WATER POLLUTION CONTROL

The American Paper Institute is the national trade association of the pulp, paper and paperboard industry. A nonprofit organization with approximately 230 member companies, it is the recognized representative of the pulp, paper, and paperboard industry in the United States. The paper and allied products industry operates more than 800 pulp, paper, and paperboard mills and over 5,000 converting plants located in nearly every State of the Union. In 1966 industrywide employment reached 684,000 people who were paid \$4.6 billion.

The paper industry is dependent on large quantities of water for the manufacture of its products and is therefore particularly aware of society's need for clean water. It was in this spirit, as I am sure you will recall, that Mr. William R. Adams, then chairman of the institute, testified before your committee on July 13, 1966, in support of a greatly expanded program of Federal grants to municipalities for the construction of waste treatment works and systems. His testimony was supplemented by technical data and financing data presented by Dr. Malcolm Taylor of Union Camp Corp. and Mr. Charles Hickey of West Virginia Pulp & Paper Co.

In the 2 years since Mr. Adams' testimony, we have continued our public support of the Federal grant program, together with support of joint municipal and industrial use of such treatment works wherever feasible. We all recognize that the national effort toward construction of adequate waste treatment facilities has been lagging, due in part to a discrepancy between authorization and appropriation of funds at the Federal level.

The American Paper Institute, therefore, is pleased to endorse the purpose of H.R. 15907, which proposes to obtain maximum use of available funds by converting these appropriations to debt service payments covering restricted bond issues to finance the Federal share of waste treatment plant construction.

Since this legislation is primarily concerned with the financing of the grant program to aid in the construction of municipal pollution abatement plants, I feel that it may be in order to indicate why the paper industry is so concerned with this subject. To begin with, the pulp and paper industry has made manifest repeatedly its interest in the solution of environmental problems. A record of over 30 years of research on these problems on the part of the industry certainly gives testimony to this position. Also during the past few years when the subject has become one of national importance, the industry has repeatedly offered constructive testimony to representatives of both Houses of Congress in their effort to enact legislation which would further the abatement of the Nation's pollution problems.

Another measure of our industry's interest in and response to the problem can be found in our expenditures and investment in waste water treatment. First, with regard to expenditures for research, the National Council of the Paper Industry has spent over \$7.5 million for research on water quality problems. Other industry groups and many individual companies have spent additional millions on similar research.

Turning from research expenditures to industry investments in waste treatment facilities, at the present time the magnitude of the industry investment is over \$325 million, and this does not include the millions spent on operating costs for such facilities. The annual outlay of dollars estimated for operating costs industrywide is \$25 million and it is expected to increase to between \$35 and \$40 million over the next few years.

Furthermore, a recent survey by the National Council indicates that the industry will invest \$80 million in 1968 for waste water treatment equipment and \$90 million in 1969. These planned outlays over the next 2 years, when added to the investment to date of \$325 million, add up, by the end of 1969, to nearly \$500 million expended by waste water treatment installations on an industrywide basis.

It is, of course, recognized today within the pulp and paper industry that any newly constructed mill must embody in its basic design the necessary facilities for treatment of wastes to preserve the environmental quality with which this Congress is so deeply concerned. There is a large segment of the industry, however, whose original installations predate the statutory requirements for treated wastes. Most of the older installations, many of them small and in some cases marginal, are located within the jurisdiction of the smaller municipalities. The treatment of the wastes of these older plants at times is not only difficult from an engineering or technical standpoint but often is disproportionately expensive, with no prospect of any return on the investment. This is one basis on which our industry has supported the legislation which recognizes that the public sector must bear a fair share of the cost of abatement.

JOINT MUNICIPAL INDUSTRIAL WASTE TREATMENT

The most feasible mechanism from an economic standpoint to solve many of these problems appears to be the joint municipal industrial treatment plant, which is built with public funds with the industry paying a proportionate share of the original and operating costs in line with its contribution to the waste load. We are presently witnessing a strong growth of interest in our industry in public treatment of mill wastes. A survey in this area recently completed by the National Council of the Paper Industry shows the following interesting facts: Of 753 separate pulp and paper manufacturing locations, 123 now discharge their process effluents to publicly owned treatment facilities. These mills account for approximately 11 percent of the total production capacity of the industry. Some 93 additional mills are presently considering discharge to public facilities. The production capacity of this group of mills also totals approximately 11 percent of the industry figure. Thus 216 mills, representing an impressive 22 percent of the industry's production capacity, have already become involved to one degree or another in public treatment of their waste waters. We are, therefore, vitally interested in the ability of the municipalities concerned to finance their share of the investment in these facilities.

Since our industry is wholeheartedly in support of the orderly and prompt solution of pollution problems, we have felt that this tripartite approach to plant financing a distribution of the financial burden among Federal, State, and local jurisdictions, with the industry paying its share of the cost to the municipality, is a logical one. The authorizations enacted in past water quality improvement acts have been a step in this direction. Unfortunately, through circumstances that are in no way connected with this subject, adequate appropriations have not been made by the Congress to implement the objectives of previous legislation. It would indeed be presumptuous of me to suggest that funds for this purpose should be given priority over any of the other problem areas which the Congress is faced.

CONCEPT OF H.R. 15907 ENDORSED

It is, therefore, for this reason that we endorse the concept of H.R. 15907 as a mechanism to direct funds to the State and municipalities in support of the Federal share of these projects.

SPECIFIC PROVISIONS OF BILL OPPOSED

Although we endorse the purpose of this proposed legislation, there are, nevertheless, a number of specific provisions in H.R. 15907 which we cannot endorse and must in fact oppose, as in our opinion their overall effect would be to retard the momentum for waste treatment plant construction now being developed across the country rather than to enhance it. I would like to explain why we are concerned about those provisions we feel we must oppose.

REFINANCING

First, section 2(c), page 2: The wording change proposed here would eliminate the provision in the present law for reimbursement to the States of the Federal share of the cost of any project begun subsequent to July 1, 1968. This would have the effect of penalizing those states which have taken the lead in developing aggressive pollution abatement programs and which have made the most progress to date. For instance, this change would severely penalize New York State, which, by prefinancing the Federal share, has accelerated the progress of municipal plant construction. The rescinding of this provision is a reversal of that phase of congressional intent as set forth in the Clean Water Restoration Act of 1966. As New York State is one of the two largest paper-producing States in the Nation it, can easily be seen why we, as an industry, are concerned about any action which will retard the progress that is well under way.

TAXABLE STATUS OF BONDS

Secondly, Section 2(f) (3) on page 5: The elimination of the tax-exempt status of municipal obligations for pollution abatement, both on those to be serviced by Federal payments and also on those covering the State and local shares, would, in spite of Federal assistance proposed under section 2(f) (1) (B) of the bill, sharply increase the total cost of interest. In addition, the elimination of the tax-exempt status would reduce the marketability of many municipal obligations which are not rated as top quality. In many States, market conditions would require a level of interest rates in excess of legal limits established by State or local law.

Third, section 2(f) (5) on page 5: This provision of the bill would restrict contracts authorizing Federal installment payments to a treatment facility serving, essentially, either a population of 125,000 people or more, or a standard metropolitan statistical area as defined by the Bureau of the Budget. This restriction would eliminate from consideration for these contracts a great many municipal waste treatment plants in smaller communities where the need for financing is particularly acute, and would also preclude the possibility of this type of assistance for many joint municipal-industrial plants involving those industries, such as our own, whose installations are mostly in rural and relatively sparsely populated locations.

USER CHARGES

Fourth, section 2(f) (5) (C) (i), page 6: A contract under the bill would require that a system of user charges be established for the purpose of amortizing construction, operation and maintenance costs of the treatment works. In Mr. Adams' testimony, referred to above, we recognized that users of waste treatment works should pay their appropriate share of the costs of construction and operation. However, many communities presently prefer to assess such costs on a property value or other basis, and we suggest that this right of choice should be preserved.

RESERVE FUND

Fifth, section 2(f) (5) (C) (ii), page 6: This provision would require the creation of a reserve or sinking fund, designed "to meet, to the greatest extent possible, expansion or replacement requirements of the treatment works service area." This would be tantamount to doubling the cost of a facility by providing for the funding of a future replacement. In view of the large sums which are required for construction of plants merely to meet present needs, we urge that these be financed first, leaving as a second step the financing of replacement facilities.

PRIORITY SYSTEM

Sixth, section 2(f) (5) (E) on page 7: At present, those States which have already made provision for financing a part of municipal plant construction and prefinancing the Federal share are generally implementing their programs on a concurrent basis, regardless of the size of current Federal appropriations. Under this new proposal in H.R. 15907, a priority system would necessarily have to be adopted, with the whole program coming to a halt upon expiration of annual appropriations. Experience to date has demonstrated the inadequacy of this kind of appropriations.

Seventh, section 3, page 9: This section, which is concerned with the size of the annual appropriations, continues the 1967 provision that at least 50 percent of the first \$100 million appropriated shall be used to make grants to communities of less than 125,000 population. In view of the large number of such communities and from our standpoint the number with proposed joint industrial-municipal plants, we feel this sum is quite inadequate when consideration is given to the fact that it applies to the total of grants to all 50 States.

OTHER PROVISIONS

Eighth, we suggest, in section 2(f) (5) (B) on page 6, that some definition or limitation be set forth to interpret "criteria established by the Secretary." We also suggest that section 2(g) (1) on page 8 include a qualifying phrase for the words "maximum efficiency" to take into consideration economic reasonableness. We also suggest that section 6(a) (6) (B), page 13, be amended to include the phrase "with due regard for technical and economic feasibility" after the word "pollutants" in line 19.

OPERATOR CERTIFICATION

Parenthetically I would like to lend my endorsement to section 2(g) (2) (B), page 9, which requires an effective statewide operator certification program. We in New York State have accomplished the same purpose by a 30 percent operation and maintenance grant to municipalities, which enables the State to insure that they are also operated at design efficiency. However, I suggest that your conditions require the state to be responsible for the operator certification program, rather than the Secretary.

ALTERNATIVE PROPOSAL

Now, having been critical of the bill as proposed, we suggest that an alternative is possible, having in mind the current stringent fiscal situation of the Federal Government. We suggest, as long as the Government is unable to appropriate sufficient funds to cover the full Federal share of treatment projects, that bonds be authorized, to be issued as needed, with proceeds restricted to this purpose, in order to fund the Federal share. These bonds would be retired, through annual appropriations for principal and interest, in much the same way that the Federal share would have been paid under the bill as originally proposed. This mechanism would permit the accelerating program of construction to proceed without loss of impetus. Then the current grant program could be continued without having to reduce the amount authorized in the Water Pollution Control Act. Such a plan would also eliminate any differentiation between municipalities of varying size.

CONCLUSION

In conclusion, Mr. Chairman, let me reiterate the strong support of our industry for the Federal role in the financing of waste treatment works, and for the result which H.R. 15907 was clearly meant to bring about: Namely, the more rapid construction of these needed facilities. We are also pleased to note and support the provisions in H.R. 15907 for a continuing Federal program of research, demonstrations, investigations, training, and information relating to the prevention and control of water pollution.

We regret that certain provisions of this legislation appear to be so restrictive as to retard progress toward the desired goal and therefore hope your committee will make needed changes in these provisions to assure that progress will result from this legislation.

We realize that, given our national priorities as they exist today, the pollution abatement effort is not going to move forward as rapidly as might otherwise be the case. We hope that the day is near when fiscal realities will permit the Federal Government to fund its share of this effort.

I thank you for this opportunity to present our views on this important subject.

Mr. DORN. Thank you, Mr. Knowlton, for a very, I think, superb statement which will be helpful to the Committee.

Mr. Clausen.

Mr. CLAUSEN. I want to join the Chairman in expressing our appreciation to you, Mr. Knowlton, for coming down here and giving us the benefit of your views. I think that you have clearly analyzed some of the problems in the legislation now before us.

TAX INCENTIVES TO INDUSTRY

I wonder, could you give me the benefit of your thinking on the question of tax credits to industry, for the industry to perform the maximum in accelerating the industries resolving their own pollution problem?

The reason I ask that question, Mr. Knowlton, is that Secretary Udall was before the committee yesterday and he seemed to think that it was not necessary to have this tax credit for industry, yet some of us have felt this would be very helpful to the industry if they had a tax credit, if they were resolving some of these pollutant problems.

Could you respond to this?

Mr. KNOWLTON. I feel everything the Federal Government can do to accelerate the program is well warranted. An accelerated depreciation program is of interest to our industry, although it merely returns the benefits to the individual corporation at a more rapid rate than it would otherwise obtain.

I think an increased investment credit would perhaps be more of an incentive.

Now, may I refer once again to New York State, a situation with which I am particularly familiar?

The New York State laws, as Governor Rockefeller pointed out earlier today, also provide a 1-year amortization which has been helpful, and second, it provides freedom from real estate taxation, exemption from real estate taxation for abatement facilities without any return. And third, it provides exemption from sales tax, from sales taxes on the original equipment.

All of these have benefited the industry in New York and I think it is a proper reflection of public interest to do so.

Mr. CLAUSEN. Well, as you know, the overall pollution problem is associated, both the public sector institutions and private sector organizations, and what we are really seeking is to somehow balance the public and private sector organizations ability to handle this particular problem.

Now, certainly when you meet with your board of directors, if you could present to them the fact that a tax credit or a business tax credit—which is the same thing, really—will be available, and they would be paying taxes anyway, if they did not take care of this particular problem, would this not help you in convincing your board of directors that they should be working toward the maximizing of control of pollution in that area?

Mr. KNOWLTON. Mr. Clausen, that would undoubtedly help, but I think I can truthfully say we do not need any further incentive toward maximizing our own efforts.

I think that the increasing emphasis on the joint industrial-municipal plant is one of the best mechanisms to accomplish this. Again, going back to New York State, this has been resolved by a declaration of policy by the State Health Department under the aegis of the Water Resources Commission, which dictates that the percentage of participation on the part of an industry in a joint plant is not limited. If it is 99 percent industry and 1 percent municipal, it qualifies for acceptance under the state program, provided that the waste is amenable to municipal treatment.

I think all of these mechanisms make a part of the whole. The more that can be done, the faster we will accomplish our objectives.

(At this point, Mr. McCarthy assumed the chair.)

ASSISTANCE TO SMALLER COMMUNITIES

Mr. CLAUSEN. As you can see, what we are trying to accomplish is to develop a program whereby each level of Government throughout the entire Federal system is given the maximum incentives and hopefully the wherewithal to carry out some of these pollution abatement objectives. I assume you were here when I directed some of my comments and questions to Governor Rockefeller with respect to the trend toward urbanization in this Nation. I have a very strong feeling that we have reached a critical point in history where we should start to try to decentralize population patterns of the country. And I believe that there is an opportunity here to assist some of these smaller communities who simply do not have the necessary tax resources to be able to provide the facilities to accommodate industry, should industry themselves make the decision to locate in some of the small so-called rural American sections.

Do you agree with what I am saying here? I would like to have a generalization or comment from you in this regard.

Mr. KNOWLTON. I think in general I do, Mr. Clausen. It might be pertinent, I think, for me to refer to and enter into the record a study that was made by the National Council of the Paper Industry on this matter of its problems of joint industrial and municipal plants.

The talk was given at our annual meeting in February. It has not been published—I have a draft of it here—and I would like to submit it for the record.

Mr. CLAUSEN. Mr. Chairman, I ask unanimous consent of the committee that this particular draft of a speech be incorporated in the record at this time.

Mr. McCARTHY. Without objection, so ordered.

(The report follows:)

[Paper presented at Annual Meeting of Members, Technical Session, National Council for Stream Improvement, Inc., February 20, 1968, New York, N.Y.]

TREATMENT OF PULP AND PAPERMILL WASTES IN PUBLICLY OWNED FACILITIES

By Dr. Isaiah Gellman, Assistant Technical Director, National Council of the Paper Industry for Air and Stream Improvement, Inc.

INTRODUCTION

The subject of this paper has received considerable attention by National Council staff over a period of time dating back to the organization's inception. While understandably concentrating our efforts on problems associated with the separate discharge and treatment of mill waste water, we have always recognized that "joint treatment,"—or what we have chosen today to call "treatment in publicly-owned facilities," would represent the most opportune and desirable solution for a growing number of mills.

I need only remind you of some of our earlier reports on this subject, such as Technical Bulletins 91 and 156. These dealt in general terms with such matters as methods for assessing sewer service charges, the use of municipal ordinances and contracts to formalize such arrangements, and pretreatment requirements for protection of publicly-owned physical facilities and prevention of interference with treatment processes.

We have looked into, and reported on, the important criteria that must be considered by our industry's mill's before entering into arrangements for public treatment, such as availability of ample capability, means for arriving at stable and equitable rate structures, and the possibility of avoiding burdensome capital expenditures. We have stressed the need for maintaining a continuing sense of responsibility by the particular mill, once such arrangements have been com-

pleted, to insure that the desired water quality protection objectives are met, and at costs that bear a reasonable relation to the service rendered.

Today we witness a strong surge of interest in public treatment (which we will document later in the talk) stemming from new requirements for additional and more widespread treatment, availability from state agencies of funds for treatment feasibility studies (coupled with some encouragement of regional treatment systems, both for improved program supervision and more economical treatment), and the availability of public funds (both federal and to an increasing degree, state) to underwrite large fractions of the construction cost of publicly-owned systems regardless of the source of effluent being treated.

Recognizing this renewed interest, the Council undertook a study during 1967 designed to establish the degree to which public treatment was being provided, and the specific circumstances surrounding the renewed interest displayed by a growing number of mills, so that we could strengthen our cooperative mill technical program where public treatment came under active consideration.

Today's paper therefore represents a preliminary report on the results of this study, which will be followed by a more detailed technical bulletin on the same subject.

STATUS OF TREATMENT IN PUBLIC FACILITIES

The study showed that of 753 separate pulp and paper manufacturing locations, 123 or 16 percent now discharge their process effluents to publicly-owned treatment facilities. These mills account for approximately 5.5 million tons per year of paper production capacity, or 11 percent of the industry total. This suggests that they tend to the smaller mills, and this is borne out by the results. The mills are concentrated in a number of local areas such as Los Angeles County, Northern Metropolitan New Jersey, Philadelphia, Neenah-Menash, Kalamazoo, Cincinnati and Chicago, which together account for 58 mills, or 47 percent of those discharging to public systems.

The mills tend to produce those grades most closely associated with location in, and adjacent to, major urban centers. Coarse paper grades account for 80 mills, of which 64 produce waste paperboard and 16 roofing felt, while fine paper grades account for most of the remainder (divided evenly between fine papers, specialties and tissue), only four mills are characterized as integrated pulp and paper units. Twenty-five percent are smaller than 50 TPD, and the median size is only 100 TPD. Only twelve mills, or 10 percent, are larger than 300 TPD.

Of the total, 59, or slightly less than half, receive primary treatment, and 64 mills are provided with secondary biological treatment. Median treatment charges reported are 20¢ and 65¢ respectively for primary and secondary treatment for the waste paperboard mills, and 30¢ and 80¢ for all the mills surveyed respectively. Three methods for computing sewer service charges enjoy approximately equal use. These are ad valorem property taxation, and rates based on flow alone, or flow plus effluent strength. Specially negotiated contracts account for only 7 percent of the rates, while the more prevalent systems each are in use at approximately 30 percent of the mills.

MILLS CONSIDERING DISCHARGE TO PUBLIC FACILITIES

This broad category covers mills known to have recently completed arrangements for public treatment, those where feasibility and rate schedule studies are still in progress, and some where such studies have led to a decision to proceed with independent treatment. The entire group includes 92 mills or 12 percent of those now operating. Their annual capacity totals 5.5 million tons, or 11 percent of the total for the industry. Taking both groups together, we find that use of public treatment facilities is more than an academic question for 28 percent of the industry's mills involving 22 percent of its production capacity.

The largest concentration of mills now considering public treatment are located in three states: New York, Massachusetts and Maine, accounting for 55 mills or 60 percent of the total. These are states where effluent treatment has only recently gathered momentum after extended periods of stream classification and abatement program development for both municipalities and industries, and where planning funds have been allocated by the legislatures to assist such regional treatment feasibility studies.

The size distribution profile of these mills is similar to that for mills already in public systems. Nearly 25 percent are smaller than 50 TPD, and the median size is 100 TPD. The coarse paper grades account for a lesser fraction of the mills, being equalled in number by those producing fine grades. We also see a

significant increase in the number of integrated pulp and paper mills involved in such studies. This is particularly true in Maine and New York. Most of the feasibility and rate studies are not far enough along to permit an analysis as to projected costs or financing procedures. The bulk, however, are predicated on providing secondary treatment in line with actual needs or regulatory policy.

Some aspects of these new studies merit extended attention, and I would therefore spend the remaining time dealing with these.

IMPACT OF STATE AND FEDERAL CONSTRUCTION GRANT PROGRAMS

In nearly every case where the proposed use of public facilities involves new treatment plant construction, construction grants figure very prominently. Out of a sampling of 22 projects for which we have detailed data (involving 33 mills), the minimum authorized federal support grant of 30 percent is referred to in seven cases, or for 33 percent of the projects. As a practical matter, it seems doubtful that such aid will fully materialize unless the federally budgeted funds for this purpose are increased or the Department of the Interior finds some alternate pay-as-you-go method for financing construction. Such an approach is under consideration by the Bureau of the Budget, by which the federal government would commit itself to pay the yearly principal and interest on local project bonds until its authorized commitment was met.

An equal third of the projects, principally in New York State, anticipates 60 percent construction grant support. These would consist of a 30 percent state Pure Waters Program grant and an equal 30 percent federal grant prepaid, however, from the available state program funds until the state can be reimbursed from Washington.

A few projects in New York, Maine and Massachusetts hope for in excess of 70 percent grant assistance, assuming both federal and state support, as well as a bonus for qualifying under comprehensive river basin abatement programs.

USE OF EDA—DISTRESSED AREA DEVELOPMENT GRANTS

Several projects have qualified for large EDA grants through the U.S. Department of Commerce distressed area assistance program. These involve a total of six mills at Grand Rapids, Minnesota, Lincoln, New Hampshire, and Monroe, Michigan.

(1) *Grand Rapids, Minnesota.*—The first of these will permit construction by the village of Grand Rapids of a \$1.3 million chemical coagulation and sludge dewatering installation handling 11 MGD, with 80 percent of the capital cost met by EDA. The mill will meet the remaining capital charges, as well as the operating costs, on a fixed contract basis.

(2) *Lincoln, New Hampshire.*—The Lincoln project is of interest in that it will involve installation of a Copeland fluidized bed unit for burning of evaporated spent sulfite liquor, as well as a conventional treatment plant for white water, weak pulp mill wastes and municipal sewage. The entire project will cost \$4 million, with EDA contributing \$1.75 million, mainly for the liquor system, New Hampshire, \$1.3 million, mainly for sewer and treatment plant construction, the Town of Lincoln, \$0.2 million, and Franconia Paper, \$0.8 million for internal liquor collection and sewer modifications. The Copeland unit will be located at the mill, and leased by its owner, the Town of Lincoln, to the mill.

(3) *Monroe, Michigan.*—At Monroe, the city sewage plant is being expanded to 24 MGD capacity including activated sludge treatment at a cost of \$7.75 million, with the help of a 50 percent EDA grant. The new facility will have sufficient capacity for treatment of effluent from four local paperboard mills.

While the number of locations that have benefited from this public aid program is quite limited, it is of interest that effluent treatment costs have been recognized as economically burdensome to a degree sufficient to warrant some form of relief under the EDA program.

SPECIAL FEASIBILITY STUDIES

At least three technical feasibility studies are now in progress designed to provide data both for design and rate determination for proposed projects at Macon, Erie and Green Bay.

(1) *Macon, Georgia.*—The Macon project involves the Macon Water Board, Georgia-Kraft and Armstrong Cork, and may result in a 15 to 20 MGD plant providing activated sludge treatment. A small-scale continuous treatment unit

has been operated at the city treatment works, handling a simulated mixture of the three effluents to develop necessary process design data. Target date for secondary treatment at Macon is 1971.

(2) *Erie, Pennsylvania*.—Hammermill has undertaken a \$150,000 company-financed study, in cooperation with the City of Erie, of the possibility of expanding the local modified activated sludge plant to handle the weak pulping, bleaching and paper mill effluents now totaling 25 MGD. The sewage plant expansion being considered may run as high as 50 MGD to account for urban growth as well. Study objectives include development of design criteria and project costs, and determination of the possible reduction in nitrogen and phosphorus nutrient discharge from the municipal plant as a result of combined treatment of the nutrient-deficient Hammermill effluent. In view of the importance attached to the problem of Lake Erie eutrophication, this stands as a major feature of the study.

(3) *Green Bay, Wisconsin*.—Four mills and the Metropolitan Sewerage District are collaborating on a similar study, which has received a \$250,000 grant from FWPCA covering 75 percent of total study cost, with the mills and the district sharing the remaining 25 percent. The study may lead to a 50 MGD activated sludge plant with 18 MGD accounted for by the four participating mills. All now have some form of pretreatment, with the three sulfite mills recovering or burning a substantial portion of their spent liquor. The degree of liquor segregation and weak effluent recovery can have a strong influence both on project capital and operating cost estimates. Consequently, the mills are investigating additional means for improved liquor collection, including the possibility of reverse osmosis. The latter is the subject of another FWPCA grant-supported project at the Pulp Manufacturers' Research League.

CONTRACT TERMINATION CLAUSES

Companies contemplating public treatment are understandably concerned with contract provisions that specify (a) the public agency's obligations to provide continued treatment, and (b) the company's continuing obligations should discharge be terminated, either because of mill shutdown or development of alternate treatment measures. Some examples of such contract clauses should therefore prove instructive.

(1) *Hutchinson, Kansas*.—A 1958 agreement between the city and the mill specifies that both are obligated toward each other for a 30-year period, with successive automatic yearly renewals, unless notice is served six months before expiration. The mill may withdraw on written notice if the basic sewerage charges, originally set at 3 cents per 1,000 gallons, are increased to 3.3 cents.

(2) *Oswego, New York*.—More recently, Hammermill and the City of Oswego, New York, signed an agreement stipulating that the City must accept and treat the mill's effluent as long as the mill remains in operation. Hammermill agreed to pay the basic charge so long as the City was required to make payments on the construction bonds, even if effluent discharge to the city treatment system were to be terminated. One year's written notice would be required before such discharge could be terminated.

(3) *Kalamazoo, Michigan*.—In the recent Kalamazoo project agreement, the city and the contracting paper mills are obligated for a 30-year period, with successive automatic 5-year renewal periods unless notice is served six months before expiration. The mills are prohibited from acquiring new treatment facilities so long as the city is prepared to provide the necessary treatment. The mills are, however, obligated to continue using existing primary treatment systems.

(4) *Monroe, Michigan*.—The agreements just concluded obligate the city and three mills for 15 years, with automatic 5-year renewal periods, during which the city must provide treatment and the mills must deliver their effluents for treatment, or pay fixed charges if mill operation is terminated. The agreement with the remaining mill runs for 40 years with the mill obligated for at least 15 years of fixed charges should mill operation terminate.

TYPICAL RATE SCHEDULES—SURCHARGES AND PENALTIES

Finally, I would like to examine with you briefly several rate schedules now in effect, and see how they deal with load variations in terms of surcharges and penalties.

(1) *Stockton, California*.—This schedule covers a secondary treatment system treating 22 MGD. Its charges to a local paperboard mill approximate 40 cents per

ton, two-thirds of which represents monthly charges, and one-third a demand charge computed from volume and load data for the heaviest month of the previous year. The mill pays no surcharge for BOD, which does not exceed 400 pp. The surcharge itself is not particularly punitive, being only 0.5 cents per lb. BOD in excess of 35 lbs. BOD per ton paperboard. The mill charges per 1,000 gallons are somewhat lower than the average for the total municipal system, reflecting some economies of scale in levying charges.

(2) *Battle Creek, Michigan*.—The Battle Creek Schedule has no surcharge rate, and results in charges of approximately 80 cents per ton for the local mills. Since the 1960 secondary treatment plant expansion proceeded from negotiations to handle the industrial load, there is provision for assessment of fixed charges proportional to the capacity allocated to the mills in the expansion design.

(3) *Middlesex County, New Jersey*.—This trunk sewer and joint treatment system employs a utility block rate approach by which unit charges decrease steadily as sewered load increases. While the schedule therefore does not appear to have a punitive surcharge quality, the rate itself is fairly high, so that if a conventional 200 TPD paperboard mill were to discharge, its rate would approximate 20 cents per 1,000 gallons, or \$2 per ton. A 50 percent increase in load beyond normal would increase these charges by at least one-third to nearly \$3 per ton, far beyond the median charge cited earlier.

(4) *Cincinnati, Ohio*.—The Cincinnati formula also yields charges above the median for normal paperboard wastes. Assuming an effluent just at the surcharge level for BOD and suspended solids, a doubling of both concentrations would add 60 percent to treatment costs.

(5) *Kalamazoo, Michigan*.—The Kalamazoo rate schedule, which was developed concurrently with the engineering studies to determine the degree of local participation, yields variable operating charges well below the median for secondary treatment. A large portion of the new treatment plant cost is covered by new ad valorem city taxes, and these constitute around 50 percent of the total charges for waste paperboard-type effluents. An interesting feature of this rate schedule is the application of additional property tax to participating mills located outside the city limits (for equalization purposes), as well as a collection charge based on distance from the treatment plant to cover trunk sewer costs.

(6) *Monroe, Michigan*.—The newly developed rate schedule for Monroe, which I have not presented here, provides surcharges which penalize effluents in a compound fashion as they increasingly exceed the treatment capacity assigned to the particular discharger in the project design. This approach, which is at variance with the conventional utility block rate systems, may be encountered more frequently as a means of discouraging overloads on closely designed systems, or possibly building reserve funds for interim modifications of facilities to meet such loads.

SUMMARY

After examining the data collected in this industry survey, several points bear statement by way of summary, and as guides to further industry action.

(1) While mill location factors account for the bulk of the public treatment systems now in use, the coincidence of new treatment needs for communities and nearby mills, plus the authorization or availability of public construction grant funds are undoubtedly responsible for the large number of new projects under consideration.

(2) These new projects require increasingly thorough feasibility studies, often involving pilot scale investigation, before proper choices can be made from the numerous alternatives that present themselves. The matter of choice is complicated by the uncertainties surrounding the availability of public construction grant funds.

(3) There is a broad scatter of sewerage charges around the median for given degrees of treatment, as well as great variety in both the methods of rate determination and specific unit costs. This suggests that there is only limited value in examining other rate schedules for specific inputs to a new project schedule.

(4) We do find a growing use of the principles advanced in the Joint Committee report in 1951. These call for engineering and fiscal analysis of capital and operating costs for the different functional parts of a given project to determine what costs should be assigned to (a) property taxes (regardless of sewer use), (b) fixed annual costs on a predicted basis considering capacity reserved in project design to known dischargers, and (c) variable costs assigned based on actual measurements and analysis of effluent discharge.

(5) Lastly, regardless of the specific features of either the treatment system evolved, or the agreed-on rate schedule and contract form, there must be proper protection for the interests of all parties in terms of financing, administration, overload protection and treatment process performance. This requires continuing management attention to all aspects of such arrangements, both during project study phases, and after these have been translated into the reality of operation.

MILLS NOW DISCHARGING TO PUBLIC FACILITIES

Number of mills, 123 of 753 or 16 percent.
Capacity, 10⁶ TPA, 5.5 of 50 or 11 percent.

Major locations:	Number
Los Angeles County	13
Northern Metropolitan New Jersey	19
Philadelphia	6
Neenah, Menasha	6
Kalamazoo	5
Cincinnati	5
Chicago	4
Total (47 percent of 123)	58

MEDIAN REPORTED SEWERAGE CHARGES

[Cents per ton]

Waste paperboard mills (31) :	
Primary	20
Secondary	65
All mills surveyed (54) :	
Primary	30
Secondary	80

DEGREE OF TREATMENT NOW PROVIDED

[In mills]

Primary	59
Secondary	64

MILLS NOW DISCHARGING TO PUBLIC FACILITIES

Distribution by size:

TPD:	Number
0-100	62
101-200	35
201-500	23
Greater than 500	3

Median size 100 TPD.

Distribution by type:

Coarse paper grades:	
Waste paperboard	64
Roofing felt	16
Fine paper grades	39
Integrated pulp and paper	4

MILLS STUDYING DISCHARGE TO PUBLIC FACILITIES

Distribution by size:

TPD:	Number
0-100	44
101-200	19
201-500	23
Greater than 500	5

Median size 100 TPD.

Distribution by type:

Coarse paper grades:	
Waste paperboard	32
Roofing felt	6
Fine paper grades	38
Integrated pulp and paper	15

DISTRIBUTION OF RATE COMPUTATION METHODS¹

Type:	Percent
Negotiated contracts-----	7
Ad valorem-----	30
Flow alone-----	31
Flow plus strength-----	32

¹ Based on replies from 90 of 123 mills.

STOCKTON, CALIF., RATE SCHEDULE

Monthly charge: \$22 per 10⁶ gallons; \$5 per 1,000 pounds BOD (>400 p.p.m.); \$330 fixed service charges.

Annual demand charge:¹ \$100 per 10⁶ gallons; \$7.20 per 1,000 pounds BOD.

MIDDLESEX COUNTY, N.J., RATE SCHEDULE

Utility-type block, rate per quarter—Flow (in million gallons):

1st 40-----	\$236
Next 60-----	96
Next 100-----	50

BOD 30 to 800 tons, \$21 to \$10 per ton.

Suspension solids 10 to 700 tons, \$29 to \$10 per ton.

CL₂ 30 to 810 cwt., \$13 to \$10 per cwt.

CINCINNATI, OHIO, RATE SCHEDULE

Minimum monthly charge for first 7,500 gallons, \$150 to \$90.

7,500 to 2,250,000 gallons, 13.4 cents per 1,000 gallons.

Over 2,250,000 gallons, 7 cents per 1,000 gallons.

Surcharge volume, S_w, 3 cents per 1,000 gallons.

Where S_w, cubic feet=Flow, 10⁶ gallons [(S_w -2,500)35+ (B_w -2,500)43].

Where S_w and B_w= pounds S.S. and BOD per 10⁶ gallons.

BATTLE CREEK, MICH., RATE SCHEDULE

\$14.20 per 10⁶ gallons.

\$5.14 per 1,000 pounds BOD.

\$11.64 per 1,000 pounds suspension solids.

Plus fixed charges covering 26.7 percent of 1960 secondary treatment expansion of \$5,600,000.

KALAMAZOO, MICH., RATE SCHEDULE

\$0.94—30.80 per 10⁶ gallons (collection charge).

\$17.40 per 10⁶ gallons flow, or 47 percent.

\$4 per 1,000 pounds BOD, 33 percent.

\$2 per 1,000 pounds suspension solids, 20 percent.

Plus: 2 mills additional property tax on mills outside city and continued operation of mill primary facilities.

Mr. KNOWLTON. All right, sir. Thank you.

Mr. CLAUSEN. Thank you very much for an excellent contribution, Mr. Knowlton.

Mr. MCCARTHY. Mr. McEwen.

Mr. McEWEN. Thank you, Mr. Chairman.

Mr. Knowlton, we appreciate your testimony here today. There is one thing at this time that I would like to discuss.

MILLS USING MUNICIPAL FACILITIES

Your testimony on the bottom of page 4 of your prepared testimony indicates that now 11 percent of the mills in the country are involved

¹ Levied for maximum load month.

in a joint industry-municipal plant arrangement, and an additional 11 percent will be coming in, or a total of 22 percent of the industry.

Am I to take it from this that 78 percent of the industry will not be able to have their wastes treated through a municipal treatment plant?

Mr. KNOWLTON. I think we must approach that with recognition of the fact that the more recent additions to our capacity, the large plants that are being built today and have been built in the last few years, have been out in the country and have included in the basic design of the facility treatment works that are necessary to handle their waste.

The problem comes down to the older facilities that do not have built-in treatment facilities. Hence, this 22 percent of the capacity assumes much larger proportions when you consider the number of plants involved and the fact that this is an older part of the industry.

We are urging, as an industry policy, that as many of the older facilities as possible investigate thoroughly the possibilities of cooperation and participation within a joint municipal-industrial plant.

This study of Dr. Gellman goes into that in some depth and I think it will be of interest to your committee.

Mr. McEWEN. Let me put the question a little differently. Has there been any question of concern or complaint from those companies whose plants are not situated in a community where they can tie in with a municipal treatment plant? In other words, a mill located out in the country, not at any city or village. In one such case they spent a substantial amount in putting in their own treatment facilities. Do such plants feel they are at any competitive disadvantage or is there an unfair burden placed on them because they cannot go into a joint municipal-industrial venture?

Mr. KNOWLTON. I think this is a matter of facing the realities of each individual situation. If they were foresighted and public spirited enough to go ahead and do the job, and in other cases where a marginal mill is concerned it cannot be done. This leads to a possible other suggestion and that is the creation of a quasi-municipal sewage district. I believe there are some of those in existence in the Middle West. I think attempts have been made to create such districts and make them eligible for the same type of treatment and public-fund assistance as is available to the municipal plants. But no two—it is a platitude to say that no 2 mills are exactly the same, and in New York State I think in most individual cases they have had to hammer out a program with the authorities of the health department in effecting the reduction of their pollution loads. This can be done in other States as well.

Mr. MCCARTHY. Thank you very much, Mr. Knowlton. I just wanted to add my compliments to you personally, to your company, and to the Institute for the tremendous work you have done in leading the way. I am in a way an alumnus of the paper industry. The company I was with for 13 years before coming down here had seven paper mills, National Gypsum Co., so I am familiar with your problems and the tremendous challenge that you faced.

I think the whole country really should be in your debt for the way you really tackled this problem. And I hope that your example will be followed by others.

The committee will stand adjourned until—

Mr. KNOWLTON. Excuse me, Mr. McCarthy. May I give one further answer to Mr. McEwen?

Mr. McCARTHY. Yes.

NO COMPLAINTS OF UNFAIR COMPETITION

Mr. KNOWLTON. Mr. Flom has told me we know in the Institute of no instance where any company has considered that they have been subjected to unfair competition. I think that is in response to the question you asked.

Mr. McEWEN. Thank you.

That is it.

Mr. Chairman, we all know one of the arguments for the importance of a Federal program is to try to bring all States into some uniformity so that an industry in one State would not be at a competitive disadvantage with industry in another State, because in one State it would be burdened with cost of pollutant abatement and in another State it would be free of any responsibility for pollution abatement. That is what I was leading into—the question of whether we here bring in an element of competitive advantage or disadvantage to this program.

Mr. KNOWLTON. I think we accept it as a fact of life.

Mr. McEWEN. In your industry, you have not had any complaints?

Mr. KNOWLTON. No.

Mr. McCARTHY. The committee will stand adjourned until 2 p.m. (Whereupon, at 12:40 p.m., the committee was recessed, to reconvene at 2 p.m., the same day.)

AFTERNOON SESSION

Mr. McCARTHY (presiding). The House Public Works Committee is now in session.

Our first witness is Mrs. Wallace, of the Oyster Industry.

THE "OIL AND HAZARDOUS SUBSTANCE POLLUTION CONTROL ACT OF 1968"

STATEMENT OF ELIZABETH WALLACE, THE OYSTER INSTITUTE OF NORTH AMERICA

Mrs. WALLACE. Thank you, Mr. Chairman.

Good afternoon, gentlemen and friends.

Our trade association, The Oyster Institute of North America, was chartered in 1908 to unify the oyster growers. Now we represent the producers and dealers of the three species of oysters and three major commercial species of clams.

It will not surprise you to hear that we vigorously support H.R. 15906, the Oil and Hazardous Substance Pollution Control Act of 1968. As the victims of the carelessness and exploitation of the oilmen, we hope for relief and redress for our tribulations from this type of pollution.

Almost everywhere, ships pump their bilges at night and often within the confines of an estuary. This practice is so harmful to the

waters and shore, and so apparent the next morning, one is baffled that it can happen so often. If the owners of vessels become responsible for spilling, leaking, pumping the bilges, et cetera, we wager that crewmembers will become instantly intelligent in their operations. It is our hope that the Secretary can issue regulations that can and will prove negligence that holds up under court action. States have struggled with provisions, regulations, laws, and inspections only to be defeated in actual practice.

EFFECTS OF OIL ON OYSTER PRODUCTION

In the various areas, oil affects our industry in different ways. Should a substantial oil spill occur in an estuary growing shellfish, we would hope it could be removed before sinking or being sunk. Oil eventually sinks, and oysters have a free-swimming larvae stage, during which they are helplessly exposed to all kinds of environmental conditions. Oil in water has a definite affinity for other material. Silt floating in water soon is attached to oil that might be present. The specific gravity of the mass increases and it gradually sinks to the bottom. The rapidity of sinking is dependent somewhat upon winds, amount and size of particles of the silt. If the silt load is high and the particles large the oil sinks rapidly. If the silt is low it may float for some days and be widely dispersed by the winds and current. In either case the result is bad for marine organisms. Oil is even attracted to microscopic plants and animals. The organisms no longer remain suspended but sink to the bottom to die. The late Dr. Thurlow Nelson has reported an extensive mortality of soft-shell clams from a heavy film of oil being deposited at low tide on the bed. Dr. Nelson said, "Oil is, gallon for gallon as thrown out, the most destructive to aquatic life of all the foreign substances now entering our coastal waters." Oil incorporated into the tissues of oysters and clams causes them to be inedible even if it does not cause their demise from smothering or from toxic effects.

In States with tidal areas as in North Carolina, South Carolina, Georgia, Alabama and in the Gulf States, oyster reefs form all along the tidal areas and on reefs in the shallow bays that are often exposed at low time. Oil not only kills the spat—that means the baby oysters—in these tidal areas but renders the shells unfit as clutch. In other words, the young oyster cannot or will not set on an oily shell. The potential for any such shore or reef hit by oil slick is negated.

In the gulf, where oil is produced, the older rigs send oil ashore by small, numerous feeder lines that are often laid in shallow water and subject to breakage and leakage due to age, location, and being damaged by boat action. Unless these leaks are really major, they go undetected for long periods of time. However, the seepage, if near an oyster bed, ruins them as food. In such cases, the oyster farmer is out of luck and may have gone out of business. It is virtually impossible to establish responsibility in these cases.

In the process of drilling wells, the discharge is supposedly collected and the oil is burned in pits ashore. The oystermen of Louisiana testify that the entire mess is too often dumped wherever it is conveniently undetectable. There are not enough supervisory people available in Louisiana to make the State law effective. Dr. Paul Galtsoff and

others studying this problem in Louisiana found even this soluble fraction was detrimental to oysters, hampering feeding and having the effect of narcotics.

Our members along the York River in Virginia—a western tributary of Chesapeake Bay—have suffered losses ever since the installation of the Shell refining plant across the river from Gloucester. There were all kinds of promises and assurances that Shell would not be harmful to the vast marine resources of the York River. The oyster growers in the vicinity get poorer each year, and more and more are giving up. Spills and accidents occur all the time. Virginia fines the company, but the oystermen are told, "Sorry." If only the victims had redress, the couplings, the hoses, the valves of the equipment loading the tankers would, we believe, suddenly operate much better. To add to their grief, up the river on the opposite side, there is a Navy supply depot. Despite our Government's effort to abate pollution of its own vessels, the evidence is strong that Navy ships at the depot discharge oil or pump their bilges. Oily debris frequently fouls these areas and the only source is the depot itself.

RESOLUTION OF PACIFIC COAST OYSTER GROWERS ASSOCIATION

The members of the Pacific Coast Oyster Growers Association, which are affiliated with us, expressed their problems with oil and oysters in the following resolution and action at their annual meeting last August:

Whereas, extensive contamination of shorelines, bays, harbors, and estuaries of England and France resulted from oil from the wrecked tanker *Torrey Canyon*, and

Whereas, similar oil spills at sea have caused contamination of beaches along the coast of the United States, and

Whereas, certain methods used for control of oil spills may also cause harm to biological populations, and

Whereas oysters, clams, crabs, and other food species may be contaminated by oil or by chemicals used in control of oil spills so that they will be unfit for market, and

Whereas Puget Sound is being considered as the major West Coast unloading area for super tankers, and other bays important to oyster culture are used as ports for medium-sized tankers: Now, therefore, be it

Resolved by the Board of Trustees of the Pacific Coast Oyster Growers Association:

1. Each member be alert to opportunities to participate in local decisions regarding establishment of oil depots in Puget Sound and in other areas important to oyster culture, and that,

2. The association and each member demand inclusion of adequate facilities and procedures for control of oil spills in any oil depot development, and,

3. The Association go on record as supporting national programs for development of procedures for controlling oil spills which will prevent damage to commercial fish and shellfish resources, and that,

4. The executive secretary be instructed to send copies of this resolution to the appropriate local, State, and Federal agencies.

A little oil is too much for our product because it cannot be marketed once these hydrocarbons become incorporated into the tissues. We cannot be a part of the GNP without your help.

AMENDMENT RECOMMENDED

We respectfully request that section 21 of H.R. 15906 be amended as:

(a) add to line 11 the phrase "and to the marine resources."

CONCLUSION

For the giant steps in water pollution legislation, which you of the public works committee have initiated and maneuvered into law in recent years, we are profoundly grateful. Together we must implement these statutes via continuous effort and realistic appropriations to achieve effectiveness. Because of the vision and action of this very committee, we may be able to preserve and, hopefully, restore this heritage. Despite the willingness of the polluter and the inertia of bureaucratic bodies, I see progress as I move about the country. Polluters are less arrogant, the public is aroused even if sometimes misdirected, and nearly every State is about to agree to belonging to the union, that is, being a part of the action. As we participate in the various enforcement conferences being called by the Federal Water Pollution Control Administration, the most frequent controversy whirls about how to achieve adequate sewerage treatment facilities for municipalities.

FEDERAL ASSISTANCE TO WASTE TREATMENT PROJECTS

I was at a loss to know whether I was supposed to testify on H.R. 15907 or not. However, with this being such an important problem, we hope that it can be resolved as quickly as possible nationally. In my simple way of thinking, I suggested that a 50-percent grant for any disposal system that meets the Federal specifications be guaranteed.

It seemed to me that confusion and disenchantment of the various States may be dissipated in action if these people knew exactly what they must do and how much they could depend upon the Federal Government for help.

Mr. McCARTHY. Thank you very much, Mrs. Wallace.

Mr. Chairman, any questions?

Mr. BLATNIK. I have no questions. I appreciate your attending. The witness again has been so helpful in the past and so have the witnesses of the Oyster Institute of North America.

PROGRESS IN WATER POLLUTION CONTROL

I think we are on the road to making progress, though, as you indicate in your concluding statement. I think the picture is a lot different now than it was 10 years ago.

Mrs. WALLACE. Yes, Mr. Blatnik, that is true.

Mr. BLATNIK. In many cases the dominant concept was that pollution was primarily a local problem and a health problem, but now we realize that it is a very complicated problem in breadth and depth, in interlaces and interlocks. Municipalities and States and river basins and industry, people, and the Federal Government definitely have quite a stake in it.

We are going to try to improve the financing, which will be one area most complicated, and try to make it easier for the municipalities to engage in the financing. It has been a problem. We hope to do more on oil pollution. It has been really complicated, I think, in the area of enforcement, as to what do you do with a complicated substance that you deal with, plus other chemicals such as phenols? We don't know what to do with it when it gets in the water.

Mrs. WALLACE. It is toxic.

Mr. BLATNIK. The pollution act, by the acts of 1955 and 1956, the financial aid was aimed a little more heavily at larger cities now to avoid a lot of the pollution from the congested metropolitan areas. Not only industrial but also municipal wastes are very harmful to your existing oyster beds.

Mrs. WALLACE. Yes. All along the shorelines. It is so important to have a comprehensive plan to take care of their wastes, so that we do not actually make it worse. And this can happen.

Mr. BLATNIK. Those engaged in comprehensive planning, plus other criteria which you have spelled out in 1966, will enable municipalities to get up-to-50-percent grants.

Mrs. WALLACE. That is right.

Mr. BLATNIK. I appreciate your acknowledging that we have made some progress. We all agree there is a long, long way yet to go.

Mrs. WALLACE. That is right.

Mr. BLATNIK. We are determined not only to go the distance but to speed up, as we get cranked up, and we are getting cranked up in a very positive and effective manner to accelerate, to keep up with the need.

Mrs. WALLACE. We count you and your colleagues our major blessings. Thank you, Mr. Blatnik. Your vision is so wonderful.

Mr. MCCARTHY. Mr. Wright?

Mr. WRIGHT. I think not at this time.

Mr. MCCARTHY. Thank you very much, Mrs. Wallace.

(At this point Mr. Blatnik assumed the chair.)

Mr. BLATNIK. Next is our respected colleague and our friend, long a very ardent worker and coworker on behalf of pollution control, Congressman John Dingell, from Detroit, Mich.

Let the record show that Congressman Dingell was present on two different occasions this morning.

Congressman, we appreciate your coming back again for the convenience of the committee this afternoon.

Let the record show that, in addition to being a consistent supporter of the Federal Water Pollution Control legislation in Congress ever since its inception in 1956, the Congressman also has additional amendments, and his bill, H.R. 494, is before us, which I imagine you will describe and explain, as well as H.R. 16044, which will encourage or design to encourage the improved operation of waste treatment plants through chemical as well as mechanical means.

Congressman, you are a familiar figure before this committee. We respect your competence in this field and certainly your earnestness, and also your ability to speak so articulately and make yourself clearly understood with or without the script. Please proceed as you wish. Your entire statement will appear in the record, the complete text, at this point.

STATEMENT OF HON. JOHN DINGELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. DINGELL. Thank you, Mr. Chairman.

I must apologize to the Chair for having been caught rather short of time and rather busy in my office and not having been able to prepare the appropriate number of statements for the committee.

Mr. Chairman, for the record, my name is John D. Dingell. I am a member of Congress from the 16th Congressional District of Michigan. I would like to thank the Chair, my very dear friend of long standing, for the privilege of being here today. I would like to commend the chairman and the members of this distinguished committee for their longstanding interest in clean water and in restoring cleanliness to the waters of this Nation. I believe it may be fairly said that without the leadership of the distinguished chairman of the subcommittee, my good friend from Minnesota, Congressman John Blatnik, that the progress we have seen, the enormous progress we have seen in these past few years, would not have taken place. It has been one of my proud boasts that I have been able to work with the distinguished chairman over these years, going back to the enactment of the first original water pollution control bill in 1956, the Blatnik bill, that has done so much to clean up our waters and lay the basis for further progress.

Mr. Chairman, I will not comment on the administration legislation before you. There have been a number of other witnesses who have done so. I would like to comment on some peripheral matters before the committee that I believe might be of assistance to the committee in terms of evolving a good piece of legislation.

FEDERAL GRANTS FOR USE OF NEW METHODS IN WASTE TREATMENT PLANT OPERATION

I would like to direct the attention of the committee first of all to H.R. 16044, and point out the virtues of that very modest proposal, authorizing some \$25 million a year from fiscal 1969 through 1972, inclusive, and which sums would remain available until expended for purposes of making grants annually to States, municipalities, intermunicipal or interstate agencies, for the purpose of assisting in the operation of existing waste treatment plants, using proven methods to achieve substantial and immediate improvement in effluent quality, including phosphate removal.

These grants would be made pursuant to State plans and would be made after State water pollution control agencies certified to the Secretary of the Interior that the operation of such waste treatment plan has been performed and will be performed in accordance with the purposes of the bill to utilize newer and better methods and new additives in matters of this type.

I would point out that this legislation has significant support throughout the industry, particularly the manufacturing chemists and a number of their constituents and members.

I would point out that I do not appear here today as representative of this group or of any member, and I do not appear as advocate of any particular device or treatment, form of treatment or additive that might be used. But it occurred to me in this time of great shortage of funds that one of the things that can be done would be to utilize every method presently available to us to substantially improve the quantity and quality of treatment that is afforded to our waters. As the Chair well knows, the cost of operating these plants is enormous. It is going to be in the next 5-year period something on the order of \$1.4 billion and conceivably can rise considerably higher.

In addition to this, there is going to be needed for construction something on the order of \$8 billion, or perhaps as high as \$8.7 billion, to construct the plants needed.

INADEQUATE FINANCING OF WASTE TREATMENT WORKS CONSTRUCTION

Our present level of expenditures, particularly considering the level of expenditures that has been programed in the budget for the past, that is for this fiscal year and the previous 2 fiscal years, certainly gives us no hope of reaching or stimulating the level of construction that is needed.

In the State of Michigan, Federal grants will go to somewhere between one-third and one-fourth of the eligible applicants and conceivably this year it could run to even a smaller fraction, and we are finding continuing dissatisfaction from the communities and from the States at the level of funding that the Federal Government has made available.

This is a matter of some concern, since I must tell you it is my frank opinion that we are now finding our program of waste treatment plants and sewage abatement works and things of this kind being significantly retarded by the low level of Federal funding that is now being made available. I am sure the record indicates, Mr. Chairman, the figures insofar as construction grants as opposed to the level that this committee has authorized.

I would urge, Mr. Chairman, that this committee in its continuing interest in this matter not simply permit this question of water—of Federal grants under Public Law 660, as amended, to be handled in the rather cursory fashion that it has been handled by the Appropriations Committee and the Bureau of the Budget. I would hope this committee in the exercise of its oversight and its wise policy in the field of water pollution would be most vigorous in compelling a more generous and a more wise and a more realistic level of expenditures, and one which is more closely related to the very carefully planned-out program, in terms of the level of expenditures that has been programed by this committee in terms of the language of the amendments to Public Law 660.

I would point out that in all probability the level of funding that is authorized by Public Law 660 over the next 40 or 50 years is not going to be adequate even if maintained and substantially enhanced. This, of course, is one of the reasons why H.R. 16044 affords opportunity for some advancement.

H.R. 16044 NOT A SUBSTITUTE FOR ADEQUATE TREATMENT

I want to make it very clear, Mr. Chairman, that the purpose of the bill is not to set up a substitute for adequate treatment. It is to do two things, Mr. Chairman. First of all, during this time when funds are short and can be expected to be short, it is my hope that this legislation will afford the basis for improving significantly the quality of our water treatment through encouraging States, municipalities, communities, interstate, intermunicipal agencies to utilize the most modern and efficient operation of their treatment plants.

POTENTIAL EFFICACY OF CHEMICAL TREATMENT

Potentially, it is possible, Mr. Chairman, to remove, through the utilization of polyelectrolytes, polymers and a number of other things. The significant improvement in waste treatment, conceivably in well-operated plants, operated on a secondary basis, it is possible to remove as much as 90 percent of phosphates and to have a significant improve-

ment in removal of nitrates, in terms of removal of solids, in terms of removal of biological oxygen demand, and in terms of removal of micro-organisms.

Some of the figures that have come to my attention in this matter are interesting. First of all, the raw-waste system—flocculation system—can be used in primary plants where the solids-handling equipment is adequate and where the plant is adequate to the needs, and can result in significant increases in the efficiency of the plant. Raw-waste flocculation can be used in almost every secondary plant.

Chemical treatment could be applied now to additionally prevent some 240,000 tons per year of organic solids from reaching our waters. With adequate sludge facilities at a capital cost of some \$5 million, an additional 118,300 tons per year of organic solids could be retained and could be removed from our waterways.

In cities where raw-waste flocculation could be successfully applied now, a tremendous amount of increase in terms of efficiency could be achieved for the modest cost of \$15 million. I would point out, Mr. Chairman, that the level of addition of these chemicals to the waters is very, very slight. In some instances as few as five parts per million can create enormous increase in efficiency of the plant.

I would point out, Mr. Chairman, that in a number of other cities where raw-waste flocculation could be successfully applied, if sludge capability was made adequate, would cost an additional \$5 million.

In cities where phosphate removal is required—some eight cities, having about 1,103 million gallons per day—this could be accomplished for about an additional \$6 million.

The total costs for a program of the kind that I have indicated would run about \$24.6 million or just a little less than the amount authorized.

The cost for application in terms of removing solids and improving solid removal would be \$3 to \$8 per thousand gallons—rather per million gallons. And phosphate removal can be improved for \$10 to \$20 per million gallons. And it is conceivable that if these new devices and these new chemical additives are used properly that we could reduce without increasing significantly our expenditures for capital construction the pollution to our waterways by about 40 percent.

This is a tremendous improvement in terms of our endeavors to abate the pollution of our waterways, and it is quite important.

I do have something that I found in Chemical & Engineering News, a rather excellent article about chemical removal of phosphorous being feasible, something which is one of our major problems, and I will submit that for the record at this point if I may do so.

Mr. BLATNIK. Without objection, so ordered.

(“Chemical Removal of Phosphorus Feasible” follows:)

CHEMICAL REMOVAL OF PHOSPHORUS FEASIBLE

[From the Chemical & Engineering News]

Removal of 90 to 95% of phosphorus from municipal waste waters can be achieved today in a typical 10-million-gallon-per-day treatment plant for 5 cents or less per 1000 gallons. This is the conclusion drawn by the Federal Water Pollution Control Administration from an evaluation of phosphate removal cost data. The data have been accumulating from lab and pilot plant tests as well as from full-scale plant operations.

The process which would lead to these costs and which can be designed, constructed, and operated with greatest confidence today would employ chemical treatment, according to Dr. Leon Weinberger, FWPCA's assistant commissioner

research and development. But certain types of combined chemical biological treatment systems will also be ready soon, he says.

These findings were among reports presented at the four-State Lake Michigan enforcement conference held earlier this month in Chicago (C&EN, Feb. 12, page 9). Conferences were also the first to hear from Michigan's department of public health on results of tests conducted last year with Dow Chemical involving use of polyelectrolytes for removing phosphates from municipal waste water. Dow also chose the time of the conference to announce its commercial entry into phosphate removal using polyelectrolytes (C&EN, Feb. 12, page 19).

Alkaline removal with lime and adsorption or precipitation with metallic hydroxides are the two common types of chemical treatment for phosphate removal. They can be applied as tertiary treatment or independently as separate treatment for various waste waters. Typical phosphate removal for either type or combination, Dr. Weinberger says, readily exceeds 90%. Along with phosphate removal there is a reduction in turbidity, in biological oxygen demand and chemical oxygen demand, and in bacterial numbers.

The principal advantage today in chemical treatment, Dr. Weinberger points out, is that plant operation can be kept within close control. Moreover, laboratory data will predict dosage levels for particular phosphate residuals as well as settling rates for clarifier designs. A still further advantage is that chemical treatment can be effective even with fluctuations in the preceding conventional processes and should maintain a more uniform effluent quality than other phosphate removal processes.

Dr. Weinberger provides a cost breakdown for a tertiary chemical process treating secondary effluent. Capital amortization on the basis of cost per 1000 gallons varies with plant size, ranging from 0.97 cent per 1000 gallons for a 1-million-gallon-per-day plant to 0.65 cent per 1000 gallons for a 100-million-gallon-per-day plant. Operation and maintenance likewise vary, depending on plant size. For a 1-million-gallon-per-day plant, they would run 0.41 cent per 1000 gallons, and for a 100 million gallon-per-day plant, 0.08 cent per 1000 gallons.

Other costs are constant. Land amortization runs 0.09 cent per 1000 gallons. Cost of sludge disposal by hauling to land fill (25-mile one-way trip) is .67 cent per 1000 gallons.

More than half the total cost is in chemicals. Lime, at 1.75 cents, and iron salt, at 0.87 cent, add up to 2.62 cents per 1000 gallons. However, a significant savings is possible if sludge is recalcined to recover part of the lime. Dr. Weinberger puts the savings at 0.96 cent per 1000 gallons.

Even without recalcination, however, the total comes in at under 5 cents per 1000 gallons. For the 1-million-gallon-per-day plant, the total is 4.76 cents per 1000 gallons. For a 10-million-gallon-per-day plant, it's 4.31 cents; and for a 100-million-gallon-per-day plant, it's 4.11 cents. For normal plant loadings, 5 cents per 1000 gallons (\$50 per million gallons) is equivalent to about 1 cent per person per day.

Two forms of combined chemical/biological treatment can be used. A precipitant such as lime may be added to the primary tank, where it takes out most of the phosphate with some additional removal in the biological phase. Alternatively minerals can be added directly to the actuator tank, causing slightly soluble phosphorus compounds to form and precipitate. In the latter process, Dr. Weinberger says, additives such as aluminum or iron salts cause no interference in the biological activity, and mixing and residence time provided by the aerator are enough for precipitate to form.

One example of mineral addition is a field study completed by FWPCA at the Xenia, Ohio, waste water treatment plant. Using makeshift equipment and adding sodium aluminate at an aluminum-to-phosphorus ratio of 1.8:1, 85 to 92% removal of phosphate was obtained. Normal removal, which the plant returned to following the study, is 20%. The chemical cost for the test, Dr. Weinberger points out, was 5 cents per 1000 gallons, even though equipment was makeshift and conditions were not the most controlled.

Equipment was makeshift at Grayling, Mich., too, where Michigan's public health department and Dow conducted field tests with polyelectrolytes. Tests were started following bench studies that indicated 90% or more of total phosphates could be removed from raw wastes by plain sedimentation with the addition of about 20 mg. per liter of iron as ferrous chloride, an equal amount of sodium hydroxide, and about 0.5 mg. per liter of an anionic polymer.

Iron and caustic, according to the report, were added to the sewage at the lift station with no formal mixing facilities. Polymer was added at the entrance to the settling tank with crude and temporarily rigged mixing equipment. Moreover, the report says, the plant was grossly overloaded hydraulically at that time because of the city's seasonal influx of tourists.

COST AND OPERATING DATA BUILD UP AS EXPERIENCE WITH PHOSPHATE REMOVAL GROWS

Location	Status	Size—Million gallons per day	Process	Actual or projected cost for 10 to 20 million gallons per day, cents/ 1,000 gallons	Actual or projected phosphate removal efficiency, percent
Lake Tahoe, Calif.	Operational	2.5 to 4	Chemical—alum tertiary with separation beds	<9	>95 (0.1 to 1.0 p.p.m. in effluent).
Nassau County, Long Island, N.Y.	Operational since 1965	0.6	do	<7	>60.
Pomona, Calif.	Operational	3	Chemical/biological—alum secondary with activated sludge	<5	>80.
Lansdale, Pa.	do	0.3	Chemical—alum tertiary with separation beds	<10	>90.
Wayne, Mich.	Operational for short period	45	Chemical/biological—alkaline waste calcium chloride to raw sewage	<10	>80 (jar test).
Lake Tahoe, Calif.	Startup February 1968	4 to 7.5	Chemical—lime tertiary with separation beds	<9	>95 (0.1 to 1.0 p.p.m. in effluent).
Las Vegas, Nev.	Operational since 1961 (2 sites)	4	Chemical—lime tertiary with single clarifier	<4	>95 (0.5 p.p.m. in effluent).
Washington, D.C.	Operational	Pilot plant	Chemical—lime tertiary with dual clarifiers and lime recovery	<4	>95.
South central region	Prior operation (5 sites)	do	Biological—activated sludge, phosphate uptake	<1	to 87.
Black River plant, Baltimore, Md.	Operational test	20	do	<1	>90.
Irvine, Calif.	Operational	Pilot plant	Biological—activated sludge, phosphate uptake, acid elutriation, chemical removal	<5	~90.

Source: Water Pollution Control Administration.

Even so, total phosphate removal was between 60 and 80%, with a most probable mean value of 72%. Without polymer, there was a "very low order" of removal. In addition to phosphates, suspended solids removal was from 60 to 87%, with a mean value of 78%—a 27% increase compared to performance without chemical addition. Five-day BOD removal increased to about 58% during the study from a mean value of about 40% before and after.

Similar tests were carried out at Lake Odessa, Mich., where treatment facilities include trickling filters and sludge digesters. Made under similarly makeshift and uncontrolled conditions, the tests showed that polyelectrolyte treatment enhanced trickling filter performance, as measured by five-day BOD and suspended solids removal. With the chemical treatment, suspended solids removal increased from a mean value of 78 to about 89%, and BOD removal from about 60 to 80%. Total phosphate removal fell between 75 and 92% with a mean value of 82%.

Based on its work in these and other tests, Dow has decided to offer commercially its services for phosphate removal projects. The company feels that removal of 90% or more is possible at costs varying from as little as \$15 per million gallons to as high as \$50 per million gallons, depending on the particular waste and treatment facilities.

Mr. DINGELL. I would point out, Mr. Chairman, that this matter was discussed in connection with the report of the Department of the Interior, the summary, entitled "The Cost of Clean Water," which is filed with the Congress, pursuant to Public Law 660, as amended, and point out in there that this study did indicate that removal efficiency may be increased by more effective use of currently available treatment methods or by other methods now under study. Then they went on to discuss where a Federal Water Pollution Control reesearch and development grant has been made to a Cleveland, Ohio municipal treatment plant for a pilot study, the possibilities of increasing the removal of efficiency by using the relatively new polyelectrolytes, coagulating chemicals, offers rather considerable promise, and I would hope that this promise can be realized.

REASONS FOR LEGISLATION

The reason for the legislation, I must confess to you, is first the shortage of funds available to carry out our program of abatement of water pollution through new construction, something which I think must be remedied at the earliest possible moment.

But in addition to this, Mr. Chairman, I must point out that I have a very strong antipathy to the idea of making grants for operation. But I believe the only way we are going to get these new devices used and to achieve the efficient operation of these plants that we really hope to is by making funds available to the desperately faced cities and municipalities of this Nation which are having a difficult time meeting the problems which they face in such diverse matters of poverty, establishment of adequate school system, police protection, preventing riots, providing educational opportunities, jobs and all of the other things that we have traditionally looked to the cities and the States to do.

STRENGTHENED ENFORCEMENT AUTHORITY

Mr. Chairman, if I may now direct the attention of the Chair—there are several other bills that I believe are of interest to the committee. Several of them are not before this committee. I would urge upon the committee careful consideration of H.R. 494 and the principles that are included in that legislation. This would strengthen and

improve the authority to enforce abatement of pollution, would require filing of notice with respect to discharge of matter in interstate or navigable waters, and require permits to regulate discharge matters, and accomplish a number of other purposes, which I believe would be desirable including expediting significantly the rate at which water pollution abatement actions may be carried forward. It also would provide consistent with the principles established in the Air Pollution Act the devices for encouraging international participation in the abatement of water pollution, a matter which greatly affects my district along the Detroit River, which does affect a number of the boundary waters across the country.

VESSEL AND OIL POLLUTION CONTROL

I would also, Mr. Chairman, urge consideration of H.R. 486 and H.R. 485, two pieces of legislation which are not assigned by the rules of the House, Parliamentarian and Speaker to this committee, but which do merit consideration insofar as the principles they involve.

H.R. 485, dealing with the establishment of programs to abate pollution to the navigable waters to the United States, through establishing standards for disposal of waste from vessels. There are an enormous number of vessels that are in daily commerce upon our waters, which are an enormous source of pollution.

In my district there is something on the order of 100,000 vessels of all sizes, in almost continuous operation on the waters of the Detroit River and Lake Erie.

I would point out that the same study that I mentioned earlier indicates that in any given year there are 110,000 commercial and fishing vessels, 1,500 federally owned vessels, and about 8 million recreational watercraft using the navigable waters of the United States.

In addition to this, there are approximately 40,000 foreign ship entrances in the United States which are recorded each year. This would attempt to establish standards which would affect the handling of waste treatment by these vessels, requiring holding tanks, chlorination and other matters, with which at fairly modest costs a significant improvement in water quality, particularly in confined waters, like the Great Lakes, could be achieved.

H.R. 486 does substantially the same thing, with special emphasis on the Great Lakes, and also, Mr. Chairman, in connection with some problems that we have with regard to the Oil Pollution Act of 1924.

I recognize that there will be some jurisdictional problems in connection with these matters between the Committee on Public Works and the Committee on Merchant Marine and Fisheries of which I am a member, to which these bills are assigned. But I believe there is the possibility of utilizing the principles already established in connection with the Boating Act, I believe of 1958, which does afford the Federal Government the established principle of establishing Federal standards in connection with the handling of vessels, vessel licensing and matters of this kind, and at the same time establishing a practice of appropriately requiring State action. Failing this State action, the Federal Government is authorized to step in and to reach the particular problem.

I would point out, Mr. Chairman, that this generally goes along with the practices and the patterns that have been established under this very able committee, under the leadership of its very able chairman, in terms of arriving at State programs which are entirely adequate—which are approaching the level of adequacy, in terms of handling pollution originating from industrial and municipal sources. I would hope, Mr. Chairman, too, that this committee would give thought to some of the problems that are now arising that are a little bit out of the ordinary realm of pollution.

THERMAL POLLUTION

And I would direct the attention of the Chair and the members of the committee to the problem of thermal pollution. In theory at least this can be handled through the water quality standards, and it is subject to abatement as is any other pollution.

I would point out, Mr. Chairman, because of the novelty of it, it has not yet been so handled. I would point out in addition to this, Mr. Chairman, that there will very shortly be large numbers of enormous steam generating plants, both conventionally powered through conventional fossil fuel uses and also through the use of nuclear energy. These are going to have heat emissions into our waters which will be enormously higher and enormously more destructive than those which we have faced in times past, with the conceivable possibility of very, very adversely affecting water uses, water quality, fishing and wildlife, municipal water supplies, and a number of other things.

I would hope, Mr. Chairman, that some effort would be made by this committee in its consideration of water pollution legislation in accomplishing two things.

Perhaps meeting this need through special legislation, directed specially at the problem of thermal pollution, or possibly through exercise of its oversight authority. The particular problem I found is not so much the fossil fuels, as it is the atomic reactors, which are going to create particular problems, and on which, in terms of abatement of this kind of pollution I have received most minimal cooperation, indeed outright refusal to cooperate any way through the Atomic Energy Commission.

And I would again urge the strong attention of this committee to the very, very frank, what I regard, very frankly, Mr. Chairman, as a very gross failure by the Atomic Energy Commission in this area.

Mr. Chairman, that concludes my statement. I wish to express again my thanks to my dear friend the chairman, and also the members of the committee, for the privilege of being here and giving you my views on these matters today.

Mr. BLATNIK. Thank you.

The gentleman again impresses us with his facility and easy manner of his oral presentation without a text. I wonder what you would do if you had a written text?

Mr. DINGELL. Thank you.

Mr. BLATNIK. You do offer several sound suggestions. I repeat some of them: The point of improving chemical means to improve the efficiency of mechanical processes now in use, and research work is being

done on organic polyelectrolytes, water soluble polymers, and particularly in the field of phosphate, which has been a real problem.

Mr. DINGELL. This is a major problem in the lake area and in our area.

Mr. BLATNIK. It would save a lot of money trying to clean up the lakes under the clean lakes program. We will consider these suggestions here. The suggestions you made are very, very pertinent and very helpful. We assure the gentleman they will be given full and careful scrutiny and evaluation. We will call on him for his judgment, too, and also the deliberations in executive session.

We do hope to come out with, I hope, what will be a very effective sort of omnibus bill, putting several categories in for which substantial improvements are justified and necessary now on the basis of past experience and past finding. We find improvements can be made. It is not going to be easy. The gentleman will recognize that. You have fiscal problems, chemical problems, you have enforcements aspects to which you made reference, and all of these. To mesh them all into the existing program without causing too much dislocation will take some careful planning. But I know with the cooperation we have received in the past from membership on both sides of this committee, I think we will come out with a very good sort of omnibus bill to amend the current water pollution law.

If there are no further questions from either side——

PURPOSE OF H.R. 16044

Mr. DINGELL. Mr. Chairman, I would like to add one comment that I should have mentioned earlier. The purpose of my legislation, the handling of the treatment plants, financing programs for new additives, new treatment programs, is not to substitute for adequate construction, adequate treatment. It is to encourage where primary treatment is the only source available for maximum efficiency of that, where secondary is the maximum level of treatment, that should be operated in the most efficient fashion to remove the largest amount of all kinds of wastes from the water. And it is not, Mr. Chairman, my intention to substitute this for, let's say, having secondary treatment plant construction or tertiary treatment plan construction. It would be my hope it would be utilized to the maximum treatment, both through adequate construction, adequate facility, adequate treatment method.

It is my hope also, Mr. Chairman, and I wish to stress this, that the funds from this will very clearly not be made available for such things as drawing water out of the waste, dehydrating the waste, which some persons might try to utilize this kind of program for. That is a problem I expect the operator of the plant to meet through conventional financing sources and through his own resources. But it is my hope that this will be available to encourage novel, new and particularly efficient methods as opposed to just encouraging more of the same kind of inefficient operation and to encourage utilization of old devices but with Federal financing. I do not believe that would be at all an appropriate basis for me to come before this committee on.

(The following letter was received subsequently from Representative Dingell:)

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., May 2, 1968.

Hon. GEORGE H. FALLON,
*Chairman, Committee on Public Works,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: I am concerned about the provisions of H.R. 15907, a bill to revise regulations governing Federal contributions to sewage treatment plants, as they would affect plans in Michigan to control water pollution by the construction of 210 new sewage treatment plants and enlargement of 126 existing plants.

To launch this statewide program estimated to cost \$1,200,000,000 the Michigan Legislature has placed a proposal to authorize a \$335,000,000 bond issue on the ballot for November. If adopted, part of those funds would be used to "pre-finance" future Federal contributions to sewage plant construction, in accordance with provisions in existing Federal law.

The Michigan Legislature has been willing to go ahead on the basis of the express and implied promises in the 1966 Federal legislation, as has New York. I understand nearly a dozen States have similar plans in various stages of development.

The passage of H.R. 15907 as introduced would substitute other provisions for financing future sewage treatment plants. This change would take place before the people of Michigan have a chance to vote on the plan approved by the Michigan Legislature.

I am sure you can appreciate that such an action would offer opponents of the Michigan water cleanup an opportunity to create uncertainty in the public mind about the State's program. I hope a way can be found to avoid placing Michigan's Clean Water Program in such jeopardy.

Michigan spokesmen object to the proposals in H.R. 15907 which would divide sewage treatment plants into two classes, and offer 30-year contracts for Federal contributions to construction costs only to plants in areas serving more than 125,000 persons. This would limit this form of aid to 14 of Michigan's 83 counties, and 106 of 335 communities planning construction. It would force sponsors of plants planned for 229 communities to rely on sharing in Federal year-to-year grants. The prefinancing provisions presently in the law apply equally to plants of large or small size.

H.R. 15907 also would deny the tax exemption privilege to the proposed Michigan bonds, and insist on user charges which would be unrealistic in some instances. I endorse the conclusions expressed by Ralph A. MacMullan, Director of the Michigan Department of Conservation, in his letter to you of April 24:

"PL 84-660 as it stands now is a good law. We strongly believe that the amendments contained in H.R. 15907 would weaken, rather than strengthen water pollution abatement in Michigan. We urge that the State of Michigan be allowed to continue its battle against water pollution under the commitments made by Congress under the Clean Water Restoration Act."

This need not preclude Congress from offering more explicit financing assurances to encourage future construction programs.

Will you please include my letter in the record of hearings on this legislation.

With every good wish,

Sincerely yours,

JOHN D. DINGELL,
Member of Congress.

Mr. BLATNIK. We have a letter here from Hercules, Inc., in support of your H.R. 16044 and encouraging the use of water soluble polymers in the separation of solids from liquid suspension.

It will appear in the record at this point.

(The letter from Hercules, Inc., follows:)

HERCULES, INC.,
Wilmington, Del., April 18, 1968.

Hon. JOHN A. BLATNIK,
*Rayburn House Office Building,
Washington, D.C.*
(Attention of Maurice B. Tobin, legislative assistant).

DEAR MR. BLATNIK: During the past seven years Hercules Incorporated has investigated the use of organic polyelectrolytes (water soluble polymers) in the

separation of solids from liquid suspensions. Our research program has resulted in extensive trials at municipal waste treatment plants and we have proved that these materials significantly improve solids removal. It has been demonstrated that typical waste treatment plants can increase solids removal by as much as 50 percent through the use of polyelectrolytes in their existing physical facilities.

Little or no capital expenditure is required to use these chemicals, since a simple mixing and feeding system, which is generally standard in municipal waste treatment plants, is the only equipment needed.

The technology involving the use of polyelectrolytes has not been fully utilized by the municipalities because :

(1) Present laws do not force immediate pollution abatement, and

(2) Existing Federal subsidies encourage municipalities to construct additional facilities and rely on long range results instead of *immediate abatement through use of chemicals*.

H.R. 16044 introduced by Congressman Dingell on March 19, 1968 would provide funds to increase the capability of *existing* municipal waste treatment systems, immediately reducing pollution from these sources.

Hercules urges enactment of H.R. 16044 which would expedite the cleaning up of our waterways.

Yours very truly,

S. H. HELLEKSON, *General Manager*.

Mr. BLATNIK. Thank you very much, Congressman.

Mr. DINGELL. Thank you, Mr. Chairman.

Mr. BLATNIK. Next we have a panel of witnesses from the American Petroleum Institute and also a representative from the American Merchant Marine Institute. I believe they are all together.

Am I correct, Mr. Checket?

Mr. E. S. Checket is the marine general manager of Mobil Oil Co., New York City. I believe Mr. Checket will give the first part of your panel statement, followed by Mr. P. N. Gammelgard and Mr. Pittman, from the Shell Oil Co., is available for questioning. I understand you have no statement.

Mr. Ralph E. Casey—Mr. Casey, we understand you will join the panel in the interest of time. You have an interest in the subject matter?

Mr. CASEY. Yes, Mr. Chairman.

Mr. BLATNIK. Mr. Checket, will you proceed? Please give your name and title for the record.

OIL POLLUTION CONTROL

STATEMENT OF EVERETT S. CHECKET, MARINE GENERAL MANAGER, MOBIL OIL CO., NEW YORK, N.Y., AND MEMBER OF AMERICAN PETROLEUM INSTITUTE'S GENERAL COMMITTEE; ACCOMPANIED BY P. N. GAMMELGARD, VICE PRESIDENT OF ENVIRONMENTAL AFFAIRS, AMERICAN PETROLEUM INSTITUTE; JOHN W. PITTMAN, SHELL OIL CO.; AND RALPH E. CASEY, PRESIDENT, AMERICAN MERCHANT MARINE INSTITUTE, INC.

Mr. CHECKET. Thank you.

Mr. Chairman and gentlemen, my name is Everett S. Checket. I am general manager of the marine transportation department of Mobil Oil Corp. I am also a member of the American Petroleum Institute's general committee, division of transportation, and it is in the latter capacity that I am appearing here today. I also have the pleasure of representing the Western Oil and Gas Association.

Inasmuch as Mr. Gammelgard will also comment on the legislation now before you, my remarks will be limited to the effect of proposed section 19 of S. 2760, or H.R. 14000, on vessels.

We are aware that your concern, as members of Congress, is how to strengthen our laws to protect the Nation's harbors, rivers and coastlines. I can assure you that we, in the petroleum industry, recognize that both Federal law and international agreements need revision in order to afford adequate protection.

Those of us who operate tanker fleets recognize that we—along with all those who transport oil or other substances capable of causing pollution—have a responsibility not only to try to prevent pollution, but also to act swiftly to minimize potential damage from a discharge or substances into the environment.

There is ample testimony to our acceptance of this responsibility in the many voluntary actions oil companies have taken to remove spills, restore beaches affected by oil spills, and to cooperate with local authorities in many harbor areas in purchasing and maintaining equipment to contain and remove spilled oil.

Many oil companies have been, and are continuing to spend considerable time and money in research on new and more effective dispersants and emulsifiers to lessen the harmful effects of an oil spill and in the design of fixed and portable standby booms to be used from ships or shore. Also, through our so-called load on top procedures, and rigidly enforced controls during loading and unloading operations, we have made great progress toward eliminating pollution during our normal operations.

Since it is our understanding that section 19 of S. 2760 is intended to affect all vessels—including tankers, dry-cargo and passenger vessels, smaller commercial vessels, such as barges and tug boats on our rivers and harbors, plus pleasure craft—we fully support its basic objectives. Without some modifications, however, we can foresee some very real problems in achieving its basic objectives.

It will be our purpose in this statement to enumerate the problems we see in the bill and suggest ways in which they might be overcome and the bill might be made more effective and workable.

We should like to turn, at the outset, to what we feel is the most important part of the bill, namely section 19(e) dealing with removal of oil spills.

FINANCIAL CAPABILITY OVERLOOKED

This section, as written, does not, in our view, accomplish the basic objective we all hope to achieve—namely the establishment of an effective legal and monetary program for recovery of the costs of removing an oil spill. We can foresee a variety of circumstances under which it would be impossible for the Secretary of the Interior to recover the costs of oil removal from the party who caused the spill.

For example, a small vessel operator with limited overall assets could be virtually bankrupt as a result of an accident resulting in pollution. Another instance might be that of a company whose sole asset consists of one ship—and if that ship were seriously damaged or lost in the accident involving pollution—where could the cleanup funds come from?

Then, too, a foreign shipowner causing pollution might not be accessible to the secretary for collection of costs resulting from pollution. In this last example, bear in mind that we are speaking of all categories of ships—freighters, tankers, bulk cargo, and so on—which in international commerce constantly travel in and out of U.S. waters, and along with U.S.-flag vessels are potential sources of pollution.

The public interest will not be fully protected unless legislation pertaining to an obligation to remove an oil spill also provides a constant and reliable guarantee of an availability of funds—in other words, what we call financial capability. The bill ignores this fundamental condition and therefore might give to the Secretary of the Interior a meaningless right to recover his costs in removing a spill.

We urge that this pivotal concept of financial capability be incorporated in the bill. We would suggest incorporating a provision that: (1) Any vessel registered, enrolled, or documented under the laws of the United States or (2) Any foreign vessel entering a port of the United States must demonstrate its financial capability. Evidence of financial capability can take many forms which the legislation should recognize.

INSURANCE

The most common form of providing financial capability is insurance. Demonstration of adequate coverage could be made by filing with the appropriate governmental authorities, at the time of registry or entry, a certificate of insurance, or an appropriate protection and indemnity club certificate of entry or similar evidence of insurance coverage, including self-insurance. Such evidence would demonstrate coverage of the shipowners' potential liability for the cost of removing a spill in the territorial waters of the United States and would assure that funds are available to cover the cost of removing spilled oil.

Any such amendment concerning evidence of financial capability should also permit such capability to be established by other means, such as evidence of sufficient corporate net worth within the United States, a voluntary deposit of assets within the United States, or a guarantee from a U.S. company of sufficient assets.

We also would urge that this provision leave room for the acceptance of possible international alternatives which may be adopted under the auspices of the Intergovernmental Maritime Consultative Organization, more familiarly known as "IMCO." This could be done by granting to the Secretary discretion to accept any alternative contained in an international convention or treaty to which the United States becomes signatory.

LIMITATION OF LIABILITY

Assuming the necessity of financial capability, it is essential that a shipowner's liability for the cost of removing a spill be subject to some practical limit, unrelated to existing or traditional limits of a liability. Without a limit, it would be impossible for many shipowners to establish financial capability. Most shipowners would undoubtedly try to obtain insurance in commercial markets against the risk of liability for the costs of removing a spill. But if this liability is not lim-

ited in any way, we are advised by the insurance industry that insurance would be practically unavailable.

The potential risks of unlimited liability would be too large a burden for many small independent vessel, barge, or tugboat owners to assume, and would result in their elimination from the industry. But, if a reasonable and realistic limit is imposed, such operators could obtain the necessary insurance in the marketplace.

We have a definite suggestion concerning what we think would be a realistic and reasonable limit on liability. There is, it seems to us, some relationship between the size of a vessel and the probable cost of removing an oil spill in which it is involved.

Size is an indication not only of the amount of oil or other pollutants the vessel might carry, but also of the damage it might inflict on another vessel, causing the latter to pollute. Thus, a 1,000-ton oil barge would not have the same pollution potential as a 50,000-ton tanker. Likewise, although a tugboat might cause a tanker accident, it would hardly be likely to be an accident of *Torrey Canyon* proportions; whereas a large luxury liner could be the cause of a collision resulting in a spill of such magnitude. For these reasons, an escalating liability related to vessel size seems reasonable to us.

We would, therefore, suggest that a vessel's liability for oil removal costs alone be limited to \$250 per gross ton, with an overall maximum limit of \$8 million. This should provide adequate funds for cleanup of spills except in an extreme case. For those very rare cases where the limit would not cover the cost of removing a spill, legislation, such as the Federal Disaster Assistance Act of 1950, referred to in the President's Report on Oil Pollution of February 1968, would be available to the Secretary of the Interior.

We believe that the limitation we suggest is in harmony with current international thinking and, at the same time, would give small individual shipowners, including the owners of barges on our rivers, a realistic liability they should be able to insure at a reasonable cost. Such a limitation of liability should be solely applicable to oil removal costs and should not be related to existing U.S. statutes pertaining to a vessel owner's rights to limitation of liability.

HOLD NEGLIGENT PARTY LIABLE

Another question raised by section 19(e) is whether it is just to hold a vessel owner or operator liable for reimbursing the Government for oil removal even if some other agent caused the discharge. Obviously a person should be liable for the consequences of his own negligence, but section 19(e) asks more than that. It makes no distinction between the shipowner who is the victim of an "unavoidable accident" resulting in pollution and the willful or negligent polluter.

Of course, to the man on shore it is of no consequence whether the oil that covers his beach was discharged willfully or accidentally. He wants it removed, as well he should. But at the same time the answer is not to protect one innocent party by making another innocent party pay, nor is it to excuse the guilty party while causing the innocent to pay. This would be contrary to long established concepts of justice and would place an economic burden on the shipping industry not placed by law on other segments of the business community.

We all know that in other areas, such as automobiles, liability is based on fault. When a driver crashes into a properly parked automobile, that driver, and not the owner of the parked car, is responsible for damages. Similarly, a tanker that is properly moored might be rammed by another vessel under circumstances clearly demonstrating that the other vessel and it alone was responsible for the collision and subsequent discharge of oil from the moored tanker. Nevertheless, section 19(e) would hold the innocent vessel liable for cleaning up the spill.

Similarly, a vessel striking an unmarked or uncharted wreck or shoal would be liable, and the party truly at fault—perhaps a Government agency that failed to mark the wreck or shoal—would not be liable under this bill even though the spill was generated by its negligence.

There are innumerable other possibilities of injustice—including that of a torpedoed vessel, which under section 19(e) would still be liable for cleanup.

These injustices can be corrected by amending the bill to stipulate that, in all cases, the party actually at fault alone is liable. In other words, section 19(e) should hold the negligent party, whom it might now excuse, and release the innocent party, whom it might now hold.

PERMIT SHIPOWNERS TO RECOVER COSTS FROM THIRD PARTY

We recognize that action to remove a spill must be taken promptly and cannot await a decision as to which party is at fault in causing the pollution. Therefore, while recommending that liability for the cost of removing a spill under section 19(e) should be predicated on fault, we suggest further changes which would be fair and would, at the same time, encourage a shipowner to promptly remove a spill, irrespective of fault.

To encourage such action on the part of shipowners the bill should provide that the party who caused the vessel to effect pollution is liable to the vessel, or the Federal Government, as appropriate, for the cost of removal. If so amended, S. 2760 would permit a shipowner who incurred expenses in voluntarily removing an oil spill to recover his costs or a proportion of the costs from a third party, including Government, whose negligence caused or contributed to the spill. This suggestion is in accordance with traditional principles of admiralty law.

PRESUMPTION OF FAULT

Furthermore, while urging that legal liability be predicated on fault, we suggest a further change that would encourage a shipowner or operator to remove a spill promptly. This change would shift the burden of proof as to fault from the Secretary to the vessel owner or operator.

This would mean that if, for example, the Secretary found it necessary to institute an action to recover the costs of cleaning up a spill, the shipowner or operator would have to establish lack of negligence to escape liability.

Such an amendment would give the Secretary an advantage he does not now enjoy. Under present law he must have evidence of willfulness or gross negligence before he can proceed against a vessel.

FEDERAL PREEMPTION OF FIELD

We have one further important suggestion. S. 2760 should "preempt the field" by providing that no other Federal statutes shall be construed as including within their terms a discharge of oil and that no State or local government or administrative agency may impose on any vessel owner or operator any requirement, penalty, or liability with respect to cleanup of any discharge of oil into or on the territorial seas or navigable waters of the United States.

"GOOD SAMARITAN" PROVISION

As will be noted by Mr. Gammelgard, voluntary cooperative programs to prevent and clean up oil spills have been hampered in the past by fear of liability for civil damages to third parties. There are times when the swift assistance of someone with appropriate equipment at or near the scene of an accident could help to prevent the spread of an oil spill, and thus minimize potential damage. I should therefore like to join Mr. Gammelgard in urging that a good samaritan provision, along the lines of the one he will suggest, be incorporated in this bill.

We do have a few thoughts in connection with other portions of the bill. However, as Mr. Gammelgard will discuss these in detail, I will merely state here that we support his recommendations.

Before concluding my statement, I should like to briefly summarize the major points of my testimony:

One, the petroleum industry shares the concern of the public and of public officials over the problem of oil pollution. We fully support responsive and effective legislation to help solve this problem.

Two, we believe that section 19(e) as written does not adequately protect the public interest, since it overlooks the question of financial capability.

Three, we urge amendments incorporating this concept of financial capability which, in its simplest form, means the insurability of the cost of removal of a spill.

We urge further amendment of the bill to provide that liability for the costs of removing a spill is subject to a realistic limitation unrelated to existing limitation of liability statutes.

We believe the bill should be changed to excuse the innocent party from liability for the cost of removing a spill and hold the negligent party who caused the spill liable for the costs.

We also suggest an amendment stipulating that, whenever it appears that a vessel discharged oil requiring removal, the Secretary of the Interior shall presume the shipowner or operator to be at fault until lack of fault has been established.

We would like to see a provision in the bill specifically permitting a shipowner to recover his costs in removing an oil spill from a third party whose negligence is proved to have caused the spill.

We believe this bill should "preempt the field," precluding State or other Federal action with regard to discharge of oil by vessels.

And, finally, we urge the adoption of a good samaritan provision to encourage the development of voluntary mutual assistance programs to combat oil spills.

In closing, I should like to thank the committee, in behalf of the American Petroleum Institute, for this opportunity to appear here today. We sincerely hope our comments will assist you in making this bill a more effective and workable instrument.

Thank you.

Mr. BLATNIK. Thank you very much for the statement, Mr. Checket.

Mr. Gammelgard, do you want to continue with the statement or will this be the presentation for the panel?

Mr. GAMMELGARD. I think if you asked your questions on Mr. Checket's part of our presentation, Mr. Chairman, that would probably be better.

DISCUSSION OF WITNESS' RECOMMENDATIONS

Mr. BLATNIK. My questions will be few at this point. There is a lot to digest in what is obviously a well-thought-out paper.

At the outset, the suggestion, recommendation of an insurance type guarantee provision to insure financial capability to protect those who are injured by an oil spill as such is an intriguing one. It is the first time that it has been offered or presented before this committee in the presence of the chairman and it seems to make sense.

Would I be correct if I were to say just to have a punitive provision alone would not give too much guarantee to the parties that are injured by an oil spill, either beach property owners or private residents, or resort owners, or whatever they may be? Would I be correct in assuming to punish say a small operator with very limited fiscal means, give him a penalty provision, to try to squeeze some money out of him would be like the old debtors' law where a fellow in debt too long was thrown in prison until he paid his debt? He would never have an opportunity to get out of jail to earn money to pay his debt, so it is a self-defeating thing.

Mr. CHECKET. You are quite correct, Mr. Chairman.

Mr. BLATNIK. You do have an excellent point there. The party that is being hurt by them wants it removed regardless of who is responsible for it.

Your recommendation shall receive our careful review and much more, certainly, validation than is possible in this limited time in this cursory review of the recommendations, and we assure you it shall be given very careful scrutiny.

On page 9 you state, in the middle of the page, you recognize that action to remove a spill must be taken promptly, and so forth. Therefore, while recommending that liability for the cost of removing a spill, and so forth, should be predicated on fault: "We suggest further changes which would be fair and would, at the same time, encourage a shipowner to promptly remove a spill, irrespective of fault."

I am not quite clear who would make a determination on fault and who particularly would make a determination as to who should do the actual cleaning up?

Mr. CHECKET. Mr. Chairman, what we are suggesting here is that, particularly in the one example, the ship, even if it was rammed by another ship, that the ship polluting or causing the discharge would not wait to worry whether the other fellow was at fault, but he should

promptly step in and take whatever actions can be reasonably taken at the time to minimize the effects of the oil spill.

We are saying that no matter who is at fault, prompt action must be taken by everyone involved.

Mr. BLATNIK. Would someone have to order them to take proper corrective action? Or is this voluntary understanding?

Mr. CHECKET. No, our suggestion here is they wait for no order of anyone, but they immediately take prompt action to minimize the spill. This could take many forms. This could take just moving the vessel out to the open seas without just waiting for orders from anyone, to use any and all means or measures available to combat the spill.

Mr. BLATNIK. Without going into anymore details, on the bottom of page 10, I may call attention to something I will need much more explanation to understand. You state: "we have one further important suggestion. S. 2760 should 'preempt the field' by providing that no other Federal statutes shall be construed as including," and so forth.

I am sure you have good reasons for it and good justifications, but what I am getting at, we will certainly have to consider the involvement of a State when it sets standards for waters within its jurisdiction involving State water standards approved by the Secretary of the Interior.

Would not the States have a role to play in the monitoring system to determine whether or not certain pollution is exceeding the standards?

Mr. CHECKET. No. Mr. Chairman, in that case, there would not be a conflict. I think what we are speaking of from just the marine side, the tanker side, is that there are agencies, Federal agencies, such as the Coast Guard, which issues regulations which would cover all areas that would assess fines. We are saying this bill should prevail and there could not be other regulations issued by the State which might be in conflict or duplicate the Federal legislation, so that we are responsible to one body for uniform legislation.

Mr. BLATNIK. Mr. Wright.

Mr. WRIGHT. Yes, Mr. Chairman.

Mr. CHECKET. I am intrigued by the possibilities of this creative suggestion you have brought to us. It is quite comprehensive it seems to me and is an entirely new and heretofore somewhat unexplored possibility. I think it has obvious merit. I want to ask a question or two about that.

First, I observed your comments on page 2 of your statement with reference to any voluntary actions oil companies have taken to remove spills, restore beaches affected by oil spills, cooperate with local authority, and further reference to considerable time and money spent in research and progress made toward eliminating pollution during your normal operations.

EXPENDITURES BY THE OIL INDUSTRY FOR POLLUTION CONTROL

I am familiar with some of that. As a matter of curiosity, would you, or perhaps Mr. Gammelgard, give us some reliable estimate as to how much money the oil industry may spend in a given year on the question of pollution in general, pollution abatement research?

Mr. GAMMELGARD. Mr. Chairman, I would like to attempt to answer Mr. Wright's question.

Over the years, we have conducted surveys within the industry as to expenditures for both air and water pollution control facilities from the industry's land-based facilities in the United States. And these, as I think you would all expect have been going up quite markedly in recent years.

The 10 years prior to and including 1965, for water conservation and water pollution prevention measures, industry installations, we invested over \$150 million in equipment alone. Now, this is strictly money put into brick and mortar and so forth,

In the year 1966, a survey that we have just completed shows capital expenditures of \$79 million; in 1967, \$113 million; in 1968, a projected \$145 million. These are investment figures, not including operating costs, which are substantial and amount to somewhere around \$50 million per year not including administrative costs nor research and development. In research and development, we have spent some \$22 million in water pollution research in the last 3 years.

Mr. WRIGHT. \$22 million in research? You mentioned last year \$145 million.

Mr. GAMMELGARD. This current year, 1968, \$145 million.

Mr. WRIGHT. Last year \$113 million?

Mr. GAMMELGARD. Yes, sir.

Mr. BLATNIK. Will the gentleman yield?

Do I understand that is just a capital investment for a pollution abatement control facility, just for the brick and mortar of the facility itself, installation? Is that correct?

Mr. GAMMELGARD. That is right.

Mr. WRIGHT. All of this is related to abatement of pollution?

Mr. GAMMELGARD. Yes, sir.

Mr. WRIGHT. That is considerably more than half of what the Federal Government is paying, is that right?

Mr. GAMMELGARD. Well, I think that the Federal Government for the fiscal year 1968, for water pollution control measures for Federal facilities, asked for \$51 million. I do not know what the actual appropriation was.

Mr. WRIGHT. We had something like \$203 million last year for program grants and this year I think it was testified yesterday that the request in the budget is for some \$225 million for the nationwide grant program.

This includes the amount that you spent in moving away the salts, for example, to keep them from getting into the water tables where you are drilling inland?

Mr. GAMMELGARD. This does include production expenditures in water pollution control.

Mr. Wright, regarding that \$51 million figure I gave you, this is not in the sewage-treatment plant grant program; this was a request for Federal facilities such as Army and Navy bases, and so forth.

Mr. WRIGHT. Yes, I understand the distinction which you made; yes, to the Federal Government's own facilities.

Mr. GAMMELGARD. Yes, sir.

Mr. WRIGHT. I was thinking in terms of the total national program.

Well, that is amazing. It is amazing also to see the acceleration of this type of activity. I think you said 10 years, completing in 1965, the industry spent \$150 million, inclusively, or an average of some \$15 million a year, and now you are up—in 1966, \$79 million; 1967, \$113 million; and in 1968, \$145 million. That is quite a rapid acceleration.

I suppose this reflects the recognition on the part of industry and business in general as well as the general public, of the growing importance of pollution abatement. I am delighted to see this kind of response on the part of this particular industry. I do not know, perhaps other industries are doing similar things too. I hope they are.

Do you know of any other industry, for example, that may be approaching those kind of investments?

Mr. GAMMELGARD. I do not know of any, Mr. Wright. I know that industry in general is greatly increasing the amounts they are spending for both air and water pollution control facilities. I think this is a development that is going along in the public sector, in the private sector, and the Government sector simultaneously.

Mr. WRIGHT. It is extremely heartening, because what we had hoped to do with this program was not to preempt the field in the sense that everybody would turn the job over to the Federal Government, simply because we were spending more money on it, but rather to stimulate and encourage more private and local expenditures. I think it can be demonstrated that we have encouraged more local expenditures by local governmental units during the first 8 years or 9 in which we had contributed a total of some \$500 million on the part of the Government in the grant programs, we had stimulated local investments of some \$3 billion in total, so I think that was a demonstrable success.

Now, if in the total effort and the attention that we have been able to direct to it, we have encouraged industry—and I do not know that the oil industry is typical, it is probably atypical, but even if we encouraged one industry to encourage its private endeavors to this extent, I think it is magnificent.

AVAILABILITY OF INSURANCE

With respect to your suggestion, the first suggestion that we require a showing of financial capability on the part of anybody who might have a capacity to pollute waters by oil spills, it seems to me that the key suggestion contained in that program is the requirement of insurance liability. This is not, if course, an entirely new concept. Many States require anyone driving an automobile in the State to have proof of liability insurance.

Do you have reason to believe this insurance can be obtained?

You mention a maximum liability of \$8 million, which is pretty high. Do you think insurance companies would make a program of that kind available?

Mr. CHECKET. Of course, we have looked into this matter, have discussed it with both the American Marine Underwriters as well as the United Kingdom-Scandinavian Underwriters, and we have been

assured that this insurance would be available, particularly coupled with a limit established as a limit of liability, and liability only with fault, that this could be available at a reasonable cost.

Mr. WRIGHT. You are reasonably sure that it could be?

Mr. CHECKET. Yes, sir.

Mr. WRIGHT. This is very interesting, because yesterday, without any detailed thought at all of this nature, I had posed a question to—I do not remember whether it was the Secretary of the Interior or one of his associates—as to whether the Department of the Interior had thought anything about requiring liability insurance. The reply, as I recall, was to the effect that they feared that the limit would be too small and the insurance industry would not be willing to sell liability insurance in sufficient size to accommodate this.

You indicate to me that you made these contacts?

Mr. CHECKET. Yes, sir.

Mr. ROBERTS. Will the gentleman yield?

Mr. WRIGHT. Yes.

Mr. ROBERTS. If I may interject, some of the outstanding insurance people in the United States and maybe Great Britain also would say they would take this risk I am sure.

Mr. WRIGHT. Mr. Chairman, I will indicate my great interest, then.

Your suggestion of a reasonable and realistic liability related to the gross tonnage of the vessel—

Mr. CHECKET. Yes, sir.

Mr. WRIGHT. And therefore to its potential pollution capacity, it seems very logical. Your specific suggestion is that the vessel's liability be limited to \$250 per gross ton with an average maximum limit of \$8 million.

I do not know of any of these disasters which have cost as much as \$8 million.

Mr. EDMONDSON. We have testimony regarding one that did.

Mr. WRIGHT. This would be the *Torrey Canyon*? Of course, that was the biggest one, the *Torrey Canyon*.

Do you have knowledge of the cost relating to the other cleanups of these spills?

Mr. CHECKET. Other than the *Torrey Canyon*, the only other one of really significant money that we know of was the report we heard this morning from the representative of Puerto Rico, where the cost of removal of the oil was estimated to be approximately \$500,000.

Mr. WRIGHT. \$500,000?

Mr. CHECKET. Yes, sir.

Mr. WRIGHT. I see. That would be well within the limit.

Mr. BLATNIK. The testimony by the Resident Commissioner of Puerto Rico late this morning, including I believe he stated the Commonwealth of the Department of Public Works as of April 15 had spent \$285,000 in cleaning operations. It is estimated that their final cost will run in excess of \$500,000. You are correct. But the problem is not quite that simple, getting back to the fault recommendation you bring.

Mr. CHECKET. Yes, sir.

Mr. BLATNIK. Clarifying jurisdiction. It has been called to my attention, on this occasion, that six government agencies, some from the

Commonwealth and some from the United States proper, from the mainland, arrived at the scene, and each was unsure as to which should do what, how much, or just when. So obviously it is an area that will require real careful evaluation, planning, and just to determine who has the authority to enforce work.

DISCUSSION OF RECOMMENDATIONS

Mr. WRIGHT. Mr. Chairman, this brings us to this so-called Good Samaritan suggestion that you have.

I am sorry that our colleague, Jim Howard, is not here. He made an intensive study on the spot of the Puerto Rican disaster and was telling me yesterday that one of the companies, I forget which one it was, at first had offered to come in and clean it up voluntarily and then, apparently upon consultation, with their legal officers, had to withdraw the suggestion for fear their voluntary act of cleaning it up might subject them to civil suits on the basis that they had assumed liability.

This, of course, is quite at cross purposes with their impulse to try to be helpful.

So that you believe we could incorporate into the bill some so-called Good Samaritan provision —

Mr. CHECKET. Yes, sir.

Mr. WRIGHT (continuing). Which would encourage immediate voluntary effort to clean up by, specifically, exempting this fellow from liability placed upon his good deed?

Mr. CHECKET. Yes, sir. We think this would be a very constructive amendment to the bill.

Mr. WRIGHT. It seems so to me. I think it is a very constructive suggestion all the way through. I think it bears very close sympathetic scrutiny by the committee, Mr. Chairman. I want to congratulate the gentleman on a creative and constructive approach, certainly not a negative approach.

It seems to me it does rather little good to pass a law that says somebody is going to have to pay for this if the person who is required to pay does not have money to pay. It is the old question of getting blood out of a turnip.

Mr. CHECKET. Yes, sir.

Mr. WRIGHT. So perhaps we need two things: First, some machinery to authorize and equip the Federal authority to move in rapidly and effect the cleanup if someone else does not do so, and secondly, a program of this type to establish liability, to require financial responsibility on the part of those who may incur liability, and to encourage voluntary acts of good will without the assumption of liability when the party is not the guilty party.

Mr. CHECKET. Yes, sir. We fully support that.

Mr. WRIGHT. I think it is very constructive.

Thank you very much, Mr. Chairman. I will not belabor the point at this time.

Mr. BLATNIK. Mr. Edmondson.

Mr. EDMONDSON. Mr. Chairman, can we assume there will be further testimony, both on details of the "Good Samaritan" provision and also

on the cost of the insurance proposal that has been suggested from these witnesses?

Mr. CHECKET. On the insurance proposal, if I can take the second one first, we would not have actual figures as to costs, neither we, and I presume not the insurance witnesses. This is a matter we have gone into at some length. We know we have been assured they will be of reasonable cost; but as premiums are set, they depend partially upon the experience factor of each individual owner, as to whether he pays something more or something less. And his cost factor would vary from year to year depending on his experience factor.

Mr. WRIGHT. Do you know whether there is any other country in the world today which requires this insurance or bonding protection in connection with ships operating?

Mr. CHECKET. I know of no other country at this time. It is certainly a question that we would hope would be considered on an international basis through the machinery of the CMI and IMCO.

Mr. EDMONDSON. On the "Good Samaritan" proposal, do you have some specific language to propose on it?

Mr. CHECKET. We actually do have some language that we have prepared with respect to the various points that have been made in my statement that would really incorporate in proposed legislation everything that we have recommended, and I know we would be prepared to submit this draft of recommended changes to the committee.

Mr. EDMONDSON. Mr. Chairman, I have no further questions. I would like to state for the record that I agree with the gentleman from Texas that we have had some very constructive and helpful testimony so far, and I think it is also general knowledge, at least in our part of the country, that the petroleum industry and leaders in the petroleum industry have been substantial contributors to conservation movements and organizations. They are very keenly interested in the overall problem of improving the quality of our waters and our environment. And I think this is a plus for the petroleum industry that is not generally understood in some parts of the country. I certainly know that in our State, some of the real leadership in this field is supplied by the leaders in the petroleum industry.

Mr. CHECKET. Thank you.

Mr. BLATNIK. Thank you.

Mr. DORN. Mr. Chairman, I do want to join my colleagues in commending the petroleum industry for its fine testimony here today.

I am interested in this "Good Samaritan" clause suggestion, and the insurance also. Perhaps we would have an opportunity for further questioning later on in the hearing.

As an individual member of the committee, and I would say for other members of the committee also, I am impressed by the amount of expenditures this great industry has spent to alleviate this problem.

Thank you, Mr. Chairman.

Mr. BLATNIK. Mr. McCarthy.

Mr. MCCARTHY. Thank you, Mr. Chairman.

OWNERSHIP AND TONNAGE OF VESSELS

Mr. Checket, on page 3 of your testimony, I am a little confused, you say there in paragraph 2 that you can foresee a variety of circum-

stances under which it would be impossible for the Secretary of the Interior to recover the costs of oil removal from the party who caused the spill.

You cite several examples of small vessel operations, with limited overall assets, a company whose sole asset consists of one ship, and a foreign shipowner.

Now, as I see on the first page of your statement, or the second, you are with the Mobil Oil Corp. Well, none of those circumstances fits you, does it?

Mr. CHECKET. No, sir. We would not say that it would fit us, nor probably any other of the major U.S. oil companies.

Mr. McCARTHY. What percentage would you say is in these three categories you cite on page 3?

Mr. CHECKET. I do not believe I could give you any accurate percentage, although we could certainly further try to have a breakdown.

Mr. McCARTHY. Have you any idea how many oil tankers there are in the world?

Mr. CHECKET. Well, the oil tankers today, I do not have the figures in numbers, but they certainly total over 140 million tons.

Mr. WRIGHT. Would the gentleman yield?

Perhaps you missed the point. We think such legislation as this applies to ships owned by oil companies, but it would be a very small percentage of the ships.

Mr. CHECKET. Right. The oil companies, generally, at least the major oil companies that we know of, own between 45 and 50 percent of their tonnage.

Mr. WRIGHT. You are talking about tankers, only?

Mr. CHECKET. Yes, sir.

Mr. WRIGHT. But this applies not alone to tankers—

Mr. CHECKET. No, sir.

Mr. WRIGHT (continuing). But to all kinds of ships?

Mr. CHECKET. All kinds of ships.

Mr. WRIGHT. Tankers are not the only thing that are known to break up and spill oil, are they?

Mr. CHECKET. That is correct.

Mr. McCARTHY. So you do not know what the tonnage is as represented by the major oil companies in the United States.

Mr. CHECKET. Offhand, no. We can certainly supply the data.

Mr. McCARTHY. I think it would be very interesting to get an idea of what we are talking about in terms of the small vessel operator, how much that represents; the single company would be one ship, foreign shipowners—I realize, of course, this is a global operation and companies like yourselves, while they are large, you just do not know what you represent.

Mr. CHECKET. I should like to, also, point out to you, sir, that it is not just the tonnage itself, it is the laydown capability.

As an example, if the barge shuttling in the harbor over a period of a year, just by shuttling back and forth, carries a substantial amount of either oil or other types of products; whereas, you could have a tanker that is running from the Persian Gulf to the United States east coast that might make only six trips a year. So this is another problem that does get involved when we are looking at pollution

capability. It is not just a number of ships; it is where they operate and how frequently they operate that creates some of the other problems here.

ACT OF WAR

Mr. McCARTHY. I notice on page 9 you talk about other possibilities including that of torpedoed vessels. Do you feel this would be a problem?

Mr. CHECKET. I do not know that it would be a problem except in the case of an act of war. That would be the only problem as we would see it.

Mr. McCARTHY. We could not collect from the guy that sunk it, I do not think.

Mr. CHECKET. No, sir. We think in an act of war the ship that was torpedoed should not necessarily be liable for the pollution, both criminally and possibly civilly, and for the cost of removal, if he was torpedoed during wartime.

WASTE OIL FROM SERVICE STATIONS

Mr. McCARTHY. Now, just one more question of Mr. Gammelgard, Mr. Chairman.

Another aspect of this whole oil pollution problem that we have not touched upon, and I do not at least see it in the testimony of these gentlemen, is the problem that is very acute in our area and I suspect it is all over the country.

Now, we have information established by the public works department of the city of Buffalo that the major source of oil pollution in Buffalo Harbor is the hundreds of service stations in the area who, partly as a result of the removal of the excise tax on oil, now find the crankcase oil that has been drained, is virtually valueless. In some cases they even have to pay to have it taken away. In the old days they could get maybe \$15 or so for it a year; now it is worthless.

What most of them do, they just flush it down the Buffalo sewer system.

Just at this very time of the year, we have one awful problem, because the ice is beginning to break up. All winter long this oil builds up behind this ice bridge and just at this time it all comes down. We had last year the worst catastrophe in the history of Buffalo in oil pollution.

I know you do not own all these service stations, but as the industry you say you are doing so much—and I am impressed and I really am surprised at the approach you have taken, I am very favorably impressed with what you have said here, and you cite on page 2 the many voluntary actions you have taken. I think they are impressive. But is there any way within the industry, without getting into more legislation, that something could be done about this problem of flushing that many millions of gallons of crankcase oil down the municipal sewer system?

Mr. GAMMELGARD. Mr. McCarthy, we recognize this as a problem in the industry. It is also a problem outside of the industry, such as the person who buys his oil from one of the mail order type stores or from

tire or auto supply stores. What that person does with his used crankcase oil, we do not know. I have questioned a few people who buy oil from such sources and the only way they could find to get rid of it was either to dump it out in some vacant lot, or down the street sewer.

This is certainly something we do not like to see and to the extent that we can help our stations in solving this problem, we will. We have made an extensive survey of over 800 service stations located in—large cities, small cities, and in rural areas in various parts of the United States. The survey was made last year and it showed that some 2 percent admitted dumping oil down the sewer as the only way of getting rid of it.

We do not think that is the way to go about it. We are now approaching the problem on an interdivisional basis in the industry, with refining, research, marketing, and transportation involved to help the dealer where the reclaimer has gone out of business due to those factors that you have talked about, and they are real factors in his problem. So we hope that we will be able to alleviate this problem.

However, I do not think that this is a problem for Federal legislation. I think that a city that has this problem—and it seems to be concentrated in certain areas of the country while in others it is pretty well taken care of by the reclaimers—is to pass a local ordinance with a stiff fine that if the service station operator is caught dumping the oil in the station drain, that he has a fine to pay to the city. I think this can be done by city ordinance.

Mr. McCARTHY. Well, those exist already. They would have to have a guy at every manhole to enforce that.

Mr. GAMMELGARD. Pardon me, sir, I think they could make them keep a record of their oil and how did they dispose of it. This is done in some cities where they come in and say, "Where is your receipt?" Or "How did you get rid of your oil?"

Mr. McCARTHY. They have an ordinance like that in Buffalo, but it does not work. They just do not have the personnel to enforce it.

I do not say we should get into this, and I certainly commend your efforts within the industry to tackle it and help your stations, because these little fellows are looking to you, big brother, Socony, Mobil, Shell, and so forth, to help them out of this thing.

Mr. GAMMELGARD. I am sure they are.

Mr. McCARTHY. I hope you will come to grips with it, because otherwise the outcry is going to be such that we will be having a bill in here to deal with this and I do not like to see that. But certainly this is a major problem and I certainly wish you well in your efforts within the industry to come to grips with it.

Mr. GAMMELGARD. Thank you.

Mr. McCARTHY. Thank you, Mr. Chairman.

Mr. BLATNIK. Mr. Roberts.

Mr. ROBERTS. Thank you, Mr. Chairman.

I just want to express my appreciation to the oil industry for what they have done in this effort. I am particularly grateful, Mr. Chairman, that the president of the API is a former distinguished colleague of ours. We are real proud of the work all of them are doing.

Thank you.

Mr. BLATNIK. Mr. Cramer.

PENALTY PROVISIONS

Mr. CRAMER. I have some questions, but I will try to keep to a minimum, because I do think there are a few that need to be asked to help clarify the record a little bit.

For instance, as I understand it, under House bill 15906, in addition to liabilities, cleaning up, there is also, on page 4, subsection (c), willfully violating, \$2,500 fine or imprisonment for a year, criminal liability; again, (d), owner or operator who violates provisions of this section or any regulation issued thereunder shall be liable for a civil penalty of not more than \$1,000, right? And (e) is any vessel other than a public vessel in violation of this section or any regulation shall be liable for civil penalty of not more than \$10,000.

Now, that is in addition to what you basically have been discussing, right in the way of penalties, requirements, and so forth?

Mr. CHECKET. Yes, sir.

Mr. CRAMER. What happens to the enforcement when someone other than the owner or operator are responsible?

Let me give you an example. How about members of crews, ships strangers to the salvors or others who have dealings with the ship, or others colliding with her?

Mr. CHECKET. I think I understand what you mean, sir. We would certainly support any legislation that would assess the fines or monetary penalties or penal provisions against the party who was found to be at fault in the pollution; that is, other than the owner or operator of the vessel who actually discharged the oil.

Mr. CRAMER. We got into the \$10,000 under (e). You have any vessel other than a public vessel involved in violation of this section or any regulation shall be liable for civil penalty of not more than \$10,000.

That is without regard to whether there is any responsibility in the handling of that vessel. I do not know whether an act of God is excluded under that or not think it is applicable. In a way, even an act of God would be included.

Is that not the way you read it? I am having difficulty reading it otherwise.

Mr. CASEY. Mr. Cramer, I believe that—and I am referring really more to H.R. 14000 rather than the bill you referred to, the section is a little bit different—but both (c) and (d) refer back to (b). In other words, (b) establishes what is the unlawful discharge of oil. There are exceptions in (b) for unavoidable collision on emergency affecting life and property, and so forth.

In the report of the Senate committee explaining the (b), they do say that (b) imposes liability without fault.

Now, strangely enough—

Mr. CRAMER. Absolute liability.

Mr. CASEY. Although there are exceptions, the implications you have to establish have to come within one of the exceptions.

Mr. CRAMER. Unavoidable accident.

Mr. CASEY. Negligence. If it is avoidable—

Mr. CRAMER. You have the burden of proving it comes within the exceptions.

Mr. CASEY. It is a very proper interpretation. But I want to point out (c), which is the criminal section, refers to the violation of (b), but it says you have to willfully violate (b).

How you willfully violate a section that imposes liability without fault I do not know.

Mr. CRAMER. I do not understand a lot of the draftsmanship.

Mr. CASEY. I think the draftsmanship in the bill is very poor.

Mr. CRAMER. Now, we lack, unfortunately, complete expertise or substantial expertise in the field, so if someone in your organization or both could submit language to carry out some of these recommendations, to take care of some of these problems, I would like to see it and give it some consideration.

Mr. CASEY. It might be appropriate for me to say at this point, I represent the American Merchant Marine Institute. Our position is entirely different, but not inconsistent entirely, with the American Petroleum Institute. My full statement is quite lengthy.

Mr. CRAMER. We will get both of them. We will have to marry the two somehow, somewhere in drafting.

Mr. BLATNIK. Let the Chair say there obviously will be need for us to consider further change, not only with you but with other agencies of the Government or in the Department of the Interior, and other people, insurance people. We have two good witnesses coming with more detail. We hope to be able to contact you.

Mr. CHECKET. Be happy to.

Mr. BLATNIK. To enter the discussion and work in the formulative stage. Because there is going to be I think a long period of digestion that has to take place before you come out with a solid proposition. We do aim and hope to and intend to come out with the soundest proposition as combined judgment of this committee will make it possible.

If there are no further questions——

Mr. CASEY. Mr. Chairman.

Mr. BLATNIK. Mr. Casey.

Mr. CASEY. I would like, respectfully, to request an opportunity sometime before you close your hearings to present the position of the American Merchant Marine Institute.

Mr. BLATNIK. Yes. Do you have any additional testimony?

Mr. CASEY. Yes. My statement is quite different from the statement of the American Petroleum Institute.

Mr. BLATNIK. I do not understand. I see.

Mr. CASEY. When I agreed to sit as a member of the panel, I thought I would have an independent right to present our own position.

Mr. BLATNIK. Yes, you do.

Mr. CRAMER. You defend your independent rights. [Laughter.]

Mr. CASEY. I think it is quite too late to do it today.

Mr. BLATNIK. Mr. Casey, we have a colleague of ours who has been waiting for some time today. Could you wait for awhile? We have two witnesses from London who are hopeful of leaving this evening. Between the long committee hearing and the tornado warning outside—I do not want to disturb anyone—[laughter]—I thought you might know about. This is the safest place to be. We will find out.

We have an excellent panel of conservationists in the forefront of this battle for the last 20 years, the Chair can recall.

You have been patient waiting for 2 days, now all of today to be heard, but will you wait for a while, Mr. Casey?

So the gentlemen from the American Petroleum Institute thank you. The staff shall keep in contact with you for consultation.

Mr. Gammelgard.

Mr. GAMMELGARD. May I proceed now, Mr. Chairman?

Mr. WRIGHT. Mr. Chairman, I was just curious what was proposed with respect to the statement of Mr. Gammelgard.

Mr. BLATNIK. Oh, I thought this was a joint statement.

Mr. GAMMELGARD. I am sorry, Mr. Chairman, for the misunderstanding. Mr. Checkett gave the first portion of it. I have the second portion, which deals with shore installations.

Mr. BLATNIK. You have a separate statement? I am sorry, I did not understand. I thought this was a joint statement which was to be presented by Mr. Checkett by both of you.

Do you have a separate statement?

Mr. GAMMELGARD. Yes, I do. May I proceed with that?

Mr. BLATNIK. How many pages is it?

Mr. GAMMELGARD. Well, I think it is about 13.

I can submit this, Mr. Chairman, if you prefer.

Mr. CRAMER. I suggest, Mr. Chairman, would it be an imposition to come back tomorrow? I have some other questions to ask, too.

Mr. GAMMELGARD. I would be pleased to come back tomorrow.

Mr. BLATNIK. What is the schedule for tomorrow?

(Discussion off the record.)

Mr. BLATNIK. Mr. Gammelgard, would you proceed with your statement.

Mr. GAMMELGARD. Yes, sir.

Mr. Chairman, I will brief this.

I am appearing today in behalf of the API and the Western Oil and Gas Association, and the National Petroleum Refiners Association.

I will skip around a little bit. I would like to start at the bottom of page 2.

Mr. BLATNIK. This statement, by the way, will appear in its entirety at this point.

(The prepared statement of Mr. Gammelgard follows:)

STATEMENT OF P. N. GAMMELGARD

My name is P. N. Gammelgard. I am Vice President of Environmental Affairs, American Petroleum Institute, and director of the Institute's Committee for Air and Water Conservation.

On behalf of the Institute and the Western Oil and Gas Association, which I am also representing here today, I would like to thank the Committee for this chance to comment on the important legislation now before you—S. 2760.

To begin, I should like to emphasize that our industry recognizes the urgency of developing better means of protecting our water and coastlines from discharges of oil or other potentially harmful substances.

I can assure you that we favor doing all that can be done to reduce the likelihood of accidental spills of oil. Moreover, we are seeking to cooperate in every way possible with government—at all levels—to assure that swift action is taken to minimize the harmful effects of such spills regardless of how they occur.

Before discussing specific provisions of S. 2760, I would like to make a few general observations concerning oil pollution in the context of the nation's overall effort to control water pollution.

PROGRESS UNDER THE WATER QUALITY ACT

I am sure I needn't remind the members of this Committee of the many months of effort and the extensive discussions that culminated in the 1965 amendments to the Federal Water Pollution Control Act. That important legislation, which is just now beginning to be implemented, is far more than a step forward. It is a comprehensive program for effective action to protect and enhance the quality of the nation's waters.

The excellent response of the states to the challenge of setting water quality standards—within a tight time schedule—has justified the confidence of the Congress in the ability of the states to do the job.

Already, as a result of the sense of urgency generated by all this standard-setting activity, one can see signs of real progress. Within my own industry, for example, almost every week the trade papers carry a story of plans for some major improvement in an oil facility's waste water treatment system.

For these reasons, I am confident that the Water Quality Act of 1965, if given a fair trial, will prove effective in achieving a high degree of water quality control. I might add that—under that act—we can look forward to orderly progress in reducing any type of pollution—including oil pollution—that may result from inadequate or improper waste disposal practices.

FEDERAL CONTROL OF OIL RELEASES FROM SHORE FACILITIES

This brings me to what we in the petroleum industry believe to be one of the most important questions raised by S. 2760. This is the question of whether additional federal legislation is needed or actually can bring about better control of accidental oil releases—or releases of any other common pollutant—from shore facilities.

Federal regulation of vessels within our territorial waters is clearly desirable because vessels move from place to place. Regulation of mobile sources of pollution by multiple jurisdictions is just not practical. In the air pollution control field, for quite similar reasons, Congress has provided for federal regulation of vehicles, but has left control of stationary sources of air pollution to the states. Traditionally, Congress has also left control of stationary sources of water pollution to the states, believing that—because the states are closest to the problem—they are in a better position both to determine their needs and to carry out the huge job of policing and enforcement.

Thus, in the Declaration of Policy of the Federal Water Pollution Control Act, the following statement appears:

"* * * it is hereby declared to be the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of the States in preventing and controlling water pollution * * *"

The declaration goes on to say:

"Nothing in this Act shall be construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the waters (including boundary waters) of such States."

In the general enforcement section of the act—Section 10—the following statement appears:

"Consistent with the policy declaration of this Act, State and interstate action to abate pollution of interstate or navigable waters shall be encouraged and shall not . . . be displaced by Federal enforcement action."

As we see it, the net effect of including shore installations in S. 2760 now before you would be to render the policy declaration of the Water Pollution Control Act meaningless, and to open the door to direct federal regulation of not only oil as a pollutant but of every water pollutant from every possible source along every waterway in the nation.

NEED NOT SHOWN

The recent joint report on oil pollution by the departments of Interior and Transportation places great stress on the *possibillity* of oil pollution from shore installations. The report cites statistics on the quantity of oil being handled in commerce and points to its pollution *potential*.

As we see it, such figures by themselves do not build a plausible case for federal regulation of shore facilities. The figures show that there are huge amounts of oil being handled every year. Yet to find just three significant shore

mishaps to cite—one of which did not even involve oil—the departments had to search the records back to 1962. Even the largest shore spill cited was only one-one thousandth of one percent of all the oil handled in the United States that year.

Federal occupation of any field ought to be based on demonstrated needs, not merely on possibilities—and there ought to be some evidence of state failure or inability to do what is required.

In our opinion, it would be a mistake to abandon or bypass the orderly procedures established in the 1965 amendments to the Federal Water Pollution Control Act, before they have even been given a trial. So far the Secretary of the Interior has approved water quality standards covering all common water pollutants—including oil—for a majority of the states. Hopefully, the other states will soon also receive approval of their proposals.

In no case we know of has approval of any state's standards been held up or refused because of imperfections in proposals for dealing with pollution by oil. Clearly, if the Secretary of the Interior has reason to believe any state has not made adequate provision for dealing with oil pollution, he has the authority, under present law, to withhold approval of the state's standards and implementation plans, or, if necessary, to set and enforce standards of his own.

PRACTICAL DIFFICULTIES IN CONTROL OF SHORE INSTALLATIONS

As a practical matter, the federal government would probably find it difficult to exercise effective control over all shore installations. It must be remembered that S. 2760 would apply to countless thousands of shore installations, both little and big, most of which have no connection with the oil industry. Included would be factories and utilities that use oil for fuel, lubrication, or cooling. And many other users would be affected as well.

Although attention is naturally focused on more obvious, readily identifiable potential sources of oil—such as shoreside terminal and loading facilities and refineries—the fact is that these facilities are not a major factor in the overall oil pollution problem. The need for special precautions at such facilities has long been recognized, and therefore, the risk of pollution is actually smaller there than elsewhere.

Many less obvious on-shore sources, which S. 2760 would not cover, can and do contribute to accidental oil pollution. For example, hundreds of gallons of fuel oil recently showed up in a major East Coast harbor. Investigation by the port authority revealed that the oil had leaked from a fuel storage tank in the basement of a city school into a sewer and eventually the harbor. It is difficult to see how either federal or state regulation could help in such instances.

It is difficult to see how the federal government could deal more effectively with such problems than the states. It seems quite possible that federal involvement would tend to slow down, rather than expedite, action in local problem situations. Moreover, it would take unnecessary duplication of existing state and local enforcement personnel.

There is another consideration. In view of the penalties—both criminal and civil—that could be imposed under S. 2760, some shore installations might be less inclined to admit responsibility for an accidental discharge if they could avoid doing so. Thus the number of unacknowledged spills from various sources could well increase.

In short, direct federal regulation of shore installations would establish a precedent that is inconsistent with the spirit of the Water Pollution Control Act; it is not justified on the basis of need; it holds little promise of providing better solutions than state and local control; and it could actually discourage present sincere efforts to solve the problem on a local basis.

COOPERATIVE PROGRAMS AT MAJOR HARBORS

This brings me to something I think the Committee will be interested to hear about. I am referring to cooperative efforts of petroleum companies and others to provide for swift action to contain and remove spilled oil at major harbors and along major waterways where petroleum cargo vessel traffic creates a potential for such spills.

Briefly, these efforts follow this general pattern:

The oil companies and other industries with terminal facilities on the harbor meet with representatives of interested government agencies, such as the local

port authority, the fire department, the state police, the Coast Guard, the Corps of Engineers, and, in a few instances, the Federal Water Pollution Control Administration.

Usually, a harbor pollution abatement committee is formed—with both industry and government members—to assess local needs and devise a procedural plan. The oil companies and other industries underwrite the cost of most—and in some cases all—of the emergency equipment purchased, such as floating booms, skimming devices, or pumping equipment.

Lines of communication are set up, and the duties and responsibilities of each of the government agencies and industries are defined. Usually, the local port authority or fire department assumes responsibility for storage and deployment of equipment and the oil companies agree to remove the oil once it has been contained.

There were only a handful of these cooperative programs just a year ago. But right now more than 25 programs are either in effect or being organized. Eventually, we would hope to have an active program at every major harbor in the nation, but there is one serious stumbling-block—and one that the Congress could help to remove.

"GOOD SAMARITAN" PROVISION

Although our enthusiasm to get more of these programs underway is very strong, a question has been raised concerning the possibility of liability to third parties for accidents during a cooperative cleanup operation. Because of this question, some companies have been reluctant to agree to lend manpower assistance in cleaning up a spill for which somebody else's vessel is responsible.

One way to resolve this problem would be to incorporate an appropriate Good Samaritan clause in the legislation now before the Committee. Under such a clause, any person who voluntarily assisted a vessel owner or operator in cleaning up spilled oil would be relieved of liability for civil damages except in cases of willful or wanton misconduct. If such a provision is adopted, I am confident the response of the petroleum industry will be both positive and prompt.

OTHER PROVISIONS OF S. 2760

I would now like to comment on several provisions of S. 2760. As Mr. Checket indicated in his statement, the bill contains a number of provisions—in addition to Section 19(e)—that are of concern to us.

First of all, we fully support the criminal provision of S. 2760, Section 19(c), as applied to vessels. There is, however, one foreseeable problem in its application, as well as in the application of the civil-penalty provision, Section 19(d).

Both provisions prescribe penalties for discharges of oil, but, as "oil" and "discharge" are defined, severe federal penalties could be exacted even for a very minor, harmless discharge. Clearly this does not reflect the true intent of the bill. Therefore, we urge that the definition of "oil" in Section 19(a) be modified slightly to read:

"Oil means substantial floating oil of any kind or in any form, including, but not limited to, fuel oil, sludge, oil refuse, and oil mixed with other matter."

This definition would give both the potential polluter and the on-the-scene enforcement officer some guidance, in interpreting the statute, as to what conduct is intended to be prohibited.

Also, in Section 19(c), the criminal provision would apply only to the owner or operator of a vessel or shore installation, or to their employees. But it is conceivable that others—such as vandals or saboteurs—might also be guilty of willful act. Thus, we urge that the words "or any other person" be added to this subsection—and, of course, that the reference to shore installations be deleted.

I will not comment in detail on Section 19(e) or the overall question of liability for costs of oil removal, since Mr. Checket has already done so. I would like to point out, however, that S. 2760 contains no definition of "remove" or "removal" and thus provides no guidance as to what is expected.

Because actual physical removal is often impractical, a literal interpretation of the term "removal" would be unreasonable in many cases. Therefore, we urge that a definition of the term be included in the bill, and we suggest the following language: "‘remove’ or ‘removal’ means the taking of all appropriate

and reasonable measures to mitigate potential damage of oil discharged into or upon navigable waters or adjoining shorelines."

I should now like to turn to Section 19(h) of S. 2760, which describes the regulatory responsibilities of the Secretary of the Interior. As written, Item (1) of this subsection requires the Secretary to prescribe the methods and procedures to be followed in removing oil from water and shorelines.

To anyone who has read the accounts of attempts to ameliorate the effects of the *Torrey Canyon* and *Ocean Eagle* disasters—or the recent report to the President by the Departments of Interior and Transportation—it should be quite clear that no one yet is in a position to do what this provision asks of the Secretary. Oil spill removal is a field in which there are few experts—where every promising new idea deserves a trial. We suggest, in fact, that the bill should provide funds for federal participation in the research effort in this area, just as it does for acid mine drainage and eutrophication research.

To impose now a legal requirement that specific cleanup methods or procedures be used could well discourage the overall development work needed at this time, and could prohibit the early use of new possibly more effective methods and procedures. We suggest, therefore, that the words in Section 19(h) "set forth the methods and procedures to be followed in removing oil" be changed, so that the Secretary is directed instead to "describe the conditions under which oil shall be removed." It would also be desirable for the Secretary to be asked to "from time to time, issue such research findings, recommendations, and other technical information as may assist in oil removal."

Item (3) of Section 19(h) directs the Secretary to issue regulations that "will assist in preventing the pollution of the navigable waters of the United States." This language is so vague as to provide no guidance as to what type of regulation is contemplated. It could well be broadly construed to go beyond the purposes of Section 19 to permit the Secretary to regulate equipment design or operation. In the area of ship design and equipment, now regulated by another federal agency, it could produce jurisdictional conflicts.

We believe that, where possible, regulatory agencies should be concerned with performance, leaving the means of achieving satisfactory performance to the ingenuity of the regulated. We recognize that the Secretary must be able to issue such regulations as will assist in carrying out the purposes of the act. In our view, however, Items (1) and (2) of Section 19(h), as we recommend they be amended, would give him sufficient powers.

In closing, I should like to thank the Committee once again for the opportunity to appear here today. On behalf of both Mr. Checket and myself, I would like to express the hope that our testimony will prove helpful to you in drafting legislation that is truly responsive to the problem. We shall be happy to answer any questions you may have.

Mr. BLATNIK. Now you briefly call our attention to the areas that are of particular importance and of concern to you.

Mr. GAMMELGARD. Thank you, Mr. Chairman.

PROGRESS UNDER THE WATER QUALITY ACT

Already, as a result of the sense of urgency generated by all this standard-setting activity—and I am talking about the State standard-setting activity of the last several years—one can see signs of real progress. Within my own industry, for example, almost every weekly trade paper carries a story of plans for some major improvement in an oil facility's waste water treatment system.

For these reasons I am confident that the Water Quality Act of 1965, if given a fair trial, will prove effective in achieving a high degree of water quality control. I might add, under that act we can look forward to orderly progress in reducing any type of pollution, including oil pollution, that may result from inadequate or improper waste disposal practices.

FEDERAL CONTROL OF OIL RELEASES FROM SHORE FACILITIES

This brings me to what we in the petroleum industry believe to be one of the most important questions raised by S. 2760. This is the question of whether additional Federal legislation is needed or actually can bring about a better control of accidental oil releases, or releases of any other common pollutant, from shore facilities.

Federal regulation of vessels within our territorial waters is clearly desirable because the vessels move from place to place. Regulation of mobile sources of pollution by multiple jurisdictions is just not practical. In the air pollution control field, we have the example of the automobile, whose pollutants are controlled on a national basis and not a State by State basis.

Turning now to page 4, we point to several declarations of policy in the Water Control Act, which I think are quite important:

It is hereby declared to be the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of the States in preventing and controlling water pollution.

The declaration goes on to say:

Nothing in this Act shall be construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the waters (including boundary waters) of such States.

In general enforcement section of the act:

Consistent with the policy declaration of this Act, State and interstate action to abate pollution of interstate or navigable waters shall be encouraged and shall not . . . be displaced by Federal enforcement action.

At this point I would like to add the statement that I completely agree with Mr. Oeming's statement yesterday, which, as I got the message, was that Michigan was able, willing, and wanted to take care of pollution from shore installations in their State.

As we see it, the net effect of including shore installations in S. 2760 would be to render the policy declaration of the Federal Water Pollution Control Act meaningless and to open the door to direct Federal regulation of not only oil as a pollutant, but of every water pollutant from every possible source along every waterway in the Nation.

NEED NOT SHOWN

As we see it, such figures by themselves do not build a plausible case for Federal regulation of shore facilities. The figures show that there are huge amounts of oil being handled every year. Yet to find just three significant shore mishaps to cite—one of which did not even involve oil—the Departments had to search the records back to 1962. And I am referring to the report to the President by the Departments of Interior and Transportation. Even the largest shore spill cited was only one one-thousandth of 1 percent of all the oil handled in the United States that year, and that was a spill of some 40,000-odd barrels.

Federal occupation of any field ought to be based on demonstrated needs, not merely on possibilities, and there ought to be some evidence of State failure or inability to do what is required.

In our opinion, it would be a mistake to abandon or bypass the

orderly procedures established in the 1965 amendments to the Federal Water Pollution Control Act, before they have even been given a trial. So far the Secretary of the Interior has approved—in many cases conditionally—water quality standards covering all common water pollutants, including oil, for a majority of the States. Hopefully, the other States will soon also receive approval of their proposals.

We know of no case where any State's standards have been held up or refused because of imperfections in proposals for dealing with pollution by oil. Clearly, if the Secretary of the Interior has reason to believe any State has not made adequate provision for dealing with oil pollution, he has the authority, under present law, to withhold approval of the State's standards and implementation plans or, if necessary, to set and enforce standards of his own.

PRACTICAL DIFFICULTIES IN CONTROL OF SHORE INSTALLATIONS

As a practical matter, the Federal Government would probably find it difficult to exercise effective control over all shore installations. It must be remembered that S. 2760 would apply to countless thousands of shore installations, both little and big, most of which have no connection with the oil industry. Included would be factories and utilities that use oil for fuel, lubrication, or cooling.

Many less obvious onshore sources, which S. 2760 would not cover, can and do contribute to accidental oil pollution. For example, hundreds of gallons of fuel oil recently showed up in a major east coast harbor. Investigation by the port authority revealed that the oil had leaked from a fuel storage tank in the basement of the school in the city into a sewer and eventually into the harbor. It is difficult to see how the Federal Government could deal more effectively with such problems than the States.

There would be tremendous duplication of personnel if they did try to cover it. The States would still have to control their intrastate waters.

In short, we think that direct Federal regulation of shore installations would establish a precedent that is inconsistent with the spirit of the Water Pollution Control Act. It is not justified on the basis of need; it holds little promise of providing better solutions than State and local control, and it could actually discourage present sincere efforts to solve the problem on a local basis.

COOPERATIVE PROGRAMS AT MAJOR HARBORS

Now, I think the committee would be interested in hearing about the cooperative efforts of petroleum companies and others to provide swift action to contain and remove spilled oil at major harbors and along major waterways where petroleum cargo vessels traffic creates a potential for such spills.

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Both provisions prescribe penalties for discharges of oil, but, as “oil” and “discharge” are defined, severe Federal penalties could be exacted even for a very minor, harmless discharge. Clearly this does not reflect the true intent of the bill. Therefore, we urge that the definition of “oil” in section 19(a) be modified slightly to read:

Oil means substantial floating oil of any kind or in any form including but not limited to fuel oil, sludge, oil refuse, and oil mixed with other matter.

The modification is adding the words “substantial floating.”

On the next page, in section 19(c), the criminal provision would apply only to the owner or operator of a vessel or shore installation, or to their employees. But it is conceivable that others, such as vandals or saboteurs might also be guilty of a willful act. Thus we urge that the

words "or any other person" be added to this subsection and, of course, that the reference to shore installations be deleted.

Because actual physical removal is often impractical, a literal interpretation of the term "removal" would be unreasonable in many cases. Therefore, we urge that a definition of the term be included in the bill, and we suggest the following language:

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To anyone who has read the accounts of attempts to ameliorate the effects of the *Torrey Canyon* and *Ocean Eagle* disasters—or the recent report to the President by the Departments of Interior and Transportation—it should be quite clear that no one yet is in a position to do what this provision asks of the Secretary. Oil spill removal is a field in which there are few experts—where every promising new idea deserves a trial. We suggest, in fact, that the bill should provide funds for Federal participation in the research effort in this area, just as it does for acid mine drainage and eutrophication research.

Skipping a little, item (3) of section 19(h) directs the Secretary to issue regulations that "will assist in preventing the pollution of the navigable waters of the United States." This language is so vague as to provide no guidance as to what type of regulation is contemplated. It could well be broadly construed to go beyond the purposes of section 19 to permit the Secretary to regulate equipment design or operation. In the area of ship design and equipment, now regulated by another Federal agency, it could produce jurisdictional conflicts.

We believe that, where possible, regulatory agencies should be concerned with performance, leaving the means of achieving satisfactory performance to the ingenuity of the regulated. We recognize that the Secretary must be able to issue such regulations as will assist in carrying out the purposes of the act. In our view, however, items (1) and (2) of section 19(h) as we recommend they be amended, would give him sufficient powers.

In closing, I should like to thank the committee once again for the opportunity to appear here today. On behalf of both Mr. Checket and myself, I would like to express the hope that our testimony will prove helpful to you in drafting legislation that is truly responsive to the problem.

Thank you.

Mr. BLATNIK. Thank you for an obviously very well thought out and precisely presented series of recommendations, which will be given very close attention and evaluation, discussion, both by the staff and members of the committee. And we obviously will require continuing dialogue and discussion with you or representatives on the technical and legal aspects.

Mr. GAMMELGARD. That we will be pleased to do.

Mr. BLATNIK. We are more interested in accomplishing constructive

and positive results rather than going on a punitive expedition. We hope that that will somehow produce the desirable results. I think we are going to make a great forward step in a very difficult problem.

To oversimplify, no one knows to this day how you adequately remove the oil, no matter how innocently the cause may be, or wherever the accident may be.

I call this to your attention, I am personally more interested in research work the industry may be doing or different industries wherever they may be, jointly or individually, on dispersants, homogenization of chemicals, use of chemicals.

I know there is substantial progress being made, because I am one who is a strong advocate of encouraging this type of research work, not only by the Federal Government in grants to universities, but also working with and through the industries involved, whether they be paper, synthetic fibers, chemicals, fuel, and certainly in your case. I think some breakthrough perhaps may be reached. Some indications look very encouraging, very attractive. We will need more information on that, which we will appreciate very much.

Mr. GAMMELGARD. We will do that.

Mr. BLATNIK. Do you have any brief comments, or comments from any members with you? I appreciate the members standing by.

Mr. Wright?

COVERAGE OF SHORE INSTALLATIONS

Mr. WRIGHT. Very briefly, the central thrust of this testimony directs itself to the shore installations in the first place, and Congress decided in the 1966 act this should not be included in the community provision of the act. There are thousands of rivers related and unrelated to the oil industry. Your position and those with you are already thoroughly covered under the existing law in regard to the States and the applied standards.

Mr. GAMMELGARD. I haven't seen a single one of the 25-or-so-odd State laws that have come to my attention that do not give a pretty strict definition of what is permitted in the way of an oil discharge. Mr. Oeming's statement yesterday defined it as "no visible film of oil, gasoline or related materials, no globules of grease." This is typical of other States' requirements and to meet this is going to take some real control facilities on shore installations; but we are going to do it.

Mr. WRIGHT. Well, really, there is more sense in taking oil discharges and putting them under an entirely different administration than in, like the pickling liquors coming from pickle factories or acids coming from steel mills or from some other operations, or chemicals coming from chemical plants, any of the other pollutants. I am sure you cannot obviously do that with States, where vessels are moving around and some vessels are obviously doing that.

Mr. GAMMELGARD. Exactly the way we feel.

Mr. BLATNIK. Mr. Pittman, do you have a separate statement?

Mr. PITTMAN. No, sir; I do not.

Mr. BLATNIK. You join the chairman in his presentation?

Mr. PITTMAN. Yes, sir.

Mr. BLATNIK. Mr. Cramer?

REQUIREMENT TO AMELIORATE THE EFFECTS OF DISCHARGE

Mr. CRAMER. What does "ameliorate" in your statement mean to you?

Mr. GAMMELGARD. To reduce the effects of; you take whatever steps you can to lessen or reduce.

Mr. CRAMER. The owner-operator of a vessel is going to have the duty to "ameliorate," is that right?

Mr. GAMMELGARD. That is right.

Mr. CRAMER. The owner has to do it pursuant to the instructions and directions of the Secretary, but I would not know what that meant, and to what extent it had to be ameliorated. You cannot replace the sand on the beaches?

Mr. GAMMELGARD. That has been done, sir.

Mr. CRAMER. There are limits as to what can or should be done. Do you not think that ameliorate is a bad word?

Mr. GAMMELGARD. Well, there might be a better word. To me it just means to do whatever you can to bring the effects down to the lowest reasonable level.

Mr. CRAMER. Now, on page 8 again, if such owner or operator fails to so act, the Secretary may "ameliorate" the effects. Does that mean he pays the damages to the businesses that have been affected, the hotels that have had cancellations, restaurants that have not done any business, beach establishments, cabanas, et cetera?

Mr. GAMMELGARD. It could go that far, I presume.

Mr. CRAMER. If these regulations say so, he can look at these, and "ameliorate the effect." His regulations could be broad enough to cover any effect under this wording.

Mr. GAMMELGARD. It is practically without limit as it is proposed, and the tab, whatever it is going to be, would just be passed on.

Mr. CHECKET. I think, Mr. Congressman, there is some problem in the language as written perhaps applicable to that section that giving broad powers can produce regulations that are in conflict with other regulations that are already in effect, and ameliorating it could be something that is in conflict with a regulation the Coast Guard already has in effect as far as the ship is concerned.

Mr. CRAMER. In the language of the present bill the Secretary may remove the oil and may arrange for its removal and charge a ship to "ameliorate its effect." There must be a reason for it.

Mr. CHECKET. I really don't know.

Mr. CRAMER. I think that is all, Mr. Chairman.

Mr. BLATNIK. We thank you gentlemen, very much.

Mr. CASEY, did you have a separate statement to read?

Mr. CASEY. I have a long statement, Mr. Chairman. I would like to have it inserted at this point, and just to hit the highlights.

Mr. BLATNIK. The statement will appear in its entirety at this point in the record.

(Prepared statement of Ralph E. Casey follows:)

STATEMENT OF RALPH E. CASEY, PRESIDENT, AMERICAN MERCHANT MARINE INSTITUTE

My name is Ralph E. Casey, President of the American Merchant Marine Institute. Our organization comprises some 32 companies which own and operate a major part of the U.S.-flag oceangoing cargo vessels, tankers, passenger ships,

and bulk carriers engaged in the domestic and foreign trades of the U.S. As such, Mr. Chairman, we welcome the opportunity to testify before this Committee on this highly important bill, H.R. 14000 (S. 2760), which deals with the vexing problem of pollution of the seas.

I would like to state at the outset that we in shipping have traditionally accorded great concern to all endeavors designed to prevent contamination of the seas by oil or other noxious materials.

My direct testimony will be concerned primarily with those provisions of H.R. 14000 (S. 2760) relating to oil pollution. I might say that my testimony will be of a non-technical nature. Other industry witnesses will be able to comment on the more technical aspects of the problem as it relates to shipping.

First, I would like to comment briefly on the genesis of the legislation dealing with this problem and how it has changed drastically in its progression through the legislative process. Originally, Mr. Chairman, we were invited to testify on proposals which were being heard by the Subcommittee on Oil and Water Pollution of the Senate Committee on Public Works. These bills were S. 1586, introduced by Senator Magnuson; S. 1591, introduced by Senator Muskie; and S. 1604, introduced by Senator Case. The purpose of these bills was to amend Section 2 clause 3 of the Oil Pollution Act of 1924 (33 USC 431, et seq.), by eliminating the word "grossly" from the definition of "discharge" and adding the word "accidental". At that time it was our position that we did not object to the removal of the word "grossly" from clause 3 Sec. 2 of the Oil Pollution Act of 1924 since we could appreciate the enforcement problems involved. We did, however, object to substitution of the word "accidental" in its place.

I would like to point out, Mr. Chairman, that the Committee completely rewrote these bills and transformed the legislation into a much different and radically more drastic proposal. The new bill, S. 2760, which contains provisions upon which we were never afforded an opportunity to express views, was reported out by the Senate Public Works Committee on December 11, 1967, and passed by the Senate on December 12 without the benefit of debate, exchange of ideas, or floor consideration. This Senate-passed bill is before us at the present time in the form of H.R. 14000 and is the subject of our concern and deliberation.

PROVISIONS OF S. 2760 RELATING TO CONTROL OF OIL POLLUTION

In this connection, it would seem appropriate to list the accumulated changes and additions which constitute the greatly expanded Senate-passed bill. Thus, S. 2760 provides:

1. The Oil Pollution Act of 1924 is repealed and the appropriate provisions regarding oil pollution become Section 19 of the Federal Water Pollution Control Act.

2. The phrase "grossly negligent" and the word "willful" are eliminated from the definition of "discharge" as found in the Oil Pollution Act of 1924. "Discharge" is now defined as "any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil".

3. This bill adds a definition of the term "public vessel". The purpose of this definition is to make it clear that the prohibitions of the new section apply to these public vessels but not the penalties.

4. The definition of a "vessel" would include all vessels, both foreign and domestic.

5. Extends coverage of the Act to shore installations.

6. A "public shore installation" is defined as a shore installation operated by the United States, or by a State.

7. The definition of the term "United States" has been expanded so that coverage of the new section applies to the Commonwealth of Puerto Rico, Guam, American Samoa, and the Virgin Islands.

8. Two definitions in the 1924 Act have been revised. The first is the definition of "person". The definition in the 1924 Act seemed to create an ambiguity by making a distinction between the owner, operator, master, agent, or employee of a vessel and an individual company, corporation, or association. The report accompanying the bill [No. 917] states that there should not be such a distinction as the latter group is, in fact, the owner, etc., of the vessel. The bill uses the more descriptive term "owner or operator" which includes individuals or organizations such as a corporation, etc., that owns, operates, or charters by demise a vessel, or owns or operates a shore installation.

The second revision is in the definition of the word "oil". The changes in this definition were necessitated by the addition of "shore installation". The revision makes it clear that the bill would cover discharge wastes that include oil, or oily mixtures.

9. Sec. 19(e) provides that the owner or operator involved in a discharge shall remove the discharged oil immediately. If the owner or operator fails to do so, the Secretary may arrange for its removal and such owner or operator will be liable for the full actual costs of cleanup. The cost of removal is in addition to any penalties prescribed in Sec. 19. The only exception to this cleanup liability is where the spill was due to "an act of God".

10. Authorizes appropriations to a revolving fund to enable the Secretary to finance cleanup measures.

11. Under subsection (g) the Commandant of the Coast Guard may suspend or revoke licenses issued to the master or any other officer of the vessel found violating provisions of Sec. 19(b).

12. Subsection (h) provides for the issuance of regulations by the Secretary of the Interior which (1) set out method and procedure for removing oil from the navigable waters, (2) facilitate enforcement of the section, and (3) will assist in preventing pollution of the navigable waters. He may also issue regulations which authorize the discharge of oil under certain circumstances.

Turning now to the bill itself, section 19(a) of the Federal Water Pollution Control Act, as amended by H.R. 14000, contains a number of definitions of terms employed in the statute.

PROHIBITION AND PENALTY PROVISIONS UNCLEAR

Subsection 19(b) would make it unlawful to discharge or permit the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines of the United States except (1) in case of emergency imperiling life or property, (2) unavoidable accident, collision, or stranding, or (3) as otherwise permitted by regulations prescribed by the Secretary of the Interior.

Since the bill uses the terms "*unavoidable* accident, collision, or stranding", the logical presumption is that some degree of fault would have to be shown for a violation to be proved. Yet, in Senate Report No. 917, accompanying S. 2760, there appears the following explanation of the language of section 19(b):

"The bill would make it unlawful for anyone to discharge oil into the waters covered by the bill or upon the adjoining shorelines of the United States and Puerto Rico, Guam, American Samoa, and the Virgin Islands, *regardless of fault*. The amended 1924 act now prohibits only grossly negligent and willful discharges of oil. The bill, like the 1924 act, recognizes that there are exceptions to this general prohibition which should be recognized in applying a criminal statute. These are cases of emergency where life or property are involved, other than the property of the vessel or shore installation, or cases of unavoidable accident, collision, or stranding. Thus, the test under the bill is whether the vessel or shore installation discharged the oil and, if it did, whether the discharge was excusable under one of these exceptions. If the discharge did not come under one of the exceptions, then the discharge is unlawful." (Emphasis supplied.)

The best that can be said for section 19(b) as it now reads is that its meaning is not clear. It could be construed as rendering any spilling of oil "unlawful" unless the owner or operator can establish that the spill was due to "an emergency imperiling life or property, or unavoidable accident, collision, or stranding, and except as otherwise permitted by regulations prescribed by the Secretary * * *." In other words, the burden of proof would shift to the owner or operator to prove he was not in violation.

Subsection (c) would make it a crime, subject to the imposition of a fine or imprisonment, or both, whenever the provisions of such subsection (b) are willfully violated. And subsection (d) would impose a civil penalty of not more than \$10,000 for violations of subsection (b). Said subsection (d) also would authorize denial of clearance of a vessel liable for the civil penalty until the penalty is paid or its payment guaranteed. Furthermore, an unpaid penalty would constitute a lien on the vessel. Thus, both the criminal provisions of subsection 19(c) and the civil penalty provisions of subsection 19(d) are tied to the language of subsection 19(b).

Of course, subsection 19(c) does contain the word "willfully" and the Senate Report says, "The bill and the 1924 act would require that this penalty only

apply where the court finds that the discharger willfully violated the prohibition against discharging oil and such discharge did not fall into one of the exceptions mentioned above." Again, Mr. Chairman, I am somewhat mystified as to how you can "willfully" violate a provision of law that purports to impose liability "regardless of fault".

All those ambiguities should be resolved or endless litigation will inevitably result. And I respectfully suggest that subsection 19(b) should be amended so that negligence would have to be proven to establish a violation. Indeed, were it not for the language of the Report quoted above, I am firmly of the belief that an unlawful spilling under 19(b) would be one resulting from an *avoidable* accident or, in other words, happening which but for the lack of reasonable care would not have occurred.

CLEANUP PROVISIONS

However, Mr. Chairman, the provisions of subsection (e), with respect to cleanup, are of the utmost concern to the shipping industry. They read:

"(e) The owner or operator of a vessel or shore installation from which oil is discharged into or upon the navigable waters of the United States or adjoining shorelines shall remove such discharged oil immediately from such waters and shorelines in accordance with regulations prescribed by the Secretary under this section. If such owner or operator fails to so act, the Secretary may remove the oil or arrange for its removal from such waters and shorelines, and such owner or operator and, as appropriate, the vessel and the shore installation shall be liable, *notwithstanding any other provision of law*, to the United States, in addition to any penalties prescribed in this section, for the full amount of the actual costs incurred by the Secretary under this subsection: *Provided*, That there shall be no such liability where such discharge was due to an act of God. Clearance of a vessel liable for such costs from a port of the United States may be withheld until such costs are paid or until a bond or other surety satisfactory to the Secretary is posted. Such costs shall constitute a maritime lien on such vessel which may be recovered by action in rem in the district court of the United States for any district within which such vessel may be found." (Emphasis supplied.)

Basically, subsection (e) does two things: (1) It imposes upon the owner or operator of a vessel or shore installation from which oil is discharged into the navigable waters of the United States or adjoining shorelines an obligation to remove the discharged oil immediately. And if the owner or operator fails to do so, the Secretary of the Interior may remove the oil, in which case the vessel or the shore installation shall be liable for the full amount of the actual cost of cleanup; and (2) All existing legal limitations upon shipowners' liabilities would be removed in the case of cleanup obligation.

LIABILITY WITHOUT FAULT

To put it mildly, Mr. Chairman, this is a far-reaching proposal, which could have devastating effects both nationally and internationally. You will note that the only exemption from liability is where the discharge is due to an act of God. Thus, liability is imposed where the owner is absolutely without fault in a myriad of situations. For example, a small tanker owner, whose vessel was proceeding in broad daylight, could find himself bankrupt under this section should his vessel be rammed by another vessel. Or, a vessel could run aground due to negligence on the part of the United States Government in misplacing a buoy or other aids to navigation. It would seem to us—as serious as the problem is—this kind of legislation is not only unwarranted but grossly unjust.

Of course, we recognize that innocent victims want protection from oil spills regardless of how they are caused. And we subscribe wholeheartedly to that. But at the same time the answer is not to protect one innocent party by making another innocent party pay.

NO LIMITATION OF LIABILITY

As far-reaching as are the provisions of subsection (e) in the imposition of liability without fault, the key language—and that which troubles us most—is the phrase "notwithstanding any other provision of law." This language, Mr. Chairman, would remove the traditional conception of permitting shipowners to limit their liability, at least with respect to oil spills, and has caused great

alarm, both in this country and abroad. Speaking personally, I have rarely if ever seen a piece of legislation involving shipping matters which has been so universally criticized from the standpoint of its inevitable effects.

This area of limitation of liability is a highly complicated subject, and in view of the serious implications of the present bill, it would seem desirable and necessary to outline for the Committee the history and background of the problem.

The basic United States law, in general, permits a shipowner to limit his liability, but only if the damage is incurred without his privity and knowledge, to the value of the ship after the casualty, plus pending voyage earnings. This was enacted in 1851 (46 USC § 183, 184, 185, 187, and 189) in a form which closely paralleled the British law of that time, and it has remained substantially unchanged except for certain amendments in 1936. In this connection, I would like to point out that it is now frequently said—in error, I might add—that recovery is limited to the salvage value of the ship. And, indeed, in the President's Message of March 8, 1968, it is stated that "Prior law limited the owner's liability to the salvage value of the ship." And this statement again appears in the Department of Transportation-Interior Report to the President on Oil Pollution. I repeat, this is not an accurate statement of the law.

As a result of the *Morro-Castle* disaster, the so-called Sirovich Amendment (46 USC § 183 (b)) was enacted, which requires an owner of an oceangoing vessel to provide in addition to the value of the ship and the pending freight a minimum limitation fund of \$60 per ton of the vessel's gross tonnage which would be available to personal injury and death claimants. Thus, it is not correct to say that the owner's liability is limited to the salvage value of the ship. There is also \$60 per gross ton provided for death and injury claims as well as the value of the ship and the freight receipts for the final voyage.

We have consistently advocated liberalization of the fund. The shipowners have agreed that the \$60 figure should be raised and the fund increased. This general sentiment in the maritime community resulted in the International Convention Relating to the Limitation of the Liability of Owners of Seagoing Ships, which was negotiated at Brussels in 1957, and has been signed by 30 major maritime nations. The U.S. Delegation did not sign the Convention because of significant language differences between the Convention and that sought by our delegation. Also, the Brussels Convention has not come into effect because it has not been ratified by the required number of nations. The Convention established a maximum liability based on vessel tonnage. The limitation fund is computed at \$207 per ton where only personal injury and death claims are involved, and at \$67 per ton where there are only property claims. Where there are both personal and property claims, the fund is based on the figure of \$207 per ton, with \$140 per ton to be exclusively reserved for personal injury claims. If the \$140 per ton is insufficient to cover the personal injury claims, the unpaid balance is shared pro rata with the \$67 per ton which would otherwise be applied exclusively to property claims.

In 1962, legislation was introduced in Congress which would have provided the same tonnage limitations as the Brussels Convention and which would have enabled the United States to ratify the Brussels Convention. Recognizing the inadequacies of the present limitation of liability, the industry supported this legislation. Although the 1962 bill was favorably reported out of committee, no action was taken on the floor of the Senate. There is reason to believe that a new limitation of liability bill identical to the 1962 proposal may soon be introduced on the Senate side.

That, Mr. Chairman, is limitation of liability as it stands today. Subsection (e), under the language referred to, apparently would remove all limitation on liability for the cleanup of an oil spill.

Our objections to the provision of subsection (e) prescribing the removal of limitation of liability with respect to the cleanup of an oil spill are as follows:

1. The change as now proposed relating to cleanup would be a drastic step not in harmony with maritime history.

2. The law pertaining to limitation of shipowners' liability is of international significance. Action by the United States, as here proposed, should be undertaken only in concert with other maritime nations throughout the world.

3. So far as is known, no maritime country is without some legal system permitting limitation in relation to persons and property.

4. The removal of limitation would play havoc with the current insurance market. In fact, discussions with underwriters indicate that owners will be unable to secure insurance against such risks without some limitation of liability.

5. If limitation of liability is removed, the American owners will be hit first and the hardest. American-flag tankers are employed almost exclusively in the coastwise trade between Texas and the North Atlantic and would, therefore, be in waters adjacent to the shores of the United States a much greater percentage of the time than foreign ships.

6. The most conclusive objection is that an operator subject to absolute liability without fault could be driven from the seas. The small operator (one, two or three tankers) could not financially survive the impossible burden of *total* cleanup costs for even one disaster.

Mr. Chairman, over a century ago, limitation of liability was adopted as a national maritime policy by both Great Britain and the United States to limit catastrophic losses from the perils of the sea. Both the British and American merchant marines were failing fast, for there were investments in other areas just as lucrative and much less risky. Consequently, it was found necessary, in the interest of attracting capital to the owning and operating of ships, to protect against the extraordinary perils of the sea.

Today, the situation facing the American merchant marine is as bad or worse than it was a hundred years ago. Three-quarters of our fleet is over 20 years of age. No adequate replacement program is yet on the horizon. Unless radical measures are taken fast, there is a good prospect that the present fleet of approximately 975 vessels will shrink to four or five hundred vessels in the years immediately ahead. Action by the Congress to remove all limitation of liability upon any risk, including oil spillage, would be the last "nail in the coffin". Thus, we strongly urge retaining some form of limitation.

SUSPENSION OR REVOCATION OF LICENSES

I have already alerted some of the labor unions representing ships' officers to the dangers inherent in the provisions of subsection 19(g). Under this section, the Commandant of the Coast Guard may suspend or revoke a license issued to an officer of any vessel found violating the provisions of subsection 19(b). Senate Report No. 917 offers the following explanation of this provision:

"The 1924 act authorizes the Coast Guard to suspend or revoke a master's license or the license of any officer of a vessel found violating the act. The bill would continue this authority."

The above explanation naively forgets that in order to establish a violation under the 1924 act, either gross negligence or willfulness had to be established. Under the present bill, a violation could apparently occur "regardless of fault". I hope the Committee will appreciate the seriousness of the predicament in which our merchant officers will be placed should the bill pass in its present form.

AUTHORITY TO ISSUE REGULATIONS

And finally, Mr. Chairman, I should like to offer a brief comment with respect to subsection 19(h). In that section the Secretary of the Interior is authorized to issue regulations which, among other things, would permit the discharge of oil from a vessel under certain circumstances. It has recently been brought to my attention that situations do develop, particularly where a vessel is temporarily stranded, when it becomes advisable, in the opinion of the experts, to deliberately pump oil from the vessel into the sea. The theory is, I believe, that by lightening the vessel it may be freed and thus eliminate the danger of vastly greater damage in the event it should break up.

I merely wish to mention this kind of situation at this time, although I am sure that the Secretary would cover such situations in the regulations he is authorized to issue under subsection 19(h).

INTERNATIONAL APPROACH

Mr. Chairman, I cannot say too strongly that this entire matter of oil pollution is one which properly should be dealt with in an international basis. You will recall that at the time of the *Torrey Canyon* disaster great pressures built up in both England and France for the enactment of unilateral oil pollution legislation.

However, eventually the Government of the United Kingdom, supported by the United States and other maritime nations, called for an emergency meeting of the Council of the Intergovernmental Maritime Consultative Organization. This is a specialized agency of the United Nations, organized to provide for cooperation among governments in many areas of shipping activity, and includes all major shipping nations of the world.

Recognizing that a *Torrey Canyon* casualty could occur off the shores of this country, interest in the United States was of course high, both as to corrective measures at a national level and as to international cooperation toward the same end. In that connection, the Chairman of the House Merchant Marine and Fisheries Committee issued a statement strongly supporting an international approach to the problem.

The Council of IMCO met in Extraordinary Session in May, 1967, and instituted a series of studies of the problem brought into focus by the *Torrey Canyon* accident. The measures to be considered were in three categories: (a) those to prevent future accidents, (b) those to minimize damage if accidents should occur, and (c) legal questions.

It was agreed that top priority should be given to those items which dealt with the type of problem presented by the *Torrey Canyon* accident but that final results of the studies should include other proposals of general application to maritime safety.

A mere recitation of the subjects which IMCO agreed to study indicates the breadth and depth of the inquiry which is underway:

a. Minimizing incidents by:

- (1) Preventive measures on sea lanes and prohibited areas
- (2) Additional navigational aids
- (3) Shore guidance for movement of ships
- (4) Speed restrictions
- (5) Testing of navigational equipment
- (6) Training and qualification for officers and crew
- (7) Use of automatic pilots
- (8) Design, construction and equipment of ships
- (9) Identification and charting of hazards
- (10) Organization of watches

b. National and international procedures in the event of accident.

c. Oil pollution research relative to prevention in the event of accident.

d. Legal matters:

- (1) Investigation of casualties
- (2) Reexamination of the 1954 International Convention
- (3) Jurisdiction over foreign vessels on the high seas
- (4) Liability and compensation
- (5) Free movement of salvage equipment.

In connection with the work of IMCO in this field of pollution of the seas, other international agencies are also involved. For example, the International Chamber of Shipping, which is an organization composed of shipping associations from all the principal maritime nations of the world, is very much involved in the work on the technical issues. At its Annual Meeting held a few weeks ago in London, the matter of the various legislative proposals now pending in the United States Congress was the subject of great concern. Following the Meeting, ICS agreed upon the following statement for public release:

"In the past year the far-reaching implications of the *Torrey Canyon* incident which have been remitted to the Intergovernmental Maritime Consultative Organization have been under active consideration by the International Chamber of Shipping. The I.C.S. has been coordinating views on the various studies and recommendations within the legal, technical and navigational fields and has put its practical advice at the disposal of IMCO. The I.C.S. is particularly anxious that, while IMCO and the Comité Maritime International are endeavouring to find legal solutions to the problem of oil discharged into the sea, governments should resist the temptation to introduce their own legislation to lay down procedures and deal with liability for damage. Unilateral legislation by any one government on matters of international concern can only cause serious interruption of existing international shipping practices in the maintenance of which all countries have a vital interest."

In effect they are saying to us in this country:

"When we had a problem over here resulting from the *Torrey Canyon*, you urged us not to treat the issues on a unilateral basis but to deal with them internationally. And we did so. Now we are making the same request of the United States."

I wish to assure this Committee that a great deal of progress has been made by the various Committees and Subcommittees of IMCO in resolving many aspects of oil pollution. Some of these areas are:

1. The establishment of sea lanes incorporating traffic separation was considered worthy of recommendation as a potential contribution toward greater safety. Routing and traffic separation schemes have been recommended for 10 specific areas, and 2 additional areas have been designated as ones to be avoided by tankers carrying oil.

2. Port advisory services are felt to have value, and their establishment is recommended for appropriate ports—particularly those handling noxious or hazardous cargoes or at oil terminals.

3. The extension of pilotage services was also recommended.

4. The value of ship-borne aids to navigation was matter of general recognition, and a Subcommittee urged that the carriage of radar be made compulsory on all voyages for seagoing ships of 1600 g.r.t. and over, and recommended that suitable electronic position-fixing equipment be fitted in tankers and other ships carrying noxious or hazardous cargoes in bulk.

5. There is a proposed new international regulation to the effect that when the automatic pilot is used in congested areas or in restricted visibility, or under any other conditions in which navigation is hazardous, there should always be the possibility of instantaneous establishment of human control of the ship's movements.

6. All ships should carry adequate and up-to-date charts and other publications necessary for the intended voyage.

These matters will come before an Extraordinary Session of the IMCO Assembly in November, 1968. This Assembly Meeting will be devoted exclusively to the results of the *Torrey Canyon* program of work.

On matters primarily of public law, consideration is being given to (a) the problem of determining when a coastal State might be justified in taking action to forestall pollution or other damage, (b) the machinery for investigating the aftermath of casualties and the practical aspects of conducting salvage operations, (c) legal issues involving the protection of innocent victims and compensation for damages suffered by them, (d) whether officials of a contracting State should be entitled to verify contraventions of the Convention provisions, stop any ship caught in the act of such intervention, and board her, (e) whether a contracting State should take into consideration a report drawn up by an authorizing official of another contracting State and institute proceedings on the basis of such report, (f) whether contracting States should cooperate in facilitating judicial and other proceedings on the basis of the report drawn up by an authorizing official, (g) whether an international tribunal should be set up which would be empowered to impose penalties when any State has been found to contravene the Convention provisions.

The International Maritime Law Committee, known as "Comite Maritime International" (CMI), is scheduled to meet in Brussels May 2-3, 1968. One of the problems to be dealt with at the forthcoming meeting involves the principle of limitation of liability. On this, there is unanimous agreement that the principle should be maintained in regard to liability for oil pollution damage. An excerpt from an interim report of CMI indicates that the main reason for retaining this principle is "that insurance of the shipowner's liability risk is greatly facilitated when the maximum liability can normally be assessed in advance, and it is in the interest of the victims that adequate insurance facilities are easily available."

Suffice it to say, Mr. Chairman, this brief summary indicates a dedication on the part of all maritime countries of the world to come to grips without undue delay with the myriad of problems that have been brought into focus by the stranding of the *TORREY CANYON*. Under these circumstances, it is our urgent plea that final action on the pending legislation be deferred at least for this session of the Congress so that the Intergovernmental Maritime Consultative Organization will have adequate opportunity to provide international solutions to which the United States can subscribe.

Thank you.

LIABILITY WITHOUT FAULT

Mr. CASEY. Mr. Chairman, I subscribe wholeheartedly to the position that the American Petroleum Institute has taken in two principal and important areas. First, that if this bill purports to impose liability without fault, that it is unfair and contrary to established legal precedents. We feel that the bill should provide for unlawful discharges only in the case of negligence.

Indeed, a reading of the bill, were it not for the statement in the report of the Senate committee, would lead me to the belief that an unlawful spilling under 19(b) would be one resulting from an avoidable accident since the section uses the word "unavoidable" or, in other words, a happening which, but for the lack of reasonable care, would not have occurred.

I note yesterday that the Secretary of the Interior said, in effect, let the fellow who made the mistake clean it up rather than the Federal Government. We subscribe to that, but a mistake in itself connotes negligence in the act of passive action.

NO LIMITATION OF LIABILITY

Aside from the question of liability without fault, the most significant change that is made in the cleanup section derives from the use of the words "notwithstanding any other provision of law which purports to remove the historic limitation of liability enjoyed by ship-owners for generations," because over a century ago limitation of liability was adopted as a national maritime policy by both Great Britain and the United States. To limit catastrophic losses from the perils of the sea, both countries adopted it. Both the British and American merchant marine was failing fast, but there were investments in other areas and much less risky.

Consequently, it was found necessary, in the interest of attracting capital to the owning and operating of vessels to protect against extraordinary perils of the sea.

Today, the situation facing the American merchant marine is worse than it was 100 years ago. To remove all limitation of liability for any risk, including oil spillage, would be the last nail in the coffin of the American merchant marine today.

Thus, we strongly urge retaining some form of limitation.

INTERNATIONAL APPROACH

Now, Mr. Chairman, I am going to skip, in the interest of time, to point out merely that we feel that this entire question is derived from the consequences of the *Torrey Canyon* and, indeed, the *Ocean Eagle* are matters that can be handled on an international basis under the intergovernmental maritime consulting organizations.

This organization has established numerous committees, both in the legal and practical aspects of what can be done to avoid similar accidents, what can be done when an accident happens.

There is a forthcoming meeting of the legal group called the Comité Maritime International, on May 2 and 3, where there will be a number of suggestions put forth before that group on an interna-

tional basis and, indeed, one of them is one that we mentioned a short time ago, in Mr. Cramer's question where it would shift the burden of proof from the Government or the Secretary of Interior to establish fault to the shipowners. He would be presumed to be negligent unless he could establish he was without fault.

This, as I say, will be considered on an international basis.

When the *Torrey Canyon* accident happened, I might say the United States urged that either Britain or France enact unilateral legislation at that time in an area of despair, so to speak, over the consequences of the *Torrey Canyon* accident.

The Chair is in receipt of a cable from the International Chamber of Shipping, composed of the national shipping organizations of 21 maritime countries, asking that this committee defer final action until this matter can be handled on an international basis.

In effect, what they are saying to us is when the *Torrey Canyon* accident happened over here you pleaded with us to handle this on an international basis, and now we are making the same request of you.

I assure you that great progress has been made in a number of the areas that are involved. There were some 18 principal subjects that they felt should be considered as a result of the *Torrey Canyon* accident, and these have been considered by subcommittees.

The American Merchant Marine Institute, the organization that I had, has engaged separate counsel to attend these meetings in London. We have other consultants that are attending on the areas that involve expertise in these fields.

In concluding, Mr. Chairman, I say that there is a great effort being made on an international basis to avoid the consequences and, indeed, to handle the spill-over that happens as a result of these extraordinary spills, and we do feel that final action should be deferred on any drastic changes in international law on the part of the United States until the matter can be handled effectively on an international basis.

CONCLUSION

The rest of my statement gives a lot of background on the limitation of liability. It analyzes the provisions of the bill which Mr. Cramer refers to, which I believe were inconsistent, and I do believe, were it not for that statement in the central report, that the terms of section 19(b), when it uses the term "unavoidable accident," necessarily implies that if you could avoid it, that you are not liable; but negligence is necessarily implied, and I believe that is what should be the crux of 19(b).

Mr. BLATNIK. Thank you very much, Mr. Casey; and thank you for your cooperation in standing by so long, and summarizing your presentation.

Mr. CRAMER?

Mr. CRAMER. Does not the "ameliorate" disturb you at all?

Mr. CASEY. I do not know where it is. The language that I have in S. 2760 is the same language.

Mr. BLATNIK. The Senate bill.

Mr. CRAMER. That is Mr. Fallon's bill, H.R. 15906, on lines 15, 17, and 18. It is also on line 2, page 9. Here it is if you want to take a look at it.

Mr. CASEY. Well, I know what was meant by this word, to take all reasonable precaution and action immediately to do whatever you could to lessen the damaging effects of the oil spill, including removal, which is the language in the original bill, and the language in S. 2760.

I directed my thinking completely around the S. 2760, and was not aware there was a difference in this respect.

Mr. CRAMER. That language does not bother you, then?

Mr. CASEY. I do not believe so.

Mr. CRAMER. I wish you would take another look at it.

Mr. CASEY. I will be glad to.

Mr. CRAMER. It seems to me to ameliorate the effect would have an endless checking of liability.

Mr. CASEY. The last thing I want in the world is to have unlimited power in the administrative agency. The liability should be prescribed in the statute.

Mr. CRAMER. On the standpoint of what is covered?

Mr. CASEY. Yes, sir.

Mr. CRAMER. Thank you. That is all I have.

Mr. BLATNIK. Thank you very much.

Our next witness is Mr. John C. J. Shearer and Peter N. Miller.

Are you two gentlemen together? Is this a correlated statement?

INSURANCE AGAINST LEGAL LIABILITY RESULTING FROM OIL POLLUTION

STATEMENT OF JOHN C. J. SHEARER, LONDON INSURANCE EXECUTIVE, ACCOMPANIED BY PETER N. MILLER, LONDON INSURANCE EXECUTIVE

Mr. SHEARER. I have a statement to make, and I will be followed by Mr. Miller.

Mr. BLATNIK. Will you proceed with your statement, Mr. Shearer?

We simultaneously express our appreciation for your being here with us. I am sure this will be very interesting testimony and, at the same time, I apologize for keeping you so long. I understand you are trying to leave, to depart this evening, to go back to London.

Please proceed at will.

Mr. SHEARER. Thank you, Mr. Chairman.

I might say that I intend to address myself only to certain features of section 19(e) of H.R. 14000 and corresponding sections of companion bills which, it is submitted, would have a serious, adverse effect on the marine transportation industry and, therefore, on the foreign trade of the United States.

PROVISIONS OF LEGISLATION WOULD CREATE UNINSURABLE RISKS

It seems to me from my vantage point as a specialist in the field of marine liability insurance that these features to which I have referred would not only be hurtful to the marine transportation industry, but would, in fact, as you, Mr. Chairman, have pointed out in addressing Mr. Checket, be self-defeating in that they would create uninsurable risks, and they would result in shipowners not being able to meet the obligation to pay the cleanup costs referred to in section 19 of H.R. 14000.

You have been kind enough, Mr. Chairman, to introduce me. I am a partner in the firm of Thomas R. Miller & Son, the managers of the United Kingdom Mutual Steamship Assurances Association, Ltd., 14/20, St. Mary Axe, London, E.C. 3. England.

I have been engaged in the management of that association for 16 years. This statement is made on behalf of all of the mutual Shipowners' Protection & Indemnity Associations herein designated, and I would like to thank you on behalf of those associations for being given the opportunity to appear before you.

ASSOCIATIONS REPRESENTED AND THEIR FUNCTION

The United Kingdom P. & I. Association is the largest of a number of mutual protection and indemnity associations, which are often collectively referred to as the London Group of P. & I. Associations. The other associations which comprise the London Group are:

- The Britannia S.S. Insurance Association Ltd.;
- The London S.S. Owners Mutual Insurance Association Ltd.;
- The Newcastle Protection & Indemnity Association.
- The North of England Protecting & Indemnity Association;
- The Standard S.S. Owners Protection & Indemnity Association, Ltd.;
- The Steamship Mutual Underwriting Association Ltd.;
- The Sunderland Protecting and Indemnity Association;
- The West of England Steam Shipowners Protection & Indemnity Association Ltd.

Apart from the London group, I am also authorized to represent the Liverpool and London Steamship Protection & Indemnity Association of Liverpool and the Scandinavian P. & I. Associations, namely Assurance Foreign Gard, of Avendal, Arendal, Norway; Assurance Foreninger Skuld, with a head office in Oslo, Norway, and Sveriges Angfartys Assurans Forening, of Gothenburg, Sweden.

These associations virtually insure shipowners of various nationalities, owning tonnage approximating 130 million gross registered tons, about two-thirds of the world's tonnage, including over 4 million tons of U.S.-flag shipping. For example, the United Kingdom P. & I. Association consists of 15 percent British-flag tonnage and 85-percent tonnage of other flags. The board of directors of this association is composed of 32 members, of many nationalities. Included are vessels flying the flags of more than 60 maritime nations.

I should explain here, albeit briefly, the main function of the P. & I. Associations. In each association, shipowners and charterers band together for a common purpose: to share mutually in the payment of claims brought by third parties for which they are legally liable as a result of their common commercial purpose, the operation of ships.

What, then, are the liabilities in respect of which the associations afford coverage? The more important are as follows:

(a) Liability for loss of life and personal injury to passengers and crews;

(b) One-quarter of the shipowner's liability for collision damage, the remaining three-quarters being customarily covered by the hull underwriters, who insure the owner against loss of, or damage to his vessel;