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PROTECTING AMERICA'S ESTUARIES: THE POTOMAC

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HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES

NINETY-FIRST CONGRESS

SECOND SESSION

JULY 21 AND 22, 1970

Printed for the use of the Committee on Government Operations

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PROTECTING AMERICA'S ESTUARIES: THE POTOMAC

TUESDAY, JULY 21, 1970

HOUSE OF REPRESENTATIVES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 2247, Rayburn House Office Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representatives Henry S. Reuss, Gilbert Gude, Floyd V. Hicks, Paul N. McCloskey, Jr., and Guy Vander Jagt.

Also present: Phineas Indritz, chief counsel; Laurence Davis, assistant counsel; Josephine Scheiber, research analyst; and J. P. Carlson, minority counsel, Committee on Government Operations.

Mr. REUSS. The House Subcommittee on Conservation will be in order for 2 days of hearings on the Potomac estuary.

Arising in the high Appalachians of West Virginia, the Potomac River flows 285 miles through valleys, ridges, and piedmont, past forests and farms, small towns, and a few small factories, until it plunges over the Great Falls to meet the metropolis at Washington. Here it reaches sea level and broadens into an estuary, where the tide ebbs and flows and the fresh water gradually mixes with the brine from Chesapeake Bay. From Great Falls to Mount Vernon, the Potomac passes through "the critical 30 miles" of urban encroachment and pollution. Thence, purified by the infusion of salt water, the estuary widening to 12 miles breadth, extends untroubled, or almost untroubled, to the sea.

As our committee pointed out in its report on Hunting Creek, the Potomac shores below Alexandria are remarkably unspoiled by the more hideous works of man. Although degraded by the effluent from the Blue Plains sewage treatment plant, the Potomac still is one of the purer big rivers in the Northeast. It still supports a great fishery. At times 50 to 70 percent of all the canvasback ducks in the Atlantic flyway may be found on its waters. The Potomac is the only great northeastern river unstrangled by the wharves and works of commerce and industry.

The question now is whether we will be able to avoid desecration of the Potomac even in the midst of vast population increase and industrial expansion.

In this and subsequent hearings, we plan, by case studies, to assess the impact upon the Potomac resulting from various human activities.

The hearing today is concerned principally with Mallows Bay.

Mallows Bay is an indentation on the Maryland shore of the Potomac estuary about 35 miles downstream from Washington. More

than a hundred wooden ships, built for World War I service, were scuttled there, in an area below low tide owned by the State of Maryland. Filled with mud and overgrown with bushes, 99 of them are still there.

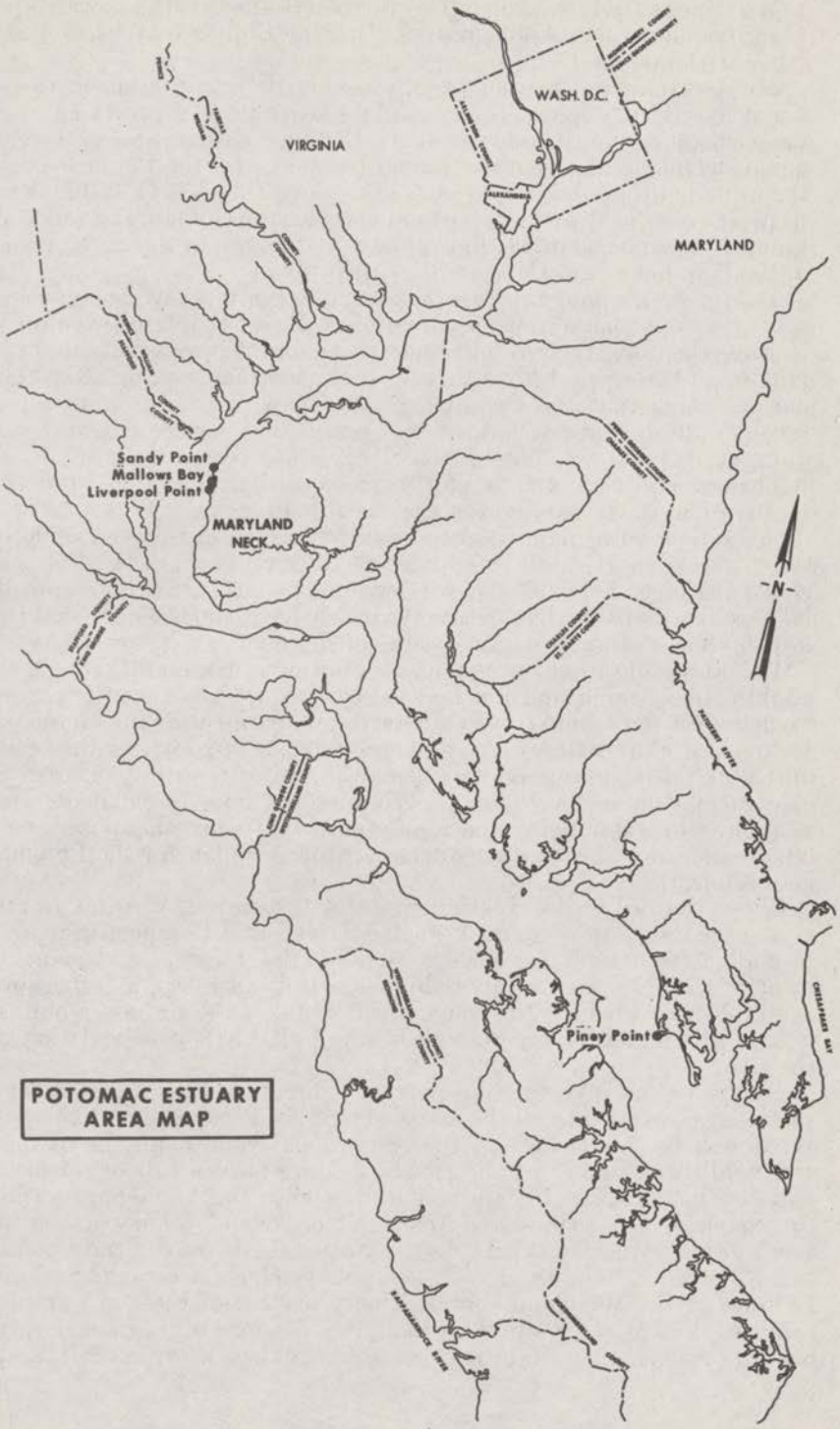
Section 116 of the River and Harbor Act of 1968—Public Law 91–483, 82 Stat. 737—authorizes and directs the Corps of Engineers to remove and destroy these hulks, but only if local interests pay 50 percent of the estimated cost of $350,000.

The Federal share of the funds for removal have not yet been appropriated or included in an appropriation request. The Secretary of the Maryland Department of Natural Resources has advised us that removal of hulks would serve no public interest and that the State has no plans to contribute any funds to the $350,000 cost of removing the hulks. The Corps of Engineers, some years ago, estimated that it would cost only $50,000 to fill 30 hulks around the perimeter of the bay with stone to form a bulkhead which would prevent the others from floating out into the navigation channel.

The land adjacent to Mallows Bay is now owned by Potomac Electric Power Co., which has announced that it intends to erect a powerplant there and run a 500-kilovolt line across the Potomac Estuary to the Virginia Electric Power Co.'s Possum Point plant.

The Interior Department's Bureau of Outdoor Recreation has prepared a report, released June 29, 1970, entitled, "The Potomac: A Model Estuary," which states: "Maryland Neck [the area containing the Pepco plant site] is perhaps the most promising recreation-open space resource along the entire Potomac Estuary."

We are today going to examine whether the removal of the hulks would principally benefit Pepco, whether such removal would damage the fishery in the bay, and whether the cost of such removal is excessive in light of the benefits it might produce. We shall also examine whether a power station ought to be built at Mallows Bay, in view of plans to make Maryland Neck into a recreation area. If a plant should be built there, do Pepco plans incorporate adequate environmental safeguards, and should the proposed 500-kilovolt transmission line across the estuary be placed under water to avoid defacing the Nation's river?


WASH. D.C.
VIRGINIA
MARYLAND
Sandy Point
Mallows Bay
Liverpool Point
MARYLAND NECK
N
Piney Point
POTOMAC ESTUARY
AREA MAP

Mr. REUSS. Before proceeding further, I should like to call upon Congressman Gilbert Gude, representing the Eighth District of Maryland. Mr. Gude.

Mr. GUDE. First, I wish to express my deep appreciation to our Chairman, Henry Reuss, for scheduling hearings on several important problems affecting the ecology of the Potomac Estuary. Several weeks ago, Chairman Reuss demonstrated his concern for the Potomac above the estuary by joining the annual hike along the C. & O. Canal Towpath—an area that we hope will soon become the Chesapeake and Ohio Canal National Historical Park, and a major step in the development of the Potomac as a model river for the Nation.

Today, we are moving from the river to the estuary. Last week, I surveyed the estuary from Washington to Piney Point and would like to stress the importance of our investigation to the preservation of this portion of the river. I hope that by these hearings we can make clear our intention that the Potomac River below Washington is not to become a 20th century midden—a combination service entrance and dumping ground for those of us who live upstream.

The estuary has much to offer us in recreational resources and as a source of a water supply for the metropolitan area. I have always thought that both these potentialities were unwisely shoved aside by those who advocate high-level dams on the main stem of the Potomac above the city. I do not see why we need a profusion of manmade lakes for recreation, when in the estuary we have a 207,000-acre natural impoundment of water with 637 miles of shoreline.

The stumbling block, of course, is pollution of the estuary. We must clean it up. Local, State, and Federal officials are finally getting down to agreement on a plan to provide tertiary treatment of the municipal waste. The elimination of phosphates from detergents, as this committee urged in its report, will speed the end of the rampant growth of algal blooms in the Potomac. We must not give up on the estuary as a source of water and recreation for our rapidly growing population, but reclamation of the estuary demands that we plan for the Potomac as a whole.

I hope that all of the riparian States will soon join Virginia in ratifying the interstate-Federal Potomac River Basin Compact. This will provide a framework for efficient regional development and management of the Potomac and its tributaries. But until such a framework is established, I believe the Department of the Interior has an obligation to fill the leadership role on heading off further degradation of the river.

Today, we are investigating potential threats to the estuary from a proposed powerplant and the expansion of the Piney Point Oil Depot. What will be the hazards to the recreational values and the seafood and wildlife resources of the estuary? More barges full of oil mean a higher risk of spills, like the recent disaster in Baltimore harbor. The consequences are serious and irreversible. Should oil depots be located in our estuaries at all? As the National Estuaries Study points out, 8 percent of the total U.S. fisheries products are caught within 12 miles of the Maryland shores. Ninety percent of these fish are dependent at some point upon the estuaries for spawning, food supply, habitat or some other vital life process. I hope these hearings will result

in some answers and some assurances that the estuary is not, in fact, being written off as an area of recreation, and needlessly defiled for shortsighted ends.

Mr. REUSS. Thank you, Mr. Gude, for your excellent statement.

The first group of witnesses will consist of Dr. Leslie L. Glasgow, Assistant Secretary of Interior for Fish and Wildlife and Parks, accompanied by Mr. Underhill, Mr. White, and Dr. Lear respectively of the Bureau of Outdoor Recreation, the Bureau of Sport Fisheries and Wildlife, and the Federal Water Quality Administration; and Mr. John Reynolds, Chief of the Operations Division, Baltimore district, U.S. Corps of Engineers. Welcome, gentlemen. We appreciate your being here.

Dr. Glasgow, will you proceed first.

STATEMENT OF DR. LESLIE L. GLASGOW, ASSISTANT SECRETARY FOR FISH AND WILDLIFE AND PARKS, DEPARTMENT OF THE INTERIOR, ACCOMPANIED BY A. HEATON UNDERHILL, ASSISTANT DIRECTOR FOR STATE GRANTS AND RESOURCE STUDIES, BUREAU OF OUTDOOR RECREATION; WILLIAM M. WHITE, ACTING ASSISTANT DIRECTOR, BUREAU OF SPORT FISHERIES AND WILDLIFE; DR. DONALD W. LEAR, SUPERVISORY MICROBIOLOGIST, FEDERAL WATER QUALITY ADMINISTRATION; AND JOHN L. REYNOLDS, CHIEF, OPERATIONS DIVISION, BALTIMORE DISTRICT, CORPS OF ENGINEERS

Dr. GLASGOW. Thank you, Mr. Chairman. I do have with me a few additional people.

Mr. REUSS. Would you please identify for the record your associates?

Dr. GLASGOW. It may not be necessary unless you ask specialized questions. If you do, I would like to call on them.

Mr. REUSS. All right, if that is relevant you will do so.

Dr. GLASGOW. Thank you. I do have a prepared statement which I would like to read.

Mr. REUSS. Under the rule, your prepared statement, Dr. Glasgow, and those of any of the other witnesses will be received in full into the record. Would you now proceed in your own way.

Dr. GLASGOW. Thank you, Mr. Chairman, and members of the subcommittee, for this opportunity to discuss with you the questions you have raised concerning the Potomac estuary.

At the direction of the Congress, we have recently completed a study of the lower Potomac, which includes the areas under consideration today. In transmitting the report of that study, copies of which have been made available to you, Secretary Hickel renewed our commitment to the development and preservation of "a Potomac estuary that is clean, pleasing to the eye and furnishing a balanced use of its resources for the benefit of all Americans."

Since 1965, the Department of the Interior has worked to accomplish this objective. The Federal Interdepartmental Task Force on the Potomac presented its recommendations in 1968. Other groups, including the Potomac Planning Task Force and the Potomac River Basin Advisory Committee, have made significant contributions to

our knowledge of the Potomac Basin and recommendations for the development of its full potential. Our most recent study, "The Potomac—A Model Estuary," is concerned primarily with the natural scenic, historic, and recreational values of the estuary from Chain Bridge to Chesapeake Bay.

Mallows Bay is a small, shallow embayment on the east bank of the Potomac River between Sandy Point and Liverpool Point, approximately 35 miles downstream from the District of Columbia. The Maryland and Virginia Shores are sparsely settled, and the nearest development of consequence is the U.S. Marine Corps installation at Quantico, approximately 3 miles upstream on the opposite Virginia shore. As you are aware, portions of the bay are now obstructed by many wrecks of vessels scuttled as the result of a salvaging operation conducted in the 1920's. The marketable parts of these vessels have long since been removed. Some of these hulls are visible above the waterline, and may constitute a hazard to small-boat navigation. In commenting upon the legislation that authorized their removal, the Department recognized that this action would be consistent with our esthetic objectives for the Potomac estuary. We are concerned, however, that the removal of these wrecks could adversely affect sport fishing opportunities, since such objects often serve as concentration points for various species of fish.

As the chairman requested, we have conducted a study concerning the possible effects of removal upon sport or commercial fishing. The results of that study were not available for inclusion in this prepared statement. With your permission, I would like to summarize our findings and to offer a report of that study for the record. In any event, we would strongly recommend that removal take place at a time other than the spawning season, and that the estuary itself not be used for disposal of the reclaimed debris. Other than as already noted, cautious removal of the boat hulks will probably have no persistent effect on the ecology of the estuary. We understand that a detailed statement on commercial fishing activity in this area will be provided by representatives of the Potomac River Fisheries Commission.

You have asked for our comments on the plans of Potomac Electric Power Co., recently announced, to construct a fossil-fuel generating station at Sandy Point and to connect that facility with a generating station operated by the Virginia Electric Power Co., at Possum Point, on the Virginia bank of the river. To achieve connection with the Vepco plant, Pepco proposes to construct a 500-kilowatt transmission line, whose actual river crossing would account for approximately 2 miles of its 5-mile length. The site itself will consist of 524 acres on the Potomac River at Sandy Point, just north of Mallows Bay and approximately 27 miles upstream from the Potomac River, Route 301, Bridge.

To answer your specific question, there is, of course, a possibility that the proposed Pepco plant may be harmful to the ecology of the Potomac estuary. Improperly planned, constructed, or operated, this facility and others like it can contribute to the degradation of environmental quality. I speak not only of air and water quality, but of fish and wildlife habitat, recreational opportunity, and scenic beauty. When the Department consults with the Corps of Engineers concerning issuance of permits which must be sought by Pepco for approval

of its Sandy Point project, we will examine closely the probable effects of that project upon the natural quality of the Potomac estuary.

We will consider water quality. Adverse thermal alteration will result if water drawn from the estuary is not cooled to its natural temperature after use. Marine life would be threatened by unnaturally high water temperatures. The Maryland Department of Natural Resources, responsible for the establishment of water quality standards in the Potomac estuary, has set a water temperature limit of 90° F. Because recorded temperatures in the estuary range to a seasonal high of 85.5° F., Pepco must return its coolant at within 4.5° of the intake temperature. Although Pepco states in its application to the Public Service Commission of Maryland that its Sandy Point Station "will have no material effect on water quality," it eschews the use of a cooling tower because it does not believe that "the relevant portion of the river is such as to make that technique either necessary or advisable." Other factors to be considered in water use by powerplants are the effects of pumping, the use of biocides for fouling control, the release of heavy metals, dredging and shoreline modifications, and fueling operations.

It should be noted that a Sandy Point plant would be the third within a 24-mile reach of the Potomac estuary from Possum Point, south to Morgantown. Difficult as it is to measure the ecological impact of a single powerplant, the cumulative effects of three such plants, closely spaced, must be a matter of concern. Pepco has announced its intention to use a model of the river in the development of a design for the station's cooling water intake and discharge system. We would welcome the opportunity to participate in this early phase of the design study. It would be our recommendation that the design be sufficiently flexible to accommodate changes in water quality standards that may later be warranted by changes in the natural condition of the estuary.

The reach of the Potomac estuary to be affected by construction of a generating station at Sandy Point serves as a spawning area for many species of fish, including large populations of striped bass. A blue crab commercial fishery exists a few miles downstream, near Maryland Point, and commercial gill nets abound in the spring.

The abundance of wildlife in this area has caused us to consider, in cooperation with the States of Maryland and Virginia, the protection of fish and wildlife areas at 34 sites adjacent to the river. Of these, 17 are deemed to be of such regional and national significance that they may be worthy of inclusion as units of the national wildlife refuge system. Those presently under study include a 200-acre site at Sandy Point itself, 235 acres of Widewater Marsh across the river in Virginia, and 3,230 acres at Nanjemoy Creek on Maryland Neck. Others of the 34 sites designated as potential recreation and fish and wildlife areas include 90 acres on Mallows Bay, and 14,500 acres at Maryland Point. We value the entire area for its waterfowl habitat and as a resting point within the Atlantic flyway. In short, we would object to any project or proposal that would adversely affect the abundance and variety of fish and wildlife which inhabit the Potomac estuary.

Our report, "The Potomac—A Model Estuary", describes Maryland Neck as "perhaps the most promising recreation-open space resource along the entire Potomac estuary." While we make no specific recom-

mendation for the establishment of a recreation area there, it appears that Federal administration would be desirable to assure the protection and enhancement of recreational and wildlife values. The Pepco proposal is not necessarily incompatible with these objectives for the Maryland Neck area, but it is, again, possible that the effects of air and water pollution would diminish recreational opportunities. The shore has several potentially good swimming sites, including one at Liverpool Point, just below Mallows Bay. The possibility of oil spillage would be increased by fueling operations, and development of the waterfront at Sandy Point might increase the hazards to recreational boating. Assuming that construction of a 5-mile transmission line would not disrupt natural values of the riverine environment or impede navigability, we could object only to the esthetic impact of this facility.

Department employees, I believe, have observed minor oil spills at Piney Point. Nevertheless, it has been the sad lesson of experience that repeated oil spills contribute significantly to the degradation of water quality and to the destruction of other natural values. We have no doubt that persistent oil pollution would have such an effect in the Potomac estuary, and that extreme care must be taken to avoid spillage. It follows that an increase in oil traffic on the Potomac, such as that required to supply the plant at Sandy Point, increases the risk of spillage. We believe the technology can be developed that would completely eliminate this hazard. However, the imposition of strict liability for the costs of cleanup, and the enforcement of new regulations will help to deter future contamination. The routine use of oil booms and similar control devices would help to localize the effects of accidental spillage at Piney Point and elsewhere along the Potomac. Simply stated, we believe that more stringent measures should be taken by tanker, barge, and terminal owners to eliminate the dangers inherent in their operations. Similar precautions must likewise be taken by fuel consumers, including the utility companies, when fuel oil is offloaded at their waterfront facilities.

I appreciate your interest, and would be pleased to answer your questions.

(Note—the study on the possible effects of removing the Mallows Bay hulks, referred to by Dr. Glasgow on p. 6, follows:)

REPORT OF THE BUREAU OF SPORT FISHERIES AND WILDLIFE ON THE EFFECT REMOVAL OF SUNKEN SHIPS WOULD HAVE ON THE SPORT AND COMMERCIAL FISHING IN MALLOWS BAY, MD.

Tides in the area range about 3 feet, and the old hulks are awash at high tide. Most of the ships are exposed at low tide. Iron bolts about 12 inches long extend from the wooden hulks making this a dangerous area for boating. Some of the hulks have broken apart and have drifted to new locations. There are dozens of ships in Mallows Bay, and they lack the esthetic appeal of a single sunken ship.

Waters in the area are brackish. Local fishermen report that fish of value to commercial or sport fishermen do not concentrate near the hulks. However, before the river was polluted, Mallows Bay was an excellent largemouth bass fishing area. Apparently, the ships do not concentrate fish as would a similar area in salt water. The principal catch of commercial fishermen at Mallows Bay are striped bass, white perch, shad, white catfish, and crabs. The hulks do not contribute to the catch. There is no oyster or clam fishery in the area.

Shrubs and herbs grow from the hulks. The principal species are river locust, willow, swamprose, cattail, and arrowhead. However, there is little area above the water, and food production is low compared to a marsh. The Potomac waters are heavily polluted in this area and algae growth restricts the growth of submerged plants.

The hulks, however, attract shore birds, such as great blue herons. A brood of young ducks was observed at Mallows Bay on the day of the survey—July 16. Waterfowl are apparently attracted to the area, because it provides protection from wind and waves. Hunters have erected duck blinds in the area and also hunt from the hulks.

People in the area do not object to the removal of these old ships; not even the people who use the old ships for hunting purposes. Everyone contacted in the area agreed that the hulks are a menace to boating, and they expressed the desire to see them removed. In conclusion, we believe that clearing the hulks from this area would have little effect on fishery resources and, in fact, may improve water quality in the area. In addition, the removal would cause only a small loss of shore bird and waterfowl resting habitat.

Mr. REUSS. Thank you, Dr. Glasgow. We would now like to hear from Mr. John Reynolds, Corps of Engineers, Baltimore District.

Mr. REYNOLDS. Mr. Chairman and members of the committee, I do not have a prepared statement. I was under the impression that I would appear to discuss the technical and factual data regarding Mallows Bay.

Mr. REUSS. If you would prefer not to make an oral statement, we will feel free to question you. It will be entirely up to you.

Mr. REYNOLDS. I will be ready for any questions you have, sir.

Mr. REUSS. Fine. We will go ahead. I have a couple of initial questions to ask Dr. Glasgow.

Taking off from the point made by Mr. Gude in his opening statement that, "until [a better] framework is established, I believe that the Department of the Interior has an obligation to fill the leadership role on heading off further degradation of the river":

Secretary Glasgow, are you and the Department of Interior in agreement with that statement and are you accepting that responsibility, as I hope and believe you are?

Dr. GLASGOW. Yes, we are in agreement with it. I think we have demonstrated our acceptance of it in action which we have taken.

Mr. REUSS. Yes. Specifically we have applauded your action on the Hunting Creek landfill a few miles down the river. We had some friendly and minor disagreement about the electric company crossover up river, but even there the general decision not to allow impingement on Antietam was one that was very agreeable to us.

Dr. GLASGOW. Yes, I think the discussion on the up-river crossing has been very helpful to us in that we will be more cognizant of these things in the future.

Mr. REUSS. We appreciated your cooperative attitude through the whole thing. Actually it is the legal responsibility for assuring that the Pepco plant at Sandy Point does not degrade the Potomac environment. It is not up to any Federal agency, but largely up to the Public Service Commission of Maryland; is that not so?

Dr. GLASGOW. Yes, that is correct. Our only obligation in the plant construction will be review of the permit that they request from the Corps of Engineers, and, of course, at that time we will comment on the permit that is requested. I think I might add that this is an area in which it would be very desirable for us to have further authority, and be required to comment on all fossil fuel plants as well as the AEC plants.

Mr. REUSS. You don't have such legal responsibility now. You do it as a friendly intervenor?

Dr. GLASGOW. For the fossil fuel plants we are not requested to make any comment other than what might be associated with dredging, and filling and this type of thing.

Mr. REUSS. This is ironic. If it is a hydroelectric plant, then you are not only required, as you should be, to make comments; but the agency charged with giving the permit, the Federal Power Commission, has to make exhaustive environmental findings. And in the case of a thermal plant, which may have just as great environmental effects, you are out in the cold, and the Federal Power Commission has nothing to do with it, either; is that not so?

Dr. GLASGOW. On the thermal plants we are asked by the Atomic Energy Commission to provide comments, and we do.

Mr. REUSS. That is on a nuclear plant. On a fossil fuel plant——

Dr. GLASGOW. We do not.

Mr. REUSS. You are out in the cold.

Dr. GLASGOW. That is correct.

Mr. REUSS. On page 4 of your statement, Secretary Glasgow, you say this, and I quote:

> Although Pepco states in its application to the Public Service Commission of Maryland that its Sandy Point station "will have no material effect on water quality," it eschews the use of a cooling tower because it does not believe that "the relevant portion of the river is such as to make that technique either necessary or advisable."

You have just gotten through pointing out that a 90-degree Fahrenheit limit is the limit already set by the Department of Natural Resources of Maryland for water quality standards in the Potomac estuary, and that without any powerplant the temperatures at the Mallows Point area naturally get up to 85.50° F., which suggests by a process of simple arithmetic that if those return waters are more than 4½ degrees hotter than the ambient stream, somebody is going to bust the water quality regulations; is that not so?

Dr. GLASGOW. Yes; that is correct.

Mr. REUSS. What do you think of the assertion of Pepco that a cooling tower isn't necessary or advisable? How are they going to cool that water to the 4½° F. tolerance that you say is necessary?

Dr. GLASGOW. The relevant portion of the river that is referred to here is an important area of the river, and should not be degraded. Therefore, it will be necessary that they return the water to the river at a temperature that is very near the temperature at which it was taken.

Mr. REUSS. What are their plans? Can they do that without a cooling tower? Here you may want to call on your technological friends.

Dr. GLASGOW. Yes, it can be done without a cooling tower, but I think that it might be much safer and surer with a cooling tower, and I would like to call on some assistance here to reply.

Mr. REUSS. Would you, at this time, introduce whoever you call on.

Dr. GLASGOW. Dr. Donald A. Lear from the Federal Water Quality Administration.

Mr. REUSS. Dr. Lear, Secretary Glasgow has said that if Pepco raises the temperature by more than 4½ degrees, ecological hell will break loose. Pepco has said that it doesn't consider a cooling tower either necessary or advisable. Can you lead us out of this morass?

Dr. LEAR. Yes. In order not to contravene the water quality stand-

ards, they could pump larger volumes of water to dissipate the heat in the larger volumes. I haven't seen the plans in detail so I don't know the technical details; but in comparison to the Possum Point facility across the estuary from it, they would probably have to pump much larger volumes of water in order not to contravene the water quality standards with the ambient temperatures found there.

Mr. REUSS. I don't understand what you mean by saying "they would probably have to pump much larger quantities of water."

Dr. LEAR. Yes, to dissipate the heat. If you had just a small bit of water, you would heat it to a high degree; but if you have a large volume of water going through you dissipate the heat into a larger volume, and then put it out in the jetstream with a jet outfall to dissipate it more rapidly, so they would have to use larger volumes of water.

Mr. REUSS. Or go to a cooling tower?

Dr. LEAR. Or go to a cooling tower; yes, sir.

Mr. REUSS. What does their application say about the volumes of water? They have said no cooling tower.

Dr. LEAR. This I don't know. I haven't seen the application in detail.

Mr. REUSS. Have any other of your people seen it?

Dr. GLASGOW. No, we have not seen it.

Mr. REUSS. You have seen enough to observe that they say no cooling tower?

Dr. GLASGOW. Yes. They could also use cooling lagoons, but, Mr. Chairman, I do not know what their proposal is.

Mr. REUSS. But I have your assurance that you will use a gimlet-eyed approach to whatever their proposal is to make sure that they don't bust the 4½ degree temperature variance?

Dr. GLASGOW. We will certainly do everything possible to keep that water temperature within the requirements of the Water Quality Act.

Mr. REUSS. Mr. Gude?

Mr. GUDE. Dr. Glasgow, if Pepco erects a powerline across the river 4 miles above the plant, which I think is going to be the location, they would have to get a permit from the Corps of Engineers, which you in turn would be obligated to comment upon.

Dr. GLASGOW. Yes. We would comment on it.

Mr. GUDE. In view of the statements in this report concerning the recreational value of this Maryland Neck area, would you comment upon the impact of this installation on the esthetic and recreational values, as well as the possible effects on the river itself.

Dr. GLASGOW. Oh, yes, sir. That would be an important part of our comment.

Mr. GUDE. What about the stacks which would be erected in conjunction with this plant?

Dr. GLASGOW. The cooling towers or smokestacks?

Mr. GUDE. The smokestacks.

Dr. GLASGOW. I don't think that we are required to comment on that. Of course without any doubt it would have a big influence on the esthetics of the river, but there is no legal requirement that we comment on it.

Mr. GUDE. On the stacks, but not upon the wires or the transmission towers?

Dr. GLASGOW. Yes. There is none requiring comment on the stacks, but there would be on the crossing of the river by the wires, since that would require a Corps of Engineers permit.

Mr. GUDE. If it is going to be necessary to barge oil in to serve this facility, then there are going to be docks and facilities erected, which again would require Corps of Engineers permits, and you would be obligated to comment upon those.

Dr. GLASGOW. Yes, we would.

Mr. GUDE. As far as the potential danger of the oil spill in that section of the river?

Dr. GLASGOW. We would comment on the impact of dredging or filling in the construction of the dock on the fish and wildlife values.

Mr. GUDE. What about the fact that this facility was going to be used as part of an oil depot or an oil transmission facility? You would comment upon that also?

Dr. GLASGOW. We would recommend safety precautions and this type of thing, and certainly the potential does exist at any facility of this type for oil spills. There are many safety devices and measures that can be taken, and, of course, we would recommend all that we could.

Mr. GUDE. I notice you comment that there should be fail-safe precautions installed in the erection of facilities for the transmission of fuel oil. In the recent spill down at Piney Point, there obviously wasn't a fail-safe system, and there was an accidental spill which caused a good bit of trouble.

Dr. GLASGOW. Many of the older facilities do not have adequate safety precautions incorporated in the system. I think any new installation would be much better, and would contain all the latest safety equipment that was practical.

Mr. GUDE. Then the Department would be able to outline what type of safety features and precautions should be built into such a system, and would be in a position to comment adversely or in support of a facility depending upon whether it would be completely safe, and guarantee that oil could be loaded and unloaded with no accidental spills.

Dr. GLASGOW. Mr. Gude, tomorrow, I think, you will have a witness who is much better qualified to comment on this than the group here today, and that is Mr. Kenneth Biglane who is with the Federal Water Quality Administration. He can provide any information that the committee would need or desire.

Mr. GUDE. In regard to the Maryland Neck area in general, we have the report which Interior put out in July of 1970, and it comments on page 73 in regard to Maryland Neck, and states the attitude of the Department as to what type of recreational facilities should be developed at Maryland Neck. However, the preliminary draft, which was received by the committee staff, contains some comments concerning Maryland Neck which we don't find in the final published draft which is this copy here with a picture of the estuary on it.

In the preliminary draft that was received by the committee staff, it is stated, "To preserve and develop the vast potential of Maryland Neck, it is recommended that a recreation area administered by the National Park Service be established in the area between State Highway 224 and the waterline and extending from Chicamauxen Creek to the point at which State Highway 6 ends at the water's edge."

In examining the map which is in the printed version, which was published in July of 1970, there is a shaded area which indicates that the Interior Department does indeed envisage this as a recreation area extending all the way from Route 6 around to Indian Head. There is a shaded area over the entire neck of land there which includes Purse State Park, a State park which the report also indicates it feels should possibly go under Federal administration to provide for continuity. It also includes Sandy Point and Mallows Bay, of course.

Also in the printed version there is a comment on page 10 which says under "Accokeek unit, Maryland Neck. Perhaps the most significant recreation, open space and wildlife area remaining in the Potomac estuary should be preserved and managed as such, preferably by a Federal agency."

It would seem to me that in the study that you all have made of the estuary, you point up the Maryland Neck area as being one of the most valuable for recreation and wildlife—you might say, the pearl of the estuary. I was wondering if you would comment on this. It would seem to me that the intrusion of a powerplant into such a prize area would legitimately cause some raised eyebrows.

Dr. GLASGOW. May I ask Mr. Underhill, from the Bureau of Outdoor Recreation, who is here on my left, to comment?

Mr. UNDERHILL. Mr. Secretary, the difference, I think, Mr. Gude, between the earlier draft and the published act can primarily be explained by the fact that the Department is not in a position to establish priorities nationwide as to all of these recreation areas. While we recognize the high value of Maryland Neck, we have to look at it in terms of available funds, the programs on the upper Potomac, and other areas throughout the country.

At the time that this report was published, we were not in a position to single this area out for higher priority than certain other areas. That is the reason that in the published report we recognize its high value, but do not come out with a firm recommendation that it be established under Federal ownership.

Mr. GUDE. As far as all of the other areas which are examined in this report along the estuary, this ranks the highest, doesn't it, in terms of the report?

Mr. UNDERHILL. In our opinion, this area has the highest potential for recreation and wildlife of any of the large areas along the estuary.

Mr. GUDE. So here we are going to see the erection of powerlines, the possibility of oil spills, more water pollution and noise pollution. Wouldn't you agree that these factors will definitely degrade the area to which you have given top priority for recreation?

Mr. UNDERHILL. Yes, sir; I would agree with that. I would say from our point of view, in terms of recreation, wildlife, and esthetic values, this would be an intrusion, and one that would probably be hard to live with. I do want to point out, however, that we were looking at it from that point of view. We were not examining the needs of the area for electric power. We were not examining the significance of a tie-in with the Virginia plant or any of the other considerations affecting the overall development of the Potomac Valley; so in a sense our position is biased in favor of preservation and recreation, and we have to look at it from that point of view.

Mr. GUDE. But from the standpoint that this is the No. 1 priority area you establish on the estuary, and this is the location for the powerplant, all other things being considered, would it be better to establish it somewhere else along the estuary or in some location rather than here? Is this the only spot at which this powerplant could be established?

Mr. UNDERHILL. I can't answer that, sir. From the power point of view, I don't know. I would say from our point of view your statement is correct. We would certainly feel that this area had a higher value for recreation and open space than for power, if there are other locations where the plant could be located.

Mr. REUSS. Would the gentleman yield at that point?

Mr. GUDE. Yes.

Mr. REUSS. Mr. Gude's line of questioning is, in my judgment, exposing a very weak area in our environmental setup. What we have just heard from the Department of Interior is that it presents sort of a "bird watcher's point of view"—it gives the ideal, but says it doesn't really know about where an electric powerplant ought to be located. It seems to me that that attitude makes it very easy for other regulatory agencies to sort of brush you aside. Somebody, and I would think it really ought to be Interior, ought to concern itself with the central issue: It is necessary of course that this area have electric power. We have got to have it. We can't have brownouts or a deficiency in electricity. But unless somebody like the Department of the Interior is willing to put on its thinking cap, and decide where the electric powerplant should be sited with the least damage to the environment, it seems to me we are not going to get rational over all decisions. We are going to get compartmentalized decisions, in which the Department of Interior puts in its good word for the environment, but the harder-headed people make the decision.

Therefore, I ask you whether it would not be a good idea for the Department of Interior, which after all has a lot to do with electric power, to make an across-the-board recommendation where this and other future electric power installations on the Potomac should be sited, in order to do the best job of environmental preservation, consistent with the needs of the area for electric power. Excuse the intrusion, but I think it is relevant.

Dr. GLASGOW. The area that we are discussing is of major significance from a recreational standpoint, and it is difficult for me to see how a powerplant in this same area can be compatible with recreational use and the esthetics involved. This points up a very important question, and that is the zoning of all land areas, especially those along the rivers and the coastal zone, where there are so many people and where so many industries want to locate.

It certainly is an area in which we should be working toward more adequate zoning and classification of our land.

Mr. REUSS. But in the absence of that zoning, and where local government shows a lamentable lack of desire to zone, what are you—the Department of Interior—as the leader on the Potomac, doing? It seems to me from what you have said that you ought to be spotting for the electric company several sites other than the Mallows Bay site—those which won't degrade the environment—and in effect telling them, "Look, with regard to your Mallows Bay site, we have got this ear-

marked for a recreational area, and it is going to louse that up, so why don't you build it in sites B, C or D," or whatever you have.

Mr. GUDE. My thought is that although you may lack all the legal tools you should have, until you do have them, I think the Interior Department ought to come out with the banner, and point to these problems. You can certainly be leading the way.

Dr. GLASGOW. We have done this in different instances along the river, and it is true we don't have the authority that will be necessary to site plants along the river. In most cases we could not do anything about it other than recommend or suggest.

Mr. UNDERHILL. Mr. Chairman, Mr. Gude, if I could just make one additional point: Of course the resolution directed us to restrict our study to the recreation, wildlife and open space values; but we are not really abrogating this responsibility, in that one of the major recommendations of this report is that there is a need for a centralized land use planning agency for the Potomac estuary which would have the authority to suggest the proper location for powerplants, for industrial development, and the other factors that result in a balanced estuary. I think to the extent that we can, we are perfectly willing to accept that responsibility, but at the present time it is more or less stepping in without the legal authority to do so.

Mr. GUDE. Until we have an agency such as an interstate compact authority for the Potomac, who is going to fill this role?

Mr. UNDERHILL. I think it has to be the Department of Interior, or at least the Federal leadership with the help of other departments.

Mr. GUDE. With regard to the type of comments that you might make on the construction of a powerplant at Sandy Point, what comments could you make as to the impact so far of the Morgantown plant upon fisheries and the thermal pollution that has come about as a result of the construction of the plant?

It would seem to me in commenting on the Sandy Point plant that there would be a valuable source of information from what the Morgantown plant has done since it has begun operation.

Dr. GLASGOW. I am going to ask Mr. Bill White to respond to your question.

Mr. WHITE. The Morgantown plant is still under construction, as I understand it. One unit recently went on the line, but we haven't had any studies to determine what the effect of it might be. The Possum Point plant in Virginia has been operating since 1948. We haven't carried out studies of it, but we don't have evidence of thermal damage from that plant.

In connection with the Morgantown plant, the Department of the Interior did comment on the Army permit application, and in those comments we recommended that the plant not degrade approved water quality standards. We will be watching to make sure that the plant does not do so.

We also recommended that long-range environmental studies be carried out of the plant's operation.

I might comment a little on powerplant siting. There is an interagency study, a national study of powerplant siting. I believe this is under the leadership of the Office of Science and Technology in the White House. Interior is participating in this effort.

As I understand it, the people are trying to develop guidelines to assist power companies in locating plants, so they will do a minimum of damage to the environment.

Mr. GUDE. You made a statement about the environmental impact of the Possum Point plant. I was wondering about the general impact, but particularly thermal.

Mr. WHITE. We have no evidence of any particular damage from the Possum Point plant. We generally hear if there is a significant fish kill or something of that order.

Mr. GUDE. Are you running studies there? There may not be any dramatic fish kill or large impact, but what about the change in populations of various types of fish, the question of the effect of this on the general ecosystem there?

Mr. WHITE. Studies of this would be desirable. Our Bureau of Sport Fisheries and Wildlife is not carrying out such studies. Dr. Lear says that the Federal Water Quality Administration does have some studies of this type.

Dr. LEAR. Yes, as part of our overall Potomac estuaries studies, we have maintained a station at Sandy Point for almost 5 years. The only noticeable effect we have been able to see from the Possum Point plant so far, without looking at it in detail, is that in early spring, say February–March, we tend to get a plankton bloom earlier than on the rest of the river. It is not an obnoxious plankton bloom as a rule. We have not done a detailed study of the plant.

One thing that probably should be emphasized from Dr. Glasgow's statement: I understand informally from other men who are working on the river that the region from Indian Head down to about Maryland Point, or possibly around to Mathias Point by the 301 bridge, is a very prime rockfish spawning area. It is all that is left in the Potomac. The fish no longer go above Indian Head. This has significance not only with respect to the estuary, but to the bay and even to the Atlantic coast, because these populations have been shown to migrate. This is the source from which they get the banner stripers up in Cape Cod, and we should watch this area carefully.

The thermal effect of the powerplant is just one effect. The effects of pumping, physically moving these things through the water, are very much unsettled in scientific literature right now. I would very much consider, especially in this 25-mile reach of estuary, the effects of physical damage to the biota in the water, possible physical effects. The literature is very unsettled on this and there is no clear-cut answer, but it should certainly be watched just as carefully as thermal inputs.

Mr. GUDE. Does the raising of the water temperature have an effect on the rockfish spawning?

Dr. LEAR. I don't know. Certainly a big increase would. I cannot be sure as to the practical effects in this estuary.

Mr. GUDE. What about the effects of the thermal rise on the promotion of algal blooms?

Dr. LEAR. This probably would contribute to promotion of the noxious blue-greens which we have experienced. They have to have the basic nutrients, but they're on heated water.

Mr. GUDE. Are there any additives going into the water at the Possum Point plant facility, such as heavy metals or other materials?

Dr. LEAR. I don't know. We haven't looked at this carefully. There

are several additives you should consider. One, the attrition of the plant materials in the heavy metals, and also the use of biocides. The powerplants often add chlorine to prevent fouling in their systems, and this addition, if not properly done, can result in damage. I think they have experienced this at the plant over on the Patuxent.

Mr. GUDE. When the powerplant adds these agents to the water, and then it is discharged into the estuary, who are they obligated to notify?

Dr. LEAR. First the State. The State has primary responsibility and if the State doesn't act, then the Federal Government usually steps in.

Dr. GLASGLOW. I think, Mr. Gude, a common heavy metal that is used in the blow-down process in many plants and powerplants as well is chromate, and copper sometimes, and there are others. For the last 6 weeks we have been investigating chromate, and its effect on the environment. It is too early to determine really what is happening. At this time it does show up as being a real hazard, but again let me repeat that it is too early to reach any conclusions whatever on it. We do know that the chromate attaches itself to the silt particles and, therefore, settles to the bottom in many places. I think though that it breaks down pretty rapidly, but I want to emphasize that it is too early for us to be predicting exactly the consequences of chromate in the water. Perhaps Dr. Lear would want to comment on that.

Dr. LEAR. I don't know in detail, Dr. Glasgow.

Mr. GUDE. To what extent has your group studied the effect of oil spills on the Potomac estuary?

Dr. LEAR. Not at all. The prime responsibility rests with Coast Guard and the Corps of Engineers. We assist when asked. This is local.

Mr. GUDE. There are the physical aspects when an oil spill occurs and so on, but does anyone study the actual effects on the fisheries, shellfish, and the fin fish, which suffer from spills?

Dr. LEAR. Yes. We have a group at the headquarters level that is looking at this. Ken Biglane, I think, will be here tomorrow when we talk about Piney Point. He was sent over and investigated the *Torrey Canyon* spill and went down to *Eagle*. He has been to all the major catastrophic spills and I think has compiled the available literature. Tomorrow, I think, he will be able to discuss this matter at length.

Mr. GUDE. But you have nothing specific on the Potomac estuary?

Dr. LEAR. We haven't experienced many oil spills on the Potomac. There have been very few. We are very lucky really.

Mr. GUDE. Of course I know that the oil spills that have occurred at Piney Point haven't seemed severe when you compare them to the *Torrey Canyon;* but in reading I did in preparation for this hearing, I notice that there is some concern that even small amounts of oil over a period of years have degrading effect on the water environment.

Dr. LEAR. Yes, indeed. I have some technical literature with me, especially on the shad, showing the effects of petroleum products, gasoline, crude oil, and they are very detrimental.

Dr. GLASGOW. Mr. Gude, I would like to comment further on the point that you raised about temperature. I think the cumulative effect of three powerplants here may be rather serious, especially in fish spawning. Fish respond to temperature in spawning, so that if you raise the temperature very much, you could induce spawning in striped bass ahead of schedule, which might then be a real problem.

Mr. GUDE. The Pepco plant at Dickerson has developed a large fish population during the winter. Is this true at the Possum Point plant?

Dr. LEAR. I don't know about Possum Point. This has been observed at the Chalk Point plant on the Patuxent. One thing you have to be careful of in developing a large fish population like this is that you might select for a single species. A good healthy environment has a lot of species, what ecologists call diversity, and when you put any kind of a stress on these systems, you tend to get one species that is really hardy and can take it, and if it is wiped out, you are wiped out. This diversity concept—we are just learning how to handle it, but it is very important. They say, "Wow, the fishing is really good" but if they are catching all white perch and that is the only thing you have got, we are very vulnerable.

Mr. GUDE. It is like having a river with nothing but algal blooms in it.

Dr. LEAR. Yes, we have a lot of productivity, but it is not useful.

Mr. GUDE. You get a great population in winter and it looks like an abundance but what does this mean during the middle of the summer for fishing in the vicinity of plants such as the one at Dickerson and Possum Point?

Dr. LEAR. I don't know, Mr. Gude.

Mr. GUDE. Could you send us the studies of the effects of oil on the shad?

Dr. LEAR. Yes, I have it right here.

Mr. GUDE. Were these studies made in the Potomac?

Dr. LEAR. I don't recall. I think I have it here. This is a journal called "Chesapeake Science." These are from the Neuse River near New Bern, N.C., where they did these studies on the white shad.

Mr. GUDE. It would be very helpful if we could have those for the record.

Mr. REUSS. Without objection, the article in "Chesapeake Science" will be included in the record.

(The article, "Reduced Oxygen Tolerance and Toxicity of Petroleum Products to Juvenile American Shad," by Marlin E. Tagatz, "Chesapeake Science," Vol. 2, Nos. 1–2, March-June 1961, is in the subcommittee files.)

Mr. REUSS. Mr. Hicks?

Mr. HICKS. I defer to Mr. McCloskey.

Mr. MCCLOSKEY. Thank you. Dr. Glasgow, if I understand the thrust of your testimony, it is that of all the places on the Potomac River estuary here below Washington, the area chosen for this particular powerplant would be repugnant to the optimum development of the estuary for recreational and fish and wildlife purposes. Is that a fair statement?

Dr. GLASGOW. Yes, it is.

Mr. MCCLOSKEY. If that is the attitude of the Department of the Interior, I would like to go back to the National Estuarine Act of 1968, in which the Secretary of the Interior was asked specifically to make a study and recommendation not later than January 1970. I am going to quote from section 2(b) of the act:

The study shall focus attention on whether any land or water area within an estuary of the Great Lakes should be acquired or administered by the Secretary

or by a State or local subdivision thereof, or whether such land or water area may be protected adequately through local, State, or Federal laws or other methods without Federal land acquisition or administration.

[NOTE.—The statute referred to is the Estuary Protection Act of 1968 (Public Law 90–454; 82 Stat. 625; 16 U.S.C. Supp. IV, 1221–1226).]

With respect to the study that the Secretary of Interior has now delivered this year, is there any statement in that study that local laws are not adequate with respect to powerplant siting on the Potomac estuary?

Dr. GLASGOW. Mr. McCloskey, I don't recall specifically. Perhaps Mr. White can.

Mr. WHITE. No, sir, I don't believe there was any specific reference to powerplant siting on the Potomac River.

Mr. MCCLOSKEY. In view of your testimony today, why not?

Mr. WHITE. In a nationwide study of that type which we carried out during I believe about a 5- or 6-month period, we were not able to get too specific. We did have a special chapter on Chesapeake Bay where we reviewed the various problems related to the bay. We certainly mentioned the possible effects of powerplants, large thermal powerplants of the nuclear type, but in the report we were not able to come up with specific recommendations for the siting of powerplants in particular areas throughout the country.

Mr. MCCLOSKEY. Let me just comment in response to that, Mr. White:

The Potomac estuary has been recognized as the model estuary for some years under a similar study by the Secretary of Interior. It is the estuary chosen to attempt to develop a balanced use for recreation and conservation and industrial development by the United States. It would seem to me that if this threat to the Potomac River estuary—the need for electricity development—has been known to exist over the last year or so, such an understanding that powerplants have to be sited along waterways might have justified that report's focusing on whether or not local laws were adequate for powerplant siting, as the law intended.

Mr. WHITE. That is a good point.

Mr. MCCLOSKEY. Do you disagree with that?

Mr. WHITE. I don't disagree at all. We did review in this report the various weaknesses of State and local laws that are governing the development of estuarine areas throughout the country. In several points in the report we did call attention to these legal insufficiencies. Our report on this estuary study actually helped to support further the legislation which the Secretary had recommended in November 1969 when he submitted the National Estuarine Pollution Study. This proposed legislation calls for a form of coastal zone management participated in by both the Federal Government and the States. It would be a grant-in-aid type of program in which the Federal Government would assist the States in developing comprehensive plans for the maintenance and development of the coastal zone and estuarine areas.

Mr. MCCLOSKEY. I understand that. Let me quote from section 2(a) of the Estuary Act under which the Secretary was given this responsibility: "For the purposes of this study, the Secretary shall consider,

among other matters, * * * (3) the value of such areas for more intensive development for economic use as part of urban developments and for commercial and industrial developments."

It would seem to me that that language in the act passed by Congress in 1968 would have made it incumbent upon the Secretary of Interior to consider powerplant siting as one of these values for more intensive development for industrial purposes. I gather that the estuarine report contains no reference to powerplant sitings on these estuaries?

Mr. WHITE. The report does not say where in a particular estuary powerplants should be located. It does point out the dangers of locating a number of them in an estuary. The report calls attention to the possible temperature problems, mechanical problems, and chemical problems to fish and wildlife resources from such plants.

Mr. MCCLOSKEY. The hope that we had in enacting that law was that you would focus attention, in the words of the act, as to whether local laws were adequate to protect the estuaries. I read Secretary Hickel's message in which he states at one point there is a need for a national land-use policy. At the same time, in the recommendations of the Secretary, he is urging that the States be charged with the zoning of the lands along the estuaries; is he not?

Mr. WHITE. This is correct. Raising this responsibility from the local level to the State level but not to the Federal level.

Mr. MCCLOSKEY. That is precisely our problem here, isn't it; namely, that the State of Maryland is the only one which will determine where this powerplant is to be sited under existing law?

Mr. WHITE. That is correct.

Mr. MCCLOSKEY. Here we have a Federal department testifying before a congressional committee on the one hand that the State has not made a proper choice or that the Federal Government has no way to effect that choice. On the other hand, in your estuarine report you did not suggest that local law was inadequate to properly protect the estuary. How do we resolve that conflict?

Dr. GLASGOW. May I comment?

Generally speaking, we did point out the inadequacy of the State regulations to protect the estuaries. This is the reason we came up with the proposal that the States be given grants to zone the coastal areas and to assist them in doing a better job. I think that if they should fail, providing the legislation eventually passes, then the Federal Government will either have to step in or we will lose our estuaries.

Mr. MCCLOSKEY. Do we have any indication that the Public Service Commission of Maryland, given a choice between putting a powerplant or a future recreational use on Mallows Bay, is going to opt in favor of the recreational use?

Dr. GLASGOW. I have no indication of this. I have no indication that it wouldn't either.

Mr. MCCLOSKEY. As this procedure goes forward, as the power company makes its application to the Maryland Public Service Commission—is it PSC?

Dr. GLASGOW. Public Service Commission.

Mr. MCCLOSKEY. Other than the Corps of Engineers' approval of the pilings for the powerline structures for transmission towers across the river and the pilings for the docks to receive the oil, at what point

in the procedure will the Federal Government have any right of regulation over the construction of this powerplant?

Dr. GLASGOW. From the Interior standpoint, at least the areas that I represent in Interior, there will be no opportunity to comment until the request from the Corps of Engineers is received.

At that point we will be asked to comment.

Mr. MCCLOSKEY. But the Corps of Engineers report under the Fish and Wildlife Coordination Act will only be as to actual construction in the waterway itself; will it not?

Mr. REYNOLDS. We will also be required in new applications to comment on the five points of the National Environmental Policy Act of 1969, which was enacted as Public Law 91–190; 83 Stat. 852, Jan. 1, 1970. Whether or not they have any legal basis for a denial of the permit I do not know. We will be required to consider the aspects landward of our present jurisdiction of mean high water shoreline from the environmental standpoint. In fact, our permits require the applicant to define to us what he is putting on the land and so forth, and the use. We will have to answer the five points in the environmental act in our report.

Mr. MCCLOSKEY. What is the current status of *Zabel* v. *Tabb*, the Florida case testing whether the Corps of Engineers could deny a permit based on environmental——

Mr. REYNOLDS. The last I heard it was under appeal.

Dr. GLASGOW. Mr. McCloskey, may I comment?

That has been resolved in the court in which it was being heard, in favor of the Government. That was I think either yesterday or Friday, a very recent decision.

Mr. MCCLOSKEY. Then the Corps of Engineers clearly does have the power to deny a permit based solely on environmental grounds, not just its intrusion on navigability; is that true?

Dr. GLASGOW. I received the message from our regional supervisor by phone and I am assuming that he is correct. This would be true.

Mr. REUSS. Hallelujah; that is great.

Mr. MCCLOSKEY. That relieves us of new legislation.

Dr. GLASGOW. This case could be appealed on to the Supreme Court.

(The case referred to was decided by the U.S. Court of Appeals for the Fifth Circuit on July 16, 1970 (*Zabel* v. *Tabb*, No. 27555; —— F. 2d ——, 1 Env. Rep. 1449).)

Mr. MCCLOSKEY. May I continue with this inquiry about the Federal regulation of powerplant siting? To the knowledge of any of you gentlemen, is there any other Federal regulation here governing the siting of this powerplant or the condition under which it is constructed, apart from the Corps of Engineers' right to grant a permit on something that is being constructed in the navigable waterways?

Dr. LEAR. Yes, sir.

Mr. MCCLOSKEY. Is the Federal water——

Dr. LEAR. If there is a likelihood water quality standards would be contravened, we would have a say-so in the matter. It would have to be a clear likelihood. Predicting in advance.

Mr. MCCLOSKEY. Dr. Glasgow's testimony on that point was that the Maryland Department of Natural Resources has set a standard of 90° maximum water temperature in the neighborhood of this plant.

Dr. LEAR. Tidal water.

Mr. McCLOSKEY. The Federal Water Quality Administration has approved that standard; has it not?

Dr. LEAR. Yes, sir.

Mr. McCLOSKEY. Are you personally satisfied that the standard is adequate to protect the fish in this area?

Dr. LEAR. This is controversial even among biologists. At the time that these were accepted, this was the best knowledge available to the biologists. There is some rethinking at the moment that even with tighter standards—especially as we add more and more thermal stresses to the environment, and it becomes more important as we do that—we are going to get cumulative additive effects, and we might have to revise these things.

At the time it seemed reasonable but they might be changed.

Mr. McCLOSKEY. Suppose these people want to go ahead and build a several hundred million dollar plant? I am not aware of the cost yet; but if the water quality standards were then changed, would the Federal Water Quality Administration have the power to shut down that plant and enforce those standards?

Dr. LEAR. Yes, sir.

Mr. McCLOSKEY. Then it would be incumbent upon anyone considering the construction of such a powerplant to consult with the Federal Water Quality Administration to ascertain not only the present standards but the possibility of change; would it not?

Dr. LEAR. Yes, sir.

Mr. McCLOSKEY. Has such consultation taken place in this particular plant?

Dr. LEAR. Not that I know. Although the powerplants have to abide by the current law at the moment. I remember this point was brought out in the hearings in Baltimore on the gas and electric case.

Mr. McCLOSKEY. I ask any of you gentlemen: To your knowledge has anyone connected with the Potomac Electric Power Co. consulted at all with the Federal Water Quality Administration, or with any agency of the Department of Interior, prior to considering where to locate this plant?

Dr. GLASGOW. I have no knowledge of that. I would like to comment on one point you raised there. A few years ago I was serving as chairman of the Louisiana State Stream Pollution and Control Commission when we passed our water quality standards. At that time we searched as carefully as we could to obtain the opinions of as many people as possible on what tolerances you could permit in temperature. We did finally come up with the conclusion that we could permit a 4° increase at that time. Since that time, I reached the conclusion that that was not adequate; we should not permit that high an increase in temperature.

Mr. McCLOSKEY. Dr. Glasgow, not only with respect to these rivers, has it not become general knowledge with respect to that fish migrations, particularly sport and commercial fish, that the temperature of the water is absolutely crucial to the whole migration habits?

Dr. GLASGOW. That is correct. And disappointing as well.

Mr. McCLOSKEY. This Maryland standard of 90° maximum is not just 4° more than the temperature of that river at any given time. I take it that the temperature of the Potomac estuary drops well below 85½° F.; does it not?

Dr. GLASGOW. I am sure it does in seasons. It does.

Mr. MCCLOSKEY. Can you tell me, is this the only standard? Is 90° the permissible maximum in the water at any time? Does it drop to this 4° increase in the natural water temperature?

Dr. LEAR. In tidal water there is a summer and winter rise allowed. You are allowed to heat the water a certain number of degrees, not to exceed 90. I don't have the Maryland water quality standards with me. If you want a specific answer, Mr. Weber is here from the Maryland Department of Water Resources; he can give you the accurate answer if you would like.

Mr. REUSS. Please state your name.

STATEMENT OF EDWIN C. WEBER, JR., WATER RESOURCES ENGINEER, STATE OF MARYLAND, DEPARTMENT OF WATER RESOURCES

Mr. WEBER. Ed Weber, department of water resources. Maryland's water quality standards state that the temperature rise permitted for any water intake which has a temperature above 50° F. must not exceed 10° F., with a maximum discharge temperature of 90° F. The temperature rise of any intake water which has a temperature of less than 50° F. must not exceed 20° F., with a maximum discharge temperature of 60° F.

Mr. MCCLOSKEY. Please explain that a little further.

Mr. WEBER. Between 50° F. up to 80° F., the standards permit raising the temperature of a discharge up to 10° F. above the intake temperature. For any intake temperature above 80° F., the temperature increase resulting from a manmade operation would need to be less than 10° F., because the State has set a maximum of 90° F. for discharge temperatures. In the wintertime, when temperatures are likely to be below 50° F., Maryland's temperature standards permit raising intake temperatures by no greater than an increment of 20° F., with a maximum of discharge temperature of 60° F. For example, if the intake temperature into a manmade operation is 40° F., it may be raised by 20° F. and discharged at 60° F. If, however, the intake temperature is at 47° F., it may be raised by no more than 13° F., so that the discharge temperature will not exceed 60° F. The standards are identified as Maryland Water Resources Regulation 4.8, "General Water Quality Criteria and Specific Water Quality Standards for All Maryland Waters."

Mr. MCCLOSKEY. Dr. Glasgow, if I understand your testimony correctly, the natural water temperature at the present time in this area can go up to 85½°?

Dr. GLASGOW. That is about the maximum.

Mr. MCCLOSKEY. Your studies have indicated that from a fisheries standpoint, a 4° increase over prior temperature may be too much?

Dr. GLASGOW. The extremes are those that control. This would be the extreme in temperature. It would be the controlling point and therefore I do feel that 4½° is too much.

Mr. MCCLOSKEY. In any event, there would be need for further study, I take it, before you could favorably comment on a powerplant which was going to increase the water temperature as much as 4½° in the area?

Dr. GLASGOW. The thermal problem is a complicated one. You may have a sudden rise or sudden fall. It may be shut off—the heat may be shut off completely, at which time it would return to the natural conditions of temperature.

It is really a complicated problem. The total volume of water that is heated is very important. The currents that you have in the river at that point are very important. Surface area exposed to radiation is very important. It is extremely complicated.

Mr. REUSS. Would you yield for a question at this point?

Mr. MCCLOSKEY. Yes.

Mr. REUSS. I am baffled. You tell us, Mr. Secretary, that anything more than a 4° rise is bad and dangerous?

Dr. GLASGOW. At the maximum temperature. Above the maximum normal.

Mr. REUSS. We are then told that the Maryland water quality standards permit a 10° rise.

Dr. LEAR. Not to exceed 90.

Dr. GLASGOW. This is when the temperature is below the maximum. Yes.

Mr. WEBER. Maryland standards set the temperature of a discharge at a maximum of 90° F. in tidal waters. Maryland standards also state that such maximum discharge temperature must not extend "* * * beyond such distance from any point of discharge as specified by the Department as necessary for the protection of the water use." It has been the practice of the Department, in the implementation of these standards, to establish this distance as zero. For example, the discharge from the Calvert Cliffs Nuclear Power Plant has been restricted to a maximum of 90° F. at the point of discharge. From 50° to 80° you are allowed a 10-degree rise above that. If your ambient water temperature was 80 degrees you are allowed to increase it up to 90 degrees.

Mr. REUSS. What if the water temperature is 85½ degrees Fahrenheit?

Mr. WEBER. Then, it would only be a 4½° rise, because the maximum discharge temperature is limited to 90° F. The numerical values and descriptive terms of Maryland's Water Quality Standards are only one part of a total water quality control effort which also includes compliance with requirements established by Maryland's Plan for the Implementation and Enforcement of Water Quality Standards, and compliance with the basic purpose of these standards, which is the protection of existing and anticipated water uses. Maryland considers its temperature standards to be as restrictive as, and in most instances more restrictive than, standards which permit ambient temperatures of large water areas to be raised either 1½° F. or 4° F., depending upon season.

Mr. REUSS. Thank you.

Mr. MCCLOSKEY. Could you send us that regulation for inclusion in the record?

Mr. WEBER. Yes, sir.

(The pertinent excerpt from the State of Maryland's Water Resources Regulation 4.8, subsequently supplied to the subcommittee by Mr. Weber, follows:)

SECTION 7.60—TEMPERATURE STANDARDS (TEMP.)

Temperature 1: For all water use categories other than IV, there must be no temperature change that adversely affects fish, other aquatic life, or spawing success. There must be no thermal barriers to the passage of fish or other aquatic life. Maximum temperature must not exceed 100° F. beyond 50 feet from any point of discharge.

Temperature 2: For group A, B, and C water uses, for nontidal waters.—For "trout waters," waters so designated to the Department by the Department of Game and Inland Fish, temperature must not exceed 72° F. at any time. For the propagation of fish and other aquatic life (Water Use Category IV) in all other nontidal waters, temperature must not exceed 93° F. beyond such distance from any point of discharge as specified by the Department as necessary for the protection of the water use. In addition for all nontidal waters other than "trout waters," maximum temperature elevation is to be limited as follows:

For natural water temperatures of 50° F., or less, the temperature elevation must not exceed 20° F. above the natural water temperature, with a maximum temperature of 60° F.

For natural water temperatures greater than 50° F., the temperature elevation must not exceed 10° F. above the natural water temperature, with a maximum temperature of 93° F.

Any deviation, other than natural, from the above requirements is to be evaluated for risk to the propagation of fish and other aquatic life by the Department of Game and Inland Fish, and will be permitted or denied by the Department of Water Resources after consultation with that agency.

For tidal waters used for propagation of fish and other aquatic life (Water Use Category IV), temperature must not exceed 90° F. beyond such distance from any point of discharge as specified by the Department as necessary for the protection of the water use. In addition, for all tidal waters, maximum temperature elevation is to be limited as follows:

For natural water temperatures of 50° F., or less, the temperature elevation must not exceed 20° F. above the natural water temperature, with a maximum temperature of 60° F.

For natural water temperature greater than 50° F., the temperature elevation must not exceed 10° F. above the natural water temperature, with a maximum temperature of 90° F.

Any deviation, other than natural, from the above requirements is to be evaluated for risk to the propagation of fish and other aquatic life by the Potomac River Fisheries Commission in this waters of the Potomac River and its tributaries under the jurisdiction of the Fisheries Commission, and by the Department of Chesapeake Bay Affairs with respect to all other tidal waters, and will be permitted or denied by the Department of Water Resources after consultation with such agency.

Mr. MCCLOSKEY. Do I understand that at 80° under the present regulation a power company could discharge water as much as 10° higher into the water at that point?

Mr. WEBER. That is correct.

Mr. HICKS. What if it is 78°?

Mr. MCCLOSKEY. Can you answer that question?

Dr. LEAR. Then it can go to 88°. You can never exceed 90 in any instance. Ninety is the top.

Mr. MCCLOSKEY. One other question about this interagency study that is now progressing on powerplant siting with the Office of Science and Technology as the lead coordinator: Who represents the Department of the Interior on that?

Mr. WHITE. I believe Mr. John Quarles represents the Department on that.

Mr. MCCLOSKEY. I have no further questions. Thank you.

Mr. GUDE. There is one thing that really concerns me in this line of questioning. If an application were made to the Corps of Engineers to build a ferry dock at Sandy Point, you would naturally be asked to comment on its impact on the environment; would you not?

Mr. WHITE. Yes, sir.

Mr. GUDE. If you had exactly the same plans for an oil depot, instead of a ferry dock, would you give exactly the same comments on the environmental impact of the construction? Are you not obligated to speak about the construction of an oil dock in the frame of reference of what its impact is going to be on the ecology of the river and fisheries and so on?

Dr. GLASGOW. I am sure that our comments for a dock built for an oil operation would be entirely different than if it were built for some rather innocuous operation.

Mr. GUDE. Right.

I thought that the only comment you would make would be about the actual physical construction. You would be precluded from going into the long-term effects of this facility on the river. You are obligated to speak to the broader question—what the facility is going to be used for and what the effects of its use would be?

Mr. WHITE. In commenting on the Corps of Engineers' applications, the Department of the Interior does consider effects of the facility proposed to be developed if the permit is granted. As the gentleman from the Corps of Engineers pointed out, there may be a legal question here as to just how much jurisdiction the Federal Government has in controlling the development on the uplands which is associated with a dredge and fill permit in navigable water.

Interior often does comment and recommend safety precautions to prevent environmental damage from such developments.

Mr. REUSS. I have a few more questions.

First of all, Secretary Glasgow, on oil spills: There is a long history of oil spills with considerable ecological damage at Piney Point. Tomorrow I shall request that there be placed in the record a list compiled by the subcommittee staff which shows various oil spills in the Potomac estuary near Piney Point during the last 7 years, which shows some 14 or 15 reported spills. The most recent—and we have all read it in the papers—was the one last month, on June 15, where as much as 1,000 gallons of fuel oil were dumped into the Potomac at the Steuart Oil Co. facility at Piney Point. It seems that the hose which they were offloading from a tanker simply split, and the oil sprayed out over the Potomac Valley.

(NOTE.—The list of oil spills referred to by Mr. Reuss appears on p. 86 of the hearing record.)

Mr. REUSS. I was over in Sweden a couple of weeks ago and visited one of the largest petrochemical complexes in Europe at Strömstad, north of Göteborg on the North Sea. They unload big 70,000-ton tankers every day from a dock very much like down at Piney Point; only in Sweden they don't have oil spills because they have a boom, of wood and plastic, which they put around the tanker and connect with the shore and if there is a spill the boom contracts and a child of three or thereabouts could scoop it up and no great harm is done. You suggest in your excellent testimony that the routine use of oil booms and similar control devices would help to localize the effects of accidental spillage at Piney Point. You are talking about the kind of thing that I saw in action over in Sweden, aren't you?

Dr. GLASGOW. Exactly.

Mr. REUSS. Isn't it rather a sad thing that we sit here wringing our hands and while the Potomac is being ruined, when there is in effect a technology which would have prevented the June 15 spill and a lot of other spills?

Dr. GLASGOW. I think that the companies themselves have the moral responsibility to carry out safety precautions of this type when they are known, and they are so simple. This would work in Piney Point during calm weather. I think there are occasions, though, when the river is so rough that booms would not be very practical.

Mr. REUSS. This could be true, but in fact the June 15 spill was a calm-weather spill, was it not, and the imposition of a boom would have stopped that very troublesome spill?

Dr. GLASGOW. I don't know about the weather on that day. Assuming——

Mr. REUSS. Are you suggesting that a boom would not have worked on June 15?

Dr. GLASGOW. No; I don't know what type of weather occurred that day. Assuming it were calm, a boom would have been very helpful.

I don't know what the weather was that day.

Mr. REUSS. I should tell you that in Sweden they have some very stiff weather in the North Sea and they report that their boom is effective in such weather. At any rate, in the last page of your statement you also point out that "The enforcement of new regulations will help to deter future contamination."

I agree with that. Had there been a regulation in effect on June 15 saying he who unloads must have a boom so as to contain this spillage, then we could have avoided the troubles of June 15; could we not?

Dr. GLASGOW. Yes, sir. I think, additionally, if it had been metal pipes rather than the rubber hoses, we might have avoided it also.

Mr. REUSS. That is true, although even a metal pipe can malfunction and cause spillage. And the boom is a protection there too; is it not?

Dr. GLASGOW. Yes, sir.

I think generally the rubber hoses are being replaced by metal pipes in many instances as an added safety precaution.

Mr. REUSS. Let's look at why there were no regulations in effect: Congress on April 3, 1970, passed the Water Quality Improvement Act of 1970 which contained the power to promulgate regulations with regard to oil spills; did it not?

Dr. GLASGOW. I don't recall the specific date but I am sure that you are correct.

(The statute referred to is Public Law 91-224; 84 Stat. 91; April 3, 1970.)

Mr. REUSS. Is it not a fact that although the President has had April, May, June and now most of July to promulgate his regulations, nothing has been promulgated? Is that not so?

We still don't have any regulations under the almost 4-month-old Water Quality Improvement Act of April 3, and had we had regulations promptly issued containing what I should think they ought to contain—namely, a provision requiring a boom in a situation like this—the oil spills of June 15 would not have happened.

Dr. LEAR. Yes, sir.

Mr. REUSS. Dr. Lear, is that so?

Dr. LEAR. Yes, sir. It would certainly have localized the effects. I believe down in the York River where they had a history of chronic oil spills, they used booms routinely down in Yorktown.

Mr. REUSS. How did it work?

Dr. LEAR. I think it works fine. Doesn't it, Dr. Brehmer? Localizing spills?

Mr. REUSS. I wish, Mr. Secretary, you would convey to the President our earnest hope that he get busy and do his job and issue regulations so that more oil spills like that of June 15 are not the result of his delays. The Congress asked the President to do it and I could write a regulation in 5 minutes to tell him that they have got to do on the Potomac what they do in Sweden and down in Yorktown and various other places. It seems to me that we are inviting more spillage. I would like to have those regulations issued like by the end of this week or some good reason offered the public why they are not issued.

Convey that message, please.

Dr. GLASGOW. Yes, sir.

I don't like to suggest that you ask this type of question of Mr. Biglane, but he will be here tomorrow and he will provide more specific information that I.

Mr. REUSS. I have one other question, I think, of Mr. Reynolds. This is a different subject—those hundred old hulks at Mallows Bay. It was estimated to cost $350,000, a third of a million dollars to tow away or by other means to get rid of those?

Mr. REYNOLDS. Yes, sir.

Mr. REUSS. And it might cost more today?

Mr. REYNOLDS. That is correct.

Mr. REUSS. Under the law, you cannot proceed unless local government offers to put up half of that?

Mr. REYNOLDS. They must pay 50 percent of the cost.

Mr. REUSS. And so far no local governments have offered to do that?

Mr. REYNOLDS. We have only been informed that they would include in their fiscal year budget, which is 1971, 50 percent of the cost. Subsequent to that, I understand that there was no money included in their budget for this fiscal year.

Mr. REUSS. Is it the State of Maryland?

Mr. REYNOLDS. Yes, sir.

Mr. REUSS. As a matter of fact, and in the interest of saving the taxpayers some money, is it really necessary to haul out those 100 hulks? They have been there for 40 years; and if we could get rid of some of the water pollution, they make a marvelous area for black bass and other game fish. They are interesting looking and a conversation piece. What in the world harm do they do that couldn't be solved, let's say, by maybe anchoring the outside ones so that they didn't go sailing off into the Potomac?

Mr. REYNOLDS. Mr. Chairman, if the environmental aspects of the hulks in their present position are not adverse to the esthetics of the Potomac, it is not necessary to do anything but to assure ourselves that they will remain where they are.

Mr. REUSS. That could be done for a few thousand dollars?

Mr. REYNOLDS. That could be done for a relatively small amount compared to complete removal.

Mr. REUSS. How much?

Mr. REYNOLDS. I would say today—the original estimate was $50,000—I would say maybe in the neighborhood of $60 to $70,000, taking the escalation of prices into account.

Mr. REUSS. You have made a real contribution to the taxpayers' interest and to this committee's deliberations. What you are saying is that there is no need to spend a third of a million dollars and remove these hulks. Precautions can be taken so that for $50 or $60,000, they will have no adverse effect on navigation?

Mr. REYNOLDS. That is correct.

Mr. REUSS. Have you ever found anyone from the age of 2 to the age of 90 whose esthetics were in any way offended by those hulks? I have seen them and they don't bother me.

Mr. REYNOLDS. I have never heard a comment regarding the esthetics except at the time that the Corps of Engineers wanted to protect navigation. The question of esthetics came up in the newspapers, congressional interest was expressed, State interest was expressed, and of course that was when our plan fell into the background.

In our district we have never had any comments with regard to the vessels being adverse to the esthetics.

Mr. REUSS. If the State of Maryland, or some locality in Maryland, should suddenly come up with the 50-percent local share of what you have described as this unnnecessary act of removing all the hulks, under the law you would have to go ahead despite your better judgment and spend the taxpayers' money to remove them?

Mr. REYNOLDS. We do have to request—we are working on the basis of law. Congress has told us we must do that. We would make the request to Congress for our 50 percent, or the Federal participation of 50 percent, and if Congress made that money available we would of course have to proceed.

Mr. REUSS. I would hope that you would make that request with your fingers obviously crossed, and you would tell the Appropriations Committee, or whoever you made this request of, that you were asking them to waste the taxpayers' money to the tune of several hundred thousand dollars. Would you not?

Mr. REYNOLDS. That is correct. We would make known our opinion in the matter; yes, sir.

Mr. REUSS. I am delighted to hear that and I congratulate you and the corps for that sensible attitude.

Mr. HICKS. Have you taken into consideration this little piece of paper added by the Secretary?

Mr. REUSS. Yes—the one that says removing the hulks would do no great damage to fish?

Mr. HICKS. Fish don't use them, as I read it.

Mr. REUSS. It says the fish don't use them because we have so badly polluted the Potomac there ain't no fish left to use them. If we ever cleared up the Potomac, they would use them. What the document, which is included in the record [see p. 8] says Mr. Hicks, is that since the fish are not now using them, to remove the hulks would do no great harm to the fish. It would, however, do great harm to the taxpayers, and I think that is Mr. Reynolds' point.

Dr. GLASGOW. Mr. Chairman, I would like to point out one thing that should have been included in my testimony but is not there. That is, the fact that if, in removing these hulks, you disturbed the bottom sediment a great deal, and if it is polluted with DDT and other chemicals, you would then by stirring it up repollute the area.

Mr. REUSS. An interesting point. So you, from the ecological standpoint, would agree with Mr. Reynolds—who has presented the taxpayers' point of view—that as far as you are concerned, simply taking minimum steps to prevent the hulks from floating away would be a better method than going to the more expensive route of removing them entirely. This might cause ecological disturbance. Is that your testimony?

Dr. GLASGOW. The point I raised is just one I would consider in the overall picture.

Mr. REUSS. Mr. Hicks?

Mr. HICKS. As I read this report, and not knowing anything about it, it says here, and I gather from the chairman's question, that people don't care. Whoever conducted this water survey expressed the desire here to see the hulks removed. Is that accurate or not?

Dr. GLASGOW. Yes, sir, it is accurate.

Mr. HICKS. The people would like to see them removed, the natives in the vicinity?

Dr. GLASGOW. All the people that were contacted on the one day we conducted the survey did suggest that they be removed. This is a very limited number.

Mr. REUSS. Were they asked if they were willing that the taxpayers, including local taxpayers, shell out $350,000 in order to facilitate their removal? This is a Gallup-type poll and I would like to know the question asked of these genial citizens.

Dr. GLASGOW. Mr. White says they were not asked this question.

Mr. HICKS. I talked to Hervey Machen, a former Congressman from that area who introduced a bill originally to have the hulks removed, and he did not generate that idea but he advised me it was generated by people who were interested in seeing the hulks removed. I suspect that it is more than just a few casual people. Whether it is worth the removal or not I don't know. I note that you said it is not of any great esthetic value down there as it would be if it were one sunken ship in the area. I have not seen the area. The chairman, I take it, and the rest of the gentlemen, have.

Dr. GLASGOW. Fishery use at the present time is largely governed by the polluted condition of the river. If the river were cleaned up, there would be much higher fishery use there.

Mr. HICKS. I have nothing further. Thank you.

Mr. REUSS. Anything more, gentlemen?

Mr. Davis?

Mr. DAVIS. I have one question for Dr. Glasgow.

Dr. Glasgow, what was the earliest date on which you or anyone in an official position in the Department of Interior learned of the plan of the Potomac Electric Power Co. to construct a powerplant at Sandy Point?

Dr. GLASGOW. Mr. Davis, I do not know. I would be glad to check as carefully as we can and provide that information for the record.

I would ask for comment from any of the people who are here with me.

Dr. LEAR. I don't know what our administrative people have. My input is from the newspapers.

Dr. GLASGOW. No one here has that information. We will do our best to provide that for you.

Mr. DAVIS. Please send a letter in to the chairman.

(NOTE.—By letter of August 20, 1970, Dr. Glasgow wrote the subcommittee as follows:)

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., August 20, 1970.

HON. HENRY S. REUSS,
Chairman, Subcommittee on Conservation and Natural Resources, Government Operations Committee, House of Representatives, Washington, D.C.

DEAR MR. REUSS: At recent hearings on the application of the Potomac Electric Power Co. to build a new facility at Sandy Point on the Potomac River you asked the precise date when a copy of that application was received in the Department of the Interior.

We have had some difficulty in establishing that date. Mr. C. Means, general counsel for the Power Co., told a member of my staff that a copy of the application was mailed to the Department on June 22, 1970. The Secretary's mailroom has no record of receipt.

We do know that personnel of the Bureau of Outdoor Recreation were in touch with private conservation groups prior to June 1. These groups apparently were aware of the application at that time. Bureau of Outdoor Recreation later obtained a copy of the application from the Maryland Public Service Commission.

Sincerely yours,

LESLIE L. GLASGOW,
Assistant Secretary of the Interior.

Mr. DAVIS. The next question is this: Dr. Glasgow, on page 5 of your statement you say, "We would welcome the opportunity to participate in this early phase of the design study," referring to the design study of the powerplant.

Has any such opportunity as yet been given to you?

Dr. GLASGOW. No.

Mr. DAVIS. My other question is directed to Mr. Reynolds.

What permits from the Corps of Engineers will be necessary for the Sandy Point plant of Pepco?

Mr. REYNOLDS. I understand—and I have discussed it with Pepco in a preliminary way—that they intend to cross the Potomac River with a line which will require Department of Army permission. I am not aware of any waterfront structures, dredging or anything else. I have not seen their plans for this but I assume there will be some. It will require Department of Army permission. Any waterfront work, channel, ward of the shoreline, will require Department of Army permission. I am not aware of any specifics of this kind.

Mr. DAVIS. That permission would have to be applied for to the Baltimore office, where you work, would it not?

Mr. REYNOLDS. That is correct.

Mr. DAVIS. When was the Baltimore office first informed of Pepco's plans to construct a powerplant at Sandy Point?

Mr. REYNOLDS. It was several months ago. I don't remember the specific date. The only way we were informed was by a copy of their application to the Public Service Commission for their license. We were not directly informed in any way.

Mr. DAVIS. That is all.

Mr. REUSS. Secretary Glasgow, Mr. Reynolds, Mr. Underhill, Mr. White and Dr. Lear, we are most grateful to you for your excellent testimony and helpfulness. We will excuse you now.

Gentlemen, it is 5 minutes of 12 and we have a number of other witnesses. If it is agreeable, I would suggest that we reconvene here at 1:30 and hopefully finish with our interrogation then.

We will stand in adjournment until 1:30 in this place when we will first hear from a panel of witnesses including Mr. Norris, Mr. Everngam, Dr. Cronin, Dr. Brehmer, and Mrs. Magargle.

(Whereupon, at 11:55 a.m., the subcommittee recessed, to reconvene at 1:30 p.m. of the same day.)

AFTERNOON SESSION

Mr. REUSS. Good afternoon. The Subcommittee on Conservation will be in session for a continuation of its hearings into the Potomac environment. We have at the witness table Mr. Norris, accompanied by Mr. Everngam, Dr. Cronin, Dr. Brehmer and Mrs. Magargle. You are all very welcome. You have statements which under the rule would without objection be admitted in full into the record. We would now like to ask you to proceed on the matters before us. Mr. Norris, of the Potomac River Fisheries Commission, would you lead off, sir, either by reading your statement or by summarizing it or proceeding in any way you like.

STATEMENT OF ROBERT M. NORRIS, JR., EXECUTIVE SECRETARY, POTOMAC RIVER FISHERIES COMMISSION; ACCOMPANIED BY K. THOMAS EVERNGAM, LEGAL OFFICER; DR. L. EUGENE CRONIN, DIRECTOR, CHESAPEAKE BIOLOGICAL LABORATORY, MARYLAND SCIENTIFIC ADVISER TO POTOMAC RIVER FISHERIES COMMISSION AND OF THE NATURAL RESOURCES INSTITUTE OF MARYLAND; DR. MORRIS L. BREHMER, ASSISTANT DIRECTOR, VIRGINIA INSTITUTE OF MARINE SCIENCE, VIRGINIA SCIENTIFIC ADVISER TO POTOMAC RIVER FISHERIES COMMISSION

Mr. NORRIS. It is just about two pages, sir, and perhaps it would be all right if we read it.

Mr. REUSS. Surely.

Mr. NORRIS. I would like to state first that we do not have anything in this statement regarding the oil facility which I understood was to come up tomorrow—Piney Point.

Mr. REUSS. Yes. I would welcome your telling us for the record anything that you can on the oil facility, in addition to what appears in your statement.

Mr. NORRIS. The biologists representing the two States' marine laboratories will have something to say on that, and they will be speaking on behalf of the Potomac River Fisheries Commission also.

The duties and responsibilities of the Potomac River Fisheries Commission concern themselves with the commercial fisheries aspect of the river and those other things which have an effect on the commercial fishery. The compact which creates the commission specifically charges the commission with the maintenance and improvement of

the seafood resources in the river. Such remarks as are hereinafter made will relate to our duties as hereinbefore stated.

With specific regard to Pepco's use of the Potomac River as a cooling facility for its steam electric generating plants, we submit the following:

The selection of a site for such a facility should be coordinated with our agency so that its placement would not materially affect the commercial fishery interest of the river. Up to this date there has been no action on the part of Pepco along this line. In both instances, the plantsite has already been selected before our agency has had any knowledge of the proposal to construct such a facility. This agency should be presented with the engineering data relative to the proposed construction in sufficient detail to enable us to make an independent evaluation of the effect of such a facility on the ecology of the river, and this information should be forthcoming prior to the making of final plans and the commencement of any construction of the project. Up to this time, Pepco has not followed this procedure. The project has been well underway before we could obtain any engineering data, and then such data as we did receive was secured with difficulty. On occasions it was not forthcoming when it had been promised; it was not complete when it was furnished; and it was furnished in certain instances at such a late date as to preclude a studied evaluation of the data in time for scheduled hearings and meetings, and, when finally received by this agency, it covered phases of the construction of the facility which had progressed to such an extent that it would no longer be economically feasible to insist on adjustments or changes in the project which might prove of material benefit to the ecology of the river. We feel that the information received by us was too little and too late.

Specifically, the facility at Morgantown is located immediately adjacent to several of the best oyster-producing areas in the river. Our commission and its scientific advisers, that is, the Virginia Institute of Marine Science, located at Gloucester Point, Va., and the Chesapeake Biological Laboratory, located at Solomons, Md., are greatly concerned about the effect of the use of river water at this point on the ecology of the river, both as regards to the buildup of heated water in the river and the sterilization of the water passing through the cooling condensers.

The proposed location of the facility at Mallows Bay, Sandy Point, Charles County, Md., is in the spawning area of striped bass, which is one of the most valuable finfish produced in the river. We are greatly concerned over the effect of the proposed facility on this reproductive cycle and feel that we should be furnished engineering data relative to the construction which would enable us to evaluate the effect of such a structure. In our view, it may be that such a facility should not be allowed at this location because of the effect.

Statements are being presented by our scientific advisers relative to their position in this matter. We trust the information set forth herein is helpful.

Mr. REUSS. Thank you, Mr. Norris.

Dr. Cronin, Maryland Scientific Adviser to the Potomac River Fisheries Commission.

Dr. CRONIN. Mr. Chairman, members of the subcommittee— –

Mr. REUSS. Dr. Cronin, you don't have a written statement?
Dr. CRONIN. No, Sir.
Mr. REUSS. Fine. Would you proceed then.

STATEMENT OF DR. L. EUGENE CRONIN, DIRECTOR, CHESAPEAKE BIOLOGICAL LABORATORY AND NATURAL RESOURCES INSTITUTE, UNIVERSITY OF MARYLAND

Dr. CRONIN. My name is L. Eugene Cronin. I am director of the Chesapeake Biological Laboratory and of the Natural Resources Institute of the University of Maryland. I have conducted research for about 30 years on the fisheries, pollution, and ecological problems of the Chesapeake Bay and Delaware Bay, and have been involved in a wide variety of related studies. My laboratory acts as a technical adviser to the Potomac River Fisheries Commission in cooperation with the Virginia Institute of Marine Science. For 10 years I was a member of the Maryland Water Pollution Control Commission. I am also a members of the Interstate Commission on the Potomac River Basin which is primarily concerned with the growing and complex pollution problems of this magnificent basin.

We have been asked to comment on four important problems.

1. The ecological effects of removing or destroying the large number of derelict ships now aground in Mallows Bay.

2. Whether or not the power station proposed by the Potomac Electric Power Co. in Sandy Point Farm may be harmful to the ecology of the Potomac estuary.

3. The environmental dangers of increasing oil traffic in the Potomac estuary.

4. Damage from the recent large oil spill in Baltimore Harbor and suggestions for preventing such occurences in the future.

My staff has prepared information in all of these for the use of your subcommittee. I would like to express my thanks to Dr. Ted S. Y. Koo, Dr. Joseph A. Mihursky, Mr. Elgin Dunnington, Mr. William Dovel, Mr. Douglas Ritchie, and Mr. Hayes Pfitzenmeyer, for this assistance.

We are here as technical adviser to the Potomac River Fisheries Commission and also as a source of information for your subcommittee on all of these questions. Baltimore Harbor, Mallows Bay, and Piney Point are all parts of the same great ecological system which is the Chesapeake Bay, and the four problems listed are important to the entire estuary. Solution of these problems will provide valuable examples for the entire coastal area of the country. With your permission, I would like to comment briefly on these several related problems at one time.

MALLOWS BAY

Certain background information is available on the Mallows Bay area that might be helpful.

First, salinity of the region. This part of the Potomac River off Mallows Bay includes the important interface between salt and fresh water where salinity varies between zero and five parts of salt per thousand parts of water. The location of that interface varies from season to season, and from year to year, depending on the flow of the Potomac River.

Second, in terms of water temperature, data from the Chesapeake Technical Support Laboratory of the Federal Water Quality Administration indicates that temperatures as high as 79° Fahrenheit can be found in September. Personal communication, as you heard this morning, indicates the temperatures reach 85° in Mallows Bay during the summer.

Third, light penetration. The Mallows Bay area has low light penetration into the water column as indicated in "Water Quality Survey of the Potomac Estuary" (Lear and Marks, 1966). They reported secchi disk readings between 0.6 to 3.0 meters. Undoubtedly low light penetration limits full algal production in this area.

Fourth, nutrients and plankton. Nitrates and phosphates are not as high as in the highly enriched waters close to Washington but they show the effects of that enrichment and are high enough to support algal blooms. There is not enough data to permit strong conclusions about the plankton populations in Mallows Bay, but the data strongly suggests that plankton has increased in recent years and that this area is showing enrichment effects from Washington area waste disposal.

Fish and shellfish—Mallows Bay is beyond the upper reaches of oyster and soft shell clam fisheries. However, it is a critical area for the spawning and nursery of anadromous fishes, particularly the striped bass. Potomac River, extending from Indian Head to Nanjemoy Creek, represents one of the most important spawning areas of striped bass in the entire Chesapeake Bay. William Dovel of our laboratory made extensive ichthyoplankton studies in the Potomac River during the striped bass spawning season of 1968 and 1969. It is our considered opinion that the area off Sandy Point and Mallows Bay and just south of it is an important incubation area for striped bass eggs.

The upper section of the river, from Namjemoy Creek to Indian Head, is especially vulnerable to pollution during the spring, because it is the critical spawning and nursery area for anadromous species, including the alewife, shad, and striped bass; therefore, every necessary measure should be taken during the spring season to prevent oil leakage, overheating or other damage in this part of the Potomac River.

Comments on the removal of shipwrecks: Shipwrecks, which have existed in Mallows Bay for many years, have no doubt established a special local ecosystem. It has functioned to some extent as an artificial fishing reef and attracted some species of fish. We do not have any evaluation of sports fishing at Mallows Bay.

The removal of the wrecks would restore the bay to its natural ecological balance, and will during the process cause some temporary readjustment on the part of existing fauna and flora. We can foresee no major harm to the environment.

Since this area is a critical spawning and nursery zone for striped bass, it would be wise not to perform the removal during the spring season.

Powerplant construction at Sandy Point: Little detailed information is available to us on design details for this installation. It is our understanding that initial capacity will be about 415 megawatts. We assume proposed operating characteristics similar to Pepco's Morgan-

town plant will raise the temperature about 10°, and a needed water supply of 350,000 to 400,000 gallons per minute. We assume the chlorine will not be used to clean the condenser tubes. Since the water column at Sandy Point is relatively well mixed, and since maximum water depth is only 30 feet, it is assumed that the intake water will be coming from the shallow shelf zone.

What effects will the powerplant operations have on phytoplankton populations? If temperature levels are held to present State standards and chlorine is not used in the system, it appears there will be a definite stimulation of algal growth when ambient temperatures are below 68° Fahrenheit, which occurs through the fall, winter, and spring. In summer, algal crops are dominated by blue-greens, so that there may be stimulation of algal growth during the summer. Thus at this site additional heat has the potential to accelerate a developing eutrophic condition in the Potomac River.

What effects will powerplant operations have on striped bass eggs and larvae? The initiation of striped bass spawning in the spring depends upon the water temperature in the river. As soon as water temperature reaches about 54° F. a rapid rise in temperature will stimulate spawning. Peak spawning takes place when water temperature reaches 60° to 67°. Temperatures higher than 70 may inhibit spawning. Higher temperature will also shorten the developmental period, causing the fish to hatch sooner. The increase in water temperature due to heated water released by the powerplant will undoubtedly advance the spawning and development schedule of striped bass in the local area. This might be seriously damaging, as the nursery area is not ready ecologically for the young.

There are no field data to indicate the level of success or failure of these stages to survive passage through such powerplants. Kerr, in California, reported 95 percent survival of young striped bass upon passage through the Contra Costa plant of the Pacific Gas & Electric Co.

What effects will powerplant operations have on the behavior of important migratory fish species? Observations around powerplants indicate that fish behavioral responses do occur as a result of powerplant design. Fish frequently move into heated areas in colder seasons and move away from heated areas in summer seasons. Intake structures often become deluged with fish accumulating on the traveling screens. Extremely high mortalities have been reported for striped bass in the intake bay of the Indian Point powerplant of ConEdison on the Hudson River. In spite of several design changes the problem still persists at this installation.

In addition to these considerations is a question of site selection and regional planning with regard to powerplants in the bay system. Dr. Mihursky, of our staff, gave eight recommendations for Maryland standard operating procedures for new powerplant sites. Among these the following points bear repeating:

1. Requirements of the aquatic resources should be given high priority in powerplant site selections.

2. Certain areas can be identified where powerplants should not be permitted. Although these areas will be more adequately identified as more information becomes available, the following localities should not be subjected to degradation:

(*a*) Those that carry abundant quantities of eggs and larvae of finfish and shellfish important to the economy and ecology of the bay, such as the striped bass spawning grounds at the salt-fresh water interface in the upper estuarine reaches.

(*b*) Those bottleneck areas, through which migratory stages of important species must pass.

3. Waters of low biological productivity or poor water quality should receive primary consideration for powerplant use. Treated sewage water, acid mine water, other already-polluted areas that will not be restored in the immediate future and the deep, low oxygen water of the central Chesapeake during summer months are examples.

In our opinion the Sandy Point site is among those that should be completely closed to use of the river for powerplant cooling because of the important spawning grounds.

Projected water needs by the powerplant industry for the bay region indicate that they will need about $\frac{1}{300}$ of the total volume of the bay per day for cooling purposes within three decades. It is estimated that the striped bass spawning grounds take up about $\frac{1}{200}$ of the total volume of the bay system. If regional planning by the power industry insists on locating in those zones ecologically important to key species in the bay system, then as a society we are being asked to accept an unnecessarily high environmental risk. We feel such a risk is unacceptable at our present level of knowledge.

The present proposal to locate at this site in spite of the obvious ecological problems sharply reemphasizes the need for adequate regional planning in relation to this industry. We offer two reports for inclusion in the record of this hearing, since they may assist the subcommittee. These are a paper entitled "Patuxent Thermal Studies" by Dr. Joseph Mihursky, and a report entitled "Comments on Proposal by Baltimore Gas & Electric Co. for the Calvert Cliffs Nuclear Power Plant" by myself and Dr. Mihursky, and I would ask that these be included in the record of the hearings.

(NOTE.—The reports referred to appear in the appendix of this hearing record.)

In addition we are providing copies of the following documents for the files of the subcommittee: A paper dealing with thermal pollution, aquaculture, and pathobiology in aquatic systems; a paper dealing with the effects of thermal pollution on productivity and stability of estuarine communities; a paper dealing with regional planning and the Chesapeake Bay environment; and the proceedings of the second thermal workshop of the international biological program, which has a great deal of information about the effects of heating.

Oil traffic, spills and handling. I have limited comments on increasing oil traffic on the Potomac River and the Baltimore oil spills.

Oil traffic differs from other forms of waterway utilization in that there is the inherent danger of oil leakage into the water. When that happens, the damage to the natural resources in the river can be serious and esthetic damage can be very great.

Let us consider the expected range of effect of possible spillage. Contamination may spread a considerable distance but the area that is thought to be most immediately threatened would comprise two tidal excursions, or about a 6-mile distance up and down the tidal Potomac.

Extensive fisheries exist within this area in relation to Piney Point. There are 23 charted oyster bars and separate seed or shell plantings, totaling 1,690 acres within this radius. During the 1967–68 season about 150,000 bushels of oysters were taken from these bottoms.

There are extensive soft-shell clam beds within this radius also, but clams are subject to rapid population fluctuations: 171,326 bushels were caught in the lower Potomac in 1964–65, 96,142 bushels in 1965–66, and 30,628 in 1966–67. In years of abundance, excellent catches of crabs are made within this area.

Commercial finfishing in the lower Potomac River alone produced 15 million pounds of fish in 1966, the last year for which we have complete records.

In addition, the Potomac River attracts a large number of sport fishermen. Mr. Ritchie of our Laboratory, who coauthored a creel census on the Potomac, estimates that the sport fishery of the Potomac River is now worth about $1 million annually.

Questions have been raised about the possible effects of a spill on oysters and other seafoods. Significant contamination will at least produce bad flavors, particularly in oysters and clams even when they don't cause mortalities. In March of 1968, contamination from the Steuart operation rendered oysters in nearby Herring Creek inedible and unmarketable for about 6 weeks. Most of the oysters eventually recovered and lost the undesirable flavor, but there was economic loss to the planters.

At worst, oil can clog the gills of fish, crabs, and oysters, coat external surfaces and cause serious mortalities.

Improved methods of handling oil.—Engineering and operational activities are not within my professional field of competence, but I have been impressed by the obvious good sense of one suggestion for the protection of valuable estuarine areas and I would like to call it to your attention.

Piney Point offers a vivid example of a structure with maximum danger to the estuary and maximum difficulty in containment. As you can see from an appropriate chart, the long pier that they have is on a point extending out from shore so that any spill is immediately spread in the estuary. An alternative kind of structure might include a box-like harbor where all transfers must occur. If spills occur, they could be almost totally contained in the box and only the organisms in the box would be seriously endangered. Perhaps only box-type transfer facilities should be permitted in oil handlings to be allowed in estuaries.

Baltimore Harbor oil spills.—In relation to Baltimore Harbor, we have no observation on the recent spill which was extensively observed by others who can provide excellent data. However, during 1964, 1965, 1966, and 1967, we flew at approximately weekly intervals over the upper Chesapeake Bay in search of sick or dying fish relating to several massive mortalities. Among our incidental notes, we observed oil slicks or spills whenever they were in the path of the plane.

Despite the existence of Federal and State regulations against such spills, we observed oil slicks or spills on every single flight over the Baltimore Harbor area during that time. These varied a great deal in location, nature, and importance but they are a significant addition to that part of the estuary.

Oil spills from handling, pumping from ships, leakage from docks, and slicks from unknown sources were observed.

There is another example. I would like to provide a brief report from the Virginia Water Control Board on the difficulties with the Yorktown refinery of the American Oil Co. This is a complete refinery, apparently, which carries the refining of oil through most of the processes.

In 1967 a serious spill occurred in January. The source is unknown but waterfowl were present on the river and a great many were killed. There was widespread interest and concern about the problem.

On Easter morning in 1967, sometime between midnight and daylight, between 1,000 and 4,000 barrels of oil were accidentally pumped overboard when a pump was attached to the wrong line. This oil spread over a very wide area and happened to be carried by high tides up into the shoreline area.

There were a third and a fourth and fifth spills in 1967. These were apparently smaller and at least one of them was the subject of a fine by the State.

This degree of pollution from a single installation seems to me to be extremely serious. As you know, the oil introduces several problems. It is highly toxic to many marine organisms, floats for a period so that it can be spread very widely by tidal action, can destroy the flotation mechanism of ducks, and can become embedded in the bottom sands and shorelines with a continuous leach of undesirable materials.

The reasons there included (1) a faulty flange, (2) leakage from a damaged hull, (3) use of a wrong valve connection, and (4) human mistakes in deviating from established pumping procedures. In addition, there have been a number of problems with oil and other materials from the bilge and additional sources in the oil fleet.

Mr. Charles Cooley, of the Virginia State Water Control Board, expressed the opinion that the operations on land can be controlled with proper engineering and fully adequate maintenance and operation. Competent, full-time surveillance is of critical importance. He is not as certain that the ship-related problems can be brought under full control.

I am not a technical expert in the treatment of the oils and the complex organic materials in oils of various kinds. I understand that they are partially treatable under some circumstances. However, these circumstances are limited to land where dikes can be built around spills and where the material can be recovered.

It is my very strong impression that it is absolutely impossible to guarantee control and recovery of such spills on the water. Part of the material is slightly soluble, and I have been informed that there are no types of styrofoam or log dams which are completely effective in rough water or where currents are reasonably strong. The Chesapeake and its major tributaries are very large bodies of water with wide exposure to the wind, and the area is almost always roughened by wind and tidal action. I must assume that any spill that occurs will be at least partially lost to control.

Therefore, biologically rich and valuable water like the Chesapeake Bay and its tributaries should not be used for oil handling except under conditions which guarantee prevention of damage from spills.

In conclusion I recommend that primary attention be directed toward preventing oil spills in estuaries and coastal areas except for absolutely uncontrolled disaster. The following means are suggested:

1. Encouragement of engineering improvements which will provide double assurance of control of oil and ships and piers.

2. Strict regulations on handling equipment, methods of operation and supervision of such equipment. Perhaps open water transfers, for instance, should be prohibited.

3. Vigorous enforcement of all pertinent laws and regulations with fines that have a strong preventive impact on the industry.

Thank you.

Mr. HICKS (presiding). Thank you, Dr. Cronin. Mr. Indritz, who is next scheduled?

Mr. INDRITZ. Dr. Brehmer will be the next witness.

Dr. BREHMER. Thank you. My name is Morris L. Brehmer. I am assistant director of the Virginia Institute of Marine Science at Gloucester Point, Va.

I would like to comment first on the proposed removal of wrecks in the Potomac River.

STATEMENT OF DR. MORRIS L. BREHMER, ASSISTANT DIRECTOR, VIRGINIA INSTITUTE OF MARINE SCIENCE, GLOUCESTER POINT, VA.

I. PROPOSED REMOVAL OF WRECKS

Dr. BREHMER. We do not have detailed information on the plans for the removal of wrecks from the Potomac River, but if proper precautions are taken, we could foresee no harm in the environment if such action is initiated. We would suggest to the agency responsible for the removal that every effort be made to prevent debris from the operation becoming a navigational hazard to recreational and commercial vessels. We would also suggest that if, during the operation, large quantities of sediment will be brought into suspension, the removal schedule be restricted to late summer, fall or winter to minimize damage to anadromous fish eggs, larvae, and juveniles that may be in the area.

II. PROPOSED POWER STATION AT MALLOWS BAY

Neither the Potomac River Fisheries Commission nor their Maryland or Virginia scientific consultants have received even preliminary information regarding proposed steam electric station to be located in the vicinity of Mallows Bay on the Potomac River. The comments submitted by the consultants must, therefore, be limited to the suitability of the area to additional heated effluent discharges into this reach of the Potomac River.

In order to develop a proper basis for generalized comments, it is necessary to review the present water quality within one tidal excursion of the proposed site.

1. The Virginia Electric & Power Co. has a 477.1 megawatts steam electric station at Possum Point approximately 5 nautical miles upstream on the Virginia shore from the site under discussion. This facility withdraws cooling water from the Potomac River and discharges the heated effluent into Quantico Creek which empties into the river just downstream from the intakes.

2. Published reports based upon field investigation by the Chesapeake Bay Institute and the Federal Water Quality Administration

indicate that water quality in this reach is seriously degraded as the result of nutrient enrichment introduced in the vicinity of the Metropolitan Washington area. Our own oberservations bear this out.

3. Environmental degradation and a reduction in the esthetic value of the water in this reach occur each summer as the result of high blue-green algae populations which develop as the result of the above-mentioned overfertilization, coupled with higher summer temperatures and insolation.

4. Analogous information from similar tidal systems would indicate that the flushing rates in this reach would be very low during low freshwater discharge conditions. This would, in turn, affect the "net available new water" available to either consumptive or nonconsumptive water users.

5. Water temperatures in excess of 86° F. have been recorded in this reach during the month of July. It is highly possible that addition of heat will aggravate an already degraded situation with corresponding deleterious influence on water quality.

6. This reach and the river to the fall line above Washington serve as a spawning and nursery area for river herring and shad. The 20-mile reach encompassing Sandy Point appears to be the most productive portion of the nursery. During 1968, the data from an intensive sampling program conducted by VIMS from the mouth of the Potomac to the fall line indicated that 65 percent of the juvenile river herring were recovered from this area.

7. Salinity levels from this reach indicate that it is within the area utilized by striped bass for spawning. Data provided by the Natural Resources Institute of the University of Maryland support this supposition.

8. In locating large water users, like steam electric generating plants, it is important that no possibility exist for creation of a "thermal barrier" to passage of migratory marine organisms up and down the river. Without further siting and engineering data, it is impossible to comment specifically, but location of powerplants opposite each other is a condition automatically requiring attention on this point.

In summary, the reach of the Potomac River within one ebb and flood tide excursion of the proposed facility is extremely sensitive to stress imposed by man's activities. Excessive environmental degradation is now occurring as the result of existing facilities and discharges. Additional stress imposed by the heated effluents from a second steam electric generating plant would serve to increase the immediate oxygen demand of algae passing through the condensers, if a single pass cooling water system were utilized, contribute additional heat to the reach which might have an adverse effect on the finfish populations, and produce additional deterioration of the esthetic value of the Potomac River.

These aspects, coupled with the possibility of thermal blockage, require that we point out to the Congress, the Potomac River Fisheries Commission and the Potomac Electric & Power Co. that the site does not appear, at this stage, to be a suitable one for this purpose.

It is unfortunate that we do not have more details to study, advise and act upon. Because of the many questions which exist, we recommend and urge that all decisionmaking bodies involved require presentation of full details by the company before any further action is allowed. We further urge that all parties concerned be enjoined against

proceeding with construction without indication of approval by appropriate State agencies.

Mr. REUSS. Thank you, Dr. Brehmer.

Dr. BREHMER. Mr. Chairman, if I might I have a statement regarding petroleum transport.

Mr. REUSS. We would like to have that. Please proceed.

Dr. BREHMER. I won't be able to appear tomorrow, so I will give it now.

Petroleum transport, loading and offloading operations pose a definite threat to water quality in the tidal Potomac River. In addition to the ever present chance of an accident involving a barge or vessel transporting petrolem products, a certain amount is lost during transfer operations due to hose failures and human errors. I am not familiar with data or estimates relating directly to the Potomac River, but Dr. M. Blumer reported in Oceanus, Volume XV, No. 2, page 4, that the port loss at Milford Haven, a relatively new British facility, was 0.01 percent of the total amount handled. If these data can be applied to American oil handling terminals, we can see that as the volume increases, the danger to the environment increases. I would not say that the relationship would be linear, however, because the environment has a definite tolerance limit beyond which all intended uses relating to esthetics, recreation, and food production are contravened.

We have not studied the role of petroleum products in the degradation of water quality in the tidal Potomac River. We know, however, that crude oil and all refined fractions are capable of modifying the environment if released into the water.

The lighter petroleum fractions, such as the aromatics and phenolic substances, are generally the most soluble in water and are primarily responsible for direct toxicity effects. These substances are also the most volatile and with the exception of the taste- and odor-producing and lethal properties do not modify the surface characteristics as do the heavier fractions.

Generally, the direct toxicity of petroleum fractions heavier than No. 2 fuel oil is relatively low in open waters, but these cuts are responsible for the destruction of intertidal organisms, birds, marshes, and damage to boats and beaches. Crude oil, which contains all fractions, degrades the environment from surface to bottom.

Tidal estuaries and bays are extremely vulnerable to degradation by petroleum products because they are semiconfined areas having relatively poor flushing characteristics. Petroleum products on the surface adversely affect the large number of ever present birds, the valuable intertidal organisms, and the beaches, marshes, and boats. The probability of having the right combination of winds and tides to prevent shore or wetland deposition of surface borne products is almost nil. The soluble, more toxic fractions adversely affect the components of the food chain, the larvae and adults of important food species, and may combine with sediments to produce residual effects. In addition, food products may acquire a petroleum taste and odor and become unsalable even when the concentrations are at sublethal levels.

Because of the vulnerability of the Potomac River and other estuarine systems, the Virginia Institute of Marine Science strongly advises that bulk oil shipments and transfer should be kept at the absolute minimum. A collision or sinking of a loaded bulk carrier would produce a major catastrophe, whereas the smaller spills at

transfer points degrade the environment in a limited area. To my knowledge, no floating barrier devices are available to contain and aid in the recovery of petroleum products under conditions of strong tidal currents or choppy seas. The soluble, most toxic fractions contained in lost materials always form a solution which has an adverse effect on aquatic life.

Adequate evidence exists to prove that the currently employed methods of transporting and transferring petroleum products do not provide adequate safeguards for the environment. Until such devices are developed or utilized by the industry, we recommend against the expansion of the petroleum transport and handling facilities in Chesapeake Bay and its tributaries.

Thank you.

Mr. REUSS. Thank you, Dr. Brehmer.

We will now hear from Mrs. Hal Magargle, environmental chairman of the Charles County League of Women Voters and also vice president for Conservation, Audubon Naturalist Society of the Central Atlantic States.

Mrs. MAGARGLE. I have brought with me two people, Mrs. Bowling and Mr. Tilp who are citizens of Charles County and St. Marys County. Mr. Tilp has something he would like to include in the record.

Mr. REUSS. Is it in writing?

Mrs. MAGARGLE. Yes.

Mr. REUSS. Without objection his letter will be included.

Mrs. MAGARGLE. And Mrs. Bowling's statement has already been given to you.

(The statements submitted by Mr. Tilp and Mrs. Bowling follow:)

FREDERICK TILP,
ARCHITECT,
Washington, D.C., July 21, 1970.

Attention: Chairman Reuss.

HOUSE OF REPRESENTATIVES,
Conservation and Natural Resources Subcommittee of the Committee on Government Operations, Rayburn Building, Washington, D.C.:

Reference is made to Mallows Bay, Md., an estuary of the Potomac River, located in Charles County.

I have been an active sailing skipper of a group of Sea Scouts located in Washington for the past 40 years; cruising the Potomac's tidewater from Georgetown, D.C., to Smith Point, Va.

I have anchored many times yearly in the southern bight of this bay and have watched the deterioration of the power craft to the north and the older sailing vessels in the southern part of the creek.

Many artifacts were removed by my Sea Scouts and given to the Mariners Museum at Newport News, where they are now on display since 1930.

The wildlife, especially the snowy white egrets, have always been an attraction to my young boys sailing with me.

The wrecks (now at water level in most places) are still a partial protection of refuge to smaller boats anchored in this open southern bight.

I am not in favor of using taxpayers' money for the removal of these wrecks.

Yours sincerely,

FREDERICK TILP.

ROCK POINT, CHARLES COUNTY, MD.

HON. HENRY S. REUSS,
Chairman, U.S. House of Representatives, Conservation and Natural Resources Subcommittee of the Committee on Government Operations.

SIR: Charles County, Md. is a rural area within 2 hours drive of Richmond, and even closer to Baltimore and the Nation's Capital. The borders of Charles

County are lapped by the waters of the Potomac, the Patuxent and the Wicomico Rivers. Its open fields and thick stands of woodland are filled with game and its rivers hold a rich harvest of seafood. Its creeks and marshlands are sanctuary for the otter, the beaver, the great blue heron, the osprey, the bald eagle and other lesser known, but equally endangered, species.

After more than 300 years of the white man's ways, we are about to lose that most cherished by our forebearers—our great waterways. In a time when every schoolboy is ecology-conscious, the officials of this area are asked to rule for industry and against people and wildlife, for it has been shown that industry and wildlife are not compatible.

The prognosis for our county in the last of the 20th century is not good. Already the sewerage effluent of the more metropolitan reaches finds its way downstream and the northern rim of the county is becoming a suburb with vast quantities of effluent of its own. Air lanes to the major airports contribute increasing quantities of particulate matter and noise. It is the fear of responsible authorities that an increase in thermal pollution by the cooling of industrial waters, the risk of oil spillage and the air contamination by one major Pepco generating plant, that at Morgantown, is more than enough. The dissolved oxygen levels of the lower Potomac and its tributaries in both States (Maryland and Virginia) are decreasing steadily.

While claiming a technological accumen of vast magnitude, the electric industry berates conservationists for wanting to preserve that which is irreplaceable. If the industry's technology is as advanced as they maintain, then let them keep pace with the demand, which they themselves have created, in some other way.

I use and enjoy electricity every day, just as millions of Americans do, yet, I do not feel that the comfort and convenience of its use to me will repay my children or my grandchildren for the callous disregard of their right to an ecologically sound environment. These waterways are not ours to exploit, but a sacred trust to preserve for the future, when the calm of Nature will be an even more necessary balm to the soul and an oasis in the desert of progress.

Other sources of power must be found, and how will future generations feel when outmoded powerplants sit rusting and idle beside their ruined waterways? Such facilities must not take precedence over living things!

As a member of a family still living on an original grant, whose lands abound in unmolested game and whose love of the water, the air and the green of woods goes deep, I can only ask:

Is our reward for the preservation of nature's bounty here in Charles County (whether preserved by accident or design) to be a fouling of our waters, a pollution of our air, a crisscrossing of our lovely scenery by those blighting monsters marching across our lands carrying power to someone else? In this day and time it is inconceivable that it should be so.

Repectfully,

JOAN LANCASTER BOWLING.

Mrs. MAGARGLE. A good bit of what I have to say has already been covered, so I will make it rather short.

Mr. REUSS. Your full statement will be admitted.

STATEMENT OF MRS. HAL MAGARGLE, ENVIRONMENTAL CHAIRMAN, LEAGUE OF WOMEN VOTERS OF CHARLES COUNTY, MD., AND CHAIRMAN, CONSERVATION COMMITTEE, AUDUBON NATURALIST SOCIETY OF THE CENTRAL ATLANTIC STATES

Mrs. MAGARGLE. I thank you for the opportunity to appear before you today to present the views of a citizen of Charles County. In my opinion the matters are of vital interest and concern to an area much larger than just Charles County on the Potomac River.

The word "ecology" comes from two Greek words that mean "the study of the home." If we take this literally, and apply to the proposals before us the same standards we apply to our homes we will take into account a number of things: 1. practicability 2. utility 3. esthetics.

The order of importance for this list would differ with the individual.

The burned-out remains of the World War I troop ships now in the bay have been there for so long—nearly half a century—that it is inconceivable that they are not an integral part of the ecosystem. Over the years, trees have taken root in the dirt inside the hulls, and these strange islands are not at all unattractive. Herons and egrets have made their homes there. The American bald eagle nests in the area. The area is part of the spawning ground for striped bass. It is known well by those who like the sport, as a good fishing spot.

THE EFFECTS OF THE PROPOSED REMOVAL OF THE WRECKS

The process of removing these bulks would distrupt the ecosystem not only in the bay, but also on the shore. I mention the shore, because it must be assumed that those who feel it necessary to remove the wrecks from Mallows Bay to "clean up the Potomac" would surely not drag them away to be dumped in some other bay or inlet someplace far away.

This raises the serious question of just what is to be done with the remains. They should not be burned—that would merely produce another form of pollution. Salvage operations were abandoned long ago as unprofitable. They have no value out of the water.

How would the removal be financed? The legislation calls for equal sharing of the cost by Federal and local government. No matter how it is phrased, the U.S. taxpaper foots the bill.

Why do they need to be removed? They are not a hazard to navigation, they are part of the ecosystem of the area, providing shelter for fish and birds—and human beings who seek a few hours of peace and quiet, just sitting and/or fishing. In summation:

1. It is not practical to remove the hulks.
2. They serve a utilitarian purpose as habitat for birds and spawning.
3. To many, they are esthetically pleasing—far more so than a sterile shoreline.

ELECTRIC GENERATING PLANT AND TRANSMISSION LINES

We are chipping away at our resources bit by bit, with no overall plan in mind, or much thought as to the long range effects of our actions. Short-term thinking has gotten us into our present difficulty with our environment, and short-term thinking will not get us out of our difficuties.

The time has come to think in much broader terms, not just electric power, or recreation, or housing, or transportation, or waste disposal—but: What effect will each action taken on a single problem have on the whole?

What effect will a "fossil-fuel-fired, steam electric generating station, complete with all the usual appurtenances such as fuel handling and storage facilties, transformers, switch yards, microwave tower, et cetera," have on the land, the water and the air? That it will be detrimental to the estuary ecology seems a certainty.

I haven't heard too much about the air pollution aspects this morning, and that rather disturbs me.

Visual aspects have been gone into just a little bit. I quote from the estuary report which says, "Powerplants with tall stacks plopped

unthinkingly on the shoreline are visual blights from which one can scarcely escape on the middle sections of the estuary. The twin stacks of Morgantown are a blight inescapable for miles." A transmission line across the estuary from towers 175 feet tall will be a visual blight. They can be put under water. There is no excuse if lines there must be for it to be any other way.

A powerplant does not fit into open space recreation, fish spawning areas, or waterfowl and eagle habitats. As a member of the general public, I feel qualified to make that statement. Powerplants have to go somewhere, but I do not feel qualified to judge where that should be. Maryland's Department of Natural Resources is presently making a comprehensive analysis of Maryland's future power needs and will attempt to identify all potential sites for powerplants to meet these requirements. This, plus a regional planning concept such as that proposed in the Potomac River Basin compact and the coastal zone management legislation now before Congress is the real salvation of the estuary. We must think and plan ahead or there will be nothing to plan for.

If I may make just one or two other comments quickly off the cuff, I second Dr. Brehmer's suggestion that nothing further be done until we know more of what is proposed as far as the powerplant is concerned. I am reading now from what they filed with the Public Service Commission. They list the agencies having requirements other than the Public Service Commission in Maryland which must be met in connection with the construction or operation of the project. There are 13 in all, four Federal, three State, five county and one from the District of Columbia.

At the date of the filing of this application, that was the 30th of April, no approval had been obtained or sought from any agency except a zoning change which they were seeking in Charles County, which they canceled, or postponed, because the applicant believes that the orderly and economic way to obtain all the necessary approvals is first to file and prosecute to a conclusion this application, and then if such conclusion is favorable to proceed with the other necessary applications.

That is backward. We should know what they want to do, how they are going to do it, will they be able to get the permits from the Corps of Engineers, and so forth, and so on, before they get their certificate of public convenience and necessity. Thank you.

(Mrs. Magargle's prepared statement follows:)

PREPARED STATEMENT OF MRS. HAL MAGARGLE, ENVIRONMENTAL CHAIRMAN, CHARLES COUNTY LEAGUE OF WOMEN VOTERS, CHARLES COUNTY, MD., ON THE ECOLOGICAL EFFECTS OF THE PROPOSED REMOVAL OF SHIPWRECKS IN MALLOWS BAY AND THE POTOMAC ELECTRIC POWER CO.'S PROPOSED POWER STATION AT SANDY POINT AND ASSOCIATED TRANSMISSION LINE ACROSS THE ESTUARY TO VIRGINIA ELECTRIC POWER CO.'S PLANT AT POSSUM POINT

Mr. Chairman and members of the subcommittee, I thank you for the opportunity to appear before you today to present the views of a citizen of Charles County. In my opinion, the matters under consideration are of vital interest and concern to an area far larger than the immediate environs.

The word "ecology" comes from two Greek words that mean "the study of the home." If we take this literally, and apply to the proposals before us the same standards we apply to our homes we will take into account a number of things:

1. Practicability. * * * 2. Utility. * * * 3. Esthetics. * * * The order of importance for this list would differ with the individual.

THE VALUE OF THE SHIPS IN MALLOWS BAY

The burned out remains of the World War I troopships now in the bay have been there for so long—half a century or more—that it is inconceivable that they are not an integral part of the ecosystem. Over the years, trees have taken root in the dirt inside the hulls, and these strange islands are not at all unattractive. Herons and egrets have made their homes there. The American bald eagle nests in the area. (1) The area is part of the spawning ground for striped bass. (2) It is known well by those who like the sport, as a good fishing spot.

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We are chipping away at our resources bit by bit, with no overall plan in mind, or much thought as to the long-range effects of our actions. Short-term thinking has gotten us into our present difficulty with our environment, and short-term thinking will not get us out of our difficulties.

The time has come to think in much broader terms, not just electric power, or recreation, or housing, or transportation, or waste disposal but: What effect will each action taken on a single problem have on the whole?

What effect will a "fossil-fuel-fired, steam electric generating station, complete with all the usual appurtenances such as fuel handling and storage facilities, transformers, switch yards, microwave tower, et cetera" (4) have on the land, the water, and the air? That it will be detrimental to the estuary ecology seems a certainty.

WATER

"The proposed generating station will have no material effect on water quality" (4). "The seafood industry of southern Marylad is a significant element in the region's economy. Almost 10 percent of the region's workers are directly employed on the water and in the packinghouses. Southern Maryland needs the economic support for its seafood industry. There is a basic potential for expansion of the industry in the area. However, increasing pollution of seafood waters does not favor growing seafood activity. Unless these conditions are corrected, southern Maryland may lose a much needed economic asset" (5).

Oil. "The principal generating unit proposed is to be fired by residual fuel oil which is to be delivered by barge to the plant site" (4).

It seems redundant to comment on the danger of oil spills at this point in history, but for the record, there have been problems with spills on the Potomac from oil barges, and the results have not been pleasant or helpful to the ecosystem.

Dr. Max Blumer (6) states, "One half the total world fish production and nearly all the shell fish production comes from the coastal regions, but oil pollution threatens the coastal environment, and adds to the growing stresses from sewerage, insecticides, chemicals, over-fishing, hot water discharges, and the filling of wetlands. All crude oils are poisons for all marine organisms * * *. Long-term toxicity may harm marine life that is not immediately killed by

spills * * *. The most immediately toxic fractions of oil are water soluble; therefore, recovery of oil slicks is often futile * * *. Treatment with detergents, even the "nontoxic" ones, is dangerous because it exposes marine organisms to higher concentrations of soluble and toxic hydrocarbons. Natural bacterial action eventually decomposes spilled oil; however, the most toxic fraction disappears much more slowly * * *. There is the possibility that the products of bacterial oil degradation are more toxic than oil itself."

How can we, in good faith, allow still another potential source of oil spills on the already overburdened river?

SEWAGE

A sewage treatment plant is to be built at the site. Everyone in the Washington, D.C., area is painfully aware that sewage treatment plants vary—some potentially efficient, though overloaded, and some almost completely ineffective. Sewage is the main source of pollution in the Potomac River in this area. Here comes more—though it will "meet all applicable requirements of State and local authorities" (4). We can judge the future only, or best, from the past; therefore the preceding statement is not exactly inspiring.

THERMAL

"The probable thermal effect of the station will * * * meet all * * * requirements as presently in effect" (4). Before we sit back and relax because of the above statement, several questions need to be answered:

1. What will the temperature rise be for the water? (No cooling towers are planned.) 2. How, and where will the heated water from the plant be dishcharged? 3. What effect will these factors have on the eggs and larvae of the striped bass? Will there be any research which will demonstrate that the eggs and larvae can be pumped through the powerplant and not be damaged? The answers to these questions are all vital to the river.

AIR

"The proposed generating station will have no material effect on air quality." The principal generating unit proposed to be installed will be a cycling unit, which by definition is "one designed for relatively low capital costs" (4). Pepco's record on air pollution is not one to inspire confidence. Figures released by the National Air Pollution Control Administration on May 3, 1970, list Pepco as the No. 1 source of air pollution in Washington, discharging 12,313 tons of sulfur dioxide and 2,698 tons of particulates per year.

There are now methods presently available which would do away with or greatly reduce air pollution from "stacks" (7). They are costly, and will remain so until they are generally accepted as necessary. We all seem to agree that to clean up the mess we've made will be expensive. I firmly believe the majority of citizens are willing to pay the extra cost so long as they know the extra cost goes for environmental cleanup, and not public relations or advertising. It has been estimated that private power companies in the United States spend eight times more on advertising and public relations than they do on research and development, and that to meet maximum environmental standards would add only 5 percent to product costs (8).

The above is mentioned to demonstrate why the average citizen has little faith in the ability of a polluting industry to cleanup unless they are forced to do so, and why we are not anxious to have such an industry in the estuary.

VISUAL

"Powerplants with tall stacks plopped unthinkingly on the shoreline are visual blights from which one can scarcely escape on the middle sections of the estuary" (9). "The twin stacks (at Morgantown, Md.) are a blight inescapable for miles" (9). A transmission line across the estuary, from towers 175 feet tall will be a visual blight. They can be put under the water (10). There is no excuse, if lines there must be, for it to be any other way. "The Maryland Neck area is perhaps the most significant recreation—open space resource along the entire Potomac River Estuary" (9).

ALTERNATIVES

A powerplant does not fit into open space recreation, fish spawning areas, or waterfowl and eagle habitat. As a member of the general public, I feel qualified to make that statement. Powerplants have to go somewhere; but I do not feel

qualified to judge where that should be. Maryland's Department of Natural Resources is presently making a comprehensive analysis of Maryland's future power needs and will attempt to identify all potential sites for powerplants to meet these requirements (11).

This, plus a regional planning concept such as that proposed in the Potomac River Basin Compact, and the coastal zone management legislation now before Congress (12) is the real salvation of the estuary.

We must think and plan ahead, or there will be nothing to plan for.

REFERENCES

1. Jackson M. Abbott, chairman of the Bald Eagle Survey Committee of the Audubon Naturalist Society.
2. Dr. Joseph Mihurski; Dr. Eugene Cronin; Chesapeake Bay Institute.
3. Secretary of the Army Resor.
4. Pepco application before the Maryland Public Service Commission April 30, 1970.
5. Charles County Master Plan, February 6, 1967.
6. Unpublished paper by Dr. Max Blumer, senior scientist, Woods Hole Oceanographic Institute, Mass.
7. Monsanto Enviro-Chem Systems, Inc. (as an example).
8. The Honorable Lee Metcalf, of Montana. Congressional Record. January 28, 1970, page E431.
9. "The Potomac Estuary—A Study of the Recreational, Fish, and Wildlife Potential"—Department of the Interior, Bureau of Outdoor Recreation.
10. American Public Power Association, Mr. Herbert Blinder, director of technical services.
11. The Washington Evening Star, March 20, 1970, page C-3.
12. U.S. Senate bills 2802, 3183, and 3460.

Mr. REUSS. Thank you, Mrs. Magargle. You are a citizen of Maryland; are you not?

Mrs. MAGARGLE. Yes.

Mr. REUSS. Do you have an opinion as to the overall capacity and ability of the Maryland Public Service Commission to take into account in the granting of its permits all issues including environmental issues?

Mrs. MAGARGLE. I have no knowledge of the public service commission. I have had no experience with them. This is the first time I even read the laws concerning this.

Mr. REUSS. Dr. Brehmer, in your statement you referred to the possibility of a thermal barrier coming into being as a result of the siting or proposed siting of a powerplant at Mallows Bay, which is across the river from the existing plant at Possum Point operated by the Virginia Electric Power Co. Can you spell out a bit what you mean by a thermal barrier, and what its effects could be on the lower Potomac.

Dr. BREHMER. Yes, sir. There is considerable concern within the scientific community today regarding the introduction of heated effluents into a stream where a heated zone may be established, which would either delay the passage of fish or maybe deter the passage of fish through an area to their natural spawning grounds. There is also considerable controversy regarding a definition of the zone of passage and I think until many of the questions that now exist are resolved and answered, we should be especially skeptical of siting two plants within one tidal excursion on opposite sides of the stream used by migratory fish, anadromous fishes especially.

Mr. REUSS. What do you mean by "tidal excursion," and how extensive is the tidal excursion at the area of the Potomac between Possum Point and Mallows Bay?

Dr. BREHMER. By tidal excursion I mean one ebb or one flood excursion, the distance that a mass of water would flow during one ebb and one flood tide. I have no specific information on the Potomac, but I would estimate that the ebb is probably about 6 miles during low flow conditions, and the flood approximately 5 miles.

Mr. REUSS. What about during other than low flow conditions?

Dr. BREHMER. During high fresh water inflow conditions the excursion of the ebb would be much greater than the excursion of the flood. Those data will be sophisticated as a result of the study by Dr. Cronin's unit and Chesapeake Bay Institute this summer.

Mr. REUSS. You say much greater than 6 miles?

Dr. BREHMER. During high fresh water discharge conditions—and this is just an estimate from other rivers—the ebbtide may increase up to 8 or 10 miles, and the flood in this area decreases to possibly 1 or 2 miles, but I have no specific data for this stretch of the Potomac.

Mr. REUSS. And the distance between Possum Point and Mallows Bay is approximately 5 miles?

Dr. BREHMER. Approximately.

Mr. REUSS. So that at both low water and high water conditions, this area would be subject to the same tidal flow?

Dr. BREHMER. Definitely during low fresh water discharge conditions, and quite likely during median or higher fresh water inflow conditions.

Mr. REUSS. What is more dangerous to the environment about two powerplants sited on opposite sides of the river within say 5 miles of each other that does not appear in one powerplant on one side of the river? What, in short, is the thermal barrier over and beyond the discharge of heated water?

Dr. BREHMER. Well, it is impossible to get complete mixing of any type of effluent discharge along the shore clear across the river. Therefore, if the isotherms or the areas of equal temperature were plotted for the Possum Point plant, they would extend upstream and downstream on the Virginia side of the river.

Likewise if the proposed site is developed and goes into operation, there heated water would tend to stay more on the Maryland side. Therefore, if the two would converge, there would be the danger of a thermal barrier.

Mr. REUSS. In lay language then, while a fish may be able to sashay by the Possum Point plant, if you put a plant in on the other side of the Potomac, the chances of being able to get by unscathed are considerably diminished; is that correct?

Dr. BREHMER. This possibility does exist; that is correct.

Mr. REUSS. Mr. Vander Jagt?

Mr. VANDER JAGT. No questions.

Mr. REUSS. Mr. Hicks?

Mr. HICKS. What does that term "barrier" in and of itself mean?

Dr. BREHMER. Just an environmental barrier or a zone which the fish do not want to pass through for some reason or the other. Instead of a physical barrier such as a dam, this would be what you might call an environmental barrier.

Mr. HICKS. When you say thermal barrier you mean water temperature that the fish will avoid. When both sides come together, then the thermal barrier extends all the way across the river?

Dr. BREHMER. Until we have more information, we can say that there is a possibility that they might, No. 1, avoid it and stay below it or, No. 2, stay in it and not proceed through to the upstream spawning area.

Mr. HICKS. Dr. Cronin, your testimony had a lot that I didn't understand, but you mentioned this one particular thing—one two-hundredth for spawning grounds, was that it, and one three-hundredth for power development; one three-hundredth and one two-hundredth of what?

Dr. CRONIN. The volume of Chesapeake Bay. In other words, the power industry's predictions indicate that they will need water equal to about one three-hundredth, a third of 1 percent, of the total volume of water in the bay for cooling purposes. We have estimated that the principal spawning grounds of the bay include about one two-hundredth of the volume of water in the bay.

Mr. HICKS. How much of that is in this estuary?

Dr. CRONIN. I don't have a percentage figure on that, Mr. Hicks, but we regard the Potomac River as the second most productive region for striped bass spawning in the world. The upper Chesapeake Bay does produce a large crop of striped bass, but only that area in the world produces more striped bass than this region of the Potomac.

Mr. HICKS. And this area that we are talking about right here is the striped bass spawning ground?

Dr. CRONIN. It is in the center of the very productive system; yes, sir.

Mr. HICKS. And your recommendation is that powerplants should be put where it is already polluted and you are not going to be able to do anything about it?

Dr. CRONIN. If there is such a site where you do not foresee correction of the water quality problem, then that might be used. It it can be used in the process—perhaps in the sewage treatment system or in handling of acid mine waste, so that you can use the thermal characteristic of water while you are in the process of cleaning it up—you have done no damage to the environment and you have made an optimum use.

Mr. HICKS. But you said from studies that you have made, you are not aware of where those spots may be. You assume that they are available?

Dr. CRONIN. No such areas have been identified in large quantities in the Chesapeake Bay. As Mrs. Magargle indicated, the Department of Natural Resources, in cooperation with a great many of us, is now undertaking an effort to analyze the desirability and undesirability of various combinations of powerplant production around Chesapeake Bay. No such assessment has been completed.

Mr. HICKS. Was the dispute over where the nuclear plant should be sited one of the triggering mechanisms that started this?

Dr. CRONIN. I think it was the triggering mechanism; yes, sir.

Mr. HICKS. Is the Federal Government involved in this in any respect?

Dr. CRONIN. In the review and analysis?

Mr. HICKS. Yes.

Dr. CRONIN. Yes. At the present time members of the staff of the Atomic Energy Commission have been discussing with the group the best ways to approach the problems, and other Federal agencies may become involved. They are not at the moment.

Mr. HICKS. Is it a common view that the future is virtually atomic power production exclusively?

Dr. CRONIN. I haven't received that impression, Mr. Hicks. I am not fully conversant with the field. People from the power industry are here. I hear mixed reactions. I hear the problems of powerplant production by nuclear energy cited sometimes, and of course one hears a great deal about the advantage of no atmospheric pollution from nuclear energy. I think that the problem is still moot. I think there is no clear pattern for the future.

Mr. HICKS. I have heard about a Potomac Basin compact this morning. Does that mean that all these States are participating in this same sort of a survey to determine powersites?

Dr. CRONIN. No, sir. That compact activity does not at this point include any effort by the several States involved to review this problem. It might, however, involve such a thing if the compact is enacted and becomes effective.

Mr. HICKS. Would you recommend that the Federal Government, if it is pulling these antipollution fragmented parts of the pollution problem out of the various departments and putting them together, should undertake this type of review?

Dr. CRONIN. Mr. Hicks, I have not seen the structure of the proposed new Environmental Protection Agency. My impression is that it is primarily an enforcement structure rather than an analysis and planning structure. I am not quite clear on this as yet. I think that it must be done on a regional basis. Whether this can best be done by the Federal agencies or by Federal agencies in cooperation with the States, I am not certain which is a better technique; but I think that it must be achieved on a regional basis and that piecemeal answers like this will, in the long run, be very shortsighted.

Mr. HICKS. Thank you, Dr. Cronin.

Mr. REUSS. Mr. Gude?

Mr. GUDE. Dr. Cronin, you spoke about the possibility of locating these plants where they could utilize used water. Would you say using the effluent—provided that you had tertiary treatment or more treatment than it is now receiving from Blue Plains in a plant—causes less degradation than using the estuarine water in areas where there is already a population of organisms built up in the water?

Dr. CRONIN. That type of combination, I think, should be fully explored and would be less detrimental if properly operated.

Mr. GUDE. I gather that the water quality standards for thermal pollution in Maryland waters may not be really adequate, particularly for spawning periods. The standards were originally set in the belief that only waters at high summer temperatures do environmental damage. But now we are coming to find out that thermal pollution can be a year-round problem.

Dr. CRONIN. That is correct. The Maryland standards have been based on research and experience and they have consistently been improved and tightened.

Maryland is giving as much attention to those problems as any State in the country. At the same time, the magnitude of big plants on estuaries now has become so great and the effects so far beyond available experience that research cannot yet provide good prediction of all the effects. We have the choice between permitting the

powerplants and taking some risks, or finding an effective way to get a much better understanding while we take a conservative attitude toward using these exceptionally rich waters as an experiment in this kind of a situation.

Mr. GUDE. In setting forth the areas where you should not build plants, there is no doubt in your mind that certain areas are forbidden, such as the Sandy Point area, because they have an extremely high potential as far as fishing is concerned?

Dr. CRONIN. That potential is so high that we should include this among the areas of the Chesapeake not to be degraded by this kind of use.

Mr. GUDE. I believe that you, and I think Dr. Brehmer, stated that you are having difficulty in obtaining data about the proposed plant. Do you have full knowledge of what is in the effluent from the Possum Point plant and the Morgantown plant? Do you know what is happening to water temperature? Are you apprised of any additives there in the water that come out of the plant?

Dr. CRONIN. Both of the scientific institutions advising the Potomac River Fishery Commission were given information as the application for the Morgantown plant was advanced. As Mr. Norris indicated, we know what was planned for release from that plant. Neither of us are making monitoring surveys to determine exactly what is coming out of it at the present time. No, sir.

Mr. GUDE. In studying the impact of the Possum Point plant on the ecosystem, you are hampered because of the masking of the algae, in determining what the normal fauna and flora of the water there would be, and you really cannot ascertain exactly what the damages might be from thermal pollution at that point?

Dr. CRONIN. That is correct.

Mr. GUDE. You are certain about the effect on the spawning of the striped bass. There is no doubt about that. There may be damage beyond the damage to the spawning of the striped bass?

Dr. CRONIN. That is correct. This portion of the Potomac is a very disturbed and seriously damaged portion, particularly in the hot part of the year.

Mr. GUDE. It has been stated from time to time that there can be beneficial effects from thermal changes in water from electric plants, and at the Dickerson plant on the Potomac there is this increase in fish population during the winter. What is the effect of this thermal change during the summer near Dickerson and Possum Point?

Dr. CRONIN. We conducted quite a careful and well-designed study of the success in fishing around the Dickerson plant, comparing regular fishing above the plant, and across the river in the undisturbed water, and in the warm water below the powerplant on a year-round basis. We found that winter fishing in the warm water is better than at the other two sites. It is far better than any other nearby portion of the river. It is a very attractive site for fishing and for fishermen.

During the summer months, however, and during the larger part of the year, for about 8 months, fishing was inferior below the plant. Warm water during the spring and summer and fall tends to drive the fish away from that particular location. It has not increased production of fish in any way.

During the winter it relocates them. Wintertime happens to be a particularly fine time to add a fishery and it is of real value. It does appear to drive the fish from that particular location in the summertime. There is some gain and some loss.

Mr. GUDE. Dr. Cronin, you spoke about the location of the Steuart plant at Piney Point and indicated on the map some of the problems. At first blush, you might think if you have an oil spill way out in the water there it is not going to be so bad. Based upon your knowledge of the currents of the river, is there a possibility that a massive spill resulting from an accident at Piney Point could go upriver to any degree under that set of circumstances?

Dr. CRONIN. Yes.

Mr. GUDE. Depending on tides and winds.

Dr. CRONIN. The concern that I feel about it is that every spill is immediately carried away from the site and gets into the open system. Wind direction determines how far it goes. It is immediately beyond control except in a very limited sense. The alternative that I hope will receive full consideration is to require, if there is to be such a facility, that it be a boxed-in facility with a way of closing the gate at the mouth of it. If any accident or spill occurs, it can be positively cut off and then dealt with in a safe, careful, and thorough way. That is just completely impossible out here except for the use of log booms and styrofoam and other essentially floating barriers which can help a great deal. But this is very, very open exposure and a very rough and windy place.

Mr. GUDE. Even when you do have a containment with floats such as styrofoam, is there not a penetration of the oil downward into the water also?

Dr. CRONIN. Yes, sir.

Mr. GUDE. Oil is not just matter that floats on top; there are certain components of it that penetrate downward and you are not going to contain them unless you do have a box structure?

Dr. CRONIN. That is correct. There is always some carrying of oil down into the system.

Mr. GUDE. Have you been able to make any studies of the effects of various spills at Piney Point on the ecosystem?

Dr. CRONIN. We have not, Mr. Gude. The spills obviously happen unexpectedly and nobody wishes for them. There is no way to predict when they might occur. The Potomac River Fisheries Commission has requested both of our institutions to consider a better way to deal with these problems because they feel that they need information on the damage done. They have asked that each of us appoint a member and that the Federal Water Quality Administration appoint a member to create a pollution advisory committee for two tasks. One is to set up a response to any urgent pollution occurrence. The second is to keep the Commission advised on pollution problems that might affect commercial fisheries in any way. We would expect to work with the Virginia Water Quality Control Board, Coast Guard and Corps of Engineers and anyone else. Our particular responsibility would be what is happening or might happen in this river in terms of pollution that might affect commercial and recreational fisheries.

This is not yet organized, although we expect to meet within the next 2 weeks.

Mr. GUDE. Would it be possible to have a test plot in the vicinity of the Piney Point plant compared to a test plot not in the immediate area which would be untouched by oil spills and follow their history over a period of time?

Dr. CRONIN. Such monitoring could be established carefully and properly and fairly; yes, sir.

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

Mr. REUSS. Let me ask each member of the panel: When did you first hear about the intention of the Potomac Electric Power Co. to build a powerplant at Sandy Point on Mallows Bay?

Mrs. Magargle?

Mrs. MAGARGLE. A Charles County newspaper article, the end of April.

Mr. REUSS. What year?

Mrs. MAGARGLE. This year.

Mr. REUSS. Is that the first you heard of the proposal?

Mrs. MAGARGLE. Yes, sir.

Mr. REUSS. Dr. Cronin?

Dr. CRONIN. I read a brief account in a Washington paper which I cannot date, but it was about this same period. My next official notice was from Mr. Norris' office when we had correspondence from him that this hearing was being organized.

Mr. REUSS. Dr. Brehmer?

Dr. BREHMER. Roughly 3 weeks ago. I heard about it in conversation during a meeting at the Johns Hopkins University.

Mr. REUSS. Mr. Norris?

Mr. NORRIS. I heard about it—probably the same article in the Washington paper where the company had given notice that they had proposed this plant at Mallows Bay. I cannot date it. It was somewhere between 60 and 90 days ago. Then I asked some questions and more or less confirmed and got in touch with our advisers here.

Mr. REUSS. Mr. Norris, you agreed with the testimony that we have just had from Dr. Brehmer and Dr. Cronin and your scientific adviser?

Mr. NORRIS. Yes, sir.

Mr. REUSS. Is it the intention of the Potomac River Fisheries Commission to appear before the Maryland Public Service Commission in opposition to the application permit of the Potomac Electric Power Co.?

Mr. NORRIS. Mr. Everngam, our legal officer, is here. I would like for him to answer that question if you don't mind.

Mr. REUSS. Yes, sir.

Mr. EVERNGAM. Before we took any stand, the commission would have to meet, the three commissioners from Virginia and Maryland, and make a determination of what they wanted the executive secretary and their attorney to do about the matter. It would be a policy matter for the commissioners to decide.

Mr. REUSS. Mr. Norris, what will your recommendation to the commissioners be? Oppose it or approve it?

Mr. NORRIS. We would certainly be guided—the commission would certainly be guided, I think, by the stand that the scientists have taken here.

Mr. REUSS. You have said that you approve their testimony?

Mr. NORRIS. Yes, sir.

Mr. REUSS. I would judge then that you would recommend to the commissioners that the application not be approved?

Mr. NORRIS. I think that would be correct, sir.

Mr. REUSS. What steps is the Potomac River Fisheries Commission taking with respect to the oil spills in the Potomac and particularly to the Piney Point petroleum facility?

Mr. NORRIS. Well, about a year and a half or possibly 2 years ago the Steuart Petroleum Co. applied for an extension of their pier and a permit to build an additional pier there. At that time, the commission took the position they opposed any extension of the present oil facilities at Piney Point in St. Marys County, Md. That is still the position of the commission.

Mr. REUSS. This was the position taken before the Maryland Public Service Commission?

Mr. NORRIS. It was a policy adopted by the Potomac Fisheries Commission and we notified all pertinent government agencies, Federal, State, and local.

Mr. REUSS. Any further questions?

(No response.)

Mr. REUSS. If not, thank you very much, gentlemen, Mr. Norris, Dr. Brehmer, Mrs. Magargle, and Dr. Cronin. If you are able to stay in the hearing room, it may be that members will want to call you back. On the other hand, if you have urgent other business, feel free to go.

Mr. NORRIS. I can stay. Thank you.

Mr. REUSS. We would like to ask Mr. Dorsey Hughes, senior vice president of the Potomac Electric Power Co., accompanied by Dr. Ruth Patrick, of the Academy of Natural Sciences, to come forward.

STATEMENT OF D. F. HUGHES, SENIOR VICE PRESIDENT, POTOMAC ELECTRIC POWER CO.; ACCOMPANIED BY E. B. LAWLESS III, ENGINEER, STRUCTURAL; DR. RUTH PATRICK, ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA; L. W. CADWALLADER, VICE PRESIDENT, GENERATING; AND E. F. MITCHELL, ASSISTANT TO VICE PRESIDENT, ELECTRICAL ENGINEERING

Mr. HUGHES. Mr. Chairman, I would also like to have Mr. Cadwallader, our vice president in charge of generating; Mr. Mitchell of my electrical engineering department, and Mr. Lawless, if I may.

Mr. REUSS. You are most welcome.

Sit in the middle and have your associates come up, too.

Mr. Hughes, thank you for your statement, which under the rules will be admitted in full. Proceed in any way you like.

Mr. HUGHES. My name is Dorsey F. Hughes. I am the senior vice president of Potomac Electric Power Co., the electric utility which serves the District of Columbia, large portions of Montgomery and Prince Georges Counties in Maryland, and a small portion of Arlington County in Virginia. Pepco also supplies, at wholesale, most of the electricity distributed in Calvert, Charles and St. Marys Counties in southern Maryland.

By training and profession I am an electrical engineer, and I came up through the Pepco organization primarily in that field. As the company's senior vice president I now have overall responsibility

(subject to the company's president) for its operations, and the group heads reporting to me include its vice presidents for electric operations, for electrical engineering, for generating, and for purchasing and general services.

Pepco at present owns and operates six electric generating stations in this area (two in the District of Columbia, one in Alexandria, Va., one in northwesterly Montgomery County, one in southeasterly Prince Georges County, and one on the Potomac River in Charles County).

Pepco has recently taken the first steps toward the construction of a seventh electric generating station to be located on the Potomac River in the vicinity of Sandy Point in Charles County, Md., across the river from the Marine Corps' base at Quantico, Va. The area under consideration for the site is upstream from Mallows Bay.

Independently of that generating station project, in the sense that our planning calls for it regardless of the action taken on the generating station, is a proposed steel-tower transmission line to be constructed across the river about 4 miles upstream from Mallows Bay to connect Pepco's backbone transmission lines (which presently form a rough half circle around, and to the north, east and south of, its service area) with the high-voltage transmission lines of Virginia Electric & Power Co. at the latter's Possum Point generating station north of Quantico in Prince William County, Va. When such river-crossing line is placed in service it will complete a high-voltage transmission ring (using Vepco's circuits on the Virginia side of the river) completely encircling the Washington metropolitan area. (Pepco and Vepco are already interconnected on the north by high-voltage lines which cross the Potomac River between Montgomery County, Md., and Loudoun County, Va.)

JULY 21 HEARING

The June 24 letter from Chairman Reuss which invited us to present a statement at these hearings indicated that at today's hearing the subcommittee would be interested in these two subjects:

1. The ecological effects of the proposed removal of the derelict ships from Mallows Bay, including whether such removal might damage the Potomac fishery.

2. Whether Pepco's proposed generating station and river-crossing transmission line might be harmful to the ecology of the Potomac estuary.

As to the first subject—the ecological effects of a removal of the Mallows Bay hulks—I must plead ignorance both on my part and on the part of Pepco. We are, of course, concerned with the ecology of the Potomac estuary, but we played no part in the introduction or enactment of section 116 of the River and Harbor Act of 1968, directing the Corps of Engineers to remove and destroy the hulks, and we are in no position to hazard any guess as to what would be the ecological effects of such action. As we now see it, our proposed operations will be neither helped nor adversely affected by any action, or lack of action, pertaining to the hulks.

Now, as to the question of whether our proposed generating station and river-crossing transmission line might have some harmful effect on the estuary's ecology:

The station will be designed, built and operated in full compliance with all applicable air and water quality regulations. Thus, I am

confident that it will have no material harmful effects on the estuary's ecology, assuming, as I must, that the applicable regulations are designed to prevent such harm.

Wholly apart from the necessity of complying with the applicable governmental requirements, we will, in designing the station, follow our regular practice of retaining qualified independent experts to advise and guide us in how to do the job in such a fashion as to avoid any damage to the ecology.

The principal generating unit at the station will be an oil-fired steam unit, burning residual fuel oil. Its stack will be a tall one—perhaps as much as 700 feet (depending on the size of the generating unit)—with its height to be selected on the basis of studies made for us by independent air quality experts.

As I have said, the station will be operated in full compliance with all applicable water quality standards and we are aware, of course, that we will have to obtain a permit from the Maryland authorities to use that river's water for steam condensing purposes and for other purposes. Thus, there will be no problem of materially harmful discharges into the river of either condenser cooling water or chemical or sanitary wastes from the station. In that connection, I should also point out that a sewage treatment plant fully meeting the requirements of the Maryland authorities will be constructed at the station to deal with its sanitary wastes.

The transmission lines crossing the estuary will be supported on steel towers which in turn will be supported by concrete capped pilings driven into the river's bed. During the course of the construction of the tower footings there will, of course, be some disturbance of the river's bottom, but it is not expected that the actual construction of the footings will extend over a period of more than 16 weeks, so that any harmful effect on the river as a result of such disturbance will, in my opinion, be immaterial. There will be a total of four towers resting on four footings each in the river, and each tower will require the driving of about 40 piles to depths which may extend to 40 feet below the river's bottom. Once the tower footings are in place I cannot see how the balance of the construction or the line's existence could have any possible effect on the ecology of the estuary.

On this general question of the possibility of harmful effects on the estuary's ecology as a result of our projects, I think I should point out that in today's regulatory climate with respect to environmental matters, we operate in a crystal-clear fish bowl with every step we propose to take being subject to rigorous examination by competent and dedicated experts in various Federal and State agencies, so that the possibility of our projects, when finalized and carried out, having any material adverse effect on the ecology of the estuary are remote in the extreme.

JULY 22 HEARING

Chairman Reuss' June 24 letter identified the following as the items to be covered at today's hearing:

1. Whether, and to what extent, natural values of the Potomac estuary are in danger of being degraded by repeated oil spills.

2. Whether additional precautionary measures to minimize the spilling of oil are needed at the Piney Point terminal, at upstream barge terminals, or elsewhere in the Potomac estuary.

On these points, we do not feel that we can speak with any authority, except insofar as concerns the delivery of oil to our existing Morgantown Generating Station, located immediately adjacent to the Maryland end of the Route 301 Potomac River Bridge, and to our proposed new generating station which I have earlier discussed.

First, let me say that the Piney Point terminal facilities are vastly important to the Washington metropolitan area, as through that terminal moves substantially all of the residual fuel oil used in the area. From our standpoint, such facilities are particularly important, and growing increasingly so, because of the general shortage of coal for use as a boiler fuel, because at present fuel oil is, costwise, more attractive than coal, and because fuel oil offers greater benefits than coal from the standpoint of the maintenance of air quality.

At Morgantown we are now receiving oil by barge and we expect to continue to do so until the projected pipeline between Piney Point and Morgantown is placed in service—which should be within the next year and a half. In our receiving operations we are taking every precaution to avoid oil spills and to date we have been completely successful in so doing. Should there be a spill we are also thoroughly prepared to take appropriate action to recover the oil from the river and prevent any detrimental pollution.

At our projected new generating station we expect to burn residual fuel oil, as I earlier mentioned, and to receive the oil by barge from Piney Point. Here, again, we will take all appropriate precautions to prevent spillage during receipt and will be thoroughly prepared to correct any spillage which may occur.

The amount of fuel oil which will be burned at the new station will, of course, depend on the sizes and numbers of the steam-electric generating units installed. At present, we envision an initial need for perhaps 80,000 barrels of fuel oil to be delivered each week, with such oil to be moved to the station in barges having a capacity of 20,000 barrels each.

That completes my statement.

Mr. REUSS. Thank you very much, Mr. Hughes.

When did Pepco first look at the Sandy Point site and consider the building of a power generation facility there?

Mr. HUGHES. We bought the site back in 1963. Of course, power companies try to buy generating station sites they don't necessarily at the time they buy have earmarked particularly when the installation will be installed; but it is an available site for the installation of a powerplant.

Mr. REUSS. You acquired title in 1963?

Mr. HUGHES. Not title. We bought it, well, I guess you would call it under a straw basis.

Mr. REUSS. Under what?

Mr. HUGHES. It was bought under the Idamont Corp. We didn't get fee title or record title. We had the fee title but not record title until just before zoning earlier this year.

Mr. REUSS. Idamont was a dummy corporation formed by you?

Mr. HUGHES. Yes, sir.

Mr. REUSS. Formed by Pepco?

Mr. HUGHES. For the purpose of this purchase; yes, sir.

Mr. REUSS. Idamont acquired title in 1963?

Mr. HUGHES. Yes, sir.

Mr. REUSS. From whom did it buy the land?

Mr. HUGHES. I don't recall, sir.

Mr. REUSS. Farmers or whoever owned it?

Mr. HUGHES. Whoever the owner was. Mr. Cadwallader informs me five sportsmen owned it.

Mr. REUSS. How far prior to 1963 did Potomac Electric Power Co., either itself or through Idamont, conduct a reconnaissance of the Sandy Point area, in terms of whether it might be a suitable plant site?

Mr. HUGHES. I believe our search for that probably covered maybe a period of 8 or 9 months to a year, or something in that order, sir.

Mr. REUSS. Mr. Hughes, in the testimony of Mrs. Magargle she stated that it has been estimated that private power companies in the United States spent eight times more on advertising and public relations than they do on research and development. I don't expect you to have an opinion on what that is nationally. But what has Pepco spent in the last 10 years, 5 years, and 1 year, respectively, on research and development?

What has it spent on advertising and public relations?

Mr. HUGHES. I would have to check those figures, Mr. Chairman.

Mr. REUSS. Would you supply those for the record?

Mr. HUGHES. Yes, sir.

(The information requested follows:)

POTOMAC ELECTRIC POWER CO.,
Washington, D.C., August 25, 1970.

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: At the July 21 hearing before your subcommittee dealing with the Potomac estuary you asked two questions of Mr. Dorsey F. Hughes, senior vice president of this company, the answers to which he agreed to supply at a later date:

1. What did Pepco spend in the last 10 years, 5 years, and 1 year, respectively, on research and development?

2. What did it similarly spend on advertising and public relations?

After a review of our accounting records, the answers appear to be approximately as follows:

1. Research and development: 1960–69, $4,608,000; 1965–69, $2,763,000; 1969, $769,000.

2. Advertising and public relations: 1960–69, $8,004,000; 1965–69, $6,008,000; 1969, $1,298,000.

As to research and development, the above figures are furnished subject to these comments:

1. The company's accounting and cost accumulation procedures do not readily define, isolate or classify all such costs. (Only in the last few years have the accounting requirements of the regulatory commissions contemplated any detailed reporting of such expenses.) For example, for the years 1960, 1961, and 1962 we are not able to identify, among the payments made to various consultants for work at our powerplants, those which properly fall in the research and development category.

2. The figures represent only the company's "out-of-pocket" expenses and do not include the salary and other similar costs for company employees engaged in research and development activities.

3. Traditionally, in the electric utility industry the major research and development effort is made by the equipment suppliers, with their costs in that area being recovered by them from their utility customers in the prices the latter pay for the items of equipment which they purchase.

Respectfully,

CORNELIUS MEANS, *Counsel.*

Mr. REUSS. Thank you.

Do you have an offhand opinion as to whether that figure of Mrs. Magargle is within the ballpark?

Mr. HUGHES. It may be. I wouldn't want to guess.

Mr. REUSS. File the figures and we will let them speak for themselves. Mr. Vander Jagt?

Mr. VANDER JAGT. No questions.

Mr. HICKS. No questions.

Mr. GUDE. Thank you, Mr. Chairman.

Mr. Hughes, you mentioned precautionary features which you have at the terminal in Morgantown and you are now receiving oil there.

Mr. HUGHES. We have one of the styrofoam booms which was mentioned. We are using that at that facility. A year and a half from now it will all be by pipeline, unless the pipeline is out of order.

Mr. GUDE. What do you have—check valves, or what would happen if you had an accident at the dock? Suppose your valves were broken or something, or a barge coming in or a storm broke off the dockside facilities. What do you have to prevent the outflow of oil inshore from your stores?

Mr. HUGHES. May I ask Mr. Cadwallader to answer that?

Mr. GUDE. Yes.

Mr. CADWALLADER. We have in front of our intake house where the water goes in, a corrugated steel curtain wall which is part of our water permit. This insures that we take in the deeper water from minus 30 to minus 50. This is the cooler water and the deeper water. This is what our model studies had told us to do and this is the arrangement that our permits, both State and Federal, were based on.

I am telling you this to give you a picture of that.

On the inside of this curtain wall we have a pipe support. This is on the land side. This is a totally closed area. Therefore, our oil fill line or the oil unloading line goes along there. So any oil spill inside that area is contained in that area. All of these welded joints have been radiographed to insure their integrity. Aside from this, it is a low-pressure operation anyway. We have a valve inside this curtain wall and presently the barge would dock against this steel curtain wall and from there to our connection would extend a rubber hose.

We have a floating oil boom in service which circles the barge during this unloading period. We have applied for permits for what we feel to be a safer operation. This involves building a small dock on a river side of this retaining wall from which would be mounted a steel unloading arm with flexible joints, ball joints. This arm can be lowered to the deck of the barge and there connected either directly or through a piece of steel hose to the barge unloading station. We presently have permits from the State of Maryland to do this.

We do not yet have Federal permits to do this, although we feel that this represents our maximum safety in unloading. The Department of Interior has not yet cleared the U.S. Engineers on the issuance of the permit for that permanent oil dock which we feel is in the interest of maximum safety. So presently we are using this other method of unloading. It is the safest thing we can do under our present conditions.

Mr. GUDE. Could you get your landside oil line?

Mr. CADWALLADER. When this permit is approved by the Federal Government, then we will install this little oil dock on a water side

of the retaining wall with this steel unloading arm. We would still use a floating oil boom.

We also carry some of this so-called absorbency, as they do on the barge, which is sort of a rock wool material that can be dropped in the water to sponge up oil. This is our present method of operation, and also, we hope, our future mode of operation.

Mr. GUDE. The steel loading arm is the type which steel people wish to install at their facilities at Piney Point. If this had been in use, they would have not had the oil spill in June which occurred because a rubber hose gave way?

Mr. CADWALLADER. That is correct.

Mr. GUDE. Under high pressure. And so this steel loading arm or unloading arm is the best safety feature that you could have under this set of circumstances?

Mr. CADWALLADER. Yes, sir.

Mr. GUDE. You say there is a valve. I was wondering about the safety precaution that you have, the float you put around the barge. If you had an accident where your valve broke, or for some reason there was an outflow of oil from the shore or from the storage facility, what would you have to stop that?

Mr. CADWALLADER. We have an automatic check valve in the line which would close on any reverse flow. We have this hand-operated steel valve with an operator there the entire time that the barge is unloading.

Mr. GUDE. In other words, you have both the automatic valve and a hand-operated valve?

Mr. CADWALLADER. Yes, sir.

Mr. GUDE. If the man did not shut off the hand valve, the automatic valve would go into effect?

Mr. CADWALLADER. Yes, sir.

Mr. GUDE. Between the automatic check valve and the water, how much oil would you lose in that space?

Mr. CADWALLADER. The valve is located right where the barge hose attaches to it. Later on, it will be located right where the steel unloading arm would be located.

The check valve is upstream from that. The amount of oil spillage that you are talking about might be one or two hand-bucketsful.

Mr. GUDE. A very small amount?

Mr. CADWALLADER. Yes, sir. We carry a sizable drip pan under this connection which would hold far more oil than that.

Mr. GUDE. You have only this one line? That is, Morgantown—one unloading line?

Mr. CADWALLADER. Yes, sir.

Mr. GUDE. You are building more facilities there. Will this mean any expansion? Is it true that by that time you hope to have your pipeline completed and you won't need your oil transfer facility there?

Mr. CADWALLADER. That is right. We don't see any need for anything more than the one line we have now.

Mr. GUDE. That is all.

Mr. REUSS. Mr. Hughes, you testified that the Potomac Electric Power Co., through its subsidiaries, has actually owned the land at Mallows Bay for the last 7 years. You heard the testimony of the

Potomac Fisheries Commission representatives here earlier this afternoon, and the testimony of the Maryland and Virginia scientific advisers to that Commission to the effect that they first heard of the desire to build an electric power generating plant in May of this year—1970.

In the light of your testimony, and I am quoting from your testimony—"I am confident that this plant will have no material harmful effects on the estuaries and ecology."

Wouldn't it therefore have been a good idea to let them in on the secret?

Mr. HUGHES. We filed very soon after we decided to build and went to build the generating station. The hearing with the Public Service Commission, this action is the initiating action. In other words, we have not yet designed the plant. It was our opinion, and the opinion from I believe consultation with others, that this was an ideal site. We felt that in our opinion it was, and we still don't feel it will have any adverse effect on the ecology other than there is not anything that you can do that won't affect in some way the ecology.

Mr. REUSS. True. But you have heard the testimony of the experts charged with the duty of preserving the Potomac, that building one fossil fuel plant across the river, within 5 miles across the river from another, may set up a thermal barrier. You have heard testimony about the effect of possible oil spills.

Mr. HUGHES. What we will do is follow the same example we did here at Dickerson and Chalk Point and Morgantown. One of our first actions will be to initiate a model study. In the Morgantown, I mean the Alden Laboratories, the Polytechnic Institute has been performing that work for Potomac and other utilities. In the case of the Morgantown plant, there was an advisory committee and Dr. Cronin was one of the members who more or less oversaw—followed the developments and the tests to determine just how the discharge would be—whether there would be adverse temperature rises and all of the other factors.

We will start in on that. Everybody will have his chance to study and look at this.

Mr. REUSS. You are going to accept the advice of Dr. Cronin on the Sandy Point plant? If so, you might as well forget it, because he says it is an ecological danger.

Mr. HUGHES. I think that it will be the Department of Natural Resources, I believe is the correct title, of the State of Maryland. I am sure Dr. Cronin will have a say in connection with that.

Mr. REUSS. Mr. Cadwallader.

Mr. CADWALLADER. Mr. Chairman, could I make a statement?

Mr. REUSS. Yes.

Mr. CADWALLADER. There were four members of this special advisory committee which looked over the plans of the Alden Hydraulic Plant and followed that model study. Three were State representatives and three were consultants. Pepco did not have any direct employee on that committee.

Mr. REUSS. You are talking about the model study for the Mallows Bay plant?

Mr. CADWALLADER. Yes, sir—no, the Morgantown plant. Dr. Ruth Patrick was on this. The Director of the Alden lab was on it. Among

the State representatives, Dr. Cronin was on it. Dr. Cronin approved the final committee report and signed it.

Mr. REUSS. Morgantown was built?

Mr. CADWALLADER. This was before we did any of our waterfront design work.

Mr. REUSS. Morgantown was constructed, then, with the approval of Dr. Cronin?

Mr. CADWALLADER. The committee opinion was unanimous on that.

Mr. REUSS. My question is, are you going to pay as much attention to Dr. Cronin when he says no as you do when he says yes?

Mr. CADWALLADER. Well, initially, Mr. Chairman, he said no to everything on the Morgantown study. It seems as though as the study developed and as the results became apparent he changed his mind.

(Subsequently, Dr. Cronin submitted the following data relating to the statements made by Mr. Cadwallader:)

UNIVERSITY OF MARYLAND,
NATURAL RESOURCES INSTITUTE,
August 3, 1970.

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee,
Committee on Government Operations,
Washington, D.C.

DEAR CHAIRMAN REUSS: I wish to submit a supplementary statement relating to the subcommittee's hearing of July 21 concerned with problems of derelict ship removal, powerplant installation, and oil handling in the tributaries of the Chesapeake Bay. I request that this letter and two accompanying documents be placed in the record of that hearing.

According to the draft of the typescript part of the hearing which I could not attend in person, Mr. L. W. Cadwallader of the Potomac Electric Power Co. indicated that I was on a committee dealing with the hydraulic model study of the Morgantown powerplant and that the Morgantown powerplant was constructed with my approval. This is a grossly incorrect impression and I wish to correct the record.

I did participate as a member of the Maryland Board of Natural Resources in a committee to observe and report on the hydraulic model of the Morgantown plant constructed by the Alden Research Laboratories. The committee's specific assignment was limited to the observation of the model and estimation of its accuracy in predicting thermal distribution in the river. We concluded that the structures planned were near the known optimum for minimizing the temperature increase in that portion of the river receiving heated effluent. We made further estimates of the accuracy of various predications from the report. The entire report of the committee is enclosed and I request that it be made a part of the record of the hearing.

Subsequently, as advisor to the Potomac River Fisheries Commission, I signed the report and recommendation to that commission prepared jointly by the Virginia Institute of Marine Science and the Chesapeake Biological Laboratory. This report goes far beyond the simple estimate of the accuracy of the model and deals with several questions about the effects of the Morgantown powerplant on the Potomac River and its fisheries. We noted that the temperature predictions from the hydraulic model are reasonably accurate and useful but we recommended very strongly against the use of tempering water as proposed by the power company and we noted that the biological data provided with the application were limited to certain small sites poorly selected for this purpose and contained serious lacks and errors. We felt that they did not provide adequate baseline data or prediction data and should therefore be ignored.

In no sense have I ever approved or indicated approval of the final design and operation of the Morgantown powerplant in relation to its effects on the biological systems and fisheries of the Potomac River. I request that the full report and recommendations provided to the Potomac River Fisheries Commission be made a part of the record of the hearing of July 21, 1970.

Thank you for the many courtesies extended to me and others in the course of this hearing. I hope that the procedure will be of special value in assuring that the needs of the Nation are met with the minimum destruction of the quality of our environment.

Very truly yours,

L. EUGENE CRONIN,
Research Professor and Director.

REPORT OF THE MORGANTOWN MODEL COMMITTEE TO THE MARYLAND BOARD OF NATURAL RESOURCES AND POTOMAC ELECTRIC POWER CO., JULY 5, 1968

The committee has held a series of meetings, reviewing the planning, construction, testing, and operation of the Morgantown model of the Alden Research Laboratories at Worcester, Mass. We have received many of the results from the model and given special attention to the report of June, 1968, titled "Hydraulic model test, Morgantown Generating Station for Potomac Electric Power Co." We agree that the efforts to model and study the area of principal effect have been conscientious and capable. We recognize that the modeling of estuarine termal problems is a difficult field, still in development and subject to theoretical and practical uncertainties.

It is our opinion that the structures described in the June report are near the known optimum for minimizing the effects of temperature on the environment, under the assumptions provided by Pepco of 10° F. increment and 2,200 c.f.s. flow. Several imaginative and progressive structural changes have been considered.

It is our further opinion that—

(1) The area and shape of the water mass with increases of 2° F. or more in temperature in the river are fairly accurately predicted in the referenced report.

(2) The area of water masses with temperature of less than 2° F. increments in the river are reasonably representative of those which will occur in the prototype. Temperatures at any one site cannot be estimated within circa 0.2° to 0.3° F.

(3) The shape and location of areas receiving less than 2° F. temperature increment will vary in detail in response to meteorological conditions.

To determine the accuracy of the predictions, the committee recommends that the thermal distribution in the Potomac River as the result of powerplant activity be carefully measured by a joint State-company project after the first and second units are placed in operation and that these results be promptly reported to a joint committee for review and possible comment.

A. L. PENNIMAN, *Chairman.*
L. EUGENE CRONIN.
JOHN C. GEYER.
PAUL W. MCKEE.
LAWRENCE C. NEALE.
DONALD W. PRITCHARD.

REPORT AND RECOMMENDATIONS TO POTOMAC RIVER FISHERIES COMMISSION—VIRGINIA INSTITUTE OF MARINE SCIENCE AND CHESAPEAKE BIOLOGICAL LABORATORY

We have reviewed the material presented with the application by the Potomac Electric Power Co. and several supplementary documents.

We have also drawn up our experience with related problems in the Patuxent, York, and James Rivers and on our knowledge of the Potomac, its fisheries, and the ecology of the Chesapeake Bay area.

Several specific questions are pertinent to the considerations of the Potomac River Fisheries Commission:

1. *Does the commission have formal responsibilities in this matter?*

This question is outside of our competence. Under any interpretation, we believe that the Maryland Department of Water Resources and other responsible agencies would welcome the comments and recommendations which the Potomac River Fisheries Commission considers to be constructive in providing optimal protection of the important resources of the river and that the commission has a responsibility to comment.

2. *Should the use of tempering waters by permitted?*

We recommend that the commission vigorously oppose pumping of natural estuary water, to be used for tempering overheated water, into the steam electric

station discharge canal. This procedure, which is proposed to be used when condensing cooling water temperature exceeds State standards of 90° F., is simply moving the mixing zone into steam electric station property and is, therefore, a deviation other than natural from the Maryland water resources standards, as established by their regulations. The 90° F. was established as a State water quality standard in order to protect aquatic life; it recognizes the thermal requirements of estuarine biota. If this 90° F. level is allowed to be exceeded, it then ignores developed biological data and established standards and will not provide the protection of these estuarine organisms for which the regulation is designed. Biota contained in the cooling water supply are important to continued production in the estuary, and therefore must not be damaged.

3. *Are the temperature predictions from the hydraulic modal reasonably accurate?*

We agree with the comments of the Model Advisory Committee that the model data appear to provide reasonably good estimates but that the actual temperature effects should be carefully observed and tested after operation begins.

4. *Is the available biological data adequate as a base-line description of the condition of the river and prediction of the effects of the plant?*

The survey data provided with the application are limited to certain small sites, poorly selected for this purpose, and containing serious lacks and errors. In our opinin, they do not provide adequate base-line or prediction data and should be ignored.

The experience of our staffs provides considerable, but not complete, information on the oysters, clams, crabs, fish, and other organisms of the area. They are helpful but must be supplemented.

We recommend that the commission urge the Maryland Department of Water Resources to require thorough preoperational and postoperational sampling of the organisms which, in light of current knowledge, may be threatened by such operations. These include planktonic eggs and larvae of the shellfish, fish, and other species; bottom species in the receiving area, including those which may accumulate heavy metals—phytoplankton, zooplankton, and jellyfish.

In our opinion, these studies, should be conducted in a manner satisfactory to the pertinent scientists on our staffs, and to impartial experts. Such research may be especially important if Pepco applies for expansion at this plantsite or for additional sites on the Potomac in the future.

SUMMARY OF RECOMMENDATIONS

1. That waters must not be heated more than 10° F. across the condensers of the plant or above 90° F.

2. That practice of using tempering waters to reduce water temperature to meet effluent requirements be prohibited.

3. That thorough preoperational and postoperational studies be conducted to determine accurately the effects of the plant operations on river temperatures and biota.

Operations of the Morgantown steam electric station, as proposed in the application, do not meet recommendations 1, 2, or 3. We urge that Maryland Department of Water Resources be requested to require compliance with all of these.

Respectfully submitted.

MORRIS L. BREHMER, VIMS.
L. EUGENE CRONIN, CBL.
WILLIAM J. HARGIS, VIMS.
JOSEPH A. MIHURSKY, CBL.
ELGIN A. DUNNINGTON, CBL.

Mr. REUSS. At what point do you intend, Mr. Hughes, to ask the U.S. Army Corps of Engineers whether it will give you a permit to construct a pier and outfall to unload barges and do other things over which the Corps of Engineers has jurisdiction?

Mr. HUGHES. We will have to wait until we have the design completed sufficiently so that we can apply for it. Probably it will be a year and a half to 2 years from now before that point arrives. Let me say this: We did have our informal consultation with the Corps of Engineers in connection with the river crossing over a year ago. Feasibility. Basically, you see, we cannot make applications for things

until we can proceed with the design on it. The first step is this certificate of public convenience and necessity.

Mr. REUSS. From the Maryland Public Service Commission?

Mr. HUGHES. Yes, sir.

Mr. REUSS. According to them, the next step would be the designing of the plant?

Mr. HUGHES. Yes, sir.

Mr. REUSS. That is a costly procedure?

Mr. HUGHES. That is right.

Mr. REUSS. How much? Roughly speaking, for a plant of this size how much would be involved in expenditures of your company's funds?

Mr. HUGHES. I will defer that to Mr. Cadwallader.

Mr. CADWALLADER. It would run about 4 percent of $50 million. That is $2 million.

Mr. REUSS. $2 million?

Mr. CADWALLADER. Yes, sir.

Mr. REUSS. Mr. Reynolds, Chief of the Operations Division, Baltimore Corps of Engineers, would you perhaps come forward and pull up a chair.

I would like to ask you a question in your capacity as representing the Corps of Engineers:

You have just heard Mr. Hughes say that sometime in the future, assuming Pepco gets a permit from the Maryland Public Service Commission, Pepco will then make application to the Corps of Engineers for the various permits it needs from the Corps: A permit to build a dock or pier, a permit to cross the Potomac with towers, a permit to build a sewage outfall, a permit to unload oil barges, and so on.

That would be in accordance with your usual procedure?

FURTHER STATEMENT OF JOHN L. REYNOLDS, CHIEF, OPERATIONS DIVISION, BALTIMORE DISTRICT, CORPS OF ENGINEERS

Mr. REYNOLDS. That is correct.

Mr. REUSS. Is it not a fact that under the guidelines promulgated in the Federal Register by the Corps of Engineers in June of 1970, last month, the Corps of Engineers must take into account in the issuance of these permits the complete range of environmental and esthetic and ecological considerations?

Mr. REYNOLDS. That is correct.

Mr. REUSS. At the time that application is made to the Corps of Engineers, is the Corps of Engineers, in any way, shape or manner, going to be influenced against vigorously exercising its environmental, ecological, and esthetic mandate contained in these regulations, by the fact that Pepco—under the scenario unfolded here this afternoon—will have spent $2 million or more in designing a plant?

In other words, would your sympathies in any way go out to a company which had expended that amount of money, and would you say, "Well, I guess that we will have to pull in our horns a bit here"?

Mr. REYNOLDS. No, sir.

Mr. REUSS. "On these ecological considerations."

Mr. REYNOLDS. No, sir.

Mr. REUSS. You will be stiff as a ramrod despite the expenditure of $2 million?

Mr. REYNOLDS. Yes, sir; depending upon the environmental situation.

Mr. REUSS. Mr. Hughes, as a small ratepayer of Pepco, I have got to say that I think that you should apply to the corps now before you spend that $2 million.

Mr. HUGHES. I think it might be impossible to make a formal application before that time. Certainly, we are not going to stay away from the Corps of Engineers. If we were told we were not going to get any permits, why, as one of our customers, you might suffer because eventually have to do something.

Mr. REUSS. I want you to build the power facilities you need in the least ecologically damaging places. I am the first to say that the Government at all levels is not doing a good job in planning with private utilities in spotting sites for them cooperatively where they can build their plants.

Mr. HUGHES. I believe that probably the only part of the Potomac River where waters would be such that you could build it would be in the District of Columbia. There are not any sites there. You would have to be in the damaged area. It just doesn't happen, you understand.

We believe that we can do this without damaging it. It is our conviction.

Mr. REUSS. The point I want to stress is that the Corps of Engineers, to its credit, has just recently adopted an excellent set of environmental considerations and these are now the rules of the road by which the corps is operated. I honestly wouldn't want to see you or any other private business organization expend huge sums of money—millions of dollars, as testified—only to find that the corps is then going to say, "Sorry, gentlemen, but for the reasons cited by Dr. Cronin, Dr. Brehmer, and others here today, we think this is not a sound site. We suggest two or three others where you won't have this thermal barrier because you don't have a plant right across the river."

Therefore, all I am suggesting is that you may want to go to the Corps of Engineers and find out their attitude before you spend all this money.

Mr. HUGHES. May I suggest that the Public Service Commission in Maryland is going to want to know all of those things that you are saying, sir, before it gives us a certificate of public convenience and necessity. I am sure that they want some feedback from the Corps of Engineers and others concerning this plant.

Mr. REUSS. I hope so.

What I don't know is whether the Maryland Public Service Commission has adopted this same splendid set of environmental guidelines that the Corps of Engineers has. That alert witness, Mrs. Magargle, said she didn't know much about the Maryland Public Service Commission, and I don't either. I do know about the corps. They may be the last best hope of dealing fairly with this entire situation.

Counsel, have any questions, or have you, Mr. Davis?

Mr. DAVIS. Yes, Mr. Chairman.

Mr. REUSS. First Mr. McCloskey.

Mr. MCCLOSKEY. I defer to counsel.

Mr. DAVIS. Go ahead, Congressman.

Mr. MCCLOSKEY. I was intrigued by what the factors were that the power company considered in deciding to locate at this precise point when that decision was made.

Mr. HUGHES. We had a site at Morgantown down the river at 301. I think that probably Dr. Patrick or others could say more about this. As you go further south you run into oysterbeds and things of this type. Warm water and oysterbeds sometimes don't always agree. You get more of a problem. So we looked north.

My understanding from just a layman's point of view is that north of there the river was a rather insensitive kind of river. You didn't have the shellfish and things like that. So we looked from there. And as far north as you could go was around the Quantico area. You can not go further than that toward the District very well and build a powerplant. We arrived at this. I am an electrical engineer, not a biologist, so I cannot say.

Mr. MCCLOSKEY. That is my fear. Which biologists were hired by the company to assist in the selection of this site?

Mr. HUGHES. I don't know that we had a biologist at the time that we selected this site. No. The kind of thing that you consider when you select a generating station site is the matter of fuel, cooling water, transmission, and these factors. You come into the question of ecology basically, sir. It has not been so many years that people have actually been working a lot on that. Pepco has done a lot of work on it. Perhaps this is more direct. Rather than my answering questions, perhaps if Dr. Patrick could talk a little about what she has done with generating sites it might be helpful.

Mr. MCCLOSKEY. If I may, I would like to have this record be complete. As to the genesis of the selection of a site by one of the great power companies of America, I wonder if you would tell me first when the selection of this site was made by Pepco?

Mr. HUGHES. It was made sometime in 1963.

Mr. MCCLOSKEY. And that was long before the environment played any part?

Mr. HUGHES. No, no. We had experience in environment. We started our first model study at Dickerson. We studied that. All the water temperature problems at Chalk Point, we did a lot of work there—and Morgantown. I am just citing some of the things that are necessary for a powerplant. One of them is cooling water. That is why we got our big problem here.

Mr. MCCLOSKEY. Let me proceed, if I may.

The decision was made in 1963 by the Pepco Co. to locate at this site, at Mallows Bay; is that correct?

Mr. HUGHES. Yes, sir. We bought this as a possible generating station site.

Mr. MCCLOSKEY. When that decision was made in 1963, can you identify for me the committees or the board or the other individuals who participated in making the site selection?

Mr. HUGHES. I believe the site selection was made primarily by Mr. Cadwallader here, for one.

Do you remember?

Mr. CADWALLADER. Would you like me to comment on that?

Mr. MCCLOSKEY. Yes, sir. Anyone who can.

I would like to put specifically in the record here, if I can, exactly what factors were considered when the decision was made, who made it, and how.

Mr. CADWALLADER. Well, subsequent to our starting the development of our Morgantown site, we were looking for other sites. We looked downriver. We were offered a very attractive site downriver. The only trouble was that it was completely surrounded by oysterbeds so we gave it up. As one goes south of Morgantown, this is found to be the case. Oysterbeds down there are so numerous that it is just about impossible to find what might appear to be a satisfactory generating station site. So starting at 301 and moving north up the river, we get out of the shellfish problem which is very important in the State of Maryland, and we recognize this. And in the Sandy Point area, this site of about 500 acres became available. It looked good to us. There were no shellfish involved. The area was generally considered to be an insensitive area of the Potomac River.

Mr. MCCLOSKEY. What does that word mean with respect to powerplants?

Mr. CADWALLADER. It means that there is not so much aquatic life in the river or that the water is not so clean that it makes good fishing or propagation areas.

We decided this would be a good site for a future powerplant. Now we are not without some knowledge in this matter of powerplant siting. I think I can honestly say we have more generating stations operating today that were on sites that were selected, based on models studied by the Worcester Polytechnic Institute and Alden Research Laboratories, a nonprofit organization, reviewed by the Academy of Natural Sciences on aquatic life, which also is a nonprofit organization. We had two, Dickerson and Chalk Point, and now Morgantown, operating on sites that were bought and designed on that basis, with a view to doing everything possible to avoid damage to aquatic life or air pollution or any of the other environmental considerations.

Mr. MCCLOSKEY. Mr. Cadwallader, can you tell me what danger does a properly run generating plan, with proper precautions taken as to aquatic life in the vicinity, represent to something like oyster beds?

Mr. CADWALLADER. Well, it is a temperature problem. Oysters become sensitive to water temperatures of say 93° or 94° F. or above.

Mr. MCCLOSKEY. They wouldn't be bothered by 90° or below?

Mr. CADWALLADER. Ninety degrees or below? The indications are that they are perfectly healthy. Dr. Patrick here, who has done this work for us for 15 years now, can testify as to that in detail, and I would prefer that she give you this type of testimony because she is an expert on it.

Mr. MCCLOSKEY. Dr. Patrick, is this correct, that water temperature of 90° or below is not harmful to oyster beds?

Dr. PATRICK. I would say in general, to answer your question, when 90° occurs, yes, but let me explain to you. An oyster has many stages in its life history, and like any other organism, certain of those stages take place in the spring and certain in the fall and certain ones in the winter. Now, if an oyster is growing up normally in the season, you must remember that the temperature of the water is not 90° all of the time. It would only reach 90° during the summer months.

Oysters do not live at the surface of the water, particularly in the summertime. It is true when they are spawning the larvae are in surface waters, but during the summertime they would not be at the surface; and the subsurface water, if the surface water never exceeded 90°, should not approach 90°.

I was on Secretary Udall's committee. We studied this very carefully in developing water quality criteria, and we believe that this was a relatively safe temperature to arrive at, though our laws or our criteria, if you recall, are a little bit different than the laws of the State of Maryland.

Mr. McCloskey. My concern with Mr. Cadwallader's testimony was that you didn't locate this plant down river, although you had an ideal site, because of the impact of temperature of your water on the oysters. Now the Maryland testimony is that 90° will be the limit so you will have to put water back into this river not in excess of 90°. Will that be harmful to oysters?

Dr. Patrick. No, I don't think so.

Mr. McCloskey. If you meet the 90° criteria, you could locate this further down river; could you not?

Dr. Patrick. Yes.

Mr. McCloskey. Without damage to oysters?

Dr. Patrick. Without damage to oysters, yes.

Mr. McCloskey. Then is it correct that the original decision not to locate down river because of the danger to oyster beds is no longer relevant today in deciding where this site were to be located—were you to make that decision in 1970 rather than in 1963?

Dr. Patrick. I would say, as I said before, this 90° water——

Mr. McCloskey. Can you answer the question, Doctor? Is it yes or no? Is that a relevant factor?

Dr. Patrick. As a scientist, it is difficult to answer a question of that kind just exactly yes or no.

Mr. McCloskey. Let me try to rephrase it, and in trying to enact laws sometimes it is difficult to take scientific terms and make them into law.

Dr. Patrick. I can easily appreciate that.

Mr. McCloskey. If I understand Mr. Cadwallader's testimony, the only reason that this plant was not located down river was because of the danger, or the potential danger, to oysterbeds by the discharge of heated water apparently higher than 90°. Do I interpret your testimony correctly, sir?

Mr. Cadwallader. At the Morgantown plant we have a 90° limit, and that is what our permit is based on and that is what we are living by.

Mr. McCloskey. Let's go back to your testimony, because I don't understand it. If you were going to discharge water at 90° or below, why did the danger to oyster beds cause a difference in your decision to move from this perfect bed that you were offered previously? I thought I understood you to testify to us that the decision was because of the temperature of the water?

Mr. Cadwallader. In the building of our southern Maryland generating stations we have had great pressure put on us by the State of Maryland as regards to oysters. Now, up until just a couple of years ago the Maryland State limitation was 100°, leaving the discharge

and reentering the water. Well, we know today that 100° Fahrenheit, if it gets to oysters, will kill them. In fact that State regulation of 100° was still in effect at the time we bought Sandy Point, and it was still in effect at the time we received another site down river. A temperature of 100° is lethal to oysters.

Since that time, of course, everybody has learned a great deal more about oysters and what their temperature tolerance is.

Mr. McCloskey. Let me see if I state it correctly now. In 1963, when you were faced with the possibility of an alternate site, under Maryland law you were privileged to discharge water at 100° into the river, but that would have hurt oysters.

Mr. Cadwallader. Yes, sir.

Mr. McCloskey. So it was reasonable from your standpoint, and certainly of protection to the environment, to look for a site where you could still put 100° water in, but which would not damage oysters; is that correct?

Mr. Cadwallader. No; we couldn't put 100° water in now if we wanted to because the new regulation is 90.

Mr. McCloskey. Let's go back to 1963, when you made this decision.

Mr. Cadwallader. In 1963, 100° was it and we would have in the summertime to put water back in the river close to 100°.

Mr. McCloskey. How much money do you save in operating costs in a plant such as this, if you can put the water back in at 100° instead of 90°?

Mr. Cadwallader. It is a matter of heat transfer.

Mr. McCloskey. I understand. Do you have a dollar figure?

Mr. Cadwallader. It becomes a sizable money figure, but as you reduce the temperature difference—that is bring that figure down lower—everything gets bigger physically, and, of course, it costs money to buy the equipment that is so much bigger.

At Morgantown I guess the difference in cost between the 90° that we have now, that we are designed for, and a possible 100°, would be a couple million dollars.

Mr. McCloskey. A year, or is that initial construction cost?

Mr. Cadwallader. It would be a couple million dollars in a total of $150 million, say.

Mr. McCloskey. Is that annual operating costs or in total constructions cost?

Mr. Cadwallader. This would be capital costs, capital dollars, money investment required to build a plant with the same generating capacity but with smaller condensers and smaller everything.

Mr. McCloskey. Is that cost also reflected in your operating expenses, once you construct a powerplant, if you are having to cool it say 2° more? Are your operating costs increased as well as your capital investment?

Mr. Cadwallader. The operating costs are increased some by virtue of the fact that we have to pump a lot more water through the condenser, in addition to the bigger size. We have to pump a lot more water. I mean if you take a given quantity of water, with say a 50° rise, for easy figuring, if you cut that temperature rise in half, you double the quantity of water; and, of course, we are talking of a lot of cooling water, so that the pumping costs go up, and this in effect means that we use more of the power we generate to run our auxiliaries, and this makes that unavailable for sale.

Mr. McCloskey. Mr. Cadwallader, you made your initial choice to locate this plant down river primarily because of environmental reasons then; did you not?

Mr. Cadwallader. Yes.

Mr. McCloskey. And since the time that your decision was made, the President, in 1965, instructed the Secretary of the Interior to develop a plan to make the Potomac and its estuary a model national river. Since that time, have you reconsidered at all the location of this powerplant at this particular site, in view of the determination by the Department of the Interior that this is probably the best potential recreation area that is left along the Potomac estuary?

Mr. Cadwallader. I wouldn't say that we were not always aware of the fact that we need future generating station sites, but once the Potomac estuary is taken away from us, that is a lot of potential development area that is removed.

Now, on the Patuxent River, where we have Chalk Point, we had great resistance there initially, so that in effect we find ourselves moving so far away from our service area that the transmission costs—and, of course, everybody objects to transmission lines, too—increase tremendously, and anything from a quarter of a million to half a million dollars a mile for high voltage transmission, it very rapidly runs into a lot of money.

Mr. McCloskey. Let me rephrase the question. Were you present this morning when Secretary Glasgow testified that the Sandy Point-Mallows Bay area, in the judgment of the Department of the Interior, represents the highest caliber potential wildlife refuge and recreation area remaining in the whole estuary?

Mr. Cadwallader. Yes, sir, I heard that.

Mr. McCloskey. If that determination is correct—without pushing Pepco out of the estuary at all but asking you to reconsider for the same praiseworthy reasons that you reconsidered your 1963 alternatives—would it not be appropriate to look for some site other than the primary recreation and wildlife refuge area remaining on the Potomac?

Mr. Cadwallader. Well, you know, sir, of course in 15 years we have bought Dickerson, Chalk Point, Morgantown, and then Sandy Point, and prior to the time it became known that we had these sites, and planned developing power generating facilities there, nobody ever talked about them. I mean nobody hardly even knew they were there. But the day after we announced it publicly, it sure is amazing how important every one of those sites became to everybody.

Mr. McCloskey. Your name appears of record on the title, doesn't it? Isn't that land shown in the records of the county down here as being in Pepco's name since 1963?

Mr. Hughes. No.

Mr. McCloskey. Why not? Why do you not disclose it publicly when you buy a piece of land and decide ultimately you are going to build a powerplant there some years in the future?

Mr. Hughes. It has always been a case that it escalated land costs with regard to transmission lines.

Mr. McCloskey. Pardon me?

Mr. HUGHES. It has generally escalated costs when you go ahead and start development.

Mr. MCCLOSKEY. Do I understand, then, that you deliberately conceal your ownership of property and the plans that you have for that property, because of the fear that additional lands that you may have to ultimately acquire will increase in cost?

Mr. HUGHES. Basically that is right, yes. I think that that is something you can't do any more, sir, but that is the way it has always been.

Mr. MCCLOSKEY. Do power companies always make their plans in secret?

Mr. HUGHES. No.

Mr. MCCLOSKEY. To conceal from the public——

Mr. HUGHES. Not basically, sir. I mean buying a generation station site, you know you may own sites and never develop one, but buy lands knowing what the possible development of a generating station may be.

Mr. MCCLOSKEY. I was trying to ascertain whether Mr. Cadwallader was being facetious in trying to answer my question or not.

Mr. HUGHES. No, I don't believe so.

Mr. MCCLOSKEY. He said the minute the public learns of something then they object. They hadn't objected for some seven years before, if I understood his testimony.

Mr. CADWALLADER. I was trying to be factual.

Mr. MCCLOSKEY. How could the public object until they knew about it?

Mr. HUGHES. You are right, sir. There is no question about that.

Mr. CADWALLADER. This is true.

Mr. HUGHES. Basically, I don't think that Pepco was really aware that this was as important a site as has been indicated today—I mean in our opinion in looking at the site.

Mr. MCCLOSKEY. May I ask, then, if you are able to disclose how many other sites you own under different names elsewhere in this area that you have not yet disclosed to the public?

Mr. HUGHES. We do not have any other sites.

Mr. MCCLOSKEY. You do not. This site and this site alone since 1963 has been owned by the power company, withheld from public knowledge, and planned for the ultimate development of a generating site; is that correct?

Mr. HUGHES. We have it there available for possible use as a generating station site; yes, sir.

Mr. MCCLOSKEY. Let me go back to the question I asked earlier. Having made the decision in 1963—before the Federal Government put such emphasis on the Potomac River, before the emphasis on preservation of wild fowl resting places, before the emphasis on the Potomac River as a national model of a river, these things having happened in the past several years—is it not possible that the company should perhaps reconsider its choice of sites?

Mr. HUGHES. I think that this is something that to me seems to be one to be properly determined before the Public Service Commission where we can get all the facts. We have heard some things today, Mr. McCloskey, but I don't know that any other site on the Potomac itself would be any better than Sandy Point.

Mr. McCloskey. You can't think of any that would be any worse from the standpoint of recreation and wild fowl, if the testimony we heard this morning is correct.

Mr. Hughes. Before I came here today, sir, I thought it was an ideal site. Have you been down there? I have been there and looked at the green water and everything.

Mr. McCloskey. Our problem, Mr. Hughes, is in trying to reconcile from the Federal standpoint the State and Federal law and the Federal goals and State goals with respect to preservation of land in estuaries. Quite obviously up until this point in time there have been differing goals. Utility companies have wanted to save the most money possible and deliver power at the cheapest possible cost to their consumers. State governments have wanted to promote development. County governments have wanted to promote development and tax base, and obviously now that goal runs into the goal of preserving open space and preserving recreation areas. It is for this committee to try to balance these two.

The reason I am directing these questions to you is to ascertain whether or not your company at this point in time—seeking also to balance in the public interest between the environment and the cost of generating stations located further away—should not reconsider your decision in the light of new information that has come in in the 7 years since you made your initial decision. That is the only question. Now, will you reconsider it or won't you? It really is, of course, up to the State to decide whether you should or should not, but I am interested in whether this new information has any weight with you.

Mr. Hughes. I think in trying to make any decision you have to have a balance between a lot of things. One is the need for electric power, and then of course you have got the problem that if you go further away you have got many more transmission lines. You have got all the historic sites in the State of Maryland you have to miss. You have got the transmission lines that people dislike. You have just as many problems with that as you do with water problems.

We are looking at just one part of it, you see. You are looking at the water problem now, but we have, in addition, the transmission line, land use problem, esthetics, the whole works, when we consider this. So I would think that there would have to be a balance, and I think that the Public Service Commission will consider all the effects on the ecology as well as the other matters.

Mr. McCloskey. I have no further questions.

Mr. Reuss. Mr. Davis, have you any questions?

Mr. Davis. Yes, Mr. Chairman.

Mr. Hughes, Mudd and Mudd is your law firm in Charles County, Md.; is it not?

Mr. Hughes. Yes, DeSales Mudd.

Mr. Davis. DeSales Mudd is the senior partner?

Mr. Hughes. I believe so, yes.

Mr. Davis. He also serves as director of the Idamont Corp.?

Mr. Hughes. Yes, sir; that is correct.

Mr. Davis. In so doing, he was simply acting as the attorney and agent of Pepco. He didn't have a personal interest in the corporation, did he?

Mr. Hughes. That is correct.

Mr. DAVIS. I have here a letter from Mr. Reynolds' file, and it is addressed to Mr. Mudd, dated October 19, 1964. I will read from it. It says:

DEAR MR. MUDD: * * * The proposal that was presented to you by this office in our letter of August 11, 1964, which would permanently confine the sunken hulks in their present location in Mallows Bay, has not been abandoned by this office. However, it is necessary that we obtain the approval of the property owners before any further consideration can be given to accomplishing the work as described in our letter of August 11, 1964. Accordingly, your further consideration of this matter will be appreciated.

Sincerely yours,

JOHN L. REYNOLDS.

Now, Mr. Reynolds, I would like you to look at this and see if it is an exact copy of a letter from your record, and one that you signed the original of.

Mr. REYNOLDS. Yes, sir; it is.

Mr. DAVIS. Would you give it to Mr. Hughes so he could have a good look at it, please.

Mr. HUGHES. I have here a letter which is directed to Mr. Trieschman. Why it is directed to him I don't know. It seems to be in answer to that one of October 19. Is it, sir?

Mr. HUGHES. October 19, 1964.

Mr. DAVIS. This is dated November 4, 1964. It is purported to be signed by Mr. DeSales Mudd, to the Assistant Chief of the Operations Division, Corps of Engineers, Mr. Trieschman, and I will read a part of it. It says:

With further reference to the proposal of the U.S. Corps of Engineers regarding the sunken hulks in the Mallows Bay area, please be advised that the property owner has now had an opportunity to fully consider this matter.

I regret to advise that Idamont, Inc., owner of the Sandy Point property cannot agree to positioning the hulks around the perimeter of the area and filling them with stone, to form a barrier against the escape of other hulks from the Mallows Bay area. Such a barrier may prevent the hulks from becoming a future hazard to navigation in the Potomac River, but the proposal could place serious limitations on the development of the Sandy Point property.

Very truly yours,

F. DESALES MUDD.

Again, Mr. Reynolds, if you will, look at this and see if this is an exact copy of a letter from your files; and if it is, tell us, sir.

Mr. REYNOLDS. Yes, sir; it is.

Mr. DAVIS. Would you give that one to Mr. Hughes.

My question, Mr. Hughes, is: Do you have any reason to doubt the authenticity of that letter?

Mr. HUGHES. No, I don't.

Mr. DAVIS. My next question is: Do you wish to change the part of your statement that you read into the record which I am going to read to you now:

* * * we played no part in the introduction or enactment of section 116 of the River and Harbor Act of 1968, directing the Corps of Engineers to remove and destroy the hulks, * * *.

Mr. HUGHES. No, we didn't play any part in it, I am sure of that. I wasn't personally aware of this letter until very recently. I believe that it must have been written because at that time probably Pepco didn't really know too much about how they were going to develop it. That is the only thing I can think of now. Do you have any comment, Mr. Cadwallader?

Mr. CADWALLADER. I think there are two considerations in this. Of course this property was being held presumably by the Idamont Co., which was a realty company formed to hold this property. From the standpoint of riverfront real estate and its value and the use of that real estate for riverfront homes—speaking from the real estate angle—the presence of those hulks is definitely detrimental to the value of riverfront real estate.

This was the position of the Idamont Co., and Mr. Mudd elected to view it that way. From the standpoint of a powerplant, it makes no difference to us whether those hulks are there or removed, because we don't plan to build any homes along the riverfront or anything like this. We are talking of a generating station, so while the two views may appear somewhat incompatible, if you view the hulks from the standpoint of an industrial facility versus a real estate holding, the difference is apparent, and that is what happened.

Mr. DAVIS. Mr. Reynolds, was not that letter principally what caused the Corps of Engineers to abandon the plan of stabilizing the hulks in place and go to the plan of removing them?

Mr. REYNOLDS. The plan of removing them didn't come into being until Congress passed the law. We weren't directly involved in that. What happened was when we asked for authority of the Chief of Engineers to effect what was necessary to protect navigation, at that time there was considerable publicity and interest in the removal of the hulks in Mallows Bay, so the Chief of Engineers directed us to secure evidence from the property owner, the State of Maryland, and the county, that they did not object to this procedure.

Mr. DAVIS. That is the procedure of stabilizing them?

Mr. REYNOLDS. Of protecting navigation only.

Mr. DAVIS. That would be to fill 30 of them around the perimeter?

Mr. REYNOLDS. Fill them with stone.

Mr. DAVIS. With stone and secure them.

Mr. REYNOLDS. Just to contain them; yes, sir. Then we tried to seek evidence from the property owner and from the county to secure their permission to go forward, and that was the basis of these letters.

Mr. DAVIS. And when Mr. Mudd refused that permission, that ended that plan?

Mr. REYNOLDS. We reported back to the Chief of Engineers that we were unable to obtain that consent, and the Chief of Engineers directed us to keep an eye on the wrecks, to keep them out of the Potomac River channels for protection of navigation.

Mr. DAVIS. And actually after that the Corps of Engineers gave up the $50,000 to $65,000 plan of stabilizing them and went to the plan that was finally adopted in section 116 of the 1968 River and Harbor Act; is that correct?

Mr. REYNOLDS. That is correct.

Mr. REUSS. Any further questions?

Mr. DAVIS. Yes.

Mr. REUSS. Mr. Hughes wants to say something.

Mr. HUGHES. Mr. Davis, I have here a copy of the Maryland Senate Joint Resolution No. 35, which urges Congress to authorize the U.S. Army Corps of Engineers to remove abandoned ships now located in the Potomac River. Pepco had nothing to do at all with this joint resolution. The date of this resolution is February 28, 1966.

Mr. REUSS. Did Mr. Mudd?

Mr. HUGHES. Not to my knowledge, sir; not acting for Pepco in any way.

Mr. DAVIS. Mr. Hughes, we didn't say that Pepco was the entire moving force in the adoption of section 116 of the River and Harbor Act of 1968. We didn't say that, but what you say is, "We played no part in the introduction or enactment."

Mr. HUGHES. That is correct, sir.

Mr. DAVIS. And you still adhere to that statement in view of what Mr. Reynolds has just said?

Mr. HUGHES. Yes.

Mr. DAVIS. In view of the letter by Mr. Mudd that is before you?

Mr. HUGHES. Yes. This happened before, and Mr. Cadwallader explained the reason for it at the time. When we bought this property we bought it for a future generating site, but we weren't sure about whether we would develop it as one, and we were just protecting the interests of the property; but now we have played no part in any resolution about moving the ships. The only thing we did was to say we didn't want them to apparently anchor them there permanently.

Mr. DAVIS. You were interested in protecting the value in case you decided not to use it for a generating station?

Mr. HUGHES. Yes, sir.

Mr. DAVIS. You did have something to do with the abandonment of the cheap plan and the adoption of the expensive plan by the Corps of Engineers; did you not?

Mr. HUGHES. Not really. As I understand it, the legislation started from the Maryland Senate with regard to having these ships removed, not stabilized. I think you have got two entirely different things we are trying to put together.

Mr. DAVIS. Mr. Hughes, I have a couple more questions.

You stated:

> * * * I think I should point out that in today's regulatory climate with respect to environmental matters, we operate in a crystal-clear fish bowl, * * *

I suppose this means, does it not, that you give full and complete and accurate information to the regulatory bodies when you are applying for certificates of convenience and necessity and making other filings required by law. Is that correct?

Mr. HUGHES. Yes, sir, we do.

Mr. DAVIS. Did you report in your annual report to the Federal Power Commission that Pepco was owner of the Sandy Point site at any time up to latest one that you filed?

Mr. HUGHES. No. I cannot—I am sorry that I cannot answer the question.

Mr. DAVIS. Can any of the people who accompany you?

Mr. HUGHES. I checked with counsel. I don't think we did. As I say, I don't think there was any requirement that we do report land held for future sites. Particularly in this case it had never been announced that a generating station site was——

Mr. DAVIS. There is a requirement, though, that you report any corporations that you control to the FPC in the annual report; is there not?

Mr. HUGHES. Well, Idamont is DeSales' corporation. I am afraid I am not qualified to answer some of the questions.

Mr. DAVIS. I though that you said it was set up by Pepco?

Mr. HUGHES. It was set up to buy this real estate for Pepco; yes, sir.

May I ask Mr. Means and have him explain what Idamont is?

Mr. MEANS. My name is Cornelius Means, counsel for Pepco.

Idamont is a company owned and controlled by Mr. Mudd. It is used to put property, whenever he gets it for any of his clients and the client does not want to take it in the client's name. When we wanted to get this property at Sandy Point, we didn't want to disclose our interest in it because it was wholly a vague idea that sometime in the future we might have a generating station site there. We supplied the money and Mr. Mudd closed the transaction and put it in the corporation's name. That is all there is to it.

Idamont is not a subsidiary and has no connection with Pepco.

Mr. MCCLOSKEY. Would you yield?

Excuse me, counsel. Doesn't the Federal Power Commission require that you report assets owned by your corporation in its annual report?

Mr. MEANS. Not in terms of identification of properties, no. We list our dollars and assets and that kind of thing.

Mr. MCCLOSKEY. How do you carry that piece of investment on the company's books?

Mr. MEANS. Property held for future use. There is an account for that. I don't identify each piece of property.

Mr. MCCLOSKEY. Was it carried as a cash asset or property asset?

Mr. MEANS. Property asset. The investment is carried that way.

Mr. MCCLOSKEY. The only title to the property that connects it to the company is a letter back and forth indicating that he holds it in trust for you?

Mr. MEANS. Actually, we had a trust with Idamont. They were holding it in trust for us—an unreported trust agreement. We also held an unrecorded deed from Idamont to us that we could place of record at any time we wanted to. That was to protect our investment.

Mr. MCCLOSKEY. Your interpretation of the Federal Power Commission requirement is that it need not be reported to them?

Mr. MEANS. There is no place that calls for a specific identification of property. No.

Mr. DAVIS. Mr. Means, to get the record straight, you did not identify Idamont as a controlled corporation in your reports to the FPC?

Mr. MEANS. No. Where it is not a controlled corporation, they have nothing to do with it.

Mr. DAVIS. Did it have any other assets except what it was holding in trust for Pepco?

Mr. MEANS. I imagine so. I don't know. I would have to ask Mr. Mudd. I never saw an Idamont balance sheet or anything else. It is just a straw as far as we are concerned.

Mr. DAVIS. As a matter of fact, sir, it didn't have any property at all that was anywhere approaching the value of that Sandy Point tract?

Mr. MEANS. That is perfectly possible.

Mr. DAVIS. That is all.

(Prior to the hearing, the following correspondence was exchanged between the subcommittee chairman and the Federal Power Commis-

sion concerning Pepco's failure to report its ownership of the Sandy Point property:)

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., July 2, 1970.

Hon. JOHN R. NASSIKAS,
Chairman, Federal Power Commission,
Washington, D.C.

DEAR MR. NASSIKAS: On April 30 of this year the Potomac Electric Power Co. filed with the Public Service Commission of Maryland an application for a certificate of public convenience and necessity to construct an electric generating station on the Potomac River at Sandy Point in Charles County, as well as certain transmission lines. The application recites that Pepco "owns the site of the proposed generating station in fee simple, having acquired equitable title to such property on October 31, 1963. Record title was vested in the applicant on April 15, 1970."

We have examined Pepco's Form 1 annual reports to your Commission from 1963 through 1969 and are unable to find any identifiable reference to the Sandy Point property.

According to Charles County records, the property was conveyed on October 31, 1963, by Sandy Point Estates, Inc., a Maryland corporation, to Idamont, Inc., a Maryland corporation. The consideration, as indicated by the affixed revenue stamps, was $295,000. Record title remained in Idamont, Inc., according to Charles County records, until April 15, 1970, when it was conveyed, without any recited consideration, to Pepco. The officers and directors of Idamont, Inc., are Pepco's local lawyers in La Plata, Charles County, Md., Messrs. F. DeSales Mudd and C. Maurice Flinn, and their wives and secretary.

We are unable to find any reference to Idamont, Inc., in Pepco's annual reports, either as an "associated company" or otherwise.

The subcommittee would appreciate your answer to the following questions:

1. Do the facts recited above indicate probable cause to believe that the Potomac Electric Power Co. has filed false reports with the Federal Power Commission?

2. If your answer to the preceding question is yes, what sanction do you propose to urge against Pepco?

3. If your answer to the first question is no, (a) do you believe that amendment of the reporting requirements of the regulations of the Federal Power Commission is desirable to require disclosure of the location of real properties held by utilities through strawmen, and (b) what amendment or amendments would you suggest?

The Conservation and Natural Resources Subcommittee has scheduled hearings at 10 a.m. on Tuesday, July 21, 1970, on the question of whether Pepco's planned power station and proposed 500 kv. transmission line linking it with Vepco's Possum Point plant may be harmful to the Potomac Estuary. We hope we may receive your answer to the above questions not later than Thursday, July 16.

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

FEDERAL POWER COMMISSION,
Washington, D.C., July 14, 1970.

Hon. HENRY. S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, Rayburn House Office Building, Washington, D.C.

DEAR CONGRESSMAN REUSS: This is in response to your letter of July 2, 1970, addressed to Chairman Nassikas, concerning purchase by Potomac Electric Power Co. of an electric generation site through the use of an undisclosed agent, Idamont, Inc. Since the questions you raise are adjudicatory I am taking the liberty of responding to you. In this context, the views expressed are mine and would not be binding upon the Commission in the event of a hearing, but would reflect the staff position.

You first ask, "Do the facts recited [in your letter] indicate probable cause to believe that the Potomac Electric Power Company has filed false reports with the Federal Power Commission?" It does not appear that the company has filed false reports with the Commission. In the staff's 1965 audit, the purchase price of the property was listed as an advance for future generating sites, under the name of Idamont. This amount has been reflected in the company's Form 1 Annual Reports in Account 186, Miscellaneous Deferred Debits, specifically, Account 186.11—Other Work in Progress, without reference to the Idamont corporation.

Your second inquiry, "If your answer to the preceding question is Yes, what sanction do you propose to urge against Pepco?" Since we do not believe that the company has filed false reports with the Commission, staff will not initiate any proceedings.

Your final question is, "If your answer to the first question is No, (a) do you believe that amendment of the reporting requirements of the Regulations of the Federal Power Commission is desirable to require disclosure of the location of real properties held by utilities through straw men and (b) what amendment or amendments do you suggest?" While the decision on any rulemaking is solely that of the Commission, staff is not prepared to recommend a change in the regulations in the absence of a showing of harm to the public interest. The use of undisclosed agents for acquiring real property is not illegal under the Federal Power Act [nor under common law] and is a common business practice. This practice serves the public interest, since it enables a public utility to acquire present and future sites needed to meet the increased energy demand of its consumers without an artificial increase in cost of land to the utility's consumers occasioned by public knowledge of a utility's interest in purchasing real property. The purchase of real property, of course, does not obviate the necessity of obtaining the requisite licenses. We stand ready at all times to review this conclusion.

You will be interested to know that under Commission Order No. 383–2, issued April 10, 1970, Regional Reliability Councils are requested to furnish annually, among other things, information on large steam generating stations' construction and transmission line plans for the following 10 years.

We hope that we have been helpful to you in this matter. If we can be of any further assistance, we will be happy to do so.

Sincerely,

GORDON GOOCH, *General Counsel.*

Mr. REUSS. Are there any further questions?

(No response.)

Mr. REUSS. If not, thank you very much, Mr. Hughes, Dr. Patrick, and your associates.

Let me just say by way of concluding this phase of our hearing that this subcommittee is aware of the problems of utilities and the need to develop new sources of electric generation. We are aware that environmentalists, particularly nowadays, are quick to pick flaws in proposals by electric companies for their future generating needs. To me, the Federal Government is not without fault in this matter. If you look at the Potomac as a national river, if you look at the fact that the power needs of the people of southern Pennsylvania and Delaware and Maryland and Virginia and the District of Columbia have to be served, if you look at the fact that while the Atomic Energy Commission is concerned with nuclear generating plants and the Federal Power Commission is concerned with hydroelectric plants, if you look at the fact that nobody particularly seems to be concerned with thermal power plants:

It really would have seemed to me that the Federal Government, being the overall agency for this part of the country, should long ago have been engaged in some sort of indicative planning with the private utility companies so that you would have had some help in spotting sites that would contain the least environmental threat. I can some-

what sympathize with the position of a utility executive who has to start early in the game to acquire land.

I have no criticism of your having started early on this particular project—7 years ago—nor do I criticize the fact that you bought it in the name of a dummy. I think that I would, for the reasons given, perhaps have wanted to do that were I in your shoes.

I do think, however, that it is a cause for sadness that we don't have a setup that from the beginning would have pulled together all of the units of Government and worked with you at finding a site or sites that would have presented the least environmental hazard.

Would you agree that things can be run better than they are now run?

Mr. HUGHES. I think they will have to. I think now in the State of Maryland, with legislation the way it is, why, things will be developing in that way more, because, if you are familiar with the Maryland law under which the Public Service Commission now operates, and utilities are obliged to operate, all of these things have to be automatically considered.

Mr. REUSS. True; but that is one State and we are dealing with a whole region and Maryland's progressive view is not yet the rule in other jurisdictions where there is nothing in being to pull the whole operation together.

Maybe when the interstate compact comes into being we will be able to do it.

Mr. HUGHES. Mr. Chairman, Dr. Patrick would like to comment.

STATEMENT OF DR. RUTH PATRICK, ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

Dr. PATRICK. Could I say something as a person very much interested in ecology? I can give you my qualifications.

Mr. REUSS. Qualifications admitted.

Dr. PATRICK. All right.

What I would like to point out is that the plant which they propose to build is quite different from the Possum Point plant. The Possum Point plant has a 28° "rise" through the condensers. As I understand it, the one that the Potomac Electric Power Co. will build will have a 10° rise. They will also go to a low intake, which will mean that you will not take in as many plant organisms and that you will get cooler water. Even if there is a 10° rise, you will probably get at least 5° difference from the bottom. You will not have the kind of rise of 10° over surface water. They will not use chlorination; they will use Amertab. An article in Science last week reported that chlorine is one of the bad factors. Instead of using that, they have gone to a far more expensive system, to Amertab.

They are going to use low-flow intakes. Some of the intakes of many powerplants are run one and a half and two feet per second. We have found out, and advised our clients over a time, to go to very low rates of inflow because this protects aquatic life.

My group consists of 70 people, and we work for the Federal Government, for State governments, and we do some work within industry. My group has gone and made surveys of some 700 sections of rivers

in this country. We have looked at many, many different kinds of installations. I do not know of any company that has done more in advance to try to establish a firm baseline. I am not saying anything about choosing powerplant sites. That is not my business. So far as trying to understand the impact before they start development, I think this company has a very good record.

I think that if you look at their operating plants you will see, as compared with other operating powerplants, that they have produced very little change in the environment.

Mr. REUSS. Thank you very much.

Thank you, Mr. Hughes and gentlemen.

We will now stand in adjournment until 10 o'clock tomorrow morning in this place.

(Whereupon, at 4:12 p.m., the subcommittee adjourned, to reconvene at 10 a.m., Wednesday, July 22, 1970.)

PROTECTING AMERICA'S ESTUARIES: THE POTOMAC

WEDNESDAY, JULY 22, 1970

HOUSE OF REPRESENTATIVES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to notice at 10:10 a.m., in room 2247, Rayburn House Office Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representatives Henry S. Reuss, Gilbert Gude, Floyd V. Hicks, Paul N. McCloskey, Jr., and Guy Vander Jagt.

Also present: Phineas Indritz, chief counsel; Laurence Davis, assistant counsel, and Josephine Scheiber, research analyst.

Mr. HICKS (presiding). The subcommittee will come to order.

Chairman Reuss will be a moment or two delayed.

I will start by reading his opening statement:

This is the second day of our Potomac estuary hearings. Today we intend to cover the environmental dangers of increasing oil traffic in the estuary, and what the Government can do to minimize them.

In 1949, on land leased, and later purchased, from the Government, the Steuart Petroleum Co. established an oil terminal at Piney Point in St. Marys County, Md. There fuel oil and other petroleum products are unloaded from tankers, stored, and transshipped by barge to the Washington market. The current throughput of fuel oil is 12 to 14 million barrels annually. Steuart has contracts with Pepco to supply fuel to Morgantown, Sandy Point, and other planned upstream electric generating stations which will increase the throughput to 30 million barrels annually. Piney Point is already the second largest port in Maryland on the basis of tonnage handled. It has a storage capacity of 2,710,000 barrels.

The lower Potomac estuary is a prime seafood producing area. It is a wintering area for as many as a million waterfowl of the Atlantic flyway. We shall have testimony today of the effect of oil on shellfish, birds and other forms of wildlife.

From the records of several Government agencies, we have compiled a list of oil spills in the vicinity of Piney Point since 1963, to which I referred yesterday. Without objection, I shall order it included in the hearing record at this point.

(The compilation of oil spills referred to above follows:)

OIL SPILLS IN POTOMAC ESTUARY NEAR PINEY POINT, 1963-70

Date	Source	Quantity	Name of ship or shore facility responsible	Registry of ship	Remarks
Feb. 9, 1963	Corps of Engineers	Severe	Francis R. Hart	British	Seams split, no prosecution. Corps of Engineers calls accident unavoidable.
Mar. 3, 1963	do	Minor	Beaufort	Norway	Tanks overflowed while discharging. Referred to U.S. Attorney for prosecution. Ship never returned to United States.
June 19, 1966	Coast Guard	200 gallons	Gjertrud Maersk	Danish	Pumped bilges. Master stated depth of bilge water automatically started the bilge pump. Fined $800.
	Corps of Engineers	Minor			
Aug. 12, 1966	Coast Guard	Large quantity	Alkmaar	Dutch	Corps of Engineers states oil spilled on deck while taking on fuel and ran out scuppers. Coast Guard report implies oil was pumped overboard. Referred to U.S. Attorney for prosecution. Ship never returned.
	Corps of Engineers	No estimate			
July 11, 1967	Coast Guard	300 gallons	Unknown		Several ships had been in and left before oil was discovered.
Nov. 3, 1967	Coast Guard	No estimate. Steuart calls spill severe	Thomas M	United States	Rammed dock and broke pipe lines. Corps of Engineers says struck by squall while docking. Eyewitness says came in at excessive speed. No prosecution.
	Corps of Engineers				
July 12, 1968	Corps of Engineers	Minor	T. C. Spencer	do	Left New Orleans without proper inspection. Spilled small quantity of gasoline through crack in hull at Piney Point. Later went on to Baltimore and New York and spilled large quantities. Fined $2,500.
Dec. 23, 1968	Coast Guard	do	Gatco 95 (barge)	do	Spilled kerosene. Case dropped because of small amount and poor samples.
Feb. 6, 1969	Coast Guard		Unknown		Oil found on beach. Corps of Engineers reports 1 dead duck found; Fis and Wildlife Service reports over 500 ducks killed between Piney Point and Cove Point, and has photographs of some of them.
	Fish and Wildlife Service				
	Corps of Engineers				
Feb. 24, 1969	Coast Guard	No estimate	Vilja	Norway	Ship could not produce oil brook. Vessel blames Steuart; Steuart blames vessel.
	Corps of Engineers	Fairly large			
Apr. 23, 1969	Corps of Engineers	Very minor	Steuart		Spill erupted from boom carrying loading hose to barge.
July 11, 1969	Coast Guard	50 to 100 gallons	Unknown		Boiler blowby on unidentified ship inadvertently spilled. Steuart cleaned up 95 percent of spill from private beach.
July 28, 1969	do	1,000 gallons of asphalt	Steuart		Pipeline ruptured. ½ mile of public beach polluted and cleaned up by Steuart.
Oct. 13, 1969	Coast Guard	Slick. 100 by 30 ft	Unknown		No. 2 oil found in slick. German ship Capsa earlier reported spilling No. 6 oil on deck, which probably did not escape to water.
	Corps of Engineers				
Jan. 24, 1970	Coast Guard	200 to 400 gallons	Glorious Colocotronis	Greek	Discharging No. 5 fuel oil, scuppers not plugged. How oil got on deck not known.
June 15, 1970	do	500 to 1,000 gallons of No. 6 fuel oil	Steuart		Steuart's 8-inch flexible transfer hose split during off-loading of M/V Oliva. Oil came out in fine spray. No one observed how much escaped.

Mr. HICKS. Last autumn, a panel of experts headed by Dr. Lee DuBridge, science adviser to the President, published a report entitled "The Oil Spill Problem," concerning the Santa Barbara oil spill. The panel's report warned:

> It is also important to recognize that localized oil spills, perhaps even major ones, though impressive at the onset, rarely damage the environment permanently. On the contrary a widespread, low intensity, persistent leakage of pollutants is likely to make profound changes in the biota and the food web.

The list I have just put into the record makes clear that there is a chronic leakage of oil into the Potomac estuary around Steuart's plant. Unless there is great improvement in handling methods, and rare good luck, the situation is bound to get worse with the more than doubling of traffic at Piney Point. Today we hope to find out what is being done to stop these recurring spills.

After scheduling this hearing, there was a sizable oil spill in Baltimore Harbor on July 12, some of which escaped to the Chesapeake Bay, and I understand spread for many miles to the south, toward the mouth of the Potomac estuary. Therefore, we are broadening the scope of today's hearing to include the recent Baltimore spill and the response to it by affected Federal agencies.

We hope that in discussing both the Piney Point and the Baltimore situations, the witnesses will place greater emphasis on what can be done to prevent recurrence than on possible punishments for past occurrences. I have the feeling that we may have come to the same point in the prevention of oil spills that we arrived at some years ago in traffic safety. You will recall that we finally realized we could reduce the accident rate and the severity of accidents only so far by law enforcement. To make a further reduction, we had to redesign the highways and the vehicles.

After Dr. Blumer and Dr. Sanders tell us just how destructive oil is to marine life—a subject about which much was written but little known prior to their work—we hope the Coast Guard can tell us how to keep oil out of the water in the first place.

Our first witness will be Dr. Howard L. Sanders, senior scientist, Department of Biology, Woods Hole Oceanographic Institution, Woods Hole, Mass. You may proceed, Dr. Sanders.

STATEMENT OF DR. HOWARD L. SANDERS, SENIOR SCIENTIST, DEPARTMENT OF BIOLOGY, WOODS HOLE OCEANOGRAPHIC INSTITUTION, WOODS HOLE, MASS.

Dr. SANDERS. What both Dr. Blumer and myself will talk about might seem to be a rather insignificant oil spill in New England and you may ask what relevance has this to the topic today. However, it has told us a great deal about the impact of oil on marine life and for this reason alone I think it has a general significance.

Let me summarize what our general findings have been.

On the morning of September 16, 1969, the barge *Florida* belonging to the Northeast Petroleum Co., with a cargo of 625,000 gallons of No. 2 fuel oil came ashore at Fassett's Point off West Falmouth, Mass., and about 170,000 gallons of oil were lost into the water. Strong SSW. winds moved the oil NNE. so that much of it was carried into

Wild Harbor and the Wild Harbor River areas of North Falmouth.

On September 17 and 18 the waters of Wild Harbor were a brown coffee-colored emulsion and the shoreline was littered with almost continuous windrows of dead and dying fish and marine invertebrates. It was clearly evident that we were viewing a massive and immediate kill of at least the larger and therefore more obvious organisms belonging to the entire spectrum of animal life found in the area (more than 20 species of fish, various crabs and clams, lobsters, and numerous kinds of polychaete worms, and so forth). From the animals composing the dead bodies littering the beach, it was obvious that that mortality was occurring subtidally (where sediments were always covered by water) as well as intertidally (sediments between high and low water marks that are periodically exposed).

We immediately established a series of intertidal stations along the axis of Wild Harbor River to assay these effects and to document the patterns of change that might occur with time. Subtidally, we occupied a grid of stations in Wild Harbor and the neighboring areas of Buzzards Bay to gain some understanding of the impact of the oil on the subtidal benthic fauna.

One of our first bottom samples was taken off Wild Harbor Beach in 10 feet of water on September 19. The sample yielded 106 living invertebrates belonging to 28 species. Although alive, many of these animals were moribund and in the process of dying. In contrast, there were 1,573 dead specimens in the same sample belonging to 55 species. In other words, there already was a 93 percent mortality at this locality.

When the same site was next sampled on September 27, the living component of the population was further reduced to 75 individuals composing 27 species while the dead component was dramatically smaller, only 159 specimens belonging to 29 species. These findings indicate that in the short period of 8 days, the carcasses of the great majority of animals lacking hard parts rot and decompose so that no remnants of their presence remain.

Such an interpretation is corroborated by intertidal observations. On September 19 the tide pools along Wild Harbor River were literally filled with dead and decaying or moribund bodies of polychaete worms, clams, other invertebrates, and some fish. A week later only the shells of clams and snails were still present. Thus, there would be little evidence for the massive mortality if the survey were carried out more than 10 days after the oil spill.

Our general findings are as follows:

1. Whenever oil can be detected in the subtidal sediment samples, there is some mortality in the associated biological sample—the larger the concentration of oil, the greater the mortality. In some samples that were strongly saturated with oil, the kill has been almost total.

2. Certain forms, such as amphipod crustaceans, are highly susceptible, while others, that is, nematodes, are relatively resistant.

3. In our control stations, just outside the area affected by oil, we found normal, healthy bottom fauna which certainly indicated that the oil *per se*, either acting directly or indirectly, was the causative factor.

4. In the Wild Harbor area, the presence of oil and bottom mortality was detected at all depths down to the maximum depth, which is 42 feet.

5. Mortality was of two sorts. There was first the massive, initial mortality I just described, which occurred during the first few days At this time the remains of the soft-bodied organisms, which were the vast bulk of the animals present, disappeared within a week and only those animal residues with hard parts remained. In other words, if you came back 10 days or so after the kill, you would have no inkling of how devastating it was.

The secondary mortality is more gradual and is still occurring today—10 months after the actual spill.

6. In the upper reaches of Wild Harbor River, a very major shellfish area, almost no species of animal life have persisted. However, one form has been able to come in. This is a worm—a pollution indicator—whose scientific name is, *capitella capitata*. With the kill-off of the forms normally present, these animals moved in and exploited the resources. They rapidly grew, became sexually mature in a month and spewed out their young and very quickly occupied the whole area in tremendous numbers.

As of today, nearly 10 months after the oil spill, there is yet little indication of recolonization of this environment by any species other than the pollution indicator, *capitella*.

7. Subtidally, there are indications that the zone of oil pollution is spreading. Some of the original control stations near the edge of the polluted zone with unaffected fauna now contain oil and there is mortality among the most sensitive of these bottom-dwelling animals. As a result, new control stations further away from the polluted area were established.

8. Sediments, both intertidally and subtidally, particularly those with a predominantly sandy component, have become more unstable. Apparently this is due to the absence of the necessary animal secretions, tubes and the bottom dwelling plants that bind these sediments.

9. Substidal sediments with some mixture of sand and mud in the general geographic area of New England and the Middle Atlantic States are dominated by some of the amphipod crustaceans I mentioned earlier for the record, they belong to the family Ampeliscidae. I don't think any of you will remember the name, but I want to emphasize these animals are a major source of food for numerous bottom feeding fishes, many of which are of commercial importance. Our studies have shown that these amphipods are remarkably sensitive to oil. Whenever even the most minute quantities are present in the sediments, this important animal component is invariably missing. Thus such organisms are sensitive indicators of oil pollution. Conceivably these ampeliscid amphipods may already be absent from those areas of New England and the Middle Atlantic coast exposed to chronic low-level oil pollution. Thus, even though these animals may not be directly used by man as food, they are such a vital food source for animals that man does use that they are a significant resource.

10. In the marsh itself, the marsh grasses that came in contact with the waterborne oil at high tide during the first 3 weeks after the oil spill were killed. There has been no new growth as yet in the more heavily affected parts of the marsh.

11. Representatives of the surviving remnants of the invertebrate species that are still present in Wild Harbor River have been collected with the same suite of species from nearby Sippiwissett Marsh

which serves as a control. Our objective is to learn whether reproduction is affected in the area polluted with oil. In the one species so far examined, the common edible blue mussel, *Mytilus edulis*, animals from unpolluted Sippiwissett Marsh had ripe, well-developed gonads filling the body cavity, indicating that reproduction was occurring in the usual way. The gonads of the Wild Harbor representatives, on the other hand, were thin, emasculated, hardly more than empty sacs. Thus reproduction has not taken place for the blue mussel in Wild Harbor during the current year.

RECOMMENDATIONS

1. Concerning the recommendations and looking first at the specific case of the Piney Point installation, I can safely say that we lack the necessary background information to determine both whether biological damages have resulted from these numerous chronic oil spills and to evaluate the extent of the damages. What is necessary is a control habitat in the Potomac estuary, if there is such a place, with no known history of possible oil pollution. Such an area can serve as a frame of reference of what should be in the Piney Point area.

This site must simulate Piney Point as closely as possible regarding all environmental conditions, such as water current, depth of water, sediments, salinity, and so forth.

A detailed biological comparison of the two localities can provide some measure of the impact of possible oil pollution at the Piney Point site.

2. In more general terms, in regard to the total picture of oil and and the impact of oil, we really lack the basic information on the marine communities and their distributions in our shallow coastal and estuary zones under normal conditions.

I want to emphasize the word "normal." Without this frame of reference, any studies of oil pollution or other sick environmental situations are difficult or impossible to interpret. I might put in an aside here: We tend to pride ourselves on being pragmatic and put our money where we believe there will be practical and quick payoff. Such problems are placed in too narrow a context to have broad meaning. The components of the natural world are very independent and unless we understand the interrelationships and the general picture, the specific aspects concerned in that general picture can never be understood by themselves. By being so narrowly pragmatic for years and years, we have squandered a greate deal of money, time, resources, and personnel. It is only through basic investigations, in sufficient detail of marine communities—that the critical prerequisites to these more practical considerations can be realized.

Unfortunately, the qualified personnel able to obtain the necessary baseline data are in severely limited supply. Every effort should be made to train additional highly competent individuals for this area of research.

3. Considering the magnitude of the problem we are discussing and the limited and somewhat controversial nature of the information available on the effects of oil on the biota, we cannot afford to wait for oil spills to occur fortuitously near marine laboratories where there might be a group of scientists who have a competence, the liberty, and the inclination to exploit the opportunity. We probably have

reached the point where it has become necessary to create controlled oil spills under highly selected conditions where the biology has been carefully monitored in great detail beforehand. Different kinds and quantities of oil might be introduced into the environment. Their effects on the various components of the biota and the biodegradation of the oils themselves can be measured over time. Laboratory experiments in conjunction with the field experiments would be run as corroborative evidence.

Such investigations can provide a sound basis for meaningful oil pollution legislation.

However—and here I am going to step on a few toes—because of the politically sensitive nature of the studies, support and evaluation of such research should be undertaken by a disinterested, yet prestigious body. The National Research Council would be, in my opinion, a most appropriate choice.

4. If teams of highly trained personnel were available who at an instant's notice could be dispatched to the scene of an actual or incipient oil spill, such as the recent blowout off Louisiana, much valuable information could be collected.

Our studies of the West Falmouth spill demonstrate the critical importance of documenting the response of the biota during the first few days after the introduction of the pollutant into the environment. However, jurisdictional disputes and overlapping areas of responsibility among various Government agencies and the necessity of working through a chain of command within a given agency preclude any possibility of making an immediate and, therefore, meaningful response to the opportunities provided by such catastrophes.

I recommend that teams of scientists and technicians be organized for the express purpose of responding to oil spills much in the manner of the Civil Aeronautics Board in regard to major air accidents. The teams would be flown immediately to the site of the oil spill, together with the equipment needed for the carrying out of a successful sampling program. Boats and logistic support can be provided by local government representatives. Again, because of the politically sensitive nature of such studies the operation of the program might best be placed within the National Research Council for jurisdictional and evaluation reasons.

Thank you.

(A professional biography of Dr. Sanders follows:)

BIOGRAPHICAL SKETCH OF HOWARD LAWRENCE SANDERS, BIOLOGIST, SENIOR SCIENTIST, WOODS HOLE OCEANOGRAPHIC INSTITUTION

B.A., University of British Columbia, 1949;
M.S., University of Rhode Island, 1951;
Ph. D., Yale University, 1955;
Research associate, 1955–63; associate scientist, 1963–65; senior scientist, 1965 to present, Woods Hole Oceanographic Institution;
Instructor, Marine Biological Laboratory, 1960 to 1968;
Editorial board, Limnology and Oceanography, 1962–64;
Consulting editor, Pacific Naturalist, 1963 to present;
Board of editors, Journal of Marine Research, 1964–66;
Member, Committee on Arthropods for the Smithsonian Oceanographic Sorting Center (SOSC) 1965–68;
Member, editorial board, Archivio de Oceanografia e Limnologia, 1968 to present;
Member, Biological Methods Panel of the National Academy of Sciences Committee on Oceanography; chairman of the Working Group on Benthic Productivity;

Member, Corporation of the Marine Biological Laboratory;
Member, Bermuda Biological Station for Research;
Associate in Invertebrate Zoology, Harvard University;
National Science Foundation Environmental Biology Advisory Panel Member, 1966–68;
Member, review committee of the Duke University Cooperative Research and Training Program in Biological Oceanography, 1968–70, chairman, 1970;
Adjunct professor of the biological sciences, State University of New York at Stony Brook, 1969;
Member, Advisory Panel of the National Academy of Sciences for the Central American Sealevel Canal, 1969–70;
Research in Ecology: Ecology as applied to marine benthic communities; crustacean phylogeny; and
Author or coauthor of about 35 publications in ecology.

Mr. REUSS (presiding). Thank you, Dr. Sanders.

We will next hear from Dr. Max Blumer, senior scientist, department of chemistry, Woods Hole Oceanographic Institution, Woods Hole, Mass. Please proceed, Dr. Blumer.

STATEMENT OF DR. MAX BLUMER, SENIOR SCIENTIST, DEPARTMENT OF CHEMISTRY, WOODS HOLE OCEANOGRAPHIC INSTITUTION, WOODS HOLE, MASS.

Dr. BLUMER. I am happy to appear before the Subcommittee on Conservation and Natural Resources to discuss the environmental effects of increased oil traffic in the Potomac estuary. I have been involved with the study of hydrocarbons in the sea and with the development of methods for their analysis for many years. An oil spill close to our laboratory last fall has shown us how suitable these methods are for studying the fate of pollution in the environment, and our analysis of the effect of this oil spill upon fisheries resources is directly applicable to the topic under discussion here.

THE OIL SPILL OF WEST FALMOUTH, MASS.

In September 1969 a fuel barge ruptured her hull on submerged rocks off West Falmouth. The cause for the accident was an error in navigation under conditions of good visibility. Approximately 650 tons of No. 2 fuel oil were discharged into the coastal waters. Chemists and biologists at Woods Hole are studying the immediate and long-term effect of this spill. The oil involved in this spill is a refining product of petroleum. It is contained within the crude petroleum and as such it has effects which are typical both for unrefined oil and for refinery products. However, some differences exist in the mode of toxicity of different petroleum products. Thus, the lower boiling oil products, such as gasoline and kerosene, contain higher concentrations of many fast-acting poisons; on the other hand, the higher boiling oil fractions and whole crude oil contain much more of the persistent, long-term poisons, including substances known to produce cancer.

I wish to point out that this is the first study where modern methods of oil analysis have been coordinated with a biological study of the long-term effect of an oil spill on the ecology and fisheries resources in a coastal area. It has been said that 9 months after the *Torrey Canyon* accident "bottom samples revealed no trace of oil-microbial action and bottom currents had been fast and complete" (Eglinton, 1969). However, this conclusion rests only on visual observation. Vis-

ually oil is not evident at West Falmouth either; however, chemical analysis reveals its presence and the biological study measures its toxicity.

Now I wish to summarize our present knowledge of the aftermath of this accident.

PERSISTENCE AND SPREAD OF THE POLLUTION

Oil from the accident has been incorporated into the sediments of the tidal rivers and marshes and into the offshore sediments, down to 42 feet, the greatest water depth in the sea.

The fuel oil was still present in inshore and offshore sediments, 8 months after the accident.

The pollution has been spreading on the sea bottom and now covers at least 5,000 acres offshore and 500 acres of marshes and tidal rivers. This is a much larger area than that affected immediately after the accident.

Bacterial degradation of the oil is slow; degradation is still negligible in the most heavily polluted areas and the more rapid degradation in outlying, less affected, areas has been reversed by the influx of less degraded oil from the more polluted regions.

The kill of bottom plants and animals has reduced the stability of marshland and sea bottom; increased erosion results and may be responsible for the spread of the pollution along the sea bottom.

Bacterial degradation first attacks the least toxic hydrocarbons. The hydrocarbons remaining in the sediments are now more toxic on an equal weight basis than immediately after the spill.

Oil has penetrated the marshes to at least 1–2 feet depth; bacterial degradation within the marsh sediment was still negligible 8 months after the accident. (From: Blumer, Sass and Souza, 1970; Blumer, Sass and Souza, unpublished results.)

BIOLOGICAL EFFECTS OF THE POLLUTION

Where oil can be detected in the sediments there has been a kill of animals; in the most polluted areas the kill has been almost total. Control stations outside the area contain normal, healthy bottom faunas.

The kill associated with the presence of oil is detected down to the maximum water depth in the area.

A massive, immediate kill occurred offshore during the first few days after the accident. Affected were a wide range of fish, shellfish, worms, crabs and other crustaceans and invertebrates. Bottom living fishes and lobsters were killed and washed up on the beaches. Trawls in 10 feet of water showed 95 percent of the animals dead and many still dying. The bottom sediments contained many dead clams, crustaceans and snails.

Fish, crabs, shellfish and invertebrates were killed in the tidal Wild Harbor River; and in the most heavily polluted locations of the river almost no animals have survived.

The affected areas had not been repopulated, 9 months after the accident.

Mussels that survived last year's spill as juveniles have developed almost no eggs and sperm. (From: Hampson and Sanders, 1969; Sanders and Hampson, 1970; Sanders and Hampson, personal communication.)

EFFECT ON COMMERCIAL SHELLFISH VALUES

Oil from the spill was incorporated into oysters, scallops, soft-shell clams and quahogs. As a result, the area had to be closed to the taking of shellfish.

The 1970 crop of shellfish is as heavily contaminated as was last year's crop. Closure will have to be maintained at least through this second year and will have to be extended to areas more distant from the spill than last year.

Oysters that were removed from the polluted area and that were maintained in clean water for as long as 6 months retained the oil without change in composition or quantity. Thus, once contaminated, shell-fish cannot cleanse themselves of oil pollution.

The tidal Wild Harbor River, a productive shellfish area of about 22 acres, contains an estimated 4 tons of the fuel oil. This amount has destroyed the shellfish harvest for 2 years. The severe biological damage to the area and the slow rate of biodegradation of the oil suggest that the productivity will be ruined for a longer time.

The presence or absence of an "oily smell" is no clue for the presence of oil pollution in fish or shellfish. Only a small fraction of petroleum has a pronounced odor; this may be lost while the more harmful long-term poisons are retained. Boiling or frying may remove the odor but will not eliminate the toxicity. (From: Blumer, Sass and Souza, 1970; Blumer, Sass and Souza, unpublished results.)

TOXICITY OF OIL AND OIL PRODUCTS

The toxicity of crude oil and oil products and the danger of oil pollution to the marine ecology and to public health has been established in several independent ways. Oil and oil products contain many known poisons, e.g. fast acting compounds like the low boiling aromatic hydrocarbons and slowly acting but equally serve poisons like the high boiling aromatic hydrocarbons.

Laboratory studies on many marine animals have demonstrated the toxicity of oil and oil products.

Field studies have shown the disastrous effect of oil spills on marine organisms in their normal habitat.

From such investigations we know that all crude oils and all oil products, with the exception of some highly purified substances, are poisons for all marine organisms. Oil pollution can harm marine resources in many different ways: through direct or indirect kill, through destruction of the sensitive juvenile forms and through the depletion of food resources. The incorporation of sublethal amounts of oil leads to reduced resistance to stress and may result in failure to reproduce. Low level effects, which are still poorly understood, may interrupt any of the numerous events necessary for the feeding, migration, and propagation of marine species and for the survival of those species which stand higher in the marine food web.

We need to comment on the problem of petroleum and cancer. Some years ago, a high incidence of skin cancer in some refinery personnel was observed. The cause was traced to prolonged skin contact by these persons with petroleum and with refinery products (Eckart, 1967). These incidents have demonstrated that oil and oil production can

cause cancer in man, and these findings were supported by the isolation from petroleum of chemicals that are known to cause cancer and that were actually shown to induce cancer in test animals (Cook et al., 1958; Carruthers et al., 1967; Greaf and Winter, 1968).

Safeguards in plant operations protect the public from this hazard; however, when oil is spilled into the environment, we lose control over it and should again be concerned about the possible public health hazard from cancer-causing chemicals in the oil. We have shown that marine organisms ingest and retain hydrocarbons to which they are exposed. These are transferred to and retained by predators. In this way even animals that were not directly exposed to a spill can become polluted by eating contaminated animals. This and the presence of cancer-causing chemicals in oil pollution implies that the marketing and eating of fish and shellfish from polluted areas may constitute a public health hazard.

THE INCIDENCE OF OIL SPILLS; THE EFFECTIVENESS OF COUNTERMEASURES

No oil port is able to avoid spillage, and human error has been quoted as the principal cause of accidents (Dudley, 1968). It has been estimated that 0.01 percent of the oil entering port is lost, even in the most carefully managed ports (Dudley, 1968; Arthur, 1968; Blumer, 1969); in other ports the spillage may amount to 0.1 percent of the turnover. Ideally, countermeasures should be able to remove this spilled oil. However, the most severely toxic components of the oil are also water soluble, therefore biological damage will occur at the very moment of the accident. Countermeasures are fully effective only if all of the oil is recovered immediately after the spill. The technology to achieve this goal does not exist.

In spite of this, the use of containment and recovery techniques is to be encouraged; they will at least reduce the impact of the accident on the ecology. Burning may be called for under special circumstances, though damage will occur due to the partial dissolution of the oil under the burning oil layer.

However, I wish to advise strongly against the use of detergents, dispersants and sinking agents. These are purely cosmetic measures, which push the toxic oil actively into the environment with all the consequences of the kill of bottom organisms and destruction of fisheries resources through incorporation of oil.

RECOMMENDATIONS

1. Oil and oil products must be recognized as poisons that damage the marine ecology. They destroy fisheries resources through direct kill, through sublethal damage and through the destruction of flood sources. Polluted fish and shellfish become a public health hazard.

2. All precautions should be taken to reduce the spillage; they should be aimed at eliminating human error. Records must be kept of all spills. Spill prevention must be backed by surveillance and law enforcement. A chemical laboratory must be available to establish the tie between a spill and a vessel or port facility. In terms of cost effectiveness spill prevention is far superior to cleanup.

3. Bacterial degradation eventually destroys spilled oil. Therefore, the environment has some limited tolerance for spills. Investigations

like ours will establish the tolerance level; however, additional investigations involving other oil spills and other ecological circumstances are needed.

4. The spillage rate and the environmental tolerance determine directly how much oil a port can handle without causing additional environmental degradation.

5. Containment of the spills and recovery or burning at the earliest possible time are favored in spite of their shortcomings. The use of detergents, dispersants or sinking agents should not be permitted except in cases of extreme fire hazard.

6. Continuing chemical and biological surveys can establish the present extent and any further spread of the ecological deterioration. Chemical analysis is needed to establish the safety of fish and shellfish for human nutrition. Such surveys are possible; they are relatively inexpensive and high priority should be given to establish laboratories to perform these analyses on a continuing basis in all major port areas. There is a definite danger that fisheries products are now being marketed which are not acceptable from the point of view of public health.

(The following bibliography was appended to Dr. Blumer's statement:)

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Dr. BLUMER. In closing, I would like to put the oil spill in West Falmouth into perspective with the situation at Piney Point. The amount of oil spilled in West Falmouth was approximately 650 tons. The current throughput at Piney Point is between 12 million and 14 million barrels. If we assume that this is managed at the very best spillage rate now possible—which is about one one-hundredth of a percent of the thoroughput spilled—this would amount to 200 tons per year comparing it to 600 tons in the West Falmouth area.

If the spillage rate is typical and higher by an order of magnitude, about one-tenth of a percent, this would be 2,000 tons per year.

Also, the five pipelines from the pier are fitted with manually operated emergency cutoff valves approximately halfway between the end of the pier and the tank farm. If a ship collides with the pier and severs all five lines immediately back of their valves, and if the valves are closed immediately, the amount of oil draining out of the pipes is about 340 tons. Compare this to the 600 tons involved in the West Falmouth oil spill and I think it will give you approximately a perspective of the damage that you have to expect in this area.

Thank you.

Mr. REUSS. Before turning to Admiral Goehring, Dr. Blumer, what is the Woods Hole Oceanographic Institution with which you and Dr. Sanders are associated?

Dr. BLUMER. The Woods Hole Oceanographic Institution is an independent nonprofit research organization. Most of our funding comes from the Federal Government through grants.

Mr. REUSS. Are you associated with any university or other educational institution?

Dr. BLUMER. Woods Hole has now become a degree-granting institution and we are awarding a joint degree in oceanography with MIT.

(A professional biography of Dr. Blumer follows:)

BIOGRAPHICAL SKETCH OF MAX BLUMER, SENIOR SCIENTIST, WOODS HOLE OCEANOGRAPHIC INSTITUTION, WOODS HOLE, MASS.

Dr. Blumer was born in Switzerland and received his education at the University of Basel, Switzerland (Ph. D. 1949). He became a U.S. citizen in 1964. He has been associated with industry (CIBA, Ltd., and Shell Development Co.) and with academic institutions (University of Minnesota, Scripps Institution of Oceanography). He has been at the Woods Hole Oceanographic Institution since 1959.

He is a member of the American Chemical Society and of the American Association for the Advancement of Science. He has served on a FWPCA Panel on the Evaluation of the Toxicity of Detergents and a U.S. Coast Guard-National Academy of Sciences Panel on Pollution Monitoring.

Dr. Blumer is author of numerous scientific papers. His research interests and experience lie in the field of organic geochemistry, chemical oceanography, and oil pollution. He has worked on the origin of petroleum, the chemical analysis of petroleum, the origin and the long term fate of organic compounds, especially, hydrocarbons, in the sea and in the marine food chain.

Dr. Blumer acknowledges long term support of his work in these areas by the Office of Naval Research, by the National Science Foundation, and by the Federal Water Quality Administration.

Mr. REUSS. Thank you, Dr. Blumer.

We will now hear from Admiral Goehring.

STATEMENT OF REAR ADM. ROBERT W. GOEHRING, CHIEF, OFFICE OF OPERATIONS, HEADQUARTERS, COAST GUARD; ACCOMPANIED BY CAPT. LESTER A. LEVINE, CAPTAIN OF PORT AND GROUP COMMANDER, BALTIMORE; CHIEF BOATSWAIN'S MATE WILLIAM C. BRIZENDINE, PINEY POINT COAST GUARD STATION

Admiral GOEHRING. I am Rear Adm. Robert W. Goehring, chief, Office of Operations, U.S. Coast Guard.

I appreciate the opportunity to appear before you this morning to present the views of the Coast Guard for your consideration in your continuing study of the Potomac environment; and specifically on

the issue of environmental dangers created by the oil traffic moving in the waters of the Potomac estuary.

Admiral Bender, the Coast Guard Commandant, has asked me to inform you that another commitment prevented his being present here today and to assure you that he is personally interested in the oil pollution problem and intends that the Coast Guard will make its full contribution in taking necessary corrective actions looking to a solution of the problem.

Before undertaking a discussion of the Potomac estuary involvement, I would like to cite for you the various statutory provisions that govern Coast Guard activities in this field. As we view the total problem, there are two separate features involved.

The first of these is prevention of the pollution.

The second of these is the coordination of cleanup efforts when preventive measures fail.

In the prevention area, Coast Guard activity is based upon the administration and enforcement of three statutes:

The Tank Vessel Act (46 U.S.C. 319(a)); the Dangerous Cargo Act (46 U.S.C. 170), and the Magnuson Act (50 U.S.C. 191).

Without going into detail, I will simply state that the first of these three acts authorizes regulations for the design and construction, operational procedures, and manning requirements for tank vessels carrying inflammable or combustible bulk cargo, including petroleum products.

The second authorizes regulations of a similar nature concerning vessels carrying other dangerous articles or inflammable and combustible articles other than in bulk.

The third authorizes regulations for waterfront facilities to protect the port area from damage or injury that might result from improper handling or stowage of hazardous articles, including petroleum products.

Thus, there is ample authority in connection with general safety measures to issue regulations looking to the prevention of oil spills from vessels, as well as the shore interface.

The recently enacted Water Quality Improvement Act of 1970 will assist in this area by specifically authorizing regulations looking to oil spill prevention. As to actions to be taken when preventive measures fail, the Coast Guard assists in the enforcement of the Refuse Act of 1899 (33 U.S.C. 407) and will be directly involved in the enforcement of the Water Quality Improvement Act of 1970.

Turning to the issue at hand, during calendar year 1969 the Coast Guard reported and investigated, as appropriate, 1,186 possible violations of Federal water pollution laws. Of these, 1,007 involved oil spills, three of which occurred in the Potomac estuary. While figures for 1970 have not been completely compiled, there were four oil spills reported in the Potomac estuary in the first half of the year. I have brought with me a brief summary of those seven cases. Three of those seven cases occurred at the Steuart Petroleum Co. in Piney Point, Md., and all three involved transfer of oil from tankers to the terminal.

(The summary referred to by Admiral Goehring follows:)

Date	Location	Source	Pollutant	Quantity	Cause	Remarks
Feb. 24, 1969	Piney Point, Md. (at Steuart Petroleum Co. dock).	Norwegian tanker, Vilja	No. 6 oil	Unknown	Unknown	Ship could not produce the required oil record book. Ship personnel were not cooperative during cleanup.
Apr. 6, 1969	Anacostia River, Washington, D.C.	Gasoline truck	Gasoline	4,000 to 8,000 gals	Truck overturned on highway. Fire department flushed gasoline into river.	Created fire hazard.
Oct. 30, 1969	Kingman Lake, Anacostia River, Washington, D.C.	Unknown	Thick oil	Less than 200 gals	Unknown	Oil slick 3½ miles long.
Jan. 24, 1970	Piney Point, Md. (at Steuart Petroleum Co. dock).	Greek tanker Glorious Colocotronis.	No. 5 oil	200 to 400 gals	A cargo tank overflowed while ship was offloading oil. Scuppers were not plugged.	Oil slicks 200 ft. long, 1½ to 6 ft. wide and 3 ins. thick.
Apr. 17, 1970	Anacostia River, Washington, D.C.	From storm sewers	Oil	50 to 100 gals	Unknown	
May 2, 1970	Robinson Marine Terminal, Alexandria, Va.	Liberian freighter Helgoland	Oil	Unknown	Pumped bilges	Broken slick several hundred yards long; soiled recreational boats.
June 15, 1970	Piney Point, Md. (at Steuart Petroleum Co. dock).	Tanker Oliva	No. 6 oil	400 gals	Transfer hose burst while offloading oil.	Fouled 5 miles of beach on Maryland side with film 1 to 4 ft. wide.

Admiral GOEHRING. In one case, the cause and quantity of the spill were not identified. In the second case, a spill of between 200 and 400 gallons resulted from personnel inattention, and in the third case a spill of an estimated 400 gallons resulted from the failure of the transfer hose.

In connection with the figures which I have given to you on the incidents reported nationally, I would not wish you to gain the impression that these figures necessarily reflect all the spills that actually occurred. There may well have been unreported spills that were not brought to the attention of the Coast Guard, and in this regard we look, with some anticipation of more accurate statistics, to the legal requirement in the Water Quality Improvement Act for a report of all harmful discharges which occur.

The real issue, however, relates to what has been, is being, and will be done to minimize the frequency of these incidents. From a statistical point of view, the amount of spilled oil in proportion to the amount of oil transported is very small. Nevertheless, any individual spill which could have been prevented by proper procedures is unacceptable.

The volume of oil traffic in our waterways during the past several years has been constantly increasing. The latest compilation of statistics indicates that over 500 million short tons of petroleum and petroleum products moved through the 13 largest port complexes during calendar 1968. In the Potomac River there was a total movement of 3.8 million short tons. Each of the more than 125,000 separate vessel movements reported in the 13 largest ports constitutes a potential spill, and increased attention and alertness is necessary in order to insure that these movements are carried out without adverse effect on the water environment.

The regulation of shipboard and dockside procedures and the requirements for equipment and personnel competence must be constantly upgraded and reviewed, as necessary. We are doing that on a continuing basis. As our information collection system develops trends and patterns, our attention will be more effectively directed toward any weak parts of the prevention system so that necessary corrective action may be planned and, where appropriate, implemented.

For instance, we have recently held public hearings concerning additional equipment standards and personnel requirements on the shoreside of the transfer system. Additional regulations have been approved and are in the process of publication. It is anticipated that they will be published within the next month. I have copies of those regulations with me for your information.

Mr. REUSS. We are grateful for those. Do you have them here now?

Admiral GOEHRING. Yes, sir.

Mr. REUSS. Without objection, they will be made part of the record at this point.

(The data provided by Admiral Goehring follow:)

SUBCHAPTER I.—SECURITY OF VESSELS AND WATERFRONT FACILITIES (CG–239)

Part 126—Handling of Explosives and Other Dangerous Cargoes Within or Contiguous to Waterfront Facilities

The proposed addition to part 126 will enhance the safety of ports, navigable waters of the United States, and vessels and their cargoes by preventing accidental spillage of bulk liquid and liquid gas dangerous cargoes, which may create a hazard to waterfront facilities, vessels or port areas, during transfer operations.

PRESENT REGULATIONS	APPROVED REGULATIONS	REASON FOR CHANGE
126.15(o) Maintenance of bulk liquid cargo transfer system(s) used for handling any bulk dangerous cargo shall be so maintained as to prevent leakage. Suitable means, such as drip pans for collecting liquids, shall be provided during coupling or uncoupling operations.	(Not Published as of July 22, 1970.) Delete entire section and insert new section as follows: 126.15(o) *Control of liquid cargo transfer systems.* When performing bulk liquid and liquefied gas dangerous cargo transfer operations, the waterfront facility cargo transfer system shall be subject to the following conditions: (1) The cargo transfer system in use shall be under the continuous control and surveillance of the waterfront facility owner or operator or his assigned representative, who shall be considered as the person in charge of the shoreside transfer operation. The person in charge of the shoreside transfer operation must be trained in, and capable of performing competently, the necessary operations which relate to the transfer of the specific cargo. The captain of the port shall be furnished satisafctory documentary evidence to this effect. (2) Prior to the transfer of cargo, the person in charge of the shoreside transfer operation shall insure that the following conditions exist:	To provide continuous control of the shoreside transfer operation involving bulk liquid and liquefied gas dangerous cargo, and thereby reduce the potential hazards involved in the transfer of these dangerous cargoes. Such control will be consistent with similar regulations for handling the transfer of these products on board the transporting vessel, i.e., supervision by a trained, competent individual, the posting of warning signs, the maintenance of the transfer system, etc.

PRESENT REGULATIONS	APPROVED REGULATIONS	REASON FOR CHANGE
	(*a*) Warnings signs are displayed on the facility at the point of transfer facing the shoreline, and facing each way along the shoreline, without obstruction, at all times during the coupling transfer operation, and uncoupling. The warning signs shall conform to 46 CFR 151.45–2(e)(1). (*b*) Proper precautions will be taken to insure that no repair work on the transfer system or receiving tanks is carried on during cargo transfer, and that provisions of 33 CFR 126.15 (*c*) are complied with. (*c*) Where fixed sumps or troughs are not installed, adequate pans or buckets have been placed under cargo hose connections during coupling, uncoupling, and cargo transfer. (*d*) Suitable material has been used in joints and in couplings when making connections to insure that they are tight and leak free. (*e*) Sufficient bolts have been used in bolted couplings to prevent leakage. (*f*) That the person in charge of transfer operations on the vessel (including barges), tank car or tank truck has reported ready for transfer of cargo.	

(*g*) Have in his possession a cargo information card for the specific cargo to be transferred. The information card shall conform to the specifications of 46 CFR 151.45–2(e)(3), and shall list:

(i) Cargo identification characteristics, and

(ii) Emergency procedures, and

(iii) Fire fighting procedures.

(*h*) Obtain a declaration of inspection from tank ships and may assure himself that the condition of the vessel is as stated in the declaration of inspection in accordance with 46 CFR 35.35–30.

(3) When transferring cargo to or from a vessel (including barges), tank car or tank truck the person in charge of the shoreside transfer operation shall in addition to (2) above maintain a means of communications with the person in charge of transfer operations on board the vessel (including barges), tank car or tank truck in order to provide immediate notification to secure the transfer system and cargo flow when necessary. Such communication may be by vocal, visual, or electronic means. If electronic means are used, the equipment shall be suitable for the hazard involved.

(4) The person in charge of the shoreside transfer system shall not start cargo transfer operations or, if started shall discontinue transfer under the following conditions:

(*a*) During severe electrical storms; or

PRESENT REGULATIONS	APPROVED REGULATIONS	REASON FOR CHANGE
	(*b*) If a fire occurs on the facility or in the vicinity; or (*c*) If a break occurs in the cargo transfer system; or (*d*) If requested by the receiving person in charge of transfer operations. (5) The person in charge of the shoreside transfer operation shall control the shoreside operation as follows: (*a*) When transferring cargo from a facility: (i) Supervise the operation of cargo system valves; and (ii) Notify the receiving person in charge of transfer that the facility is ready to start the transfer; and (iii) In coordination with the receiving person in charge of transfer operations, start the transfer of cargo slowly; and (iv) Maintain cargo connections to prevent leakage; and (v) Observe operating pressure on the cargo system; and (vi) Stand ready to secure the transfer system when necessary or when requested to do so by the receiving person in charge of transfer operations.	

(*b*) When transferring cargo from a vessel (including barges), tank car or tank truck to the facility:

(i) Supervise the operation of cargo system valves; and

(ii) Maintain cargo connections to prevent leakage; and

(iii) Observe rate of flow for the purpose of avoiding overflow of tanks or overload of the transfer system; and

(iv) Secure the transfer system only after advising the person in charge of transfer operations aboard the vessel (including barges), tank car or tank truck of intent to do so.

(6) When transfer operations are completed, the hoses on the waterfront facility shall be drained and the piping shall be secured to prevent cargo spillage.

(7) Cargo handling equipment shall be maintained in good operating condition at all times.

(*a*) Cargo hose shall not be used in transfer operations in which the pressures are such that leakage of cargo occurs through the body of the hose.

(*b*) Cargo pump systems shall be tested at least once each year to determine that they function satisfactorily at or below the maximum allowable pressure of the safety relief valves, cargo piping or hose, or maximum pump output pressure.

(*c*) Cargo pump pressure gages shall be calibrated at least once a year.

PRESENT REGULATIONS	APPROVED REGULATIONS	REASON FOR CHANGE
	(*d*) The cargo hose and piping shall be hydrostatically tested at least once each year to 1½ times its maximum allowable working pressure. The maximum allowable working pressure shall be stenciled on the cargo hoses and piping. (*e*) Cargo hose shall not be used with a cargo piping system whose maximum allowable working pressure exceeds that of the hose. The maximum allowable working pressure of a system is defined as the setting of the associated relief valves or the maximum available pressure including hydraulic shock of a system without relief valves. (*f*) Relief valve operation shall be checked at the time of each system hydrostatic test. (*g*) The dates and results of all testing shall be recorded, and made available to the captain of the port upon request. Records may be kept in a log book; or on metal tags attached to the apparatus; or by some similar means. (*h*) The escape piping of cargo system relief valves shall return the product to the supply or other suitable receiver.	

(*i*) At facilities where incompatible cargoes are handled, the hoses and systems shall be suitably marked to specify the allowance products.

(8) In case of emergencies nothing in these regulations shall be construed as preventing the person in charge of the shoreside transfer operation from pursuing the most effective action in his judgment for rectifying the conditions causing the emergency.

Admiral GOEHRING. In the enforcement and cleanup area, the Coast Guard has been intensifying its efforts during the past few years. Special aircraft patrols are being conducted over selected water areas where spills of oil and other substances are most likely to occur. Resources for additional patrol capability have been requested. Our reporting system has been revised to require more specific information in order to develop a better base from which to judge needed corrective action.

In that connection, I might mention that our Office of Research and Development is pursuing various projects which will make us better prepared not only to prevent, but to react when spills occur. We will continue to work closely with industry and with the public to enlist their cooperation in our efforts.

Under the national oil pollution contingency plan that was recently published by the President, the Coast Guard has been given specific responsibility in connection with response to spills. In order to carry out that responsibility effectively, we are engaged in an expanded program to develop effective techniques and equipment. An early product of that program is the Air Deliverable Antipollution Transfer System (ADAPTS) which is now in the final prototype test stage.

While we realize that more research in this area is needed, especially as to pollution incidents occurring on the open seas, we are not waiting for its ultimate fruition, but are engaged in utilizing the current state of the art to meet our responsibilities. We believe that with the proper coordination of all concerned, Federal, State and local, as well as industry and the public generally, the prognosis for resolving the problem is favorable.

I trust, Mr. Chairman, that these brief remarks have been responsive to your needs and that I have been able to present the Coast Guard's views adequately. I would be glad to discuss any of my comments in greater detail or to answer any specific questions you may have.

With me here today at your request are Capt. Lester A. Levine, who is Commander of Coast Guard Group Baltimore and whose area of responsibility includes the Potomac estuary, as well as William C. Brizendine of the Piney Point Coast Guard Station. They will be prepared to respond to specific questions concerning the Potomac and Piney Point.

(The Coast Guard subsequently supplied the subcommittee with the following statement concerning a proposed symposium on liability for removal of hazardous substances:)

STUDY OF LIABILITY FOR REMOVAL OF HAZARDOUS SUBSTANCES AS REQUIRED BY WATER QUALITY IMPROVEMENT ACT OF 1970 (P.L. 91–224)

The Water Quality Improvement Act of 1970 (Public Law 91–224) requires the President to submit to the Congress not later than November 1, 1970, recommendations on the need for, and desirability of, enacting legislation to impose liability for the cost of removal of hazardous substances discharged from vessels and onshore and offshore facilities, including financial responsibility requirements. An accelerated study is also required which shall include methods and measures for controlling hazardous substances to prevent this discharge, and the most appropriate measures for enforcement and recovery of costs incurred by the United States. Pursuant to an Executive order the U.S. Coast Guard has been assigned by the Secretary of the Department of Transportation to conduct the study in consultation with the Secretary of the Interior.

The study task force has been alined to afford simultaneous approach of the main areas of interests in the multimode, multiindustry problem to be studied. These forces will direct study during the next several weeks in preparation for a symposium of interested persons and representatives of various public and private groups that may be affected by any resulting legislation. The symposium has tentatively been scheduled for September 14, 15, and 16 in New Orleans. Advance announcements of the symposium have been distributed; preparation of an agenda and mailing of invitations will follow receipt of replies to the notices.

The symposium will be conducted informally with panels addressing such questions as:

(*a*) Science/technical matters such as definitions, environmental base lines, etc.

(*b*) Prevention techniques and equippage, both currently used and proposed.

(*c*) Recovery techniques and equipment (including prospects for the future), and desired responses to spills.

(*d*) Legal and economic matters including liability, bonding, legislative considerations, enforcement alternatives (e.g. penalties, etc.), recovery of Federal costs, etc.

Public interest in the study of this topical subject and possible impact of the recommendations upon industry and upon our environment requires, and seemingly assures, wide-spread response to the symposium invitation.

Mr. REUSS. Thank you, Admiral Goehring.

Turning first to Dr. Sanders and Dr. Blumer of Woods Hole: Gentlemen, your testimony is very devastating. Let me see if I can summarize it and then get your comment on it.

What you are saying is that at Woods Hole—and as a result of the breaking up of that oil ship off West Falmouth—you have had an opportunity, apparently not given to anyone else in the world, to see what happens in the case of an oil spill. Is that correct?

Dr. SANDERS. That is correct.

Dr. BLUMER. Correct.

Mr. REUSS. And among your findings are that oil spills are very persistent and last for a long time, years or more; that they have a lethal effect on marine life; that they can extend the area of that lethal effect for a long period after the initial spill; that there are dangers to human beings involved in eating marine life which has been contaminated by oil spill, and that those dangers may include cancer.

Are all the statements I have made a correct résumé of your testimony?

Dr. SANDERS. I would concur in that.

Dr. BLUMER. Yes; I concur.

The magnitude of the effect has surprised us, especially for the oil involved in this accident. It had, previous to this investigation, been said, and it is still said by many, that fuel oil is a relatively minor problem because of the relatively great volatility, that it evaporates. This is an argument often used in cases of oil spills—that the most toxic fractions evaporate rapidly and are no longer a danger. We find this is not true.

The most volatile fractions and the less volatile fractions of that oil spill are present in the environment now, 10 months after the accident.

Mr. REUSS. Is there a process whereby higher elements in the food chain retain a larger proportion of the hydrocarbons contained in petroleum similar to that which has been observed in 2,4,5-T and similar compounds? In other words, does it start with a little bug eat-

ing a bit of it, a little fish eating the bug, a big fish eating the little fish, and then, God forbid, maybe some citizen eating the big fish? Is there a buildup, in short?

Dr. BLUMER. I think there is a transfer. The oil is probably taken up first by filter feeders in the form either of droplets or absorbed on some of the food that the organisms take in. Filter feeders are many of the commercially important species of shellfish. From such organisms it moves to the next organisms on up to those which we eat.

In our experience we have seen this transfer. We have not seen yet, and we do not know whether it exists, the buildup, the rise in concentration that was observed in the case of the pesticides. The eagle which feeds on fish has a far higher pesticide concentration than lower forms of marine life.

Dr. SANDERS. If I may add, I think that is a central problem that you have hit upon. We are not unaware of it. Right now we are concerning ourselves with exactly this problem of what is happening as you move up the food chain. Is there a tremendous enhancing of the effect as in the persistent pesticides?

We have just in this last week collected some of the higher predators which have been frozen and which will be analyzed by Dr. Blumer for the hydrocarbon concentrations and compared with the source of food that they are feeding on.

Mr. REUSS. Admiral Goehring, you have indicated that of the three recent spills down at Steuart Petroleum at Piney Point, in one case the cause of the spill could not be identified; in another it resulted from inattention of personnel, and in the third case it resulted from the failure of the transfer hose. Is that correct?

Admiral GOEHRING. Yes, sir.

Mr. REUSS. I am looking at your proposed new regulations and I do not really see anything in those new regulations that would have stopped the spills, if the acts which caused them were recommitted in the future.

I said yesterday at the hearing that I was much impressed in Sweden a few weeks ago at seeing the boom made of wood and plastic which, under Swedish regulations, is required to encircle the tanker as it is being unloaded. It seems to work very well in the North Sea, which is no mill pond.

I notice your regulations do not—unless I have read them too hastily—include any requirement of a boom.

Admiral GOEHRING. No, sir; they do not.

Mr. REUSS. Why is that? Perhaps I do them an injustice, but they seem mainly to be exhortations to the personnel to be careful.

Well, presumably they knew that at the time that these existing spills resulted from personnel inattention, or a hose that broke, or whatever.

Admiral GOEHRING. Our present regulations, Mr. Chairman, require a tanker man on the receiving vessel, on the vessel itself. As you can see, in many instances this is inadequate because if this one man happens to doze off, a spill can very readily occur.

Then, too, in shutting off the flow of oil, you not only have to shut it off at the vessel, but also up in the tank farm.

Mr. REUSS. Your new regulation does require a shoreman?

Admiral GOEHRING. Yes, sir; it does require a man on the facility.

Mr. REUSS. Which is certainly an improvement, I grant you.

Admiral GOEHRING. Furthermore, this man should be certified as to his qualifications to perform the necessary operations.

One other safeguard concerning these two operators that is significant is that the two be in constant communications with each other, so that we not only have the dual capability of shutoff, but we have one man checking on the other one to see that he is alert and with the operation.

There are tests involved in here, too, sir, concerning the materiel.

Mr. REUSS. Hoses, valves, and so on?

Admiral GOEHRING. Yes, sir.

Mr. REUSS. Why do you not have a requirement of a boom? We heard yesterday that there is one in use in Yorktown, on the York River, which works well.

Admiral GOEHRING. This is an item that will be considered for inclusion in our new regulations, when the Federal Water Quality Improvement Act of 1970 becomes effective, Mr. Chairman.

Mr. REUSS. It does not become effective until you issue the regulations?

Admiral GOEHRING. We just received the delegation of authority yesterday, by Executive order, so that we can now proceed with regulations.

Mr. REUSS. It is high time, I might say. That bill became law on April 3.

Admiral GOEHRING. Yes, sir, I agree.

Mr. REUSS. You were not told until last night that you were supposed to get out the regulations?

Admiral GOEHRING. As you recall, there were many sections of the law, and many of the responsibilities were given to the President. A complex delegation arrangement had to be worked out to resolve the jurisdictional aspects.

Mr. REUSS. Then the document which you have handed us called "Proposed Regulations"——

Admiral GOEHRING. Yes, sir, these were developed under the old law.

Mr. REUSS. You presumably will expand it considerably, in view of the heightened public concern about oil spills.

Admiral GOEHRING. We have every intention of proceeding with this as rapidly as we can.

Mr. REUSS. And one of the things which—and may I have your assurance on this—you will consider is the requirement that tankers discharging oil be protected by some sort of a boom?

Admiral GOEHRING. Yes, sir. This will be very seriously considered.

Mr. REUSS. Glad to hear that.

Mr. Vander Jagt?

Mr. VANDER JAGT. No questions.

Mr. REUSS. Mr. Hicks?

Mr. HICKS. Do I understand, Dr. Sanders or Dr. Blumer, that this is the only in-depth study of an oil spill that has been made to your knowledge?

Dr. SANDERS. Yes.

Mr. HICKS. There have been some studies of some kind on these other spills, have there not? What about the Santa Barbara episode?

Dr. SANDERS. Most of the oil spills always occur under situations that are a great disadvantage to the scientists working on them.

If you imagine yourself as suddenly having a giant oil spill, you are standing on the beach and the oil is coming in for hundreds of miles on both sides of you, what do you do? The sheer magnitude of the catastrophe is overwhelming. It is physically impossible to do very much. You usually end up by looking at what happened on the beach on a rock, something of this sort, trying to discern whether there are any biological effects. Of course, this becomes horribly unrealistic. By the time you acquire the sufficient manpower, get the necessary okays and arrange the series of necessary political steps that are required, it is already too late to learn very much.

I think our studies show the crucial nature of the first few days. This will be missed. This is why I have urged that there has to be a group of people who can at an instant's notice go to an incipient or actual oil spill or blowout and document exactly what is happening.

There is also the problem of understaffed personnel, in the case of the major oil spills, who attempt to do a job that is overwhelmingly large. We were fortunate in the West Falmouth spill because it was close by, and small enough so that we we able to somewhat handle it.

Granted, with more personnel we could have done a better job.

Mr. HICKS. This presupposes almost a Government group, does it not, the kind that you emphasized, to be ready to go at a moment's notice?

Dr. SANDERS. It presupposes a Government group, a well-trained group of people. I must emphasize "well trained." Unless this type of science is done—well, it had better not be done; it will do more damage than good.

Mr. HICKS. You have a very prestigious institution there in Massachusetts. Is there not a fairly prestigious one on the west coast?

Dr. SANDERS. Oh, yes.

Mr. HICKS. San Diego has one?

Dr. SANDERS. Yes.

Mr. HICKS. What is the name of that?

Dr. SANDERS. Scripps Institute of Oceanography, part of the University of California at San Diego.

Mr. HICKS. Do you know whether they had any people at work on Santa Barbara? What do you call that—a blowout, or how would you characterize that situation?

Dr. SANDERS. That would be called a blowout. As far as I know, at least in the area of biology, I do not think any of the personnel participated.

There were some biologists working on it from the University of Southern California, but again this was late in the game. The question is, what can you salvage out of it? There were some people at the University of California at Santa Barbara who worked on it, but again they were facing the initial problem I described of not having ships, standing on the beach with oil rolling in for many miles on either side.

Mr. HICKS. If there were a Government group such as you described—and certainly this oil problem has become such in the public mind; it seems to be occurring, based on Admiral Goehring's testimony, frequently enough to have them on the go quite a bit—what department would you like to see it in?

Dr. SANDERS. I would preferably like to keep it away from any specific department because of the inevitable complications that arise.

This is why I am suggesting that it might, at least for jurisdiction purposes, be a nonpolitical but prestigious body such as the National Academy of Sciences. They can therefore also insert enough quality control by constant reviews to make certain that the data that comes out would be of really important significance.

Mr. HICKS. Is that body that you just mentioned Government-funded, or at least partially?

Dr. SANDERS. Perhaps someone else can answer this. I do not believe so, but I really do not know.

They have done this in the past. Interested groups in the Government can approach the National Academy of Sciences for advice or to have panels evaluate certain problems. I have sat on a couple of these panels, myself. I think it is established precisely for these types of problems.

Mr. HICKS. To do that, then, they would just have to about fund them for that purpose, give them a grant, no strings attached and ask them to assemble this group of people.

Dr. SANDERS. I would suspect that the National Academy group would be as an advisory and evaluation group which would periodically review what is going on and offer constructive criticisms. You have the advantage here of drawing upon the very best people in the country. Even though they would not necessarily do the work, they could have a very real impact in maintaining quality control.

Mr. HICKS. The Navy is rather highly funded on this oceanographic business, is it not? Do they not get the funds and then apportion them out or grant them out?

Dr. SANDERS. Yes, yes; there are a number of grants by different branches of the Navy for various aspects. Some of it is rather applied—less of it—though some of it is still in the area of basic research.

Mr. HICKS. Do you get any funds from the Navy?

Dr. SANDERS. Our institution does. I personally do not.

Mr. HICKS. I mean the Woods Hole?

Dr. SANDERS. Yes.

Dr. BLUMER. The funding through ONR has become in the last few years increasingly mission-oriented and you have to demonstrate to ONR now that the work that you want to do is immediately relating to the problems of national security and Navy interests.

At this time, at least at our institution, the Navy has not funded any pollution work, any pollution studies.

Mr. HICKS. Part of that, of course, is the provision that was put in the military procurement bill, saying that research has to be directly connected with defense. There has been some consideration to backing off on that, at least by some of the committee.

Admiral GOEHRING. Mr. Hicks, could I add something at this point, sir?

Mr. HICKS. Yes, Admiral.

Admiral GOEHRING. The national contingency plan issued early in June by the President does have a provision for scientific inputs to the regional responsible team which assembles in the event of a large spill.

Mr. HICKS. That is to get it controlled and cleaned up? It is not to find out what the actual harm is that these spills can do?

Admiral GOEHRING. Well, this is an open-ended sort of provision. It is also in there to provide scientific data and monitoring, whatever might be of value to the Nation.

Mr. HICKS. Thank you very much, gentlemen, and thank you, Mr. Chairman.

Mr. REUSS. Mr. Gude?

Mr. GUDE. Admiral Goehring, is there something lacking in the law under which you drew up these proposed regulations, so that you could not require the installation of these new metal hoses with flexible joints which evidently are so much safer as far as accidents go? If you had one of those at Piney Point, they would not have had this spill in June.

Admiral GOEHRING. There is a deficiency, Congressman Gude. The law on which these regulations are based is a security law. It is aimed at safety.

We have before the Congress right now a proposed Ports and Waterways Safety Act, H.R. 17830. In fact, that is where the commandant is this morning, attending the initial hearings on this bill.

This bill, the Ports and Waterways Safety Act—I am checking the citation on that and it is H.R. 17830—permanentizes in effect the authority which was the basis for these regulations.

These regulations are based on an Executive order which is in effect during the time of war or partial mobilization. In other words, our authority could be withdrawn overnight if the Executive order they are based on was canceled.

The Ports and Waterways Safety Act would also extend our authority over the port facilities, which will enable us to look at the facilities from the point of view not only of security and safety, but also pollution and the effects on the environment.

Mr. GUDE. I notice in the proposed regulations on the third page under (d), you require that the cargo hose and piping shall be hydrostatically tested at least once each year to one and a half times its maximum allowable working pressure.

This is to prevent blow-outs of the hose, is it not? If you could provide for a regulation like that, why could you not provide that these metal hoses be installed rather than the present flexible rubber types?

Admiral GOEHRING. That is a good question. We feel in this instance that a performance test would determine whether or not the hose was adequate. We could write more detailed regulations, but at this point we felt this was the route to go.

Mr. GUDE. I know the Steuart people assured us that they do hydrostatically test their hose down there at greater pressures than they normally carry, and yet this hose burst.

What about cut-off valves? Again, I have not had a chance to read these regulations over carefully. In the case of the Steuart facility, the cut-off valves are halfway between the unloading point and the storage area.

What do you have in these regulations that would take care of the backflow of oil in case of a breakage which may occur or which can occur at the docking area?

Admiral GOEHRING. I would like to refer that to Commander Charter.

Can you cover that?

STATEMENT OF COMDR. DANIEL B. CHARTER, JR., ATTACHED TO OFFICE OF OPERATIONS, U.S. COAST GUARD; ACCOMPANIED BY COMDR. CLIFFORD F. DeWOLF, OFFICE OF CHIEF COUNSEL, U.S. COAST GUARD; AND COMDR. MYRON E. WELSH, OFFICE OF MERCHANT MARINE SAFETY, U.S. COAST GUARD

Commander CHARTER. I do not think we cover that in these regulations, but we are considering a dual cut-off that would be located on the loading vessel and on the facility itself. This is not reflected in these regulations but will be in the next draft that we come up with.

Mr. GUDE. These two areas seemed to be the real soft points, it seemed, in the Steuart operation, that might be covered in these regulations.

Turning to another area, we have spoken about cargo ships which carry oil. What about ocean-going vessels carrying other cargoes which are oil-powered coming into the Chesapeake Bay, either through the capes or through the C. & D. Canal? What about the pumping over of water which has been stored in the oil compartments as ballast and the contamination from that? What is your authority in this area?

Are you updating any regulations in this regard?

Admiral GOEHRING. Yes, sir. There have been changes in the International Convention in particular that relate to this problem.

As far as any pumping within 50 miles of the coasts, generally this is prevented.

This is one of the main reasons why we are increasing our surveillance so that we can detect any infractions of this convention.

One other thing that is being encouraged is the development of more receptacles in ports so that the ships will not have as serious a problem as they have right now in terms of getting rid of their tank washings and residues.

Mr. GUDE. I understand that a ship coming into the bay may wait for a stormy period or some period when they could not be observed from outside of the ship. They may go by an oil slick and they say, "man the bilge", and they pump out and no one can detect it. There is ample opportunity to pump this stuff over without surveillance if they are so inclined.

Does the pilot on the vessel have any control over this? They take a pilot on at the capes and also when they come through the C. & D. Canal.

Do you have any control over the pilots and their operations?

Admiral GOEHRING. From a legal point of view, I am not sure.

Commander DEWOLF. I am Comdr. Clifford DeWolff, attached to the Office of the Chief Counsel of the Coast Guard.

No, sir, pilots do not fall under the direct concern of the Coast Guard. Most of the pilots who would be involved here would be State pilots and the State pilots of course are under State jurisdiction.

Admiral GOEHRING. I am sure that the pilots groups would cooperate with any program that we would set up.

Captain Levine has a further comment, Mr. Gude.

Captain LEVINE. We maintain close liaison with the Maryland Pilots Association in Baltimore. Whenever we have any report of an instance of pollution by vessels transiting the bay area or harbor area, we immediately call the president of the association and bring it to his attention. Of course, he does not leave that unchecked. We have the same problem with speed on the river, and the bay area; that through this liaison we solicit and apparently we do get a large amount of cooperation from them. They are sensitive to this, knowing that we conduct this surveillance.

Mr. GUDE. If your personnel observed a ship coming up the bay discharging oil, you can immediately take action?

Admiral GOEHRING. Yes, sir.

Mr. GUDE. I do not know what amounts of oil are pumped over when they discharge from the bilge, but it would seem to me that you would possibly have an incremental effect in the bay from this oil going in. I wonder if either Dr. Blumer or Dr. Sanders would speak to the point that I think it takes as much as a year sometimes for water to come from the input at the Potomac and Susquehanna and actually to leave the mouth of the bay.

The oil that goes in does not get dispersed as rapidly as if you have an oil spill out in the ocean. We are not as fortunate as someone on an oceanside.

Would you have any observations about this accumulation of oil?

Dr. BLUMER. I would like to say first something referring to a question you asked before, which I think is very important: The amount of oil being spilled by nontanker vessels.

The director of Shell International Transport has estimated that from the washing of cargo tanks of tankers at sea we have an input into the ocean of about 2 million tons per year of oil. The manager of Mobil, I believe, has estimated that from the pumping of bilges of commercial vessels other than tankers, there is an input of about one-half million tons. So this is about one-quarter of the input from the tanker fleet. This is very, very sizable.

Now, with regard to the question you just asked, we should not forget that the oil that you discharge either at sea or in an estuary does not stay on the surface and float. We find large quantities in West Falmouth to water depths of 42 feet, which is the greatest depth in that particular body of water. The oil gets down in storms, it becomes loaded with organisms that are encrusted by the oil, it becomes loaded with heavy minerals, clay, and so on.

Oil has been observed on the sea bottom after the *Torrey Canyon* accident; published photographs exist. Oil has been observed in Santa Barbara on the sea bottom and in our West Falmouth case, incorporated into the bottom sediments. This certainly slows down the flushing rate a great deal. If you had just the normal slow flushing of the oil out on the surface layer of the estuary, you might have a certain residence time. But once it is on the bottom, it becomes essentially immobile and the organisms that are on the bottom are exposed to that. So you may have very long residence times, much longer than if you had free flushing.

Dr. SANDERS. It is a difficult question to answer in the sense that we lack the basic framework. The answers to the questions you raised are lacking primarily because this type of work is not practical enough to be supported. We are paying the price for this today. We should be able to answer the sort of question you raise, but it is our particular sense of short-range priorities that does not permit us to acquire this sort of information.

Mr. GUDE. The real answer would be in prevention?

Admiral Goehring has said that they are working toward the discharge of the bilges in the harbor into a closed system where the poisons can be dealt with, rather than at sea or bootlegged into the bay.

Dr. SANDERS. Yes, I think this would be a useful approach. This would not entirely eliminate it, but it would certainly greatly reduce the problem.

Mr. GUDE. As to the use of a boom around a vessel: In the case of accidental spill, from what you have said already you may contain what is on the surface but some of the oil components immediately go down into the body of water and, unless there is something underneath to catch it, it has done its damage.

Dr. BLUMER. It is my opinion that the technology to avoid biological damage through oil spills does not exist. You can minimize it with booms. Booms have their shortcomings in bad weather. The harbors in West Falmouth were closed off by booms. In spite of that, we have severe mortality in the closed-off areas.

Mr. GUDE. The booms will help?

Dr. BLUMER. They will help some.

Mr. GUDE. There was one other thing that I wondered about. We heard that a massive oil spill rarely damages the environment permanently. I believe that was from a Presidential study on the oil spill on the west coast. But from the testimony that you gentlemen have given, it sounds to me like it is an atomic bomb, and recovery would be more in the terms of decades, almost, rather than within 10 months or 2 or 3 years.

Dr. SANDERS. I prefer to be conservative here. The data is still coming in. What we can definitely say is that the duration of the effects are much longer than we would have suspected in the past.

Mr. GUDE. Admiral Goehring, with regard to these new regulations that you have submitted to us, what effectiveness do you think they would have had in regard to this recent oil spill in the Baltimore Harbor?

Admiral GOEHRING. I think they would have prevented the oil spill, Congressman Gude. From what we know, and without prejudging the case, it appears there was one man in attendance and he was on the barge. It is alleged that he was asleep. If we had had one other man there in constant communications with him, I do not think the spill would have happened.

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

Mr. REUSS. Do counsel have questions?

Mr. DAVIS. What work is the Coast Guard doing on automatic cut-off devices that would not be vulnerable to human error like a man or two men falling asleep?

Admiral GOEHRING. There are automatic cutoff devices in use, Mr. Davis. They have not yet been required aboard vessels, to my knowledge.

Commander Welsh could give you a little more technical information along these lines.

We are well aware of their capabilities and we are certainly considering their application.

Commander WELSH. Insofar as the application or installation of automatic cutoff devices for the transfer of petroleum products such as heating oils and so forth, our regulation do not at this time address themselves to any such requirements. We do, however, require automatic cutoff devices for the more exotic cargoes, such as chlorine, for example.

Mr. DAVIS. Then the devices do exist and could be installed to work on oil transfers?

Commander WELSH. Certainly; Yes, sir.

Mr. REUSS. Thank you very much, Admiral Goehring, and your associates, and Dr. Blumer and Sanders. We very much appreciate your help.

Admiral GOEHRING. Thank you, Mr. Chairman.

Mr. REUSS. I will now ask Mr. Willie J. Parker of the Bureau of Sport Fisheries and Wildlife, and Mrs. George Barnes of the Potomac River Association, accompanied by her associates, to come forward.

STATEMENTS OF WILLIE J. PARKER, AGENT-IN-CHARGE, MARYLAND DISTRICT, BUREAU OF SPORTS FISHERIES AND WILDLIFE

Mr. REUSS. Mr. Parker, you are agent-in-charge of the Maryland District of the Bureau of Sport Fisheries and Wildlife?

Mr. PARKER. Yes, sir, I am.

Mr. REUSS. Have you had an opportunity to observe oil spills in the Piney Point area?

Mr. PARKER. Yes, sir, I have.

Mr. REUSS. When?

Mr. PARKER. The most serious one was in February of 1969. We maintain as a part of our waterfowl program two banding stations in this area. One is at Cove Point, which is 20 miles up the bay on the western shore. The other is about 20 miles up the river from Piney Point on the Virginia side near Westmoreland State Park.

The reason we have been in these two particular localities is they are both staging areas for waterfowl as they begin their northern migration. They are there in considerable numbers.

On February 3, 1969, at the Cove Point landing station, we began to pick up in our waterfowl traps oil on canvasback, redhead, greater scaup and lesser scaup. On receipt of this information, we have a pilot and a Supercub on floats. We began to look for the oil slick area. We did this for several reasons.

Number one, if we can find the slick relative to an unusually large concentration of waterfowl, there are preventive measures we can take to herd the waterfowl away from the impending danger of the oil. We flew the shore in a seaplane at a very slow speed from Cove Point down to the mouth of the Potomac River.

We saw enroute several large flocks of sea ducks and diving ducks on the shore, which is unnatural. On closer inspection by air and setting the airplane down several times, we were able to observe that these birds were oil-soaked and could not return to the flock.

Mr. REUSS. What was the date again?

Mr. PARKER. The flight was February 4, 1969.

Mr. REUSS. And what evidence did you have that there was an oil spill, other than the fact that you found it on these waterfowl?

Mr. PARKER. We know that there is a constant movement of birds between these two staging areas, from Westmoreland State Park up the Potomac and Cove Point, which is on the bay. We were reasonably sure that the birds were trading from Potomac River and that we would find the oil there.

Mr. REUSS. Did you find the oil there?

Mr. PARKER. We found the oil at the extreme end of the point on the north side of the Potomac River. That is where we first found it. We flew the north shore of the Potomac River; and this Supercub flies low and reasonably slow. We found literally thousands of waterfowl affected by this. We set the plane down. We began to find large splotches of crude oil, heavy, thick tar-like substance on the beach. It was apparently from our contact with the birds, at Cove Point, the same type of oil; at least it was real thick and heavy.

Our investigation continued up the northern bank of the Potomac to Piney Point. We found oil to within I guess a half-mile below Steuart Petroleum Co. We continued our flight up the river. Above Steuart Petroleum Co. we found several hundred whistling swans and several thousand other species of waterfowl that were not affected as far as we could determine from any oil.

We flew all the way up to the bridge on 301 highway and then flew down the other side of the river. But the principal area of damage seemed to be from Piney Point down to the mouth of the Potomac.

Mr. REUSS. Were any ducks killed?

Mr. PARKER. Yes, sir. Literally hundreds of old-squaw, scoter, eider, canvasback, redhead. I have some pictures of some of them. We found these ducks up the bay as far north as Cove Point.

Mr. REUSS. If you will, we would appreciate looking at your pictures, if they were taken during this oil spill in February 1969.

Mr. PARKER. These photos were taken by Marvin Myers, the photographer for the State game and fish department there in my presence on February 10 and 11, 1969.

Mr. HICKS. Taken where?

Mr. PARKER. Taken at Cove Point.

Mr. REUSS. May we have these for the record?

Mr. PARKER. Yes, sir.

(NOTE.—The photographs submitted by Mr. Parker appear on pp. 120–122.)

Mr. REUSS. All right. That is one spill.

Have you had any truck with any other spills?

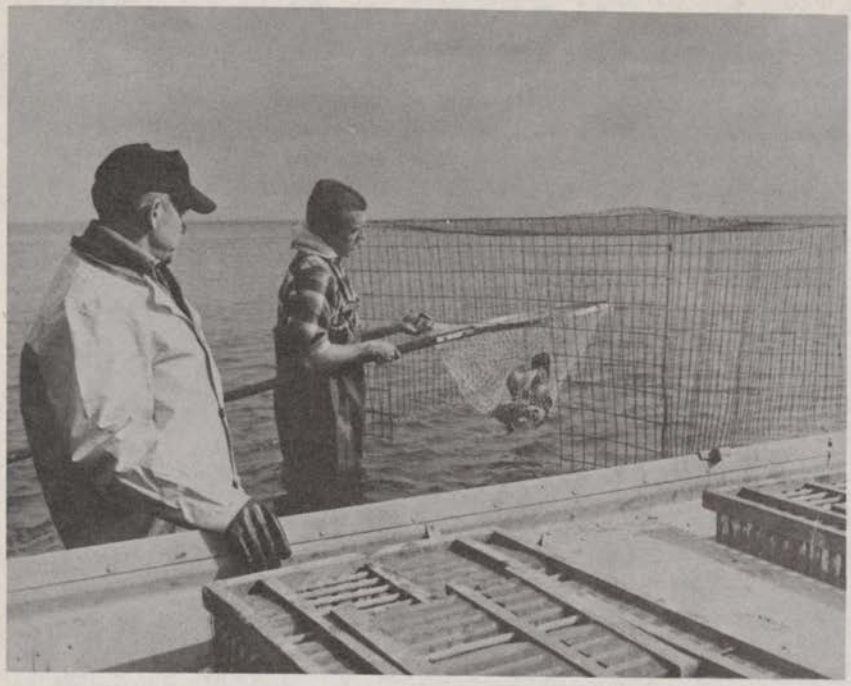
Mr. PARKER. There was a minor spill this year called to our attention. But it was just about the time that the birds had left the area. We were out of funds from about the first of March until this past July 1. We were not able to conduct an extensive investigation because we had no report of any damage to waterfowl.











Mr. HICKS. Could I ask one question?

How far is it from Piney Point to the mouth of the river?

Mr. PARKER. Approximately 20 miles.

Mr. HICKS. You had a station on the bay which is 20 miles from the mouth of the river?

Mr. PARKER. Yes, sir.

Mr. HICKS. And another one on the Potomac, did you say?

Mr. PARKER. Yes, sir.

Mr. HICKS. That is where in relation to Piney Point?

Mr. PARKER. It is up the river approximately 20 miles. We use the facilities at Westmoreland State Park, Virginia State Park. It is on the Virginia side of the Potomac River.

Mr. HICKS. So that there is a distance of 60 miles from one to the other by water?

Mr. PARKER. Yes, sir; by water.

Mr. HICKS. And you say that these fowl interchange?

Mr. PARKER. Yes, sir.

Mr. HICKS. But you found no evidence of oil above Piney Point, between there and Westmoreland?

Mr. PARKER. We picked up some birds later that had some oil spots on them the size of a dime, quarter or half-dollar at the banding station at Westmoreland State Park. We picked up a few birds there incapacitated completely by oil. This was after this.

Mr. HICKS. But you found no oil in the water or on the beach?

Mr. PARKER. That is correct, sir, except from Piney Point to the mouth of the river at its confluence with the bay.

Mr. HICKS. From your speculation, where did these Cove Point birds get encrusted with oil?

Mr. PARKER. On the Potomac River. You see, this concentration of birds at Westmoreland State Park is tremendous. At times it will build to three-quarters of a million birds. They extend in rather solid line for several miles down this section of the Potomac. They began their buildup in October. About the last of December, this past year it totaled about 400,000 birds. Then as the spring migration began in early February and throughout February and March, this population increases and fluctuates considerably from week to week. But they use this part of this river in its entirety.

Mr. HICKS. That is below Piney Point?

Mr. PARKER. Yes, sir.

Mr. HICKS. Did that oil extend from Piney Point all the way across the river?

Mr. PARKER. We found no oil on the Virginia side of the river. We do not know why, other than tide and wind might have directed it toward the northern shore.

Mr. HICKS. You say you did find birds on the shore that should not have been on the shore. Was that on the Virginia shore?

Mr. PARKER. The Maryland shore, between the mouth of the Potomac River and Piney Point.

Mr. HICKS. Were those birds able to fly?

Mr. PARKER. Some were able to fly. It was according to the degree of their contamination by this oil. Some could not fly, some could not swim. This oil removes their natural ability to float. They cannot stay in the water. When they come to the beach, they are subject to heavy predation from raccoon, gulls, several other predators.

Mr. HICKS. Did you find any oil in the bay?

Mr. PARKER. We found no oil in the bay. All we found was on the beach.

Mr. HICKS. What causes these birds to die, these that you have pictures of?

Mr. PARKER. Oil. The birds cannot swim, cannot stay in the water. These are diving ducks, canvasback, redhead, lesser scaup, and greater scaup.

Mr. HICKS. Will they starve to death?

Mr. PARKER. They will starve to death.

Mr. HICKS. How did they get to that point?

Mr. PARKER. Evidently after they lost their strength, when they got into this area where this greater concentration of birds would naturally attract them, then they gradually weakened until they could not make it back and could not feed and gradually died. We found some dead in our traps.

Mr. HICKS. At Cove Point?

Mr. PARKER. Yes, sir.

Mr. HICKS. Thank you.

Mr. REUSS. Mrs. Barnes, would you introduce your associates from St. Mary's County? I believe all of them have written statements and under the rules, those statements will be admitted in full in the record.

Would you then arrange your presentation and those of your associates as you wish? I guess I would say that we are trying to conclude the hearing in the next hour or so because we have a rather heavy floor

schedule this afternoon, so that if you epitomize the high points, we would appreciate it.

Mrs. BARNES. Thank you, Mr. Congressman.

We have coordinated our effort here so that we can minimize the time. We hope there will be questions.

May I present my statement? At the conclusion I will introduce my associates.

Mr. REUSS. Fine.

STATEMENT OF MRS. CATHERINE W. BARNES, COCHAIRMAN, POTOMAC RIVER ASSOCIATION OF ST. MARYS COUNTY, MD.

Mrs. BARNES. Mr. Congressman and members of the committee, I would like to express our appreciation for the privilege of appearing before you to present our views and comments concerning the future of the Potomac estuary.

The natural values of the Potomac estuary are indeed in great danger of being degraded by the repeated oil spills at the Piney Point terminal. The local residents and watermen of the lower Potomac estuary know well that there were many oil spills at the Piney Point terminal during the first 20 years of its existence, spills that are not on the official documents. These spills were not reported by the residents for many reasons, including good neighborliness, the belief that Steuart personnel were conscientiously trying to prevent spills, lack of knowledge concerning the possible effect of such spills on the ecology, ignorance as to the proper reporting procedure, and apathy. Consequently, there are no official records of the vast majority of these spills. But every spill has taken its toll of seafood, marine life, and waterfowl.

In 1968, the Board of County Commissioners, St. Marys County, Md., established a study committee to research the assets and liabilities of a proposed foreign trade zone and petroleum processing facility at Piney Point. It was during the ensuing study of the proposed facility that information concerning previous spills and the extent of damage from the spills was made available.

I would like to present a copy of the study committee report to you for your use.

(The report of the study committee is in the subcommittee files. Excerpts from the report are reprinted in the appendix of this hearing record.)

Statements were received from residents of the area that many oysters had been killed, more were oily in taste and not edible, and, above all, not salable. That was in 1968.

Today, 1970, the same statements are heard from different sources, farther up the Potomac River. In this year alone five spills have occurred to date at the Piney Point terminal, four of which occurred during the first 6 months of the year and an asphalt spill occurred just last week. Not only are oysters reported as tainted or dead, but testimony is now available concerning tainted hard crabs and rockfish caught in the lower estuary.

According to the Chesapeake Bay Foundation, approximately 50 percent of Maryland's winter population of diving ducks use the lower Potomac estuary as their primary wintering ground, in addition to

numerous Canada geese and whistling swans. During years of low abundance, 50 to 70 percent of all the canvasback ducks in the Atlantic flyway can be found in the lower Potomac at one time. An ill-timed oil spill could have an especially drastic effect on the ducks, many of which are already in short supply due to other environmental pressures.

The movement of petroleum products in and out of the terminal at Piney Point will increase tremendously upon the completion of the five storage tanks currently under construction, and the completion of the oil pipeline to two electric generating plants and a proposed third plant in southern Maryland.

As present operations are expanded, we can expect additional spills, for it is a plain and simple fact that all spills, large or small, are caused by human error, human carelessness, or by calamities beyond human control. We know that the personnel at the Piney Point terminal have made a conscientious effort to prevent spills, but even with this precaution there have been many.

Accident prevention methods, no matter how conscientiously practiced, are not adequate against human error or poor judgment. Additional precautionary measures to minimize the spilling of oil at the Piney Point terminal, or at any terminal in the Potomac estuary, are without a doubt needed and should be made mandatory. The proper equipment and facilities necessary to reduce the hazards of these spills must be installed and utilized.

(Mrs. Barnes' prepared statement follows:)

PREPARED STATEMENT OF MRS. CATHERINE W. BARNES, COCHAIRMAN OF THE POTOMAC RIVER ASSOCIATION OF ST. MARYS COUNTY, MD.

Mr. Congressman and members of the committee: I would like to take this opportunity to express our appreciation for the opportunity to appear before you to present our views and comments concerning the future of the Potomac estuary. Hearings such as this serve the major and important purpose of educating and enlightening our Federal legislators concerning matters that may not be well known to them. We hope that the information presented at this time will indeed serve that purpose.

Whether the natural values of the Potomac estuary are in danger of being degraded by repeated oil spills is not a difficult question for me to answer. They are indeed in great danger of being degraded by the repeated oil spills at the Piney Point terminal alone, much less any other terminals in the estuary. To what extent the natural values are being, or have been, damaged would depend on what method or device was used to measure the damage. I can probably more clearly answer these questions to your satisfaction by siting examples of the potential hazards as I see them.

As we all know, threats to our God-given and priceless natural heritages have been in existence for years. It is only recently that we as citizens have realized the extent of these hazards and have voiced a loud cry against them. It is even more recently that government on the State and Federal level has given credence to these hazards.

The local residents and watermen of the lower Potomac estuary know well that there were many oil spills at the Piney Point terminal during the first 20 years of its existence. These spills were not reported by the residents for many reasons including good neighborliness, the belief that Steuart personnel were conscientiously trying to prevent spills, lack of knowledge concerning the possible effect of such spills on the ecology, ignorance as to the proper reporting procedure, and apathy. Consequently, there are no official records of the vast majority of these spills. But every spill has taken its toll of seafood, marine life, and waterfowl.

In 1968, the board of county commissioners, St. Mary's County, Md., established a study committee to research the assets and liabilities of a proposed

foreign trade zone and petroleum processing facility at Piney Point. It was during the ensuing study of the proposed facility that information concerning previous spills and the extent of damage from the spills was made available. (I would like to present a copy of the study committee report to you.) Statements were received from residents of the area that many oysters had been killed, more were oily in taste and not edible, and, above all, not salable. That was in 1968. Today, 1970, the same statements are heard from different sources, further up the Potomac River. In this year alone, five spills have occurred to date at the Piney Point terminal, the most severe occurring on June 15. Not only are oysters reported as tainted or dead, but testimony is now available concerning tainted hard crabs and rockfish caught in the lower estuary. Soft-shell clams caught in Piney Point Creek are not edible being tainted of oil.

According to the Chesapeake Bay Foundation, approximately 50 percent of Maryland winter population of diving ducks use the lower Potomac estuary as their primary wintering ground. Over 10,000 Canada geese and numerous whistling swans also use the area. During years of low abundance 50–70 percent of all the canvasback ducks in the Atlantic flyback can be found in the lower Potomac at one time. An ill-timed oil spill could have a drastic effect on the ducks, many of which are already in short supply due to other environmental pressures.

The movement of petroleum products in and out of the terminal at Piney Point will increase tremendously upon the completion of the five storage tanks currently under construction. Upon completion of an oil pipeline to two electric generating plants and a proposed third plant in southern Maryland, the movement of these products into Piney Point will increase even more. Installation and utilization of an additional oil terminal at the Morgantown electric plant will require further product handling. With all this is the ever present potential, the ever-increasing possibility of another spill. For it is a plain and simple fact that all spills, large or small, are caused by human error, human carelessness, or by calamities beyond human control. We know that the personnel at the Piney Point terminal have made a conscientious effort to prevent spills but even with this precaution there have been many. As present operations are expanded, as they most surely will be, we can expect more spills. Accident prevention methods, no matter how conscientiously practiced, are not adequate against human error or poor judgment. Additional precautionary measures to minimize the spilling of oil at the Piney Point terminal, or at any terminal in the Potomac estuary, are without a doubt needed and should be made mandatory. The proper equipment and facilties necessary to reduce the hazards of these spills must be installed and utilized.

Thank you again for the opportunity of appearing before you today.

Mrs. BARNES. As part of our presentation today, I would like to introduce Mr. David F. Sayre, president of the St. Marys County Waterman's Association, Mr. Howard J. Schlereth from Mount Holly, Va., a retired oil company executive who has had over 35 years of experience in the area about which we are talking today, and Dr. Norton Dodge, professor of economics at the University of Maryland.

Mr. REUSS. Captain Sayre.

STATEMENT OF CAPT. DAVID F. SAYRE, PRESIDENT, ST. MARYS COUNTY WATERMEN'S ASSOCIATION

Captain SAYRE. Mr. Chairman and members of the committee, I would like to present some information today pertaining to your study of the environment of the Potomac River.

I have been a waterman working on the lower Potomac for about 40 years. I have been the president of this St. Marys County Watermen's Association for the past 8 years. For the past 15 years I have seen the gradual degrading of the waters of the Potomac River. I live approximately 3 miles from this Steuart oil terminal at Piney Point and in the past years I have seen numerous oil spills, as Mrs. Barnes says; many that weren't reported, especially those many years ago.

Some of these spills were small. Some of them, in my thinking, were very large, and in my thinking also, they were potentially damaging. For example, a number of years ago the lower Potomac River from Piney Point—possibly a little bit above Piney Point—to Point Lookout, the mouth of the Potomac River, was actually covered with oil.

I don't believe this particular oil spill was reported. The citizens of that area didn't think much of it and the beaches were cleaned up in the Piney Point area.

Much of this same oil came into the St. Mary's River, which is an estuary to the Potomac—this is entirely oysterbeds, the St. Mary's River. The only place the oyster doesn't grow is in the channel. St. George's Creek, the same way.

This oil covered these waters over these oyster bars and I personally, and many of the watermen in that area with oyster tongs catching these oysters, we could see the oil. We didn't know what type of oil was on the oysters, but we sold them and wondered at that time whether we were going to be able to sell them or not because the oil was so thick on them.

At this same time I saw ducks on the Potomac shore and I saw them in the St. Mary's River trying to crawl up on the beaches, actually covered with oil and 3 or 4 days after the oil spill I walked around the shore and saw many, many, I'd say I saw personally myself as much as say 50 or 100 ducks dead, covered with oil.

At that time pollution wasn't a word as it is now but these oil spills have continued over the years and now people are more or less rising up against it.

Now, as many of you know, St. Marys County, mostly the lower part of the Potomac River, all of that area, has a very thriving seafood industry. I have written down here 1,500 watermen but I'd like to change that a little to about 1,400 watermen because in the last year I understand 100 of these people haven't been actively engaged on the water. These 1,400 are either making part of their living or all of their living from the water and so many other people are related to this same industry that if something should happen to take this industry from us, we would have a tough time in this area.

There are only three main ways of making a living in St. Marys County: The Patuxent Naval Air Station, farming, and the seafood business.

In addition there are hundreds and hundreds of watermen from Virginia who use this Potomac River. There are hundreds and hundreds of Marylanders from the Eastern Shore of Maryland who come to this same area year after year, especially for oysters and crabs.

There are also many people who come to our area for recreation; sportsmen, who live in the large cities, and this is and has been, I'd say, a wonderful place to spend your vacation, fishing, boating, crabbing and so forth, for pleasure.

With these continued oil spills around our bases, I believe it possibly may be the end of or a decreasing in our economy in that county. It will affect the entire county and on the Virginia side, as far as that goes. It will also affect the whole bay area.

We feel every extra precaution should be taken to prevent these oil spills. I do not have this in my letter here that I wrote, but I have

spoken to some engineers—I am not an engineer myself; I don't know anything about that—but it was brought up before, that there should be some kind of device in case the hose burst, that would contain this oil. I am not an engineer, as I said, but a large enclosure around this flexible pipeline in case it bursts and the valve wasn't turned off in time, that would contain this oil and could later be pumped out. I don't know if it would be an enclosure like a metal enclosure around the flexible pipeline or a dike around the whole thing.

I also have something I would like to add. In this particular area the winds and tides are very strong. That is at Piney Point; especially in the winter months. In case of an oil spill, the winds and tides can easily carry this oil 8 or 10 miles up and down the Potomac River. As you know, the Chesapeake Bay doesn't have much flushing ability. It has narrow capes and oil has to go and come with the tides until it settles to the bottom or wears itself out.

The tidal currents here at Piney Point reach as much as 4 and 5 miles an hour and at this particular point the tides run sometimes in a circle, like a whirlpool, especially about a couple hundred yards offshore of this pier. This creates a very difficult condition for the safe handling of large, deep-water vessels which present a large surface below the waterline. The current sometimes works against the ship and sometimes for it. I have known ships to ram these docks, breaking lines and so forth. The prevailing winds in that area are from the west and northwest, right downwind on this particular pier.

We speak of a boom. There was a comment on this boom. I was on a study committee that the commissioners of St. Marys County formed and according to the President's report at that time a boom did not work in rough waters. Now, we wouldn't be against a boom because I feel sure that it would help in calm waters. The report to the President by the Secretary of the Interior and the Secretary of Transportation in 1968 didn't recommend the boom.

We have come to the conclusion that there should be some other safeguards also. There seems to be more accidents at night than day. You wake up and the oil slick is upon you. Evidently we feel it happened during the night.

The area that is affected is always downtide, or downwind, like our recent oil spill.

We feel that when these ships are unloaded there should be some reliable supervision. We think that Mr. Steuart, the company, probably does all that he can to prevent this, but we should have some outside source looking in.

If one were picking a suitable location for a petroleum tank farm and pier for loading and unloading, I don't think anyone, especially in these areas, or lots of people, would pick this particular spot if they are thinking about preserving seafood and the recreational values of that area. It is a very dangerous spot and, I believe, unsuitable for any sort of oil industry. I feel sure that it will not be removed from there, but I feel sure that there also should be safeguards and the handling of excessive amounts of oil there is going to be more spills and more damage in the future.

Thank you.

Mr. Reuss. Thank you, Captain.

(Note.—Subsequently, Captain Sayre submitted the following supplementary statement:)

SUPPLEMENTARY STATEMENT OF DAVID SAYRE, WATERMAN, ST. GEORGES ISLAND, ST. MARYS COUNTY, MD.

ADVERSE WIND, WAVE, AND TIDAL CURRENT CONDITIONS FOR DOCKING AND LOADING AND UNLOADING LARGE SHIPS AND BARGES AT PINEY POINT

This is an addendum to my previous statement. As I stated there, I have been a waterman in the Piney Point area for some 40 years and for the past 8 years have been chairman of the St. Marys County Watermen's Association representing some 1,500 watermen of the county.

The winds and tides are very strong at Piney Point, especially in the winter months. In the case of an oil spill the wind and the tides can easily carry the oil 8 or more miles up and down the Potomac, damaging some of the most productive and valuable oyster beds in the Chesapeake Bay area.

The tidal currents at Piney Pont are very strong and reach as much as 4 to 5 knots at times. This tends to cause a shifting whirlpool a couple of hundred yards off the point. This creates very difficult conditions for the safe handling of large, deep-draft ships which present a large surface below waterline for the currents to work against.

Many times during the winter months and even as late as March, winds at Piney Point reach a velocity of 45 to 50 miles per hour and waves reach a height of 6 to 8 feet. The prevailing winds come down some 10 to 15 miles of open water creating very difficult conditions for handling a large boat and docking.

Under such conditions, it is impossible to contain an oil spill. Booms and other equipment or safe guards will not work. Clearly unloading or loading tankers and barges should not be permitted in winds of more than 15 or 20 miles per hour. Unloading or loading should also be restricted to daylight hours and with many more safeguards than are presently in use.

If one were picking a suitable location for a petroleum tank farm and pier for loading and unloading, I do not believe that anyone with an interest in preserving the seafood, recreational, and other values of the lower Potomac and safeguarding the public interest at large could conceivably pick Piney Point. It is a dangerous and unsuited spot for such activities which should be phased out in the next few years.

Mr. REUSS. Mr. Schlereth?

STATEMENT OF HOWARD J. SCHLERETH, RETIRED OIL COMPANY EXECUTIVE

Mr. SCHLERETH. Mr. Chairman and members of the committee, I thank you very much for giving me this opportunity to present my views.

I want you to know they are presented after many years of experience with problems of this particular nature. The reason I say this is that I retired a few years ago as chairman of the board and managing director of a Mobil Corp. refining subsidiary in Singapore, I negotiated land and seabed leases and other agreements pertaining to refining with the Singapore Government through its Economic Development Board.

This Economic Development Board was staffed by expert engineers, chemists and economists loaned by the United Nations. They had been drawn from other parts of the world to help in the economic development of Singapore. As a result of this expertise, I had to call on high quality engineering experience, high quality safety experience, high quality environmental experience, from the oil industry here in the United States. They came over and helped me in the

negotiations. I, in turn, gained much practical knowledge of oil terminaling from them.

These negotiations followed 30 years of experience in the Far East. After graduating from college in 1930, I went to China. My first experience was with Chinkiang Terminal near Nanking on the Yangtze River. In those days one of the important elements of our profit was in the amount of leakage and evaporation losses we suffered in our terminals.

Also, large Chinese distributors up country tried to get as much leakage loss as they possibly could. There were consignment agents at the time. It was necessary to know and see that the agents were following correct terminaling in order to maintain equitable relationships with them.

I also had experience at a terminal at Pukow which is in Nanking, China. The Pukow terminal fed tanks we had at Pung Poo up the railroad line. These tanks were filled through pipelines from tankers which were just beginning to come out to the Far East. Even at that early date the tankers were discharged into large bulk tanks without spillage.

It was one of the obligations of the young employees to safeguard the company by seeing that routine terminal procedures were followed and the storage of oil was correctly inventoried. It was necessary to get up before dawn to check the tanks, or to stay up all night with a tanker while it discharged ashore. Failure meant severe disciplining, spillage could mean dismissal.

These experiences were followed up on the Huang-Pu River in Shanghai at Pu-Tung. Then my experience at the Pandacon terminal in Manila; on Mactan Island in Sebu and at La Paz on the island of Panay. The one in Silay in Occidental Negros; Kota Baru in Malaysia, Udorn and Ubon which supplied Laos in Thailand. Port Swettenham on the Malaysian coast.

My experience also involved the bunkering of ships at Pulo Sebarak in the Singapore Straits, and it covered the intricacies of producing, refining, and in transferring oil from operations in Indonesia.

During the course of my career, I was a coordinator for Indonesia and Southeast Asia for Standard Vacuum Oil Co. I was division manager in Vietnam, Cambodia, and in Malaysia.

With this practical experience in the oil business, I feel that I am qualified to make the statements I have submitted in writing to this committee regarding the petroleum terminaling problem at Piney Point and requested by my fellow residents in Virginia and the residents of St. Mary's County in Maryland. I offer these statements which I have written as a result of information I have collected, and I only wish to say in addition to this that I certainly substantiate the statements of Drs. Blumer and Sanders in their research regarding the effects of petroleum in polluting local waters.

My statement reads as follows:

The natural values of the Potomac estuary are in danger of being further degraded unless the inflow of crude oil is confined to existing refineries in the Chesapeake Bay and petroleum products are handled and stored in accordance with the standards established and recommended by the American Petroleum Institute.

Mr. REUSS. Your statement will be incorporated in full in the record. Perhaps you could just summarize the main points.

Mr. SCHLERETH. It can be summarized briefly in this way: First, the petroleum industry's pollution problem is one of loss of profit. If you compare that with other industries, you will find that in the paper industry and similar industries, pollution comes from waste materials. Economically it is cheaper for those industries to rid themselves of these waste solutions in the streams. It lowers their costs.

In the petroleum industry it is different. Leakage and evaporation losses increase costs and losses against profit. So it is in the best interests of the petroleum industry to reduce spillage losses as far as it is possible. Through their research organizations and associations members of the petroleum industry have come up with solutions to many of these problems, solutions which will minimize or eliminate these spills.

I refer to the API standards—that is, the American Petroleum Institute's recommended standards covering terminal procedures for the prevention of pollution, and also standards which have been set up by the petroleum industry regarding specifications covering the pressures used in pipelines and the hoses and other equipment which terminals normally use. Not only that, but spill prevention such as the diking of tanks to prevent fire, or if a fire takes place and one tank bursts to prevent that oil from running into the rivers or the estuaries. These standard procedures and specifications have all been developed and used over the years quite successfully with a minimum of spillage.

I have a copy of the American Petroleum Institute's "Manual for the Prevention of Water Pollution During Marine Oil Terminal Transfer Operations," dated 1964, which specifically sets out many things stated here at this meeting this morning by the Coast Guard and other people. That is what I mean by API standards and I would like to present these copies to the committee.

Mr. REUSS. Thank you very much, Mr. Schlereth, the manual will be included in the record.

(The American Petroleum Institute's "Manual for the Prevention of Water Pollution During Marine Oil Terminal Transfer Operations," published in 1964, is reprinted in the appendix of this hearing record.)

Mr. SCHLERETH. There is nothing more I can add to my particular memorandum except one point: The weakness in the chain of transfer of product from a vessel to a shore installation usually is in the link of transfer of title of the product. Now, if you have a terminal receiving products, that terminal is only charged for the product that it gets in its tank. The supplier takes up the loss that occurs, so it is not in the interests of a terminal to be so concerned with the dollar value of the product lost.

Mr. REUSS. Thank you, Mr. Schlereth.

(Mr. Schlereth's prepared statement follows:)

PREPARED STATEMENT OF HOWARD J. SCHLERETH, MOUNT HOLLY, VA., RETIRED OIL COMPANY EXECUTIVE

The natural values of the Potomac estuary are in danger of being further degraded unless the inflow of crude oil is confined to existing refineries in the

Chesapeake Bay, and petroleum products are handled and stored in accordance with the standards established and recommended by the American Petroleum Institute. The refineries are well etablished in the vicinities of Baltimore and Norfolk where ancillary safety and antipollution facilities have been developed and can be updated and maintained. The standards recommended by the API are those developed by the members of industry as being the methods by which petroleum products can be handled most safely and economically. Oil spills are wasteful, uneconomical and following the API recommendations will reduce their number. Almost all of the important members of the petroleum industry recognize that following these standards are commonsense, practical and profitable business practices. Unfortunately, while these members of industry may advise their terminal and bulk plant distributors to maintain such standards in operations they are unable to require or enforce such practices.

The distributor goes his own way, frequently ignoring sound practice in the interest of reduced capital outlay and operating costs and lets the cost of his mistakes fall on the shoulders of his neighbors. Why shouldn't he? There is no penalty involved. Federal Oil Abatement Statutes (the Refuse Act of 1899, the Oil Pollution Act of 1924, sec. 431–437) provide for maximum penalties of but $2,500, and 1 year in jail. Under even the best of proof and conditions the neighboring fisherman or beach property holder has the proverbial chance of being compensated after risking the legal fees to obtain a judgement. I would suggest that the Federal and State Governments interested in the water resources of the Chesapeake and ifs estuaries, of which the Potomac estuary is one, establish strict and adequate penalties for those terminal and bulk plant operators who do not provide their installations with those standards for equipment, methods, and procedures recommended by the American Petroleum Institute. I would suggest also that legal procedures and methods be created to enable the little man who has suffered such damage to obtain quick and adequate compensation for his losses.

The best and most practical way to minimize spills at Piney Point now and in the future is for the State and Federal Governments to remove limits to the liability of the operating company for damages sustained and to provide for the legal means to collect such damages. The reports of the most recent spills of high viscosity fuel oil indicate that they were due to burst piping. One such spill would indicate faulty equipment or human error. Two such spills would indicate inefficient operating conditions. Three such spills from the same cause indicate willful negligence and a complete disregard for the environment of neighbors. It appears that nothing will bring the communal responsibilities of this terminal to the attention of its headquarters management except a severe penalty and demands that it perform within standards of the petroleum industry as set by the API.

Anyone who has had any experience in handling high viscosity fuel oil with a pour point in the 90-degree range, knows that when it falls in water in the 70- or 80-degree range, it will form into globules, and sometimes blankets, which float on the water, roll on the beaches, or adhere to shore pilings. There the oil remains to soil the environment until eaten away by bacteria.

It has been estimated that the opening of the Morgantown powerplant will require in excess of 30,000 barrels a day of this oil. That is in the neighborhood of 1,200,000 gallons a day. It is to be mixed at Morgantown with 200 tons of coal each hour for the furnaces there; 50,000 gallons must flow through Piney Point each hour to meet this demand. This 50,000 gallons an hour will be in addition to the volume which is now flowing through the terminal. If the terminal proportionately increases the number of spills precautionary measures should now be taken. I suggest that the terminal be required to meet all those standards set up by the industry as to facilities, methods, and management. Also that State laws be adopted to require such standards of performance in all terminals and bulk plants in the Potomac estuary. The foregoing recommendations are made after 35 years experience in the petroleum industry and dealing with agents and distributors knowing that their survival often depends on their doing the least that is requirede environmentally.

Mr. REUSS. Dr. Dodge.

STATEMENT OF DR. NORTON T. DODGE, ASSOCIATE PROFESSOR OF ECONOMICS, UNIVERSITY OF MARYLAND, VICE PRESIDENT OF ST. MARYS COUNTY COMMISSIONER'S STUDY COMMITTEE ON THE DEVELOPMENT OF PINEY POINT, AND COCHAIRMAN, POTOMAC TIDEWATER COUNCIL (IN FORMATION)

Dr. DODGE. Mr. Chairman and members of the committee, since I submitted my formal statement the other day and it will be incorporated in full, I will summarize it briefly.

The recent serious oil spill at Piney Point has dramatized the inevitability of accidents as the volume of petroleum shipments and transfers increases.

The question has already become, "Where should we permit damage to occur? Should it be in already degraded areas or in unspoiled areas still richly productive of seafood and uniquely blessed with recreational resources?"

With respect to the operation at Piney Point, the evidence indicates that frequent small spillages and leakages have had cumulative adverse effect on an area around Piney Point. However, one major oil spill would adversely affect many miles up and down the Potomac estuary, ruining an oyster harvest, spoiling the flavor of fish, killing wintering and migrating waterfowl, and doing damage to hundreds of boats and miles of shoreline and beaches. Repeated major spills would have severe and lasting adverse effects on the seafood industry of the entire lower Potomac as well as on the propagation of the seed oysters in nearby St. Mary's River which are used in other areas of Chesapeake Bay.

In my paper I attempted to set up a framework for analyzing the probability of spills and the varying degrees of resulting damage, and while I do not provide specific probabilities for spills or estimates of the damage from the spills of various sizes, I think that when you examine the tables you will see that anyone who makes a decision, whether he be a public official or persons such as yourselves who are trying to formulate useful public policy has to make implicit assumptions about the probabilities of spills of various sizes and degrees of damage over a period of years.

My tables are an attempt to force people to make explicit in their own minds and in public discussion what otherwise is likely to remain implicit.

It is clear that the probability of an accident is very closely related to the volume of oil shipped and the Steuart volume, based on last year's figures, is going to increase two to two and a half fold, in the next couple of years in the normal course of expansion necessary to supplying the powerplants now being built. If Steuart should put in a topping plant or a full refinery, the current volume would increase five to ten fold which means the exposure to damage would be that much greater.

In conclusion, I would like to say that an expansion or even the continuation of the Steuart operations at Piney Point poses a severe threat to an as yet largely unspoiled and uniquely valuable estuarial resource. Storage and other petroleum facilities such as theirs should not be located in an area such as Piney Point but rather in more protected, already developed, and environmentally damaged areas such as Baltimore Harbor or the Norfolk-Hampton area.

Thank you.

Mr. REUSS. Thank you, Dr. Dodge.

(Dr. Dodge's prepared statement follows:)

PREPARED STATEMENT OF DR. NORTON T. DODGE, ASSOCIATE PROFESSOR OF ECONOMICS, UNIVERSITY OF MARYLAND, VICE CHAIRMAN OF ST. MARYS COUNTY COMMISSIONER'S STUDY COMMITTEE ON THE DEVELOPMENT OF PINEY POINT, AND COCHAIRMAN, POTOMAC TIDEWATER COUNCIL (IN FORMATION)

The recent serious oil spill at Piney Point which has affected beaches, shorelines, and oyster beds for miles up and down the Potomac and its side creeks and the later more extensive spill in the Baltimore Harbor area dramatizes the inevitability of accidents as the volume of petroleum shipments and transfers increase.

In a sense, the question has already become where should we permit the inevitable damage to occur? Should it be in already degraded areas or in unspoiled areas still richly productive of seafood and uniquely blessed with recreational resources.

With respect to Steuart Petroleum's operations at Piney Point, evidence indicates that frequent small spills or leakages have had a cumulative adverse effect on an area around Piney Point. However, one major oil spill could adversely affect may miles up and down the Potomac estuary, ruining an oyster harvest, tainting the flavor of fish, killing wintering and migrating water fowl, and doing damage to hundreds of boats and miles of shoreline and beaches. Repeated major spills could have severe and lasting adverse effects on the seafood industry of the entire lower Potomac as well as on the propagation of the seed oysters in nearby St. Mary's River which are used in other areas of Chesapeake Bay.

Steuart's expansion has begun to increase substantially the volume of shipments of all products but particularly fuel oil. According to the company, an average of 40,000–50,000 barrels of petroleum products was shipped in and out of their storage facilities every day in 1969. This will increase to over 100,000 barrels a day in a few years with the completion of planned expansion. Addition of the proposed topping plant would increase the volume of shipments to an average of over 200,000 barrels a day, much of which would be crude oil with attendent greater danger. Expansion to a 200,000 barrel a day full refinery, which an engineering consultant considers a real prospect, would double again the volume of both crude oil and total petroleum products handled. Thus, exposure to damage from spills would be increased some twofold to threefold with normal expansion, some fivefold with the addition of a topping plant, and tenfold with a full refinery.

Safeguards for the handling of oil are far from foolproof at the present time and are only effective under favorable weather conditions. It appears, therefore, that barring any significant improvement in technology, the danger of oil spills in the area would increase in proportion with increases in the volume of crude and other petroleum products handled.

If we limit our concern for the moment to estimating damage from oil spills, we should very much like to provide answers to such questions as: "What is the probability of an oil spill occurring in the next year which would cause $100,000 of damage? In the next 5 years? In the next 10 years?" We should also like answers for spills causing $500,000 and $1,000,000 of damage. Unfortunately, present statistical data on oil spills are neither sufficient nor of a nature which could provide satisfactory answers to such questions. Nevertheless, any time you or other responsible decisionmakers think or say, "We believe the chance of serious damage to the seafood industry from oil spills is great," or "* * * is small," a table such as follows is filled in implicitly in thought or words, if not explicitly on paper as here. See table 1.

TABLE 1.—ESTIMATED PROBABILITY OF OIL SPILLS AT OR RELATED TO THE PINEY POINT COMPLEX

Severity of spill	Time period			
	1 year	5 years	10 years	20 years
Small in size and damage	Moderate	High	Very high	Extremely high.
Moderate in size and damage	Low	Moderate	High	Very high.
Major in size and damage	Very low	Low	Moderate	High.
Catastrophic in character	Extremely low	Very low	Low	Moderate.

Such a table is far from precise, since it does not quantify "small," "moderate," or "major," for degrees of severity, or "extremely low," "very low," or "low," etc., for probabilities. Despite this unavoidable lack of precision, we argue that advisers or decisionmakers should be required to make explicit the implicit bases of their advice or their decisions. Then these explicit assumptions can be discussed openly, in the light of whatever revelant data may be available. Clearly a catastrophe such as occurred with the *Torrey Canyon* or in the Santa Barbara Channel might not be avoided by this process, but it would not be stumbled into without some attempt, even though inadequate, to weigh probable costs against the benefits associated with a given action.

Damage to the environment by a petroleum complex—smell, noise, scenic damage—comes from a number of factors in addition to oil spills, and these must be included in any estimate of expected damage. Any evaluation of such environmental costs must recognize that they are very real, even if elusive for economic measurement.

Again, data for precise estimation of environmental costs are lacking, but experience at other storage and refinery sites and expert testimony can serve to provide, in broad terms, a fairly reliable assessment of probable expected damage.

Table 2, like table 1, forces us to arrive at explicit, even if imprecise, conclusions about the probable damage to various aspects of the environment from a petroleum complex. By requiring some thought about short term (1 year) versus long term (10 year) effects, it compels one to consider delayed and cumulative environmental impacts.

CONCLUSION

Expansion or even the continuation of the Steuart operations at Piney Point poses a severe threat to an as yet largely unspoiled and uniquely valuable estuarial resource. Such storage and other petroleum facilities should not be located in such an area but rather in more protected, already developed and environmentally damaged areas such as Baltimore Harbor and the Norfolk-North Hampton area.

TABLE 2.—PROBABILITY OF DAMAGE FROM A PETROLEUM COMPLEX AT PINEY POINT TO ACTIVITIES IN THE SURROUNDING AREA

	Extent of damage to activity					
	Probability of "some" damage		Probability of "considerable" damage		Probability of "great" damage	
Activity	Within 1st year	Within 10 years	Within 1st year	Within 10 years	Within 1st year	Within 10 years
Oysters and seafood	Moderate	High	Moderate	High	Low	Moderate.
Waterfowl	Do	do	Low	Moderate	Low	Do.
Tourism	High	do	do	do	Low	Do.
Recreation	Do	do	do	do	Low	Do.
Existing land use (primarily homes in immediate area).[1]	Do	do	High	High	High	High.
Existing land use (in broader area) [2]	Moderate	do	Low	Moderate	Low	Low.
Esthetics (in immediate area) [1]	High	do	Moderate	High	Moderate	Moderate.
Esthetics (in broader area) [2]	Moderate	do	Low	Moderate	Low	Low.

[1] Within a 1 mile radius of the perimeter of the refinery complex.
[2] Within a 5 mile radius of the perimeter of the refinery complex.

Mr. REUSS. Dr. Dodge, you say in your statement that addition of the proposed topping plant would increase the volume of shipments to an average of over 200,000 barrels a day, much of which would be crude oil with attendant greater danger.

What is the status of that proposed topping plant?

Dr. DODGE. It would probably be better to ask the Steuart Petroleum Co. representatives.

Mr. REUSS. What is your understanding?

Dr. DODGE. I understand they have no permits to import the necessary crude oil to operate a topping plant. They made a later proposal, to build a desulfurization plant, hoping to get bonus quotas from

Interior, but they were turned down on that as well. Currently the issue is in abeyance, but since the profit potential for them is very great, I wouldn't be surprised if the proposal were revived. I think they would be happy if some county commissioners and other local officials more favorable to their proposals were elected in the next election. Thus far the local people have resisted any blandishments, but with an election coming up we face problems in keeping the local government in the hands of local people.

Mr. REUSS. You aren't suggesting the petroleum industry engages in politics, are you?

Dr. DODGE. That would be the last of any suggestions I would want to make.

Mr. REUSS. I notice in your conclusion you say that Steuart storage and petroleum facilities really shouldn't be located in an area like Piney Point at all but rather in some already developed and environmentally damaged area such as Baltimore Harbor, or the North Hampton area. Is that your statement?

Dr. DODGE. That is correct.

Mr. REUSS. The Steuart Co.—and I have looked at their statement—says in effect that to use Baltimore or the Norfolk area to supply Washington with its oil would necessitate a tremendous barge trip of some 200 miles in either case, I believe. What would be your rebuttal, if any, to that?

Dr. DODGE. My rebuttal to that would be they are currently building a pipeline of more than 30 miles in length—I am not certain. It may be 50 miles in length. That length would certainly be adequate to supply the whole Washington area by pipeline——

Mr. REUSS. From where to where?

Dr. DODGE. From Baltimore.

Mr. REUSS. To where, Washington?

Dr. DODGE. Yes, Washington.

Mr. SCHLERETH. Mr. Chairman, I'd like to add something to that.

Mr. REUSS. Would you agree with what Dr. Dodge just said?

Mr. SCHLERETH. I not only agree with that, but there is something else that many people do not realize here in the United States and that is that these United States are covered by networks of pipelines which extend from Texas on up to Baltimore and to New York and places of that nature through which crude and other products are daily transported in much greater quantities than the railroads handle. These harbors such as Baltimore and Norfolk have facilities, ancillary facilities, for taking care of fires and catastrophes that a place like Piney Point could never have. If you have a tanker go aground there at Piney Point and the skipper starts discharging his cargo, where are you going to get the tugs to pull him off? If you have a fire on a tanker discharging there, where are you going to get the firefighting equipment to put the fire out? These are the things that people do not realize when they handle large quantities of oil, and there is an entirely different thing between fuel oil and crude oil. Crude oil is one of the most explosive items that you can handle. It evaporates. It pollutes the air. It is very difficult to handle. All the butanes, propanes and lighter elements of this crude oil go up into the air almost immediately. On the other hand, it does more damage to your environment if it is out

on the ground or it goes into the water. There should always be an understanding of the difference between crude oil and a product.

Mr. REUSS. Dr. Dodge, what is this pipeline that is now being built between Baltimore and Washington? Is it for crude?

Dr. DODGE. They are building a pipeline from the Piney Point terminal up to the Morgantown powerplant. I am suggesting that as an alternative the pipeline could be built from Baltimore to Washington, or there may even be existing pipelines that could be used for fuel oil. Perhaps the powerplant should never have been built at Morgantown, but should have been built closer to Washington and supplied from Baltimore. I was at yesterday's hearings. Clearly the proposed Sandy Point plant might better be put closer to Washington at Blue Plains. Again, in an area that is already environmentally damaged instead of in an area that is uniquely valuable for recreational use, seafood production, striped bass spawning, and so on.

Mr. REUSS. Captain Sayre, is it your opinion that the Potomac estuary has been permanently impaired by the oil spills from Piney Point?

Captain SAYRE. That is a difficult question to answer, but in my opinion I think it has.

I can see the difference in the seafood, not the taste of it yet, but the looks of it, the way it grows from year to year, the production. It seems to me with polluted waters, oil or other pollutants, that especially the fish are going away from this particular area. I noticed this more so this past year than any other time.

Two or 3 years ago, from then on back in past years, that area was thriving with rockfish and almost any other type of fish that generally used this area.

This year, the watermen will agree, and the people in that area who do any fishing will agree, that there was less rockfish than was ever known. I understand that there is a few rockfish down in the lower part of the bay but very few catches up in our area.

I understood from fishermen older than I am that a rockfish will only go in polluted waters to spawn because he is driven there by nature, I guess, to heads of rivers. Evidently these fish, when they get out of these polluted waters like the head of the Potomac River, that is all we see of them.

So that is my answer.

Mr. REUSS. I see. Mrs. Barnes, would you say that the Potomac estuary has been permanently impaired by the Piney Point oil spills?

Mrs. BARNES. I would say that it could be permanently impaired by repeated spills.

Mr. REUSS. Mr. Schlereth?

Mr. SCHLERETH. No, I do not feel that. I feel that there is a natural flushing out of these areas by rainfall and if the oil spillage were stopped or minimized to this one-tenth of 1 percent mentioned before, the river would not be damaged permanently.

Mr. REUSS. Dr. Dodge, do you have an opinion one way or the other on this question?

Dr. DODGE. After hearing the testimony this morning about the normal spillage at a very well-managed facility, it would seem there is likely to be cumulative damage to the area around the pier.

I know people who have skin-dived there find what they call "dead bottom" around the pier. How far it will extend would be related to how extensive these spillages were and how frequent in future years. But I think one can say that there is permanent damage to a limited area which could expand with further expansion of Steuart's operations.

Mr. REUSS. Mr. Parker, do you have an opinion?

Mr. PARKER. No, sir, not on that.

Our basic concern is damage occurring above the water to waterfowl. We are interested in the other facets.

May I call your attention to the fact that this section of the Potomac River is, we think, the most important stretch in the Atlantic area for the diving ducks and that an oil spill of some consequence there could cause a great deal to happen.

The same thing is true with Baltimore Harbor; the area south of there is important to us. They are important to canvasbacks, which are in short supply.

Mr. VANDER JAGT. Just one question of Mr. Schlereth.

In your presentation, you said that you thought perhaps the best and most practical way to minimize oil spillages is to remove the limits on liability to those who are responsible for the spillage. As I understand it, the Water Quality Improvement Act passed by the Congress this year and signed into law on April 3, 1970, places a limit of liability for those responsible for cleanup costs incurred by the United States for oil spillage from vessels at $14 million, or $100 per gross ton of the vessel, whichever is less. Where there is willful negligence or misconduct, the limitation does not apply. The limit for onshore and offshore facilities is $8 million.

I also notice that you indicate where there is one spill it could be error, where there are two, that could be inefficient operation, but when there have been three, in your opinion that is willful negligence.

Mr. SCHLERETH. Yes.

Mr. VANDER JAGT. Do you think that legislation signed into law is indeed helpful in attacking this problem?

Mr. SCHLERETH. Well, legislation signed into law would be helpful, but the implementing of the legislation is the part that always seems to fail.

The little individual who has not the time or the resources to go to the court to seek damage is the man who is most hurt in this.

As pointed out in the paper the other day, the Humble Oil Co., supplying a barge that overflowed at Baltimore, was out with the insurance assessors to determine what damage had taken place. This is the way in which these things should be handled.

Mr. VANDER JAGT. What you are saying is that the regulations and the implementation of them are all important?

Mr. SCHLERETH. Yes.

Mr. VANDER JAGT. Thank you.

Thank you, Mr. Chairman.

Mr. HICKS. Mr. Schlereth, I want to say that your experience certainly is impressive.

As I understood your statement, the people that are delivering the oil, the tanker is the one most motivated to prevent these spills. Did I understand you correctly?

Mr. SCHLERETH. No, I meant just the opposite. There has been a great change in our maritime system in the last 30 years.

Most everyone had to go to foreign flag vessels because of conditions which existed in the States regarding cost of operating vessels. These foreign flag vessels are captained by foreign skippers. These foreign skippers have no regard for local regulations at all. This not only occurs here, but it occurs in China, along the coast of China, Africa, every place. They will dump their ballast water at night, even if they are within 2 miles of shore. You cannot prevent it.

They will not have proper watchmen on board during times of discharge. A hose will break because they overpump. You have no recourse. They are up and away the next day. Even though they are under contract with you, the proof that they did it is out of your hands.

Now if there were only some way where the terminal, the shore terminal, could be responsible for all actions of any ship tied up to that terminal, where that terminal can then seek recourse through its suppliers, then perhaps you could eliminate this particular problem.

Mr. HICKS. Did I understand you to say that the terminal only pays for what actually gets into its tank?

Mr. SCHLERETH. Yes.

Mr. HICKS. But the supplier knows how much went aboard the transport?

Mr. SCHLERETH. Yes, but the supplier does not know how much got there.

Now the only way that you have of determining what you deliver to a distributor is the amount that he shows in his tank after pumping has been finished.

Mr. HICKS. Why do you say there is no way of determining what got there then? You know what he paid for. That is what got there.

Mr. SCHLERETH. Yes. The only thing that the terminal pays for is the amount they got into their tank. The leakage which takes place before it gets into the tank——

Mr. HICKS. Is that not where it is unloading? Where else is there leakage?

Mr. SCHLERETH. The only place there can be a leakage is from the valve on that vessel and the valve on the tank that is being filled.

Mr. HICKS. That is what I do not follow, when you say there is no way of determining what went into that tanker that did not get into the recipient tank.

Mr. SCHLERETH. Tankers do not always lie level, their stern may be down. It is almost impossible to take the exact measure on a tanker.

Mr. HICKS. As to what got into it in the first place?

Mr. SCHLERETH. No. You always know the amount you are loading at your loading point. The only amount that you can determine that you delivered is the amount you have actually placed in the hands of your distributor.

Mr. HICKS. All right. What about the difference in between?

Mr. SCHLERETH. The difference the supplier usually makes up.

Now it is the company, the carrier, usually on your own carriers—that is contracted carriers or in your own vessels, but occasionally when you get other carriers like the Greek fleets and other foreign fleets, you have to negotiate any exceptional loss out with the carrier itself.

Mr. HICKS. It is there that your spills come from and there is no way of controlling that at the present time?

You would put the onus on the terminal?

Mr. SCHLERETH. Legally, it is almost impossible to place your finger on a foreign vessel or a foreign contract vessel for any spillage or anything of that nature. I would place the full responsibility of that leakage on the terminal itself. That is, any action of that ship while it is tied up to the piers of that terminal should be the responsibility of the terminal.

The terminal, in turn, if it suffers a loss, should seek recourse through its legal channels with its supplier and the carrier.

Mr. HICKS. Thank you very much. Mr. Gude?

Mr. GUDE. With regard to the guidelines which have been established by the American Petroleum Institute, is there any mechanism or procedure by which various members of the Institute conform or indicate their acceptance and compliance? How are they utilized?

It sounds like the industry has a very valuable tool.

Mr. SCHLERETH. The American Petroleum Institute is a gathering place for all research information, approved methods and procedures, things of that nature, governing the petroleum industry itself.

In other words, there might be a development in the gulf on drilling or a development in South Africa. This information is flowed through this association, which in turn publishes this and makes it available to its members.

Its members are usually the leading oil companies in the United States, in this case. The British also have such an association.

So this is really a helpful guide. Your engineers and your managers and people of that nature can refer to these bulletins.

Mr. GUDE. I gathered that the institute has established standards which, for example, if you started an oil depot, you could refer to for a set of guidelines which, if followed, would guarantee that your accidents are at a minimum.

Mr. SCHLERETH. That is correct. It is correct to the extent that in the resolution of many of these matters with the Singapore Government, which was under British control, they insisted upon the standards set up by the British Petroleum Institute versus the American Petroleum Institute.

We, as an American company, preferred to use many of the standards set up by our own people.

We had quite an argument about this particular policy that we would follow and had to reach a compromise.

Nevertheless, we were following what we felt were the safest and most economical methods for building this refinery.

Mr. GUDE. These API standards are not just for industrial safety, but actually to minimize oil spills?

Mr. SCHLERETH. Yes, yes. It sets up procedures and advises on what to do on oil spills. The manual I turned over to the committee has all of that in it. Notify the Coast Guard is the first thing you do. Always notify the Coast Guard.

Notify the local fire department, as to the amount of spill, the cause of it, everything of that nature.

Do not try to hide it. Notify these people. That is the recommendation in the manual.

Mr. GUDE. You say the first act according to this code in case of a spill is to notify the Coast Guard?

Mr. SCHLERETH. Always notify the Coast Guard.

Mr. GUDE. Thank you.

Mr. HICKS. Mr. McCloskey?

Mr. MCCLOSKEY. Do you know whether or not standards of the American Petroleum Institute have been followed by the Steuart Petroleum Co. at Piney Point?

Mr. SCHLERETH. No; I have no knowledge.

Mr. MCCLOSKEY. You have no knowledge at all?

Mr. SCHLERETH. No, sir.

Mr. MCCLOSKEY. Have you had an opportunity to compare those standards with the proposed regulations that the Coast Guard offered in testimony here today?

Mr. SCHLERETH. No, I have not.

Mr. MCCLOSKEY. In your judgment, would it be negligence on the part of any oil company which failed to follow the standards of the American Petroleum Institute?

Mr. SCHLERETH. I would put it another way: that oil company is not operating in its own best interests. Now in making that statement, we must point out one thing. I retired 5 years ago. Up to that time there was no talk about pollution or anything of that nature. It was not a public issue at all.

The real motivating force on the part of the petroleum industry was to save money—that is lower your costs, save your leakage. It was not primarily concerned with polluting of waters or anything of that nature. That just naturally came about.

Is that clear to you?

Mr. MCCLOSKEY. I understand that.

You have made a very good point, I think, in your testimony that one of the problems with the present law is that a waterman, for example, who may lose his entire livelihood because his oyster beds are fouled up with oil or his source of income is denied him because of an oil slick, is in a terrible position to file a lawsuit because he cannot obtain evidence to prove damages as to negligence.

Generally, when we pass a law that causes regulations to come into being, someone who violates those regulations can be sued for negligence; it is negligence per se. This would give the Watermen's Association, perhaps in a class action brought by an attorney on behalf of the 1,400 watermen, a suit for civil damages as a result of oil spillage traced to a failure to comply with the American Petroleum Institute's regulations. That is why I ask this question:

If an oil terminal did not comply with the American Petroleum Institute's own regulations, in your opinion would that be negligence on its part?

Mr. SCHLERETH. It would be negligence if not following them caused the oil spillage.

Mr. MCCLOSKEY. Thank you.

Mr. HICKS. Thank you.

Mr. MCCLOSKEY. Could I ask at this point, do we have in this record or appended to the record a copy of the American Petroleum Institute's regulations?

Mr. DAVIS. Yes, sir.

Mr. SCHLERETH. I can submit this. It is a catalog of all its publications, covering all phases.

Mr. HICKS. I am sure counsel would be glad to have it for further research.

(The American Petroleum Institute's "Publications and Materials," 1969, referred to above is in the subcommittee files.)

Mr. HICKS. Mr. Leonard P. Steuart.

Chairman Reuss went over to answer a rollcall. He will be right back. Since all the rest of us have to go over to answer this rollcall, I think we will recess and then Chairman Reuss can determine when we will start.

(Recess.)

Mr. REUSS. Would Mr. Steuart, accompanied by his associates, Mr. Saul and Mr. Smith, be seated at the witness table, please.

Mr. Steuart, you have a prepared statement which under the rule will be admitted in full in the record. Would you now proceed?

STATEMENT OF LEONARD P. STEUART II, VICE PRESIDENT, STEUART PETROLEUM CO., WASHINGTON, D.C.; ACCOMPANIED BY WILLIAM R. SAUL, VICE PRESIDENT AND GENERAL MANAGER, PINEY POINT OPERATIONS; AND ROBERT V. SMITH, COUNSEL

Mr. STEUART. Mr. Chairman, my name is Leonard Steuart; I am vice president of Steuart Petroleum Co. of Washington, D.C.

I appreciate the opportunity to appear before this subcommittee for the purpose of discussing with you our company's operation at Piney Point, Md., and the effect of these operations on the environment of the Potomac River estuary.

It is my intention to keep my testimony as brief as possible, concentrating on the issues raised by the committee in requesting our presence.

Steuart Petroleum Co. has been in business over 65 years. It was originally engaged in the coal and ice business, and later with home heating oil and then subsequently, in the late thirties, moved into the field of commercial heating oil, which characterizes our business today. Our company is the principal supplier of commercial heating oil in the metropolitan Washington area for utilities, Federal and District of Columbia government, schools, hospitals, office buildings, and other commercial establishments. We have supplied the Federal Government's heating fuel oil needs on the basis of annual competitive bids since 1943.

This commercial or heavy heating oil is known as "residual fuel oil" and is sometimes referred to as No. 6 oil, No. 5 oil (a blend of No. 6 and the lighter No. 2 home heating oil) and in marine application as "Bunker Fuel Oil" or "Bunker C." It is heavy liquid substance which remains after certain lighter fuels, that is, gasoline, kerosene, distillate fuel oil, solvents, et cetera, are extracted from crude oil.

Due to its unusual properties, this heating oil is the oil industry's best heat-energy bargain, that is, the most heat units at the lowest cost. It is used extensively to fire powerplant boilers in public utility and industrial installations, as a fuel in the heating plants of apartment houses, office buildings, hotels, schools, and hospitals, and as fuel in diesel engines.

The bulk of this heating oil as used on the east coast of the United States is imported from foreign refineries, principally Venezuela, and is transported in large oceangoing tankers which can only be received at deepwater terminals having a minimum of some 42 feet in depth. Domestic refineries produce very little residual because their market is for the lighter fuels, gasoline, and jet fuels, and the domestic refineries operate at capacity for this purpose.

In order that it be transported, stored, and delivered, this oil must be handled under heat, approximately 120 degree to 150 degrees Fahrenheit in order to permit mobility. Otherwise it solidifies. So, not only must the tanker have heating facilities, but so must the terminal facilities, consisting of heated pipelines and heated storage tanks, and also the tank trucks hauling the oil must maintain the heat until the oil is delivered to the consumer who also must handle the oil under heat.

Prior to 1949, the supply of commercial heating oil for the Washington metropolitan area was tankered to Baltimore and then barged to Washington via the Chesapeake Bay and the Potomac River to our Anacostia terminal, and from there delivered to customers by tank truck. The water distance from Baltimore to Washington is approximately 200 miles and the barge time from Baltimore to Washington is approximately 24 hours, excluding unloading time. Oil supplies were also barged from Norfolk deepwater terminals, also approximately 200 miles by water and also an approximate 24 hours barge trip to Washington.

By 1949 the volume of heating oil consumed by users in the Washington metropolitan area was growing rapidly, and it became imperative that a more economical and more efficient method be effected to serve the Washington metropolitan area through the development of a deepwater terminal capable of receiving large oceangoing tankers. An intensive survey of possible locations for such a deepwater terminal resulted in the selection of Piney Point as the appropriate site because of its proximity to Washington, a water distance of some 80 miles, and approximately 10 hours by barge, and the only place on the Potomac River close enough to shore with sufficiently deep water capable of receiving large oceangoing vessels.

Prior to the construction of the Piney Point terminal, the Washington metropolitan area was dependent upon Baltimore and Norfolk for residual fuel oil storage.

Since 1950, when the first tanker docked at Piney Point, the volume of oil consumed in the Washington area has increased steadily, reflecting the growth pattern with which we are all familiar. In 1969, 9,700,000 barrels, or 407,400,000 gallons (42 gallons to a barrel) of oil were transshipped through the Piney Point terminal compared to 6,200,000 barrels, or 256,400,000 gallons in 1959. The Federal Government alone requires some 85 million gallons annually. This growth is continuing. With the start up of Pepco's new Morgantown oil burning plant this summer, potential conversions of coal to oil at other plants and construction of additional plants within the next 5 years, the volume of oil handled by the Piney Point terminal will necessarily increase substantially.

It is ironical indeed that in bringing this most essential product to the Washington metropolitan area, with special specifications to combat air pollution by meeting recently enacted air pollution control laws,

we encounter the risk with this very same product of adding to the water pollution problems in its transportation.

Against this background, let me address myself to two questions which I believe go to the heart of the inquiry being made by this committee:

1. Are the operations at Piney Point creating any real or lasting damage to the ecology of the Potomac estuary; and

2. What measures are being taken currently, and what additional measures are planned to minimize oil spills?

As far as the first of these points is concerned, I think that it must be recognized that any operations involving human beings are susceptible to human error. It would be both unrealistic and dishonest for me to say that oil spills won't always be a possibility at Piney Point, or for that matter, anywhere else where oil is handled. Whether we are dealing with moon capsules, airplane flights, driving a car, oil shipment, or any other segment of our complex economy, we know that we cannot wholly eliminate the risk of something going wrong.

On the other hand, if we are to fairly judge the total effect of any given enterprise on the environment, we must look at the record over a period of time. One does not evaluate flight safety on the basis of one airplane crash, but on the basis of overall performance per passenger mile.

We have been operating at Piney Point now for just over 20 years, and during that time our spillage has been comparatively negligible. I believe that no one, not even our bitterest opponent, would say that the Potomac estuary has been in any way permanently impaired by any of these spills.

Mr. REUSS. Mr. Steuart, at this point: You heard the testimony of Captain Sayre and Dr. Dodge that in their judgment the Potomac estuary had been permanently impaired by the Piney Point spills.

Mr. STEUART. Yes, sir; I did hear that.

Mr. REUSS. Would you care to modify your statement in the light of that?

Mr. STEUART. I would welcome a biological study, such as Drs. Blumer and Sanders conducted in Massachusetts, on the area at Piney Point. We feel that over the years our spills have been very negligible. I certainly question whether there has been any permanent damage to the Potomac estuary as a result of our operation.

Mr. REUSS. I am sure you do, but you wouldn't want to say that no one has made this assertion in view of the testimony we have just had from the two witnesses I mentioned.

Mr. STEUART. I will modify it then, Mr. Reuss.

(Continuing with prepared statement.) Like an airplane crash, each spill, regretfully, has a short term impact of inconvenience and unsightliness. I understand, for example, that the oil drenched beach area in England caused by the Torrey Canyon spill a couple of years ago, has been cleaned up to an extent that no one would now know that such a major spill ever occurred, and that the ecology there is normal. However, I do not wish to underestimate the very real distress this has caused our neighbors when it occurs, nor do I mean to imply that as a result some damage to oysters and clams may not occur.

Yet, I believe that the record will bear out that the annual seafood harvest figures for the Potomac estuary in no way substantiates any

overall ill effects directly attributable to the oil terminal operations at Piney Point. In fact, the best oystering, crabbing, and fishing in the area is still under our terminal docks and in our creek.

Nevertheless, as a successful and reputable business concern, we are not content to rest our efforts upon the arguments which I have just cited. We recognize that we have a continuing obligation to improve the handling of incoming and outgoing petroleum products so as to reduce the risks to the absolute minimum, and we are prepared to spend whatever funds are necessary to accomplish this end.

I would like to describe the steps we are taking both to prevent spills and to reduce the damage of spills should they occur.

As in all other environmental situations, industry must apply its technological skills to the solution of environmental pollution problems. The dependence of our system upon oil products makes it imperative that we find ways to get the benefits of this vital source of energy and at the same time eliminate the liabilities as far as humanly possible. In the past, the oil industry, like others, has concentrated its technological efforts upon production problems, and has only recently turned the full force of its technological competence in the direction of environmental protection.

As far as ship-to-shore handling of fuel oil is concerned, technological advances mean improved methods of pumping and conveying the product between transport and storage and between storage and transport.

At Piney Point, we are currently in the process of totally revamping our conveying devices. We have already installed a $30,000 steel loading arm in our barge loading operation and have purchased another for use at our upstream barge terminal in Anacostia. The engineers are now analyzing our tanker-to-shore unloading system and will shortly recommend to us the type of loading arms that will be required for this operation.

This patented steel loading arm is an all-metal device which will completely eliminate the hoses that have been used in the past. It is an example of the kind of technological improvement of which this industry is capable now that it is turning the full force of its research ability toward environmental problems. Along with the new loading arm development, the industry is producing greatly improved pressure hoses of the more conventional type. Another effort to prevent spills awaits the issuance of a permit to allow the loading of barges on the lee side of the present loading site.

Mr. REUSS. What is the regulatory body charged with the issuance of that permit?

Mr. SMITH. The Maryland State body. The Corps of Engineers. The Maryland State Water Resources Board.

Mr. REUSS. When were applications for a permit to allow the loading of barges on the lee side of the present loading site made to those two bodies?

Mr. SMITH. It has been about a year ago, sir. There is a matter of litigation involved between private parties. It is really a matter held up in court. It really has nothing to do with the governmental departments at this time.

Mr. REUSS. It would seem to me the issuance of such a permit, particularly since it would permit the erection of a permanent boom, would be readily forthcoming from both of these agencies.

Mr. SMITH. Except that there was an injunction proceeding in the court, and by reason of those injunctions the permit proceedings have been held up. This is perfectly proper.

Mr. REUSS. Who is in opposition?

Mr. SMITH. There are adjacent landowners who believe that the covenants in effect prevent the type of pier that we wish to put out there.

Mr. STEUART. (Continuing with prepared statement.) This new location can be permanently boomed, thus making the barge loading a virtually sealed operation.

Should a spill occur, we have assembled a battery of counter measures aimed at minimizing the effects of the spill as rapidly as possible. We have purchased and have standing by at Piney Point a $60,000 Mopcat, a newly perfected skimming device made by the Worthington Corp. This device is almost 100 percent effective for small spills. We also have the latest absorbents and dispersants, which act effectively to reduce the damage caused by spills.

Mr. REUSS. Are those absorbents and dispersants detergent?

Mr. STEUART. No, sir, the absorbent is not a detergent of any sort. The dispersant is a detergent agency and it is not approved. We have purchased it but may not use it.

(Continuing with prepared statement.) We also have floating booms on hand to use to contain spills within a limited area. With regard to the Swedish boom, it was demonstrated in Baltimore Harbor some 3 weeks ago. This boom, the representatives tell us, will not work effectively in a current in excess of 2 knots. Our prevailing current in the Piney Point area is 4 knots, but we have asked them to bring the boom to Piney Point to demonstrate its effectiveness in that area.

Mr. REUSS. Was this a boom developed in Sweden?

Mr. STEUART. Yes, sir, this is a Swedish boom.

(Continuing with prepared statement.) Our pressure hoses are subjected to periodic testing.

Lastly, should a spill occur, we immediately get to work on a complete cleaning program, which includes all affected bulkheads, beaches, buoys, and boats, as well as anything else requested of us by our neighbors. Curiously enough, as an aftermath of the most serious spill in our history, which as you know occurred just last month, we were both surprised and pleased to be on the receiving end of phone calls and visits from many of our neighbors complimenting us on the cleanup job we were doing.

At this point I would like to submit a series of photographs which will graphically display the effects of our cleanup effort.

(NOTE.—The photographs submitted by Mr. Steuart are in the subcommittee files.)

In addition, we are investigating the employment of a competent engineering environmental concern to give us independent advice on possible improvements to our loading and unloading techniques, as well as emergency cleanup and to keep us advised of the latest industry technological developments in the field. Such a consultant will at least serve to confirm our own expertise in this field.

In conclusion, Mr. Chairman, I want to emphasize that Piney Point has historically rendered service to this area as the point of

entry for heating fuel oil for metropolitan Washington. This terminal facility is not exclusively an installation for the marketing of the products of our company. Piney Point also serves as a terminal point for major oil companies. Moreover, the Federal Government uses the Piney Point terminal as a storage depot for jet fuel used by Andrews Air Force Base, including jet fuel for Presidential aircraft. This fuel is delivered to Piney Point by military tankers, is barged from Piney Point to Washington and piped from the South Capitol Street Bridge down to the Suitland Parkway to Andrews Air Force Base under the most strict Federal controls and supervision.

Piney Point now has a storage capacity of 125 million gallons and thus serves as the reservoir for this area for the storage of an essential ingredient in the efficient functioning of every building, school, and hospital in the metropolitan area. This reserve is called upon frequently during the winter months when current deliveries fall behind due to the worldwide shortage of petroleum products. In some instances, the availability of this reservoir has literally been lifesaving in its effect.

Moreover, in spite of the problems associated with the water transport of oil, this method remains the safest, most economical, and most efficient method of providing this necessary product to the Metropolitan Washington area. Trucking this product from Piney Point would be most inefficient and impractical and would completely overtax the highways. In addition, the proximity of Piney Point to Pepco's Morgantown station has made it possible to plan for eventual pipeline transportation of oil to that station.

Further, it may be that pipeline transportation will ultimately prove to be economically practicable for other stations in southern Maryland, thus cutting down substantially on barge transportation, loading, and unloading.

Mr. Chairman, we know that in our oil transshipping operation, as in all others, there exists the danger of spills, but we believe equally strongly in our technical capacity to keep these accidents to an absolute minimum. In its 20 years of existence, the Piney Point Terminal has been a good citizen of the Potomac River and the Chesapeake Bay, and it is our intention to continue to be such in the long years ahead.

I have with me, as technical advisor, William R. Saul, an engineer who is in charge of our Piney Point operations, and we will be glad to answer any questions the committee members may have.

Thank you.

Mr. REUSS. Thank you, Mr. Steuart. You just testified there is going to be built a pipeline from Piney Point to the Morgantown Pepco station?

Mr. STEUART. Yes, sir, we are currently in the process of purchasing rights-of-way.

Mr. REUSS. How far is Piney Point from Morgantown?

Mr. STEUART. Forty miles.

Mr. REUSS. The chart which is in evidence here indicates that in the last 7 years there have been some 16 recorded spills in the Piney Point area, many of them with very detrimental consequences. We

have also had evidence from the Fish and Wildlife Service and others that the environmental resources, particularly fish and wildlife, near Piney Point, are almost unequalled on the Potomac. You have testified just now that the Swedish boom that I have described—which is certainly one good way of minimizing oil spills—won't work at Piney Point because you have a very strong 4-knot current at Piney Point.

Mr. STEUART. That is correct.

Mr. REUSS. All of these things suggest, of course, that Piney Point, in retrospect, was not the best place to put a petroleum unloading facility.

There has also been testimony that Baltimore Harbor is degraded already and is not possessed of valuable fish and wildlife potential. If you can build a pipeline of 40 miles from Piney Point to Morgantown, why can't there be a pipeline built of approximately 30 miles from Baltimore Harbor to the Washington area, thus eliminating a project which seems to be sited in about the worst possible place?

Mr. STEUART. Well, ideally this might be considered as the answer but we have been trying over a year to purchase rights-of-way through a rural area and I question our ability to purchase rights-of-way through two urban areas, Baltimore and Washington. Also, the availability of sufficient storage on Baltimore Harbor is very limited. We have no right of eminent domain, of course. We are a private company.

Mr. REUSS. Do you or your counsel know of any way in which a governmental body could exercise the right of eminent domain to enable you to build a pipeline?

Mr. STEUART. I have no knowledge of it.

Mr. GUDE. Mr. Steuart, one of the previous witnesses referred to the Petroleum Institute standards set forth in several manuals that were submitted as evidence. Are you familiar with these?

Mr. STEUART. Yes, sir; we are familiar with these standards and we exceed them in every instance.

Mr. GUDE. Testimony also brought out a discussion of check values and time valves and possible automatic valves on your pipelines from the unloading point to the storage capacity.

Mr. STEUART. Bill Saul can address himself to that.

Mr. SAUL. Congressman Gude, there are available valves to shut down a large breakage in existence. In the type of a spill we experienced, there is nothing available today that would measure that small percentage of the total flow and give you an immediate shutdown.

Mr. GUDE. If your valves were broken, or if you had a break at dockside, the capacity of your pipelines from there shoreward to the tanks is a total of about 4,260 barrels of oil.

Mr. SAUL. We have two different sources of shutoff on the pier. As you will remember in your tour, at the end of the pier we have valves and also at the shallow water area, approximately 150 feet back from the end of the pier, we have complete shutoffs. This is an emergency site in case of any collision with the pier.

Mr. GUDE. How are those valves operated?

Mr. SAUL. They are manually operated.

Mr. GUDE. Is someone always there?

Mr. SAUL. There are always one or two men in attendance on our pier in any case of loading or unloading.

Mr. GUDE. Are they at those valves that are shoreward?

Mr. SAUL. Yes, sir; they are at the valves.

Mr. GUDE. I mean, are they at the valves on the shore side?

Mr. SAUL. They are by one set of valves and are within 150 feet of the other set of valves.

Mr. GUDE. Do you have a boom at Piney Point?

Mr. SAUL. Yes, sir, we have a thousand foot of boom in stock at Piney Point. We have every one, so far, that we have had on trial at the pier, with people present; and we have been very unsuccessful in being able to keep them up during strong tides and when the tide changes. There are periods during the day when the boom would work. There are periods of relatively light weather when it would work, but generally in the heavier heating season I would say it would be normally impractical with today's existing booms. This doesn't mean there couldn't be one developed that might possibly be the answer.

Mr. GUDE. Do you employ the boom in normal unloading operations?

Mr. SAUL. We are using them in our Washington plant and have been using them over the last 2 years.

Mr. GUDE. How about at the Piney Point branch?

Mr. SAUL. At Piney Point we have not been able to use them due to the tidal conditions I described.

Mr. GUDE. There is never a time when you can use the boom?

Mr. SAUL. That is right.

Mr. GUDE. You are installing a new metal loading arm which we saw when we were down there. Do you have a timetable for installing these or replacing all of the rubber hoses that you have?

Mr. SAUL. Yes. In fact, this morning I presented to our president some of the costs for the new type that we have and the time for installation. We are seriously considering the two major manufacturers' devices.

We have not ordered them, however. I only received yesterday the estimates and the blueprints and we haven't had a chance to study them.

Mr. GUDE. If you installed these in your present facilities, would you have to get any additional permits or is it merely a matter of exchanging the old equipment for the new?

Mr. SAUL. In all construction we would require permits from the Army Engineers and from the State.

Mr. GUDE. Even though it is on the existing——

Mr. SAUL. Even though it is within the existing confines of the pier. We would require additional piling which goes into the bed of the river, which affects the flow of the water and requires a permit.

Mr. HICKS. Mr. Steuart, are the spillages that have taken place at this facility primarily when ships are discharging oil, or are there also spillages when the barges are taking on oil?

Mr. STEUART. The majority of these instances have occurred when ships are discharging at the plant.

Mr. HICKS. You have foreign registry ships bringing oil in there?

Mr. STEUART. That is correct.

Mr. HICKS. Are they primarily foreign registry ships that come in?

Mr. STEUART. Yes, sir, I would say the majority are foreign registered.

Mr. HICKS. Is there any difference as far as your observation is concerned in the standard of care that is taken by the discharging foreign register ships and the domestic craft?

Mr. SAUL. I would like to answer that, sir, if I may. We have seen the difference in the existing laws and the potential laws already affecting the foreign ships. I find them to be a lot more cooperative. They listen to our people on the dock a lot better now about pumping bilges and I believe that it will help us in our effective control.

I would like to add in some of these foreign ship spills which are attributed to our terminal. They were caused on board the ship completely out of our control, reported by us and cleaned up by us.

Mr. HICKS. As far as legal obligation is concerned for any spillage that takes place, where does that lie, assuming someone can prove damages?

Mr. SMITH. It lies with the person who causes the direct spill. If it is the tanker, it would lie with them. About the only thing you can do is rush over to Baltimore, get a complaint and get an attachment before the ship leaves, which we have done. We have had this same thing occur not only with respect to spills, but having them damage our pier so you have to file a complaint in admiralty and get service on them before they leave because when they leave you have lost your turn, so to speak, in admiralty law on the ship itself.

Mr. HICKS. You know any time there is oil spillage somebody is going to suffer loss, don't you?

Mr. SMITH. Not necessarily. Some of the loss is really confined right to our own operation.

Mr. HICKS. Were you here this morning and did you hear the testimony?

Mr. SMITH. I heard it.

Mr. HICKS. Do you find it reasonably credible?

Mr. SMITH. I am not a scientist or biologist, sir, and I don't know.

Mr. HICKS. The point that occurs to me is that at anytime there is an oil spill and you people are there and know it is going to take place—and I suppose anytime anybody brings a suit they join you, do they not?

Mr. SMITH. Well, we haven't——

Mr. HICKS. If they don't, I am very surprised.

Mr. SMITH. I don't know whether there have been any suits over oil spills down there as yet.

Mr. HICKS. Maybe that is the answer to part of this problem. I would think you people would immediately bring a suit at any time and then let these people join with you in the event that this takes place. It seems to me that might go a little ways toward alleviating this.

Mr. SMITH. It probably could, but the question is sometimes of getting jurisdiction.

Mr. HICKS. As you point out, if anybody is going to be able to get jurisdiction, you are, because you know when it takes place and you know, easily, how to go ahead and get service on these people.

Anyway, aside from that, Mr. Steuart, what would you say was the value of the receiving facilities at Piney Point?

Mr. STEUART. I would hesitate to say right now, Mr. Hicks.

Mr. HICKS. I wasn't able to be present on that trip down there the other day. They are your receiving facilities and other people's receiving facilities?

Mr. STEUART. No, sir.

Mr. HICKS. All yours?

Mr. STEUART. All our receiving facilities.

Mr. HICKS. What would you say is the real value of product that goes through those receiving facilities?

Mr. STEUART. We quoted a figure for 1969 of some nine million barrels of product, which includes all different kinds of products. It included military jet fuels, which we do not own; we just simply terminal for the Federal Government. It includes asphalt for another major oil company which again we do not own; we simply terminal it for them.

Mr. HICKS. Do you have any rough estimate of what the value might be?

Mr. STEUART. Twenty-seven, $30 million.

Mr. HICKS. That is going to increase prospectively two or threefold, is it?

Mr. STEUART. Yes, sir.

Mr. HICKS. How many jobs are involved?

Mr. STEUART. We employ over 100 people at Piney Point.

Mr. HICKS. In addition to that, the number of domestic jobs involved in the barging—do you have any idea what that would be?

Mr. STEUART. Sixty persons in the barging operations.

Mr. HICKS. Now you heard Mr. Schlereth this morning, the gentleman who had all the experience in China and the Far East?

Mr. STEUART. Yes, sir.

Mr. HICKS. Do you agree with his suggestions that in the past, at least it has been in the economic interest of the oil companies to keep these spills to a very minimum?

Mr. STEUART. Absolutely.

Mr. HICKS. On a profit basis.

Mr. STEUART. Our spills have been so insignificant just from the standpoint of losing product, that it does not concern us from a profit-and-loss basis. Our concern of course is our responsibility to the environment and to our neighbors. Of course, it costs us money when we have spills down there.

We put some oil on the beach, we have to clean it up, our public relations is injured in every respect. It is our intent to operate as a good neighbor in the area.

Mr. HICKS. I commend you for that.

What I was trying to get at is: Is just the loss of the product itself a significant factor or has it been in your operation?

Mr. STEUART. No, sir.

Mr. HICKS. It has not been?

Mr. STEUART. No, sir.

Mr. HICKS. If that were all that were involved, you would not be concerned with taking these further steps that you are talking about? That would be more costly than the loss of profit?

Mr. STEUART. Absolutely.

Mr. SAUL. If I could add to that, in this last spill, it would be immeasurable as far as the value of the product loss.

Mr. HICKS. It would be so minimal?

Mr. SAUL. So minute, yes, that you could not find it.

Mr. HICKS. Were you involved in the spill Mr. Parker was talking about this morning?

Mr. STEUART. No, sir, absolutely not. It was concluded that this product came down from the Chesapeake Bay. Cove Point, if you will look on your map here, is up the Patuxent River.

Mr. HICKS. I understood Mr. Parker, in response to my question, to say that there was no oil in the bay, that they discovered it was all in the Potomac.

Mr. STEUART. It is quite possible for a mass of oil, an oil spill as such, to remain within rather restricted confines and move with the tide.

Mr. HICKS. I see.

Your testimony is, on the 3d of February 1969, you had no spill?

Mr. STEUART. No, sir.

Mr. SMITH. He said it was the 4th of February. But we had no oil spill any time during that particular area.

Mr. HICKS. If I recall correctly, they attributed it to the 3d of February and it was on the 4th they made their flight after having discovered fowl with oil on it.

You do not know where that came from, who was responsible for that?

Mr. STEUART. I have not any idea.

Incidentally, the Coast Guard has a record of that spill on February 4. They do not attribute it to our operation.

Mr. HICKS. They attribute it to the 4th, not the 3d?

Mr. STEUART. Well, whatever date it was.

Mr. HICKS. Whatever date it was in February of 1969. Mr. Davis, do you have any questions?

Mr. DAVIS. Sir, I have a few questions to complete the record.

Mr. Reynolds and Captain Levine and also Chief Brizendine are still here. I wanted to show them the record of oil spills in the estuary that we have compiled and put in the record and ask them to state why so many of the ships got away. All three of them can put comments in, if they will.

FURTHER STATEMENTS OF JOHN L. REYNOLDS, CHIEF, OPERATIONS DIVISION, BALTIMORE DISTRICT, CORPS OF ENGINEERS, CAPT. LESTER A. LEVINE, CAPTAIN OF PORT AND GROUP COMMANDER, BALTIMORE, AND CHIEF BOATSWAIN'S MATE WILLIAM C. BRIZENDINE, PINEY POINT COAST GUARD STATION

Mr. REYNOLDS. Mr. Davis, I do not know what you mean exactly by the "ships that got away."

In those cases where we could determine sufficient evidence to pinpoint the oil spill to the particular vessel, action has been taken against that vessel.

Now, normally what happens on these oil spills, and I think it has been mentioned before——

Mr. HICKS. Could I interrupt you? Are these all concerned with Piney Point, Mr. Davis?

Mr. DAVIS. Yes, sir.

Mr. REYNOLDS. Yes, sir, that is correct.

Normally, what happens is that we will get a report of the oil spill sometime after it occurred. It may happen at night. We may not get it until late the next day. In the meantime the ship has sailed. We have made the investigation. We cannot find sufficient evidence legally to establish guilt.

Mr. HICKS. I certainly can see a point right there where Piney Point is not very cooperative. They must know in minutes of when an oil spill takes place.

Mr. REYNOLDS. I might say, not in protection of the Piney Point terminal, I have found them very cooperative. No matter when an oil spill occurs, whether from a ship or any one in that area, either attributable to their installation or to a ship, they will get to us as soon as possible.

Mr. HICKS. That is very commendable.

Mr. REYNOLDS. Yes, sir. We find that in this business sometimes—and you will see in our listing of cases which I have presented to the committee—these cases have been turned over to the U.S. attorney, where we may be waiting for the ship to return to the United States.

Well, basically that is because at the time of the pollution we must establish that evidence to determine whether that ship is at fault or not. We cannot libel that ship until we have sufficient evidence to determine its guilt. Then we can go to the U.S. attorney, and the Marshal will file papers against the ship.

Sometimes we can get the ship before it sails, other times we cannot. But if we place ourselves in the position of libeling the ship and then not be the guilty party—these ships are very costly operations, they can run in the area of $3 to $4,000 a day—it places on us the liability for delaying that ship.

I do not know whether I have answered your question. But in terms of the ships that got away, I would say basically there is one of two things: either we could not establish that that particular ship did cause the pollution or it was not attributable to that ship.

Mr. DAVIS. Mr. Reynolds, I was referring to the ones such as the *Beaufort*, where it was referred to the U.S. attorney for prosecution, the ship never returned to the United States. That is one of them.

Another one was the *Alkmaar*. Same situation. There was no prosecution in the case of the *Thomas M.*

Let me ask this question of the Coast Guard. They have a chief down there, Chief Brizendine, who looks like an experienced man. He probably has seen the accidents occurring, seen the oil spilled. Why could he not just go aboard and arrest them? Why does he have to go up to Baltimore and sometimes by that time the ship is on its way to Europe?

Mr. REYNOLDS. I cannot answer that, because I do not know whether Chief Brizendine actually saw these spills.

Mr. DAVIS. Let's see if Captain Levine can answer it.

Mr. HICKS. That is the point, nobody cares.

Captain LEVINE. I doubt if Chief Brizendine has seen them. Our basic function heretofore has been to enforce the Rivers and Harbors Act of 1899 for the Corps of Engineers. So that when we do an investigation, we submit it to the Corps of Engineers for their processing as they see fit.

Under this new law, Water Quality Improvement Act, we will have authority ourselves, the Coast Guard will. But as far as actual citing of individual spills, I would call on Chief Brizendine for that. Do you have any comments?

Chief BRIZENDINE. I served at the Piney Point Coast Guard Station on two separate occasions, the first tour of duty was April of 1966 through August of 1967, second tour was from December 1968 until the present time.

Captain LEVINE. Did you actually see any spills occur?

Mr. BRIZENDINE. Never actually seen it come right out from the pipe except on one occasion.

Mr. DAVIS. He has never actually seen them?

Chief BRIZENDINE. On one occasion I saw an asphalt spill—last summer, I actually saw asphalt come right out of the pipe. This was drippings out of the line after the line had already ruptured. If I can refresh my memory here. It was in July of 1969.

Mr. DAVIS. Captain Levine, just one more question:

Under this new law if the chief sees oil escaping from a ship, not speaking about the shore facility, if he sees oil leaking out of a ship, can he arrest the ship right then or does he still have to refer it to Baltimore while the ship steams down through the capes?

Captain LEVINE. I believe he will be able to do that. As a matter of fact, we had an instance in one of the spills where in January, I believe, we did not take any legal action; we solicited the cooperation of the ship. It was not a matter of enforcing it. We explained the situation to them short of arrest. The ship complied.

As a matter of fact, the towboat people would not put a line on them until we gave them clearance to do so.

So we do get that cooperation from the marine industry as a whole. They recognize our authority in the field.

As far as spills, I might add, I feel, as Mr. Reynolds mentioned, when they cite a vessel, and there is a libel pending against them, even after it has gone, we keep a listing of that in Baltimore, furnished to us by the Corps of Engineers. We notify the corps upon the ship's return. We keep a listing. We have a ship's pilot in the Port of Baltimore. We know every ship coming and going. When we see the ship coming back, we notify the Corps of Engineers.

Immediate action is liable to be taken on the subsequent sailing of that ship to the port.

(NOTE.—The following list of violations of the 1899 River and Harbor Act, January 1, 1966–June 30, 1970, showing disposition of the cases, was submitted by Mr. Reynolds:)

VIOLATORS OF THE ACT OF JUNE 29, 1888, AND THE RIVER AND HARBOR ACT OF MAR. 3, 1899—JAN. 1, 1966, TO JUNE 30, 1970—BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS

Date and vessel or installation	Registry	Violation	Location	Disposition
March 1966:				
MV Archontissa	Greek	Oil pollution	Chesapeake Bay	$2,250 fine.
SS La Salle	American	Debris	do	$1,200 fine.
Barge BMC 142	do	Oil pollution	Choptank River	Do.
May 1966: MV Mathieson	Liberian	do	Baltimore Harbor	U.S. attorney.
June 1966: SS Zvir	Yugoslavian	do	do	$1,250 fine.
July 1966:				
SS Myron	Liberian	do	Chesapeake Bay	$1,300 fine.
MV Gjertrud Maersk	Danish	do	Baltimore Harbor	$850 fine.
August 1966:				
SS President Adams	American	do	do	$750 fine.
SS Alkmaar	Dutch	do	Potomac River	U.S. attorney.
September 1966: SS F. E. Weyerhaeuser	American	Debris	Chesapeake Bay	$1,250 fine.
October 1966: SS Drepanon	Panamanian	do	do	U.S. attorney.
October 1966: SS Oswego Reliance	Liberian	do	do	$1,150 fine.
November 1966: MV Norbega	Norwegian	do	do	$1,250 fine.
February 1967: SS Santa Olivia	American	Oil pollution	Baltimore Harbor	U.S. attorney.
June 1967: SS Presidente Wenceslau	Brazilian	do	do	Do.
August 1967:				
MV Frisia	German	do	do	$750 fine.
ESSO Barge NO. 9	American	do	do	Do.
MV Jancke	Danish	Debris	Chesapeake Bay	$1,650 fine.
SS Yorkmar	American	Oil pollution	Baltimore Harbor	$1,150 fine.
February 1968: MV Lexa Maersk	Danish	do	do	$850 fine.
March 1968:				
SS President Hoover	American	do	do	$750 fine.
SS Stuart Prince	British	Debris	Chesapeake Bay	U.S. attorney.
Deepwater Terminals	Baltimore	Oil pollution	Baltimore Harbor	Do.
SS Oswego Independence	Liberian	Debris	Chesapeake Bay	$2,000 fine.
May 1968: MV Manja Dan	Danish	Oil pollution	Baltimore Harbor	U.S. attorney.
June 1968:				
Barge STC 101	American	do	Anacostia River	$1,000 fine.
SS Captain Elias	Liberian	do	Baltimore Harbor	$1,750 fine.
July 1968:				
Humble Oil & Refining Co	Baltimore	do	do	U.S. attorney.
Yacht Flying Cloud	American	do	Chesapeake Bay	Do.
September 1968: Humble Oil & Refining Co	Baltimore	do	Baltimore Harbor	Do.
October 1968: SS Sofia	American	do	do	$1,500 fine.
September 1968: SS Mormacisle	do	do	do	U.S. attorney.
October 1968: MV Anco Sun	Norwegian	do	do	Do.
November 1968: SS Bonafortuna	Cypriot	do	do	Do.
December 1968: SS Simon Burn	British	do	do	Do.
January 1969: MV Polyduke	Norwegian	do	do	Do.
February 1969: SS Vainqueur Jose	Liberian	Debris	Chesapeake Bay	Do.
March 1969: Hess Oil Co	Baltimore	Oil pollution	Anacostia River	Do.
April 1969: SS Italia	Greek	do	Baltimore Harbor	Do.
May 1969:				
SS Theologos	do	do	Chesapeake Bay	Do.
SS Marirosa	Liberian	Debris	do	Do.
June 1969: SS Export Buyer	American	Oil pollution	Baltimore Harbor	Do.
July 1969: SS Elqui	Liberian	do	do	Do.
August 1969:				
SS Pioneer Crusader	American	Debris	do	Do.
SS Pennmar	do	Oil pollution	do	Do.
September 1969: Barge M.P. 23	do	do	do	Do.
November 1969:				
SS Hellenic Torch	Greek	do	do	Do.
SS Frieda	Liberian	do	do	Do.
December 1969:				
SS Buckeye Pacific	American	do	do	Do.
Barge Suburban 379	do	do	Nanticoke River	Do.
January 1970: SS Glorious Colocotronis	Greek	do	Potomac River	Do.
April 1970:				
SS Kadmos	do	do	Baltimore Harbor	Do.
American University	Washington	do	Potomac River	Do.
MV Triton	Liberian	do	Chesapeake Bay	Do.
May 1970:				
MV Helgoland	do	do	Potomac River	Do.
Howat Concrete Co	District of Columbia.	Illegal deposits.	Anacostia River	Do.
Super Concrete Co	do	do	Potomac River	Do

Mr. DAVIS. This is a technical question, but Mr. Saul, would you please state for the record how many oil lines there are on that pier and how long they are, at Piney Point?

Mr. SAUL. There are now six lines on the pier at Piney Point. They are approximately 5,500 feet in length. There are four 12-inch lines, one 16-inch line and one 18-inch line.

Mr. DAVIS. Are they kept full at all times?

Mr. SAUL. Three of these lines are emptied occasionally and the product is shifted. Normally these lines are full.

Mr. DAVIS. How far back from the pier end of the line is the emergency cutoff valve?

Mr. SAUL. Approximately 150 feet in shallow water. This is the closest proximity to the end of the pier where a deep-laden vessel could not reach. We found in the case of a couple of accidents this was the ideal spot for the shutoff valve.

Mr. DAVIS. That is 150 feet back from the end of the line?

Mr. SAUL. From the end of the pier; yes, sir.

Mr. DAVIS. Is there another shutoff valve?

Mr. SAUL. Directly on the end of the pier. Then there are other valves used in the operation, of course, back through the plant and on the tanks.

I am only speaking of emergency shutoffs, not operational valves.

Mr. DAVIS. The point of the emergency shutoff valve, 150 feet back from the end of the pier, is still out over the Potomac estuary?

Mr. SAUL. That is correct.

Mr. DAVIS. Do you have any emergency valve between it and your tank farm?

Mr. SAUL. Yes, sir.

There are also valves on the shoreline, not on every line, because these lines are graded. That is the high point right there.

Mr. DAVIS. Now this is a question also just for the record, but any petroleum man who could answer it, I wish he would: How many barrels are there in a ton of No. 2 oil? And the same for No. 6?

Mr. SAUL. 6.6 for 6 oil and 7.3 for 2 oil.

Mr. HICKS. What is that, 7.3 barrels?

Mr. SAUL. Per ton; yes, sir.

Mr. HICKS. Did you have questions, Mr. Gude?

Mr. GUDE. Yes.

In this spill of July 28——

Mr. HICKS. Mr. Reynolds wanted to add to that last answer.

Mr. REYNOLDS. I just wanted to add something that may be helpful to the committee. This new Water Quality Improvement Act may solve one of the problems we run into in libeling vessels, and it may be helpful to the committee in your consideration. That is all I had in mind.

Mr. HICKS. Right. Excuse me.

Mr. GUDE. The spill of July 28, 1969, involving 1,000 gallons of asphalt was due to a ruptured pipeline. Where did that occur?

Mr. SAUL. At an expansion joint on the pier. This was an API-approved joint. That failed.

Mr. GUDE. Where was that emergency cutoff valve that is in shallow water in relation to that rupture?

Mr. SAUL. Roughly, from that point, about 100 feet from it.

Mr. GUDE. On the bay or estuary side?

Mr. SAUL. Yes, sir.

Mr. GUDE. Was the shutoff valve turned off immediately upon the accident?

Mr. SAUL. Yes, sir. It was secured, the barge was left open to take the pressure off the joint that blew out.

Mr. GUDE. So when that occurred, you had essentially the same precautions that you now have at the facility?

Mr. SAUL. Yes, sir.

Mr. GUDE. Mr. Steuart, the location of the Piney Point facility, exposed to the weather as testified here, causes difficulty in using booms, and increases the possibility of accidents. Also, since your company acquired Piney Point we have learned more about problems such as the long-term effects of oil on the environment, and what even small spills would do to an ecosystem either in the water, underneath the water, or on top of the water.

Have you given any thought to what type of containment you could make of the facility there at Piney Point, or moving the facility to a site that would not have the hazards inherent in that location because of the weather and exposure?

Mr. STEUART. Of course with respect to the economic consideration of physically moving the plant, there is no consideration along those lines. What we are studying and studying daily is how do we provide the protection that we think we ought to have in the area? Whenever there is a new boom developed, we will look at it, we will study it.

We have purchased all types of pollution control equipment which we have on hand.

We think we are current with the available materials, pollution control materials, and instrumentation. Only as the market develops new materials can we properly protect the area.

Mr. GUDE. The area of trouble that I am speaking of, of course, lies between what has been testified to here as to a minimal amount of accidental spills you would have under a perfect system—unless you had a completely contained harbor with no way for any oil to get out of it—and the minimal loss you would get under any system.

We had testimony that I think .01 percent of oil going through a depot would be subject to spillage. How much greater is the minimal spillage you would expect at the Piney Point facility with the added hazards of the weather and not being able to utilize a boom.

Mr. STEUART. We think we are minimizing our pollution exposure by the installation of these newly developed loading arms. These are very expensive pieces of equipment. We will invest close to $100,000 in these lines which will in no way improve our operation. It is just merely a preventive move on our part.

Mr. GUDE. As far as expansion of the present plant is concerned, you have not given thought to the possibility of transferring to another location? Had you thought about the possibility of some facility there which would provide some type of containment?

Mr. STEUART. Within the Piney Point area?

Mr. GUDE. Yes.

Mr. STEUART. Well, as we previously mentioned, we are attempting to move our barge-loading facilities to the lee side of the point, which will permit us to containerize that operation. This has been tied up in

litigation for over a year, of course. This is one exposure that would be removed from the exposed area of Piney Point itself.

Mr. GUDE. Thank you very much.

Mr. REUSS. Mr. Davis?

Mr. DAVIS. I did not hear the answer to Mr. Gude's question whether they were attemping to move to a different location. What was your answer?

Mr. STEUART. I testified that we are moving our barge-loading operation.

Mr. DAVIS. I thought Mr. Gude asked if you were considering moving your entire terminal to a different location.

Mr. STEUART. No, sir, we have no plans for doing that.

Mr. DAVIS. Thank you.

Mr. REUSS. Thank you very much, Mr. Steuart, Mr. Smith, Mr. Saul, for being here.

At this point, we shall go into the recent oil spill in Baltimore Harbor. Without objection, I will include in the record here a factual statement from the Coast Guard giving its preliminary version of what happened.

(The statement referred to follows:)

BALTIMORE OIL SPILL

JULY 16, 1970.

At 0530 Sunday morning July 12, 1970, Humble Oil reported a spill of No. 6 fuel oil from the barge *Shamrock* loading in Baltimore Harbor. At 0532 a Coast Guard investigator was dispatched to the scene. The tug and barge had departed but a spill estimated at 6,000 gallons was located and a CG utility boat was sortied to deploy booms at the scene. All appropriate agencies were notified by 0720 in accordance with the Maryland Subregional Contingency Plan. This plan is one of the component elements of the National Contingency Plan published by the President in June 1970 in compliance with the Water Quality Improvement Act of 1970. At 0800 containment had been effected and it was thought that 95 percent of the oil had been contained. The Maryland port authority skimmer vessel *Port Service* was effecting recovery on the scene.

By noon on July 13 several calls had been received reporting small deposits of oil in various areas in and around Baltimore. Since no other source was known and there was a strong similarity between this oil and the oil at the spill site it was felt that this was oil that had escaped before containment was effected. At this time Humble Oil Co. was not willing to accept responsibility for the additional cleanup. During a conference between the CG on-scene commander and Maryland Port Authority, it was determined that additional response would be required. The on-scene commander conferred with Mr. Preus, president of Clean Water, Inc., on availability of material and the possibility of conducting containment and recovery operations. It was decided to go ahead with response efforts and if Humble was not willing to assume the cost we would underwrite such cost.

On the 14th Humble Oil agreed to accept responsibility for cleanup and restoration and also to accomplish it through Clean Water, Inc. Surveillance was conducted by CG helicopter and it was determined that there were extensive moderate to heavy oil slicks in numerous areas of the harbor area and light to moderate slicks in the surrounding waters and some light beach deposits. At that time the plans of Mr. Preus were reviewed by the on-scene commander and concurred in. These consisted of:

1. Remove oil in and near Humble Terminal and nearby piers.
2. Remove oil in or approaching creeks.
3. Clean private craft on site.
4. Sweep harbor of slicks with sorbent boom.
5. Clean affected beaches.

Late on the 14th helicopter surveillance and other investigations resulted in a revised estimate that the original spill consisted of at least 40,000 gallons. Humble would not confirm this figure.

During a hearing on the morning of the 15th held by the Maryland Department of Water Resource Humble advised that 67,000 gallons had been spilled. Cleanup continued by Clean Water Inc. with the CG monitoring. The Maryland Department of Water Resources was also assisting by providing surveillance in the affected areas. The Port Authority vessel had recovered 8,000 gallons of oil water emulsion. Clean Water, Inc. had about 50 men involved in the operation and by the end of the day about half the material had been recovered.

Coast Guard monitoring continued today including helicopter surveillance. Cleanup is continuing and it is felt that Clean Water, Inc., is taking all appropriate action to combat the situation. The CG will continue to monitor the case through its on-scene commander but no Federal response is anticipated at this time.

Mr. REUSS. Will the representatives of Humble Oil & Refining Co. come forward, please?

And the representatives of Harbor Towing Co. of Baltimore.

STATEMENTS OF I. E. KILLIAN, MANAGER, EASTERN MARKETING REGION OF HUMBLE OIL & REFINING CO.; JOHN T. WARD, LEGAL COUNSEL, HARBOR TOWING CO.; AND ALAN KELLER, MANAGER, BALTIMORE OPERATIONS, HARBOR TOWING CO.

Mr. KILLIAN. I have no associate here.

My name is Irwin E. Killian. I am the eastern marketing region manager of Humble Oil & Refining Co. My office is located at Towson, Md.

Mr. REUSS. You have a statement, Mr. Killian, which under the rule will be admitted into the record. Would you proceed in any way you like?

Mr. KILLIAN. Thank you.

In response to this subcommittee's invitation of July 17, I have come before this subcommittee to discuss the incident which occurred in Baltimore Harbor on the morning of July 12, 1970.

As you already know, investigations into the cause of this incident are being conducted under threat of criminal prosecution, so I am unable to give as much detail into the matter as I would like to at this time. It is hoped that this is not interpreted as an unwillingness on Humble's part to cooperate fully with the subcommittee in its investigation, for such is not the case.

I would like to hold up a newspaper which carries the headlines reporting on the Attorney General's news conference yesterday, during which he announced the fact that he would prosecute the polluters of Baltimore Harbor.

Mr. Reuss. I think I should say at this time that you have called this to my attention and requested that you not be subjected to examination here today, but that you be excused after making your statement. Is that a correct reproduction of your request?

Mr. KILLIAN. That is correct.

Mr. REUSS. In view of the fact that you are in some jeopardy as a result of the Attorney General's proposed action, we will cooperate with you at this time.

Mr. KILLIAN. Thank you very much.

(Continuing with prepared statement.) Humble owns and operates a petroleum products terminal in Baltimore, and on the morning of July 12 a barge known as the *Shamrock*, owned and operated by the Harbor Towing Corp., an independent barge concern under contract

to Humble as a common carrier, arrived at approximately 12:30 a.m. at our Pier No. 3 to take on an amount of No. 6 fuel oil for delivery to one of our customers. A spill occurred.

The exact cause of the spill has not yet been finally determined, although indications are that it resulted from human error rather than mechanical failure. Once the spill was determined to have occurred, the on-call supervisor was notified and he arrived around 4:30 a.m. and immediately took steps to communicate with the U.S. Coast Guard by telephone. The Maryland Port Authority was subsequently notified, as also were the Army Corps of Engineers and the Maryland Department of Water Resources.

There was a northwest wind blowing on Sunday morning and at daybreak all the oil was contained within the terminal area. A boom was placed around the slick to insure that no oil would get into the harbor due to a wind shift or other natural cause. A harbor skimmer, manned by a Maryland Port Authority crew, began to skim fuel oil from the area enclosed by the boom.

On Monday afternoon, July 13, it was reported to us that oil had been seen in Rock Creek about 10 miles to the south of Humble's terminal. This word was received over 30 hours after the spill occurred. During Sunday and Monday, cleanup progressed at the terminal, using the skimming boat and other equipment.

We realize that there is often considerable time involved before responsibility in these matters can be established by the authorities. Nevertheless, in order to expedite removal of oil from the harbor, Humble promptly contacted and employed a company with wide experience in the field of pollution control. This company was instructed to take whatever supplementary actions were necessary to clean up and restore the harbor beach and marine areas claimed to have been affected by this spill.

During the entire week of July 12, maximum efforts and the most effective equipment and materials permitted were used in these cleanup operations. I am pleased to tell this subcommittee that through the cooperative efforts of the U.S. Coast Guard, Maryland Port Authority, and the city of Baltimore, cleanup has been essentially completed.

I want to thank the committee, Mr. Chairman, for allowing us to make the statement and the consideration you have given us.

Mr. Reuss. Thank you, Mr. Killian.

In view of our understanding, we will not ask you questions at this time and you may stand down, sir.

Mr. Killian. Thank you.

Mr. Reuss. Will the gentlemen from Harbor Towing Co. identify themselves in the record?

Mr. Ward. Mr. Chairman, I am John T. Ward. I am here as a representative of Harbor Towing Corp., also legal counsel to the corporation. With me is Mr. Alan Keller, the manager of their operation in Baltimore.

We have not prepared a written statement. Obviously we have the same concerns regarding any possible criminal prosecution which might be forthcoming. However, we are prepared to make some comments if the committee would so desire, and are prepared, also, to speak to the general questions of what sort of things we might be looking into to prevent something of this nature occurring. We would

like to stay away from any factual questions concerning the incident.

Mr. REUSS. You do not wish to make a voluntary statement about the incident?

Mr. WARD. Not about the factual circumstances surrounding it, sir.

Mr. REUSS. In the light of that—and we would want to cooperate with you as we have with Mr. Killian—since you do not care to volunteer anything, and ask that you not be questioned about the incident, and since that is the reason why we asked you to appear here, we thank you for coming here. We understand your situation and you may stand down, sir.

Mr. WARD. If we might, sir, we would like to make a brief comment, having sat in on the hearing, to the effect that so much concern has been expressed about spills during loading and/or unloading operations, both from foreign and domestic vessels and tank barges, and we are very sensitive to this problem as a domestic corporation which deals on a day-to-day basis with this problem.

We have read all the available literature on this point. We have done considerable research into possible warning devices. This work is continuing. We have been in contact with the Coast Guard for possible approved devices, for which we are assured there are none approved for use on tank vessels where there might be volatile fumes. We would point out that this minimal acceptable spillage figure which has been mentioned as 0.01 percent and point out that, for instance, during the fiscal year 1969—that being from July 1, 1969, through June 30, 1970—our company alone transported some 204,674,000-plus gallons of petroleum products or 4,873,000 barrels, with no spills whatsoever, and this record continues back over a number of years in Baltimore Harbor.

Also, we would like to point out that the Army Corps of Engineers, as a part of a study undertaken at the request of the Department of the Interior and others, has reported that approximately 40 percent of all oil found in U.S. waters originates on shore and is carried into the waters by storm sewers and other means, and we think this should be brought to the attention of the committee as a very substantial problem in this general area.

Mr. REUSS. Does that complete your statement?

Mr. WARD. Yes, sir.

Mr. REUSS. Has your associate anything to add at this time?

Mr. KELLER. I don't think so.

Mr. REUSS. Thank you very much.

Mr. Davis, did you have any questions for any of the witnesses remaining here?

Mr. DAVIS. I have no questions, Mr. Chairman.

Mr. REUSS. Mr. Biglane, would you identify yourself, sir?

STATEMENT OF KENNETH E. BIGLANE, DIRECTOR, DIVISION OF OILS AND HAZARDOUS MATERIALS, FEDERAL WATER QUALITY ADMINISTRATION, DEPARTMENT OF THE INTERIOR

Mr. BIGLANE. I am Kenneth E. Biglane, Director of the Office of Oil and Hazardous Materials, Federal Water Quality Administration, Department of the Interior.

Mr. REUSS. Have you been sitting in the hearing room during the testimony that has just been adduced?

Mr. BIGLANE. At this day's session; yes, sir.

Mr. REUSS. Do you have anything to tell the subcommittee, Mr. Biglane, on what Federal Water Quality Administration is doing to develop methods of combating oil pollution of our waters?

Mr. BIGLANE. Yes, sir. I heard that the question arose yesterday in in regard to section 11(b)(3) of the Water Quality Improvement Act of 1970. This is the section that required the President to issue regulations describing harmful discharges of oil.

I am pleased to report to you, Mr. Chairman, that Secretary Hickel of the Department of the Interior signed these regulations yesterday and it is my understanding they will be in the Federal Register shortly. I might add that they become effective immediately upon publication under a special rule of the procedure of rules grouping.

Mr. REUSS. That is most gratifying news. Do you know when Secretary Hickel signed the order?

Mr. BIGLANE. I understand it was yesterday afternoon.

Mr. REUSS. That is very gratifying to members of this subcommittee particularly.

(Following the hearings, Congressman Reuss wrote to Interior Secretary Walter J. Hickel as follows concerning Mr. Biglane's statement relating to promulgation of the oil pollution control regulations:)

CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., July 23, 1970.

Hon. WALTER J. HICKEL,
Secretary of the Interior, Department of the Interior, Interior Building, Washington, D.C.

DEAR MR. SECRETARY: We were pleased to learn that on July 20, 1970, the day before this subcommittee's hearings on oil spills, the President issued Executive Order 11548 (35 F.R. 11677) delegating to you some of his functions under the Water Quality Improvement Act of April 3, 1970, concerning oil spills.

At the hearing on July 22, 1970, Mr. Kenneth E. Biglane, of the Federal Water Quality Administration, testified that you had signed on July 21, 1970, regulations pursuant to section 11(b)(3) of the act describing "those quantities of oil" which, when discharged, "will be harmful to the public health or welfare of the United States." Mr. Biglane also said that these regulations would soon be published and that they would "become effective immediately upon publication." (Transcript, pp. 378–379.)

Both of these actions, while very late in coming (108 days after the President approved the act), were welcome news to the subcommittee. For without these regulations, the oil pollution control and removal provisions of the new law are not enforceable.

Today, however, my staff received a frantic phone call from FWQA telling us that Mr. Biglane was mistaken—the regulations will not be "effective immediately upon publication." Rather, the Department will publish these regulations only as proposed regulations (5 U.S.C. 553) and afford 30 days for public comment.

Thus, the oil pollution provisions of the new law will continue to be unenforceable for at least another month beyond the almost 4 months since the act was adopted on April 3.

The new law does not require making in publishing these regulations. Section 553(b) specifically provides that "notice of proposed rulemaking" is not required where an agency "for good cause finds * * * that notice and public procedure thereon are *impracticable*". Certainly, when a statute, as important as this one is for protecting the public health and welfare and the total environment, cannot be enforced without such regulations, there is good cause to find that rule making is "impracticable." The Department made this finding on March 28, 1970, when it published, after a long delay and without rulemaking, over 35 pages of mine safety reglations (35 CFR 5221–5228) under Public Law 91–173. In that instance, the mandatory safety provisions of the law, which became effective on March 30,

1970, could have been enforced without such regulations by the Department. Yet the Department found it "impracticable" to have rulemaking.

We strongly believe that the Department should, as a matter of general policy, issue regulations with rule making unless there are clear and urgent reasons in the public interest for making them effective immediately. Even then, the Department should indicate that it will welcome comments and make modifications where appropriate.

However, where a statute cannot be enforced without such regulations, rule making is "impracticable" and they should be made effective immediately.

Since these regulations have not yet been published, we urge that you make them effective immediately in the public's interest. At the same time, the Department should announce that it will welcome and accept suggestions and comments looking to possible revision of the regulations after a reasonable time. Without this change, the Government will have virtually no legal tools, except the 1899 Refuse Act, for which the Department of Justice is showing a remarkable disdain, to prevent oil spills.

We shall appreciate your prompt action and response.

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., July 24, 1970.

Hon. WALTER J. HICKEL,
Secretary of the Interior,
Department of the Interior,
Washington, D.C.

DEAR MR. SECRETARY: The Federal Register of July 24, 1970 (35 F.R. 11908), contains your Department's "proposed regulations" under section 11(b)(3) of the Federal Water Pollution Control Act, as amended by Public Law 91–224, enacted April 3, 1970. Those regulations would determine the "quantities of oil the discharge of which * * * will be harmful to the public health or welfare * * *, including, but not limited to, fish, shellfish, and wildlife, and public and private property, shorelines, and beaches."

I.

Two days ago, your representative (Mr. Biglane) testified before our subcommittee assuring us that you had signed these regulations to be "effective immediately." Yesterday, we learned that Mr. Biglane's statement was incorrect and that you intended to publish them as "proposed" rules. We immediately wrote to you, pointing out that such a procedure meant that there would be no oil pollution enforcement authority (other than the Refuse Act of 1899 which the Justice Department applies only grudgingly) for the next month or more.

In light of the havoc which oil spills are daily causing, the continued delay since April 3, 1970, in adopting the regulations required by Public Law 91–224 is plainly contrary to the public interest. We repeat: the regulations should be made immediately effective to deal with the emergency resulting from the suspension of the oil pollution legislation.

II.

We have now seen the text of your proposed regulations. We believe that section 610.6 of the regulations would, in a significant way, be contrary to the Act, and result both in substantial, unnecessary, and unlawful costs to the United States, and in more oil pollution and degradation of the environment.

Section 11 of the Act of April 13, 1970, does the following:

1. It prohibits any discharge of oil in harmful quantities into navigable waters.
2. It requires the person in charge of a vessel or an onshore or offshore facility to notify the Coast Guard about such discharge.
3. It imposes criminal penalties for failure to notify.
4. It imposes civil penalties for such discharge.
5. It imposes on the owner or operator the responsibility for cleanup costs incurred by the Government, unless he "can prove" that the discharge was "caused solely by" one of our specified events.

6. It limits the owner's or operator's responsibility for such costs if the discharge was not the result of "willful negligence or willful misconduct," but imposes unlimited liability where the discharge resulted from such willfulness.

Your regulations depart from the structure of the act in a very significant way, namely, they exempt five classes of discharges from the definititon of "harmful quantities." By such exclusion they become exempt from all the requirements of the act. For example, sec. 610.6 of the proposed regulations excludes "discharges when necessary to save human life or limb." By such exclusion the proposed regulations would also exempt the owner or operator from paying for cleanup of the spilled oil, or from any penalty if he fails to notify the Coast Guard about the discharge. The act makes no such exemption in these matters. Thus, the proposed regulations would in effect amend the act.

Another example: Sec. 610.6 of the regulations recites several of the exclusions stated in the act concerning liability for cleanup costs, but the regulation adds some exclusions not in the act. In addition, the regulation fails to state that the exclusions of the act apply only where the owner or operator proves that the discharge was "caused solely by" one of the events which the act specifically excludes. Moreover, it makes those exclusions applicable to all features of the act rather than merely to the liability for cleanup costs.

We urge that you revise section 610.6 of the regulations to make them conform to the law.

The following analysis of sec. 610.6, made by our subcommittee staff, shows the basis for the objections stated above.

Sec. 610.3 and sec. 610.4 of the proposed regulations provide as follows:

> For purposes of section 11(b)(3) of the Federal Act, discharges of such quantities of oil * * * determined to be harmful to the public health or welfare of the United States, at all times and locations * * * and under all circumstances and conditions, unless otherwise excluded in this part, include discharges which:
>
> (*a*) Violate applicable water quality standards of the navigable waters of the United States, or
>
> (*b*) Cause a visible film, sheen, or discoloration of the surface of the water.

Sec. 610.6 of these regulations provides as follows:

> For purposes of sec. 11(b)(3) of the Federal act, discharges determined to be harmful in secs. 610.3 and 610.4 do not include:
>
> (*a*) Discharges resulting from a properly functioning vessel engine;
>
> (*b*) Discharges resulting from the act of a third party:
>
> (*c*) Discharges resulting from an act of God;
>
> (*d*) Discharges when necessary to save human life or limb; and
>
> (*e*) Within the contiguous zone discharges where permited under article IV of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended.

Although some of these exclusions are in the act with respect to liability for costs of cleanup, they are not there with respect to other aspects of the law. Nor is there any basis in the law to imply that Congress intended such exclusions to apply to other aspects of the law. Further, the exemptions in the law governing an owner's or operator's liability to the United States for cleanup costs are expanded by the regulations by excluding the discharge itself.

Under these exclusions, the prohibition against discharging oil in "harmful quantities," as that term is defined in secs. 610.3 and 610.4 above, will not apply to such owners or operators, despite the fact that Congress did not authorize such exclusion. Consequently, dischargers of oil "knowingly discharged," due in whole or in part to one of the above exclusions, will not, under sec. 11(b)(5) of the new law, be subject to a civil penalty of up to $10,000 for each offense assessed by the Coast Guard.

Sec. 610.9 of the proposed regulations does provide that any person in charge of oil," including "discharges identified" as exclusions in sec. 610.6, must charge of oil," including "discharges identified" as exclusions in sec. 610.6, notify the Coast Guard.

But section 11(b)(4) of the Act imposes a penalty for failure to notify the Coast Guard where there is knowledge of a discharge of oil "in violation" of section 11(b)(2) which prohibits only discharges "in harmful quantities." Hence, failure to notify the Coast Guard about such discharges would not be subject to a penalty. Thus, with these exclusions, it is possible that a person in

charge of a vessel or facility which discharges oil within the ambit of these exclusions could not be prosecuted for such failure.

Clearly, the purpose of section 11(b)(3) of the Act, in directing the President to define discharges of oil in "harmful quantities," was to allow the Department's oil pollution experts to develop a meaningful definition in furtherance of the law's purpose. It was not intended that by defining "harmful quantities" they be empowered to adopt exclusions all of which were considered and discarded by the Congress during preparation of this legislation.

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

(NOTE.—By undated letter received on July 31, 1970, Mr. Biglane informed the subcommittee that, "* * * I had understood that the regulations were to be effective upon publication. However, they were published as a notice of proposed rulemaking soliciting comments from interested persons for 30 days prior to republication. I regret any confusion that may have resulted."

(The proposed regulations were revised and published in the Federal Register on Sept. 11, 1970 (35 F.R. 14306–07), and were effective on publication.)

Mr. MCCLOSKEY. The concern of enforcement against oil spills and who would do it, either through civil litigation or criminal prosecution has been a subject of some concern. Let me ask you this question: Let's assume that an oil spill occurs offshore and washes ashore and there is a Belgian tanker out 2 miles and there is some suspicion that the two might be connected. Do any water pollution enforcement officials have the right to go aboard that ship and take a sample of that oil aboard the ship and compare it with the sample of the oil in the spill itself?

Mr. BIGLANE. Yes, sir, and let me say that the definition of ships under the new act in no way excepts, as I understand it, foreign vessels engaged in commerce. So whether it be a Belgian tanker or some other tanker, I don't think would make any difference here.

Mr. MCCLOSKEY. Under existing law and regulation, Department of the Interior personnel or Water Quality Administration personnel, would have the right to get any evidence they wanted?

Mr. BIGLANE. Evidence, yes, sir. As you know, the authority to enforce the new oil pollution provisions under the Water Quality Improvement Act of 1970, section 11, has been delegated to the Coast Guard. That is both for criminal and civil penalty.

Mr. MCCLOSKEY. For example, would they have the capacity to get samples of oil from suspected violators of the law and analyze that oil?

Mr. BIGLANE. I would suspect so; yes, sir. This has been done under other statutes. The 1899 act applies to navigable waters and your 2-mile criterion there would certainly place it inside territorial waters.

Mr. MCCLOSKEY. As a biologist, can you generally tell the source of oil?

Mr. BIGLANE. No, sir, not even as a chemist. This is very difficult. It is very difficult, by the way, to tell whether weathered oil has been refined or not; whether it is crude oil or refined oil. As oil weathers on the surface of the sea, it does lose its aromatic characteristics and other light fractions. These may become sorbed in the water column and you are left with a heavy residual product and it is difficult to

determine from what source it may have come. Oil chemists have gone into the field of activation analysis. That is, activating certain elements within the petroleum product to see if there is some relation there. Others have gone into determining sulfur, vanadium, nickel ratios. Others have tried a paraffin series of analyses to try and relate where these products come from.

From our own domestic sources, we know that in various fields, particularly on the gulf coast and the west coast, they have different types of crude. Those on the gulf coast are generally characterized as paraffinic. Those on the west coast are generally characterized as asphaltic. If we can get to the crude soon enough, sometimes we can tell you perhaps from what general area of the country that crude may have come from, but once the oil is weathered it is very, very difficult.

How do we propose to, hopefully, correct this? Well, again, more sophisticated analysis involving perhaps the tagging of oil with such things as microspheroids which may be introduced into a cargo. Then we do not know whether the microspheroids will interfere with future refining of the product. The tagging of the cargo, in my judgment, will be a help.

Mr. McCloskey. No further questions.

Mr. Reuss. If there are no further questions, you may step down, Mr. Biglane, and thank you.

This concludes our 2 days of hearings into certain environmental problems of the Potomac estuary. I am struck by the really miserable job the Government is doing in protecting the Nation's river and its environment. Here we have an oil facility at Piney Point. Witnesses have testified it is extraordinarily difficult to control oil spills there. There have been some 16 oil spills in the last 7 years that have been reported in that area with considerable damage to the oysters, ducks, and fish. When the proprietors of the Piney Point facility turn to the State and Federal regulatory agencies, there seems to be no one capable of pointing out the proper place in this area for a tank farm to be built. It is significant that oil could be landed at Baltimore and taken to Washington in a pipeline if there were only somebody to carry out that suggestion and to help clear the way.

Down at Mallows Bay we have a similar spectacle where the Pepco company is attempting to build an oil-fired electric generating plant. The testimony there is that this could heat the water very sharply, cause a thermal barrier and have other environmental consequences.

Likewise there seems to be no one agency engaged in regional, nationwide planning as to where our electrical utilities should be sited with the least environmental damage.

It can be said that nature abhors a vacuum. Certainly the oysters, the canvasbacks, the rockfish, the landscape, and the environment of the Potomac abhor the vacuum which has been created in the regulatory agencies which are supposed to make the Nation's river worthy of the Founding Fathers.

Mr. Gude?

Mr. Gude. Mr. Chairman, I want to thank you for making these hearings possible. The Potomac goes through my district and, as I said in my opening statement, we who live above Washington should not make the lower Potomac the dumping ground for the life we lead upstream.

I think the choice of these two particular problems, the proposed powerplant at Sandy Point and the Piney Point oil terminal facility, are most meaningful. Not only is an estuary a very crucial spot in the life cycle of various important fish and wildlife resources, but the proposed power facility at Sandy Point is a very crucial point for the rockfish, one of the most important resources we have in the Bay. The oil terminal at Piney Point is in the shellfish area, of water full of oysters and soft clams.

We are going to face these problems and hard choices all over the country.

We held hearings in San Francisco and were appalled to see that San Francisco Bay is in deeper trouble than we are. Solutions require allocating our scarce resources and good planning. Until we get the framework for regional planning going, I feel that the Interior Department should lead the way. If Interior cannot do the whole job with the legal authority it has, it still has our support for providing moral leadership in seeing that the environment doesn't degrade any more before we get better planning.

Mr. REUSS. Would you agree that an opportunity for greatness, too, has been thrust upon the Corps of Engineers which, because of its permit power—and that which is granted can be revoked, of course—and because of its newly and happily assumed environmental jurisdiction, can have something meaningful to say?

Mr. GUDE. They have our full and enthusiastic support.

Mr. MCCLOSKEY. Mr. Chairman, I am struck by these hearings. The fact that the subject matter represents almost a classic case of what we are confronted with as we commence the decade of the seventies; the really hard choices between where we are going to increase the cost of basic services to cover the costs of pollution that those services cause. It seems to me—and I say this for the benefit of the power company and the other agencies involved—traditionally we have not sought to charge the customer and the taxpayer for the cost of correcting pollution. We have now come to the place where this has to be paid for by someone. Whether it is paid for by restricted land use or more costly capital investment and operating procedures is essentially the decision before us and it is quite clear that the traditional manner of handling these through State governmental control is not going to be adequate to protect what our citizens are insisting is now a Federal responsibility, the protection against air and water pollution. Air and water pollution here in this estuary are contributed to not only by matters within Federal jurisdiction, but by the basic land use planning decisions of local and State government. And here, if my understanding of the testimony is correct, until 1970, neither State nor local government have been willing to play a part in the exercise of land use controls which would enable the Federal Government to protect estuaries against pollution. So that we are really trying to grasp a very difficult problem here as to where and where not the Federal Government should intervene, because it is quite clear that we could control State and local land use planning if we wish to choke them off at the waterline using the Federal jurisdiction over navigable waters.

If we, in effect, say that no one shall dump water at a certain temperature into the estuary, or that no one shall locate an oil transportation

facility in a given area in which we want to protect the marine resources, we have the opportunity at the Federal level if we choose to exercise it, in effect, to control the land use planning decisions of local and State governments. That really is the question before us, focused by the national report received from the Secretary of the Interior. I think it is their testimony that thus far they have applied only standards that went to wildlife protection and the protection of water quality.

Now the law almost forces the Secretary of the Interior to become an expert on matters of power generation and power transmission because he has no proper way of comparing apples and oranges of protection of the estuary against the economics of power transmission and power generation. That clearly is the fact. So I come out of these hearings with an immense feeling that we have only begun to attack the problem and I hope that those who attended these hearings will not limit their input to Congress and to those of us trying to find these solutions, or just to the testimony here today. I hope any of you who have given testimony or have heard testimony or have possibly taken a position or seen a solution to these problems will not hesitate to write members of this committee and the staff of this committee and suggest what you see as an affirmative way to solve these problems, because I think we have seen here in these 2 days a microcosm of every environmental problem facing the United States. Are we going to charge electric utility customers more in order to handle water pollution at the source, at these generating stations; are we going to allow land use decisions to be established on something as basic as power facility and oil terminals?

I don't know the answer but I hope we can continue educating each other.

Mr. REUSS. The subcommittee will now stand adjourned.

(Whereupon, at 2:25 p.m., the subcommittee was adjourned.)

APPENDIXES

Appendix 1.—Statements and Communications

Statement of Hon. Charles McC. Mathias, a U.S. Senator From the State of Maryland

Because of the oil spills in Santa Barbara and elsewhere, the 91st Congress recognized the need for effective measures to control oil pollution. On April 3, the Water Quality Improvement Act of 1970 became law. Unfortunately not all of the act could immediately be put into effect. Cleanup operations, however, in the Baltimore Harbor area are in accordance with the national contingency plan of this act, published on June 2. The swift implementation of this plan gives us much to be thankful for. The other part of the act directed the President to set standards. I was pleased to note that on Monday of this week the President signed an Executive order empowering the Secretary of the Interior to set standards. I have been assured that they will be quickly forthcoming. When they are set, penalties under the act may be assessed.

Maryland has been lucky in that other legal avenues are open. Attorney General Burch has announced that he plans to institute either criminal or civil proceedings against companies responsible. He feels that there is ample provision under the new environmental protection legislation enacted by the 1970 Maryland General Assembly. In other States such a law might not be available and so it is crucial that standards be quickly set. Mr. George Beall, the U.S. attorney, feels that the State law offers the most effective way of seeking redress in this case. His office will defer to the State as a matter of comity. In spite of the limitations of Federal law, Mr. Beall managed on June 16, 1970, to bring three indictments against commercial operations which have spilled oil in the Baltimore Harbor. These indictments will be brought under the Refuse Act, 33 USCA, section 413.

On Thursday, July 16, I personally inspected the Baltimore Harbor area to assess the amount of damage caused by the oil spill of the previous Sunday. When Humble Oil notified the Coast Guard of the spill, at approximately 5:30 a.m. Sunday morning, the volume of oil spilled was estimated at between 3,000 and 4,000 gallons. Maryland and Coast Guard officials revised this estimate upward, and Humble Oil later discovered that 67,000 gallons could not be accounted for and must be assumed lost into the harbor.

It is vitally important that when a spill occurs notification should be prompt and accurate. When this is so ensured, then cleanup operations will be vastly more effective. Under the Executive order the Coast Guard is designated the "appropriate agency" to receive such notification. I would strongly urge the Commandant to issue stringent regulations clarifying and implementing this designation.

When I visited the spill area a great deal of the cleanup had already been completed. I wish to commend Capt. Lester A. Levine of the Coast Guard, who has been in charge of the cleanup, for so quickly isolating and recovering the oil. Due to favorable winds and tides and the fine performance of the Coast Guard, the effect of the oil spill was minimized. We cannot count on this in the future and so it is imperative that we move to make sure it doesn't happen again.

Under a series of acts dating back to the early 19th century, responsibility for harbor inspection in the ports of Hampton Roads, New York, and Baltimore was given to the Corps of Engineers. In the Baltimore area there are presently 13 men and five boats assigned to harbor inspection. They perform a variety of other tasks besides checking for violations in the handling of oil. As we move in the direction of more stringent regulations, we must decide whether additional manpower is needed and whether the Army Corps of Engineers is the appropriate agency to perform these tasks.

Just prior to the oil spill, lye was accidentally dumped into the harbor. In both these cases the barges involved left the scene before the Coast Guard

could investigate. It appears to be advisable to amend the Safe Ports and Waterways Act or some other legislation to prohibit leaving the scene of a spill prior to an investigation. I will support such an amendment in the Senate.

My tour of the harbor area revealed quite possibly, an even more distressing facet of oil pollution. En route to the spill area, I noted the great number of oil slicks on the water. I was informed by those who accompanied me that this was the normal harbor condition. This daily discharge of oil from a myriad of sources may have a more serious adverse effect on the ecology of the area than an occasional major spill. To correct this we need to move in the direction of fail-safe systems to handle oil. Planning for new facilities should include such equipment and old facilities should be updated to conform with more stringent regulations. At present the penalties are on the books. It is my hope that the standards to be issued by the Interior Department will put teeth in those penalties.

July 22, 1970.

STATEMENT OF HON. LAWRENCE J. HOGAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MARYLAND

Mr. Chairman and members of the committee, I appreciate having this opportunity to submit to you my concern and thoughts on these matters affecting the lower Potomac estuary and Charles County, within my congressional district.

HULKS IN MALLOWS BAY

Regarding the 110 abandoned ship hulks which have been in Mallows Bay and Wide Water on the Potomac River for some 46 years, Congress enacted legislation in 1968 authorizing the removal of these hulks. The primary justification for their removal was the danger posed to river traffic by floating hulks and pieces which would break loose from time to time.

From information I have been able to gather, general interest in their removal ranges from lukewarm to completely cold. Since coming into office on January 3, 1969, I have not received so much as one letter or contact requesting the removal of the hulks or inquiring as to why the hulks had not been removed as authorized by Congress.

Although certain residents of the immediate area of Mallows Bay may desire to have these hulks removed for one reason or another, others consider them interesting, not unattractive and part of the ecology. I feel that neither group would approve of the expenditure of $350,000 in Federal and State tax money for their removal, which is the amount the Corps of Engineers stated would be required to remove and dispose of the hulks.

The Corps of Engineers, in fact, does not consider their removal necessary to assure safe navigation of the river, and has stated that for approximately $50,000 to $70,000 certain of the hulks could be anchored to prevent their ever being a danger to navigation. Even officials of the Potomac Electric Power Co., as you have noted, indicate a lack of interest in whatever action is taken on the hulks which are near the site of their proposed generating station at Sandy Point.

After assessing the situation and recognizing the need to reduce expenditures on the Federal and State levels, I can find no compelling reason for their removal and would consider the expenditure of $350,000 for this purpose at this time excessive and wasteful and one which I could not justify to my constituents, including Charles countians.

Evidently the Maryland State Legislature feels as I do because on two occasions proposals to appropriate funds to cover Maryland's 50 percent share of the costs of removal of the hulks as required by section 116*a* of the River and Harbors Act of 1968, have been deleted from appropriation measures.

I propose that the Corps of Engineers be instructed to take whatever action is necessary to stabilize these hulks to insure they do not constitute a threat to navigation of the Potomac River and that we, hereafter, leave for the pleasure of the herons, egrets, the American bald eagles, and the striped bass these unique islands which have grown out of these hulks and have come to be the home of a variety of wildlife over the years.

PEPCO GENERATING STATION, SANDY POINT

I consider the proposed Pepco station at Sandy Point to be merely one example of a situation which we will have to face again and again. The Potomac Electric Power Co. presently has six powerplants located in the Washington area. With growing population and increasing demands for power, we can assume that in

10 more years there will be a need for more generating stations, and similar situations will present themselves throughout the country.

Regarding the proposed Sandy Point station, I have two general areas of uncertainty. First, in regard to the effects on the water. Pepco has stated that the water returned to the river will meet Maryland's maximum thermal standard of 90 degrees without a cooling tower. While four or more barges of oil per day will have to be hauled up the Potomac River from Piney Point to Sandy Point, the company gives assurances that precautions will be taken to prevent oil spills.

Further assurances have been given that the sewage treatment plant to be located at the site will meet Federal standards. The main thought which crosses my mind at this point is while all these minimum standards might be met and all precautions might be taken, we are still going to be polluting and will be greatly risking serious pollution of the water in an area where the livelihood of a great many residents is derived from the Potomac River.

The standards referred to do not prohibit sewage from being pumped into the Potomac. Precautions against oil spills do not prevent accidents which are bound to happen with the daily hauling of so many oil barges some distance up the Potomac.

Various interested marine biologists and commissions have unanimously expressed concern and uncertainty over the effects of thermal pollution upon the fish and the shellfish-life in the lower Potomac, as well as uncertainty as to the effects of the 90 degree water temperature permitted under Maryland standards on the eggs and larvae in spawning beds throughout the lower Potomac.

Inasmuch as southern Maryland bordering the lower Potomac downstream is one of the few areas in which the water and air are still able to sustain fish and the landscape remains virtually unscarred in its natural beauty, you can understand my concern over the introduction of a possible new polluting force in the area.

The use of this particular site on the Potomac is also highly questionable because of the promising aspects of the development of Maryland Neck area for recreational purposes and because of the location of spawning beds for striped bass.

I urge that Pepco and the industry develop technological procedures which will provide much greater guarantees against thermal pollution and oil spills and we can be more certain that the fishlife in the lower Potomac will not be endangered.

As an interim or even long-range alternative measure to prevent blackouts or shortages of electricity in the Metropolitan area, I propose to Pepco and the public service commissions in the area that they consider restructuring their rates so that residents of the area will be encouraged to use less, not more, electricity. Under present rates, which are greatly reduced after a certain amount of kilowatts are consumed, people are encouraged to, and do, greatly waste electricity. This could be discouraged by establishing across-the-board rates for all electricity used, or by the setting of a reasonable rate for a reasonable amount of kilowatts, and charging higher or premium rates for electricity used in excess thereof.

I put these forth to the subcommittee members and interested parties in the hope that they will be of some value in balancing the needs of the environment against those of industry.

I would like to interject at this point that these two situations, the removal of the hulks and the location of the Pepco station, very much point up the need for the Potomac River Basin compact which would provide a suitable mechanism for coordination of all aspects of water resources planning, utilization and preservation.

STATEMENT OF DR. ROLAND F. SMITH, ASSISTANT DIRECTOR FOR MARINE RESOURCES, BUREAU OF COMMERCIAL FISHERIES, U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

Mr. Chairman and members of the committee, I appreciate this opportunity to give you my views on the commercial fishery resources of the Potomac River and other Atlantic coastal streams.

Historically, our Atlantic coast rivers[1] supported, and, in some cases still support, a variety of fish and shellfish species. The lower river and bay complex of any river system (the estuary) ranks among the most productive of fishery

[1] The term "river" as used in this statement means the waters from the river mouth to the headwaters, including tributaries.

environments. Here are found such valuable shellfish and marine species as the oysters, blue crab, hard- and soft-shell clams, croaker, spot, menhaden, flounders and other valuable resources. The midriver sections should support anadromous species—fish that spend most of their life in the ocean but ascend rivers and streams to spawn—these include American shad, striped bass, the river herrings, and Atlantic salmon (now found only in a couple of Maine rivers). A very abundant species, the eel, is catadramous, going to the ocean to spawn. Throughout the river system the environment should permit resident species such as white perch, smallmouth bass, largemouth bass, yellow perch, carp, catfish, plus various minnows, suckers, and others. Many of these species share in providing our Nation with sustenance and highly prized seafoods; many contribute to a valuable and ever-growing recreational fishery.

As recently as the early part of the present century, these fish and shellfish supported profitable fisheries in nearly every Atlantic coast river system. However, as man began to develop the valleys and to use the waters, the fisheries began, for the most part, to decline. Release of volumes of untreated municipal and industrial waste, physical destruction of spawning and nursery areas, construction of dams, and water diversions probably all contributed to the decline. In some instances mismanagement of the fisheries also contributed to the decline.

It is difficult today to comprehend fully and seemingly limitless supplies of fish found by early settlers in Atlantic coast rivers. Historical records of early Potomac fisheries illustrate this abundance.

George Washington operated one of the first organized commercial fisheries in the Potomac River for 40 years, beginning in 1759. Detailed records show that his principal harvest consisted of shad and river herrings.

George Chapman, who operated a 350-yard haul seine at Chapman's Point, near Indian Head, took almost 1 million shad between 1814 to 1824, an average of about 340,000 pounds each year. If we assume that there were 100 such fisheries on the Potomac during this period (and we know that 150 such fisheries operated a few years later in 1835), then the annual catches must have exceeded 30 million pounds. Records show that during a 6-week period in 1835, 22½ million pounds of shad were caught in the Potomac. These early catches exceeded any official catch records after 1857 and are in marked contrast to recent catches in the 1960's.

Despite the decline in commercial fish harvests, the Potomac continues to produce a substantial part of the total Chesapeake Bay catch. Even including our major salmon streams, the Potomac ranks among our major producers of commercial fish products—it is, in fact, the most valuable of our Atlantic coast rivers, with recent harvests totaling around 26 million pounds valued at about $2.5 million to the fishermen. Of this total catch, slightly over 70 percent (22 million pounds valued at about $1 million) consists of finfish; 15 percent, molluscan shellfish; and 12 percent, blue crabs. Between 500 and 600 fishermen and an untold number of workers in associated industries receive at least a part of their livelihood from this resource.

The river's commercial harvest has fluctuated widely over the years (table 1), and the trend has been downward for such species as shad, menhaden, sea trout, croaker, and oysters. On the other hand, the catch of blue crab, soft-shelled clams, river herrings, striped bass, and spot has been generally upward. The value of the fishery has fluctuated with the catch. Wholesale values of blue crab, oysters, clams, alewife and striped bass have increased significantly in recent years because of demand and scarcity of supplies elsewhere.

TABLE 1.—ESTIMATED COMMERCIAL CATCH OF AMERICAN SHAD, RIVER HERRING, AND STRIPED BASS FOR POTOMAC, JAMES, AND HUDSON RIVER 1901-65 [1]

[In thousands of pounds]

Year	Potomac River			James River			Hudson River		
	American shad	River herring	Striped bass	American shad	River herring	Striped bass	American shad	River herring	Striped bass
1900	2,979	2,979	247	1,089	2,070	211			
1920	1,980	4,353	312	980	4,980	152	195	74	5
1930	1,001	2,780	368	1,473	4,614	170	133	138	1
1940	322	2,691	516	270	3,420	264	3,036	173	35
1950	932	11,618	901	602	8,610	1,118	992	88	30
1960	169	5,788	1,269	302	4,630	911	274	38	133
1965	534	11,463	1,720	420	7,860	885	78	37	30

[1] Estimated from closest year records are available.

Oysters and shad, once the Potomac's most valuable fishery resources, have declined steadily. Since 1880 the oyster harvest has dropped from about 1.6 million to about 0.3 million bushels per year. In 1894 there were 26,880 acres or 42 square miles of productive oyster bottom in the main river. In 1959, only 6,700 acres remained. Most of these grounds have deteriorated through overexploitation, though pollution has prevented utilization of some productive grounds. Another problem has been the generally low rate of seed oyster production in the main river, which in some years may be negligible.

The total shad catch, recorded as early as 1857, often exceeded 4 million pounds annually until the 1900's; and although the catch has fluctuated widely, the trend has been steadily downward. The average annual catch for the past 7 years was only just over 200,000 pounds, worth about $50,000. If the annual yield of oyster and shad fisheries could be restored to historic levels, they would bring a return to the fishermen, at today's prices, of more than $8 million a year.

The entire Atlantic coast menhaden fishery has been in a serious decline recently due to causes not yet determined. Chesapeake Bay is the most important nursery area for this resource and the lower Potomac is considered the most productive feeding and nursery ground for young menhaden of any Chesapeake Bay tributary. Since menhaden support one of the most valuable commercial fisheries in the Chesapeake Bay area, maintenance of adequate nursery grounds is an important part of any management program for this species.

Recent unusually high abundance of alewife and striped bass are supporting large commercial and recreational fisheries (table 1). The high value and comparative interest in the striped bass and the increasing demand for alewife for industrial and food purposes, however, could place a heavy demand on these resources in the foreseeable future.

The supply of other species such as soft-shelled clam, river herrings (mainly, alewife and blueback herring), catfish, bullheads, carp, sucker, and white perch is generally good in the Potomac River. In fact, the harvest of some could probably be increased substantially with little damage to the resource. For example, soft-shelled clam production has about doubled annually since 1951, and the full potential of this resource has yet to be realized.

The Atlantic sturgeon was once an important commercial fish in the Potomac and many coastal and Great Lakes River. It still is taken occasionally, although it is considered rare, and is reported to be an endangered species in some areas.

Most commercial fishing in the Potomac occurs in the spring and fall, from the river mouth upstream for about 85 miles to Fort Belvoir. Gill nets are fished principally from Highway 301 bridge upstream to Fort Belvoir about 29 miles in the spring when the spawning runs of striped bass and shad are in the river. Pound nets are fished from river mouth to Highway 301 bridge about 56 miles and take most of the white perch, alewife, carp, and menhaden catch. Fyke nets and pots are fished throughout the river from spring to fall and take most of the catfish catch.

SUMMARY OF OTHER ATLANTIC COAST RIVER FISHERIES

In general, the development, trends in abundance, and problems of Potomac River fisheries have paralleled those of other Atlantic coast rivers, except in most other rivers the problems have been more severe and the commercial fisheries have declined more drastically. However, it is difficult to document this precisely, because the species composition as well as the catch composition varies with each river system. Further, the abundance of fish and value of the fisheries in different river systems may fluctuate independently, and the factors affecting trends in production and the problems associated with management of the resource change with local conditions (see table 1). Finally, complete catch records for individual rivers and/or species are not usually available. Therefore, only by comparing the yield from the entire coast or large areas can trends in total production or comparisons between fisheries be demonstrated. Such a comparison (table 2) suggests that most fisheries have changed little over the past century except in magnitude of yield.

TABLE 2.—ESTIMATED COMMERCIAL CATCH FOR CERTAIN FISH AND SHELLFISH SPECIES IN CERTAIN YEARS AND AREAS 1900–65 1

[In thousands of pounds]

ALEWIFE

Year	New England	South Atlantic	Chesapeake Bay
1901	10,701	13,782	27,661
1920	4,807	10,051	23,737
1930	4,106	10,207	21,128
1940	3,193	8,450	16,112
1950	5,696	13,048	34,628
1960	19,178	12,841	18,989
1965	10,400	15,607	38,702

STRIPED BASS

Year	Chesapeake Bay	Middle Atlantic
1901	1,352	487
1920	1,420	197
1930	1,653	201
1940	1,839	419
1950	5,834	981
1960	6,687	1,252
1965	5,162	1,533

AMERICAN SHAD

Year	South Atlantic	Chesapeake Bay	Middle Atlantic	New England
1901	9,849	10,083	21,814	1,362
1920	2,889	9,161	390	663
1930	2,541	7,181	452	203
1940	1,345	3,757	4,788	574
1950	1,651	4,474	1,802	296
1960	1,612	2,682	1,237	1,082
1965	2,379	4,298	635	427

SEA TROUT

Year	Middle Atlantic	Chesapeake Bay	South Atlantic
1901	17,812	8,450	5,052
1920	14,699	15,197	5,257
1930	13,552	14,438	3,781
1940	4,791	13,674	5,579
1950	1,798	4,603	3,578
1960	605	1,081	3,421
1965	890	2,255	3,183

CROAKER

Year	South Atlantic	Chesapeake Bay
1900	2,002	4,240
1920	2,310	18,892
1930	5,140	22,022
1940	4,342	41,724
1950	2,168	9,192
1960	2,254	4,519
1965	1,866	1,532

SPOT

Year	South Atlantic	Chesapeake Bay
1900	1,032	824
1920	1,727	1,332
1930	2,497	2,619
1940	5,288	2,353
1950	5,555	4,597
1960	6,364	4,404
1965	3,036	1,752

OYSTER

Year	South Atlantic	Chesapeake Bay	Middle Atlantic	New England
1901	15,808	78,959	32,135	10,371
1920	3,982	52,316	26,420	12,289
1930	5,896	36,724	21,516	9,432
1940	3,367	37,457	13,983	5,990
1950	3,034	29,954	18,170	4,728
1960	4,119	27,111	1,154	500
1965	4,082	21,188	757	340

CLAMS—HARD

Year	South Atlantic	Chesapeake Bay	Middle Atlantic	New England
1901	1,415	1,800	5,732	1,223
1920	201	30	1,556	1,082
1930	380	81	2,577	3,822
1940	540	79	5,207	4,453
1950	844	192	13,614	4,751
1960	531	172	6,924	5,045
1965	404	240	8,184	3,242

CRABS—BLUE (HARD)

Year	South Atlantic	Chesapeake Bay	Middle Atlantic	New England
1901	385	15,938	1,512	16
1920	457	17,631	596	1,870
1930	2,002	60,566	417	1,952
1940	15,291	38,048	1,144	2,419
1950	20,275	73,918	6,551	3,715
1960	44,927	66,338	3,643	1,691
1965	46,432	82,561	1,451	2,265

[1] Estimated from closest year records are available.

American shad were once the backbone of Atlantic coast river fisheries from Maine to Florida. No river was too long for shad to ascend, providing nothing obstructed their upstream movement (table 3). Today, less than 10 million pounds of shad are harvested annually, as compared to over 50 million pounds at the turn of the century. The two major causes for this dramatic decline are (1) dams—which, since 1900, have blocked over 4,200 river miles of spawning and nursery area; and (2) pollution—which destroyed spawning and nursery areas or prevented fish from ascending to or returning from such areas.

TABLE 3.—THE ORIGINAL, 1896, AND 1960 LIMITS OF SHAD RANGE IN 23 MAJOR RIVERS OF THE ATLANTIC COAST OF THE UNITED STATES

[Distance in miles]

River	Distance of source above coastline	Original limit of shad run		1896 limit of shad run		1960 limit of shad run	
		Locality	Distance from coastline	Locality	Distance from coastline	Locality	Distance from coastline
St. Johns	375	Sources	375	Sources	375	Lake Washington	250
Altamaha	450	Macon	370	Hawkinsville	300	Hawkinsville	300
Ogeechee	350	Ogeechee Shoals	200	Millen	100	Midville	125
Savannah	425	Tallulah Falls	384	Augusta Dam	209	Savannah lock and dam.	180
Edisto	300	Sources	300	Jones Bridge	281	Norway	120
Santee:							
Wateree	350	Great Falls	272	Great Falls	272	Santee Dam	65
Congaree	410	Green River	374	Columbia	233	Santee Dam	65
Pee Dee	497	Wilkesboro	451	Grassy Island	242	Blewett Falls Dam	242
Cape Fear	290	Haywood	210	Smiley Falls	181	Lock No. 1	65
Neuse	340	Sources	340	Fish Dam	300	Milburnie	165
Pamlico-Tar	252	Rocky Mount	157	Rocky Mount	157	Rocky Mount	157
Roanoke	457	Weldon	249	Weldon	249	Spring Hill	215
James	420		370	Boshers Dam	140	Boshers Dam	140
Rappahannock	248	Falmouth	155	Falmouth Falls	155	Falmouth Falls	155
Potomac	400	Great Falls	190	Great Falls	190	Little Falls Dam	180
Susquehanna	617	Binghamton	513	Clarks Ferry	279	Conowingo Dam	205
Delaware	457	Deposit	256	Burrows Dam	196	Deposit, N.Y.	260
Hudson	314	Glens Falls	209	Troy	164	Coxsackie	130
Housatonic	202	Falls Village	150	Birmingham	92		(1)
Connecticut	409	Bellows Falls	204	Windsor Locks	89	Turners Falls	130
Merrimac	140	Winnepesaukee	125	Lawrence	20	Lawrence	20
Kennebec	155	Carritunk Falls	108	Augusta	44		(1)
Penobscot	255		90	Verona	35		(1)

[1] No shad.

The river herrings (alewife, blueback, and hickory shad) generally rank first in commercial finfish catch in South Atlantic and Chesapeake rivers. Like the American shad, they have been practically eliminated in many north and some mid-Atlantic coastal streams.

Menhaden have all but disappeared in estuaries to the north of Chesapeake Bay. The extent to which they recover may well depend in part, at least, on their fate in the Chesapeake Bay area.

The supply of striped bass has increased and has been high in recent years in the Potomac, James, and Hudson Rivers, whereas in other rivers, such as the Roanoke, Delaware, and Susquehanna, the supply has remained fairly stable and may have decreased only slightly.

The abundance of other marine species (croaker, spot, sea trout, bluefish, and flounder) taken by the commercial fisheries from Chesapeake Bay and South Atlantic rivers has declined in recent years. The reason for the decline is unknown and to understand the causes would require research and management over an area much larger than on the basis of local river systems.

Oyster production in most rivers has shown a drastic decline. Disease and over-exploitation have been major causes of decline in some rivers. In others, such as the Hudson and Connecticut, pollution long ago exterminated oyster populations.

In short, all our Atlantic coast rivers show ever-dwindling supplies of valuable fish and shellfish. While natural fluctuations and natural phenomena are usually confused with man's effects, declines have been caused, to a large extent, by deteriorating environments, dams, and mismanagement of the fisheries.

WATER QUALITY IN THE POTOMAC RIVER

Because industrial development, to date at least, has been of minor consequence in the Potomac Valley, industrial pollution has not been serious. Domestic pollution has generally been a serious factor only in the upper river.

Young shad after hatching remain near or above the spawning area for several months and are exposed to pollution during hot weather when adverse conditions are most extreme. Conditions in the upper part of the Potomac estu-

ary are not favorable for most native fishes in some seasons. Some of the recent heavy fish mortalities probably were associated with poor water quality. This problem needs detailed study. It is generally conceded, however, that pollution abatement is mandatory as a first step in rehabilitation of shad runs in the otomac River, and necessary for maximum yields of most other fishes.

Most areas of the lower Potomac River in which molluscan shellfish are produced are still free of serious water pollution problems. However, if the pollution load in the upper part of the estuary increases, or new sources of pollution develop, water pollution also can become a major problem for the shellfish industry.

Other forms of pollution, while not affecting the fishery resources themselves, may render fish and shellfish unpalatable or dangerous for human consumption. Certain petroleum products and other types of volatile organic compounds, in extremely low concentrations, will impart offensive odors and flavors to fish. From this standpoint, we view any proposed oil refinery or terminal with considerable apprehension.

DEMANDS ON THE FISHERY RESOURCES OF THE POTOMAC

From the standpoint of physical dimensions, productivity, and variety of fish, the lower Potomac and its major tributaries have a tremendous potential for supplying good quality fishing. However, there will be a substantial increase in demand for the fishery resources, and this will place a strain on some species. Demands on other resources of the Potomac Basin and how they are used will influence the quality and the supply of fishery resources. The increased demand for commercial fishery products will be brought about by technological research that will provide knowledge necessary to use the products more effectively, by protein requirements for the projected population increase in metropolitan Washington area, and by fish bait needs for sport fishing.

Better methods of handling, packaging, and marketing of food fish, particularly shad, river herring, catfish, carp, and eel could certainly increase consumer demands. For example, a catfish pond-culture enterprise has started in the Gunston Hall area, whereby the fish are removed from the river and held in controllable ponds for later marketing at prime size and flavor. A similar approach for oysters could guarantee a consistently high quality product. Boned and smoked shad featured by producers on the Hudson and Connecticut Rivers increased customer demands for these products more than 100 percent. Thus, new processing techniques for Potomac shad could easily absorb what the river now produces.

Menhaden, which account for about 37 percent of the commercial catch, are utilized for bait, pet foods, and processed fish meal. Demand on total United States menhaden products has increased about threefold in the past decade. With improvements and expansion of markets for reduction products, the future demand on the fishery should increase greatly and will extend to alewife and other river herring.

About 10 million pounds (53 percent) of the commercial fish catch in the lower Potomac is marketed fresh or frozen in the Metropolitan Washington area. With the projected population increase, the demand will be much greater, even if it only continues in proportion to the population increase.

Future production of high quality seafoods; such as, clams, oysters, and blue crabs, will not exceed the demand. With improved techniques in culture and harvesting, development of hybrid stocks, and more realistic regulations governing oyster farming, one can anticipate a level and quality of production that will again rank Potomac oysters among the Nation's best.

Future potential production of soft clams is harder to predict. Since this is a relatively new fishery, the extent of the available supply is not known. Further, techniques of husbandry are less well developed than for oysters. As with the oyster, however, there is every reason to expect that much greater production could be readily absorbed in the market.

The fishery for blue crabs, like most Potomac finfisheries, harvests a resource which migrates out of the river seasonally. The condition of the resource, therefore, depends largely on events in Chesapeake Bay and in the ocean. Abundance of crabs in the river cannot be controled entirely under a program confined to the Potomac River itself. At present the catch in the entire Chesapeake is at a low point, but young born in 1968, due to enter the fishery late this summer, appear to comprise one of the largest year classes on record.

Many commercial species in the lower Potomac are valuable in the recreational fishery. In view of the projected 7½ million fishing trips for the year 2010, originating from the Metropolitan Washington area and the downriver counties, the increased demand on the resource will place a serious strain on striped bass, bluefish, croakers, and other sport species, and will require major management programs to maintain production.

WHAT CAN BE DONE

The report of the Potomac Planning Task Force recommended that the river be designated as "The Potomac National Landscape" which would serve as a model for the Nation. The committee report noted that the Potomac "* * * is in short, an environment which encompasses most of the ills and opportunities of the United States, 1967."

Uncontrolled industrial development is the very antithesis of the committee's vision of natural beauty. Yet one important industry could be encouraged and developed along the river without violating the spirit of Project Potomac. This is the commercial fishing industry—a part of the river's heritage and legacy. Proper management of the river's fishery resources can contribute food, recreation, and a healthy and esthetically pleasing environment for its people. A thriving fishery, commercial and recreational, could be an increasingly valuable tourist attraction in the lower river.

A great deal is already known to begin sound management of the Potomac's fisheries. Oyster biologists, for example, have the knowledge necessary to restore the supply to historic levels, which at present-day prices would be valued at about $7.5 million. Appropriate to the spirit and intent of Project Potomac, however, is the fact that techniques are known that could increase the harvest substantially above these levels. An estimated 100,000 acres of potential oyster grounds exist in the lower Potomac. Under scientific rehabilitation and management, these grounds could produce a crop worth between $20 and $60 million, depending on the intensity of the management program and demand for the product.

To put this knowledge to work requires removal of many laws and regulations that restrict development and implementation of a program of shell planting and seed production. Successful application of existing scientific knowledge and modern management techniques in the Potomac River would demonstrate to all shellfish producing States that such methods are biologically practical and economically sound.

Productive oyster bottoms offer good habitat for many desirable gamefish species. Thus, rehabilitation of oyster grounds could produce needed reefs to attract sport fishes. Additionally, clam and oyster bars might be developed in shallow waters explicitly to permit recreational fishing.

Knowledge of most Potomac finfish resources is not yet sufficient to attempt intensive management programs comparable to those that could be organized for shellfish. We are convinced, however, that preserving adequate environment and establishing reasonable regulations will at least ensure present yields. Future research can lead to more sophisticated management techniques and greater production.

In summary, the supplies of fishery resources for food and sport are generally good, but maintenance or increase in these resources will depend upon reducing pollution; keeping spawning and nursery areas free of obstruction and encroachments of man; establishing appropriate regulations to maintain spawning stocks; removing unnecessarily restrictive laws, providing fish passage facilities for anadromous species in the main Potomac; and providing the necessary scientific research to support intelligent management programs.

In his goal to farm the sea man must start in the estuaries; they are the gateway to the seas. What better place to develop techniques of marine husbandry; what better place to test new hybrids of fish or shellfish—a fast-growing striped bass for the angler, an all-season oyster supply at prices everyone can afford? And, what better place to develop adequate pollution treatment concepts and techniques, new philosophies in resource management—cooperative and unified programs at all levels of government and between all interested groups? These things are possible.

Indeed, we should not be satisfied with maintaining existing stocks of fish and shellfish at their present levels of abundance—or even at historic levels. Science and technology, through research and management, can and must improve on natural production and the quality of such species as shad, striped bass, and oysters.

While biologists may be in a position to begin immediately several sound and significant programs for the management of Potomac fishery resources, the initial problems are not for biologists to solve. A regional approach to resource management is necessary for the entire basin, wherein the fishery resources receive equitable consideration, under a sound program developed and administered by competent professionals. An important part of the work of such an organization would be to resolve the conflicts from multiple use generated by vested interests, emotional bias, ignorance, or misunderstanding.

ALEXANDRIA, VA.,
July 12, 1970.

Hon. HENRY S. REUSS,
Chairman, House Conservation and Natural Resources Subcommittee, Committee on Government Operations, Rayburn House Office Building, Washington, D.C.

DEAR MR. REUSS: As chairman of the Bald Eagle Survey Committee of the Audubon Naturalist Society, I have been conducting as annual survey of the breeding pairs of eagles in this region since 1957. I have been supported in this survey by planes and pilots of the U.S. Army and the U.S. Fish and Wildlife Service and by many concerned private citizens.

As recently as the early 1960's there were at least eight pairs of eagles nesting along the Potomac River shore in Charles County, Md., between Indian Head and Maryland Point. This year I could find only four nests in this area, one of which is in the woods immediately northwest of Mallows Bay. I saw the nest, an adult eagle and an immature eagle there on a nest check flight on May 13, 1970. I have found eagle nests in these woods for as long as I have conducted this survey; in 1962–64 there were two nests but now there is only one. Since the eagle is a fish eater, Mallows Bay, with its old wooden boat hulks overgrown with trees makes an ideal and apparently productive fishing ground. For several years in the 1960's a number of pairs of Common Egrets and Green Herons nested in the trees growing from these old hulks.

I understand that Pepco is now planning to build a new powerplant in the Mallows Bay area and that the Corps of Engineers is being asked to remove the old boat hulks, ostensibly because they are a navigation hazard. This is ridiculous. Those old hulks are rooted to the spot by well rooted trees and bushes and are well east of the boat channel.

If Pepco is allowed to build there, another of the fast disappearing eagle nest habitats will have gone and a once active heronry and a fine fishing spot will have been destroyed. If these sites are left and the pollution of the river is stopped, the Eagles and the Herons will undoubtedly return to this area and to others along the Potomac.

I should think that a much better site for Pepco to build its plant where it would do little if any damage to the ecology would be in the immediate vicinity of the Indian Head Naval facility or further down river at Smith Point, just north of Clifton Beach. These sites have already been pretty well exploited by man.

Since I will not be able personally to attend the hearing on July 21, 1970, I ask that you please have this letter read for the record in opposition to the Pepco and Corps of Engineers planned actions at Mallows Bay.

Very sincerely yours,

JACKSON M. ABBOTT.

NORTH AMERICAN HABITAT PRESERVATION SOCIETY,
Adelphia, Md., July 21, 1970.

Hon. HENRY S. REUSS,
Rayburn House Office Building,
Washington, D.C.

DEAR CONGRESSMAN REUSS: Unfortunately your public hearing regarding Pepco's proposed powerplant on the Potomac at Sandy Point, Charles County, Md., held on July 21, 1970, at 10 a.m., room 2247, Rayburn House Office Building, was not open to a great deal of public or conservation organization testimony. However, since we are a national organization comprised of 14,000 members, we would like to make our opinion known to your committee—we feel that current plans of Pepco are not based on sound engineering principles nor have there been any environmental preplant study done as to the effects of possible oil spillage from fuel-oil carrying barges, thermal pollution, loss of scenic values,

transmission line location, damage to the nearby striped bass spawning area, or possible engineering faults due to economy measures by the company. The time has come for this country to define progress. Are we to have so-called progress with a few reaping the benefits or are we to have progress with the majority reaping the benefits? Alternative: less valued sites are available and when it comes to powerplants, cheapness in construction should not even be considered, let alone permitted. Pepco's lack of enthusiasm to carry out needed broad spectrum studies should be greeted with an equal lack of enthusiasm by our elected and appointed officials to grant them permission for a powerplant until such a complete analysis of power needs with environment in mind is carried out.

Thanking you for your time, I remain,

Your most obedient servant,

R. DOYLE GRABARCK,
President, Executive Administrative Board.

ROCK POINT, MD.,
July 22, 1970.

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee of the Committee on Governmental Operations, Rayburn House Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: Please let me thank your committee for holding these hearings on the Potomac and its problems. Those of us who have been trying so hard for so long have been renewed by the interest shown by the members of the committee, and will try even harder now to prevent the use of our waterways for such degrading purposes.

I found the testimony of the Pepco officials most interesting, particularly that portion expressing their chagrin that no one found the Maryland Point area of any interest until they wanted to use it. You see, sir, Charles County has a long history of this kind of thing, as a sister county to St. Mary's, the mother county of Maryland, we are an old and long established area. When the capital of Maryland was moved to Annapolis, this area was almost forgotten in the rush to exploit more profitable regions. We were left to eke out our meager existence as farmers, fishermen, and small merchants. The irony of the idea of not knowing about Maryland Point is not that we didn't know about it, but that no one on the "outside" knew of it until it was useful to them for their purposes.

It is also very interesting that a company wishing to literally destroy our way of life here, asking for permission to ruin every aesthetic value for us, from inescapable smoke stacks which are ugly without smoke, to ecological but invisible damage to our waters, should pursue with such vigor the taxpaid removal of hulks because they are an eyesore to them and a deterrent to development of their property.

The action, or inaction of officials 50 years ago in allowing or not preventing, the placement of those ships in Mallows Bay has certainly come back to haunt our generation. What haunting qualities for future generations will Pepco and official liaison have for our children?

Please convey to the members of your committee our sincere appreciation for the time, interest, and hopefully regulations where necessary, that you all have given this problem. Oil must not be barged to these sites. and the second plant must not be built on the lower Potomac. We know enough about the ecology to wait and see what Morgantown will do when it begins operations, before we plan to ruin Maryland Point.

Very sincerely yours,

JOAN L. BOWLING.

ROCK POINT, MD., *July 22, 1970.*

Mr. LAURENCE DAVIS,
Assistant Counsel, Conservation and Natural Resources Subcommittee of the Committee on Government Operations, Rayburn House Office Building, Washington, D.C.

DEAR MR. DAVIS: As a former member of the Board of Zoning Appeals of Charles County and a participant in the oil pipeline decision for Pepco at Morgantown, I wish to express my concern with their proposed barging plans from Piney Point to Morgantown and Sandy Point.

At the hearing concerning their pipeline, Pepco indicated that they could also truck this oil from Steuart Petroleum and definitely played down any barging, indicating only a minimal amount and for a very short period of time until the pipeline could be built, an inferred span of a few months.

To barge oil for 1½ years to Morgantown and as a means to supply Sandy Point, places the whole lower Potomac in jeopardy. Indeed winter barging of oil to the site takes with it the possibility of destruction of the major duck population of the Atlantic flyway, as well as large concentrations of trumpeter swan.

In extremely cold weather the entire regional duck population is often concentrated between Morgantown and Piney Point due to rapid freezing of the upper river and tributaries.

The prevailing northwesterly winds at this time of year would sweep the river clean of waterfowl with little chance of survival, and no chance of containment of the spill.

There is no way any Government regulatory agency can justify this gamble, for we talk not of destroying a few birds, or a few acres. What is endangered here is the future duck populations of the entire Atlantic flyway. A single spill could wipe out the canvasback population of the entire east coast. I am a duck hunter and have hunted this area all my life, including the site of the present Morgantown plant.

Aside from the destruction of the species a tremendous economic loss to property owners along the entire flyway would result and the loss in recreation value would be immeasurable. As a longtime Secretary to the Charles County Waterman's Association, I realize the loss in dollars to both Maryland and Virginia oystermen should the oyster beds be ruined. It would be disastrous.

There is an alternate way (trucking) and Pepco should be compelled to use it.

Their proposed unloading sites occupy two of the most treacherous and violent areas of the Potomac. To expect to unload oil from barges at these points without spills is to expect the impossible. In periods of bad weather, shifting ice and extreme wind, it will not be possible to unload without spills. I beg of you to use all means possible to stop this planned barging.

Sincerely yours,

SAMUEL Y. BOWLING.

WASHINGTON, D.C., *July 29, 1970.*

Re Piney Point, Md.

MR. LAURENCE DAVIS,
House of Representatives,
Washington, D.C.

SIR: Reference is made to your request for data of history at Piney Point on the Potomac River, Md.

Quoted from a book titled "Maryland" of the American guide series, as published by the Oxford University Press, New York in 1940:

"*Piney Point*, a resort that was the summer social center of Washington dignitaries between 1820 and 1853. President James Monroe stayed first in the hotel and later in a cottage that became a summer White House. John C. Calhoun, Henry Clay, Daniel Webster, President Franklin Pierce, and President Theodore Roosevelt also visited here."

Quoted from a story written by Oliver Martin in the Transmitter magazine (C. & P. Telephone Co.); November 1926:

"If the voyager is seeking sheer beauty, he finds it here (at Piney Point). The island is so close to the mainland that the shore seems continuous, as it curves around into a semicircle of white, glistening sand, above which rise clumps of pine trees. Standing on the top deck of the boat and looking toward and down on this scene, with a hot sun shining overhead, it does not take much imagination to conjure up thoughts of the South Seas."

Under a separate cover I am mailing to you a book by my next door neighbor in St. Marys County titled "Life on the Potomac" by Edwin W. Beitzell, Abell, Md. A brochure describing the contents is enclosed.

I hope the above-noted information is of some value.

Yours sincerely,

FREDERICK TILP,
Member, American Institute of Architects.

POTOMAC VALLEY CONSERVATION & RECREATION COUNCIL,
Washington, D.C., July 25, 1970.

Hon. HENRY S. REUSS,
Chairman, House Conservation and Natural Resources Committee, Rayburn Building, Washington, D.C.

DEAR MR. REUSS: Pursuant to provisions for filing a statement for the record after a hearing has been held, I would like to present the following comments regarding the proposed powerplant on the Potomac at Sandy Point, Md.

The Washington Post of July 21, 1970, carried a letter to the Editor by M. Jon Vondracek, pointing out that at the time the Potomac Electric Power Co. was asking for an increase in rate to meet costs, it was spending a substantial amount to encourage people to use more electricty. While the company was issuing warnings about the dangers of a power shortage it was promoting a public demand for a greater consumption of electricity. This raises the question of whether the public interest or Pepco promotion is being served in this proposal for a powerplant at Sandy Point.

The second and more cogent point is: Pepco is ignoring the alternative of coal mine related industries providing mine mouth plant generated electricty. In connection with the hearings before the Federal Power Commission on the Storm King project of Consolidated Edison it was brought out that an offer had been made to provide power delivered cheaper than could be produced by the proposed facilities on the Hudson. It is maintained that before any new powerplants are built along the Potomac this possibility of plants at the coal mines should be explored in the public interest.

Respectfully submitted.

WALTER S. BOARDMAN, *Chairman.*

POTOMAC RIVER ASSOCIATION, INC.,
OF ST. MARYS COUNTY.
Leonardtown, Md., July 31, 1970.

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee, Rayburn House Office Building, Washington, D.C.

DEAR MR. REUSS: May I please submit the following as a supplementary statement to my testimony presented at your subcommittee hearing on July 22, relative to the Steuart Petroleum Co.'s Piney Point Terminal:

There was a great deal of local opposition to the Steuart Co. in 1949 where they applied to our board of county commissioners for permission to build one oil terminal at Piney Point. The only public hearing relative to this application was held by the Corps of Engineers, who only permitted testimony pertaining to any navigational hazards created by the 1,200-foot pier which was to be built out into the Potomac. All environmental and economic considerations were ruled out by the Corps as being irrevelant to the purpose of the hearing. Ignored was the fact that this facility was being built in a locality widely known to be a beautiful residential, summer home, recreational, and seafood area. The county commissioners approved the Steuart project by a 2-to-1 vote.

During the ensuing 19 years, the local residents tolerated the oil spills, for reasons mentioned in my testimony on July 22. We know there were numerous spills that were never officially recorded. During the July 22 hearing, Mr. Reynolds of the Corps of Engineers answered a question pertaining to the fact that Steuart is now reporting all the spills. We citizens believe that Steuart is currently officially reporting his spills because he knows that we are now doing this. We did not report his spills during the first 19 years of his operation; he apparently did not report them either.

It was not until June 1968, when Steuart applied for the foreign trade zone permit, that the Potomac River Association was organized for the express purpose of preventing the expansion of the Steuart facility from the oil terminal to one oil topping plant with its resultant petrochemical complex. The initial planning of this expansion had been kept secret from the public; it was almost at the last minute that the citizens learned of this threat to their total environment. The citizens were successful, however, in preventing approval of the foreign trade zone.

In early 1969, Steuart applied to the Department of the Interior for a 100,000 barrel-per-day oil quota. Following a tremendous amount of opposition to this

application by citizens and officials on the local, State, and National levels (Virginia as well as Maryland), Steuart withdrew his oil quota application in October 1969. (I am enclosing a copy of the Maryland State Legislative Council resolution which was unanimously adopted in August 1969.)

It is generally believed in St. Marys County that if Steuart gains control of the county government in the elections this fall, he will reapply for the oil quota. It is also generally believed throughout the political circles in the county that there is a "strong Steuart ticket" of candidates for our three-man board of county commissioners, the seven member State control committee and the two delegates and senator to the Maryland Legislature.

The county commissioners appoint the members to the county zoning board and to the county economic development committee. (A comprehensive plan for St. Mary's County, which included a zoning ordinance for the county, was completed in 1967, specifically restricted Steuart to the level of his operation at that time. The zoning ordinance has never been officially adopted. It appears that our State department of economic development is oriented toward the development of heavy industry throughout the entire Chesapeake Bay area. Our deep water close to shore, our relatively cheap land and the lack of proper zoning makes the bay and its tributaries most attractive to heavy industry, powerplants, etc.)

We were interested in Mr. Steuart's statements during his testimony on July 22 pertaining to his application a year ago for the permit to build a barge-loading pier on the sea side of Piney Point. Mr. Steuart did not mention that the reason for the litigation was because this pier is to be built on lots on Piney Point Beach, which has been a choice summer-home location since the early 1900's. The pier is to be built almost in the front yard of a summer resident. (The original deed to the lots on Piney Point Beach contained a covenant stating that the beach was to be used in common by all the lot owners; no lot owner owned the beach in front of him; and construction on the beach was restricted to beach houses and fishing piers.) To my knowledge, this is the first time that the Steuart Co. has publicly admitted that this new pier is to be barge loading facility. At the Corps of Engineers hearing on this application in June 1969, the Potomac River Association expressed its suspicion that this was the purpose for the new pier; Steuart Co. representatives maintained that the pier was to be used for mooring barges. Barges are already being moored to dolphins at this location and have been a source of irritation and potential danger to the adjacent lot owners for several years. The water in this area can be very rough in a strong southeast wind.

We were also very interested in Mr. Steuart's discussion on July 22 of the proposed pipeline from his Piney Point facility and the difficulty which he has had in securing the right-of-way for this pipeline. The citizens realize that a pipeline would eliminate barge traffic as well as tanker traffic on the highway. However, with the seeming present trend in Maryland to allow industry to locate on its waterways without requiring adequate controls to protect those waterways, the citizens are reluctant to give a right-of-way for the pipeline which could conceivably supply all kinds of potentially damaging industry along the waterfront. Mr. Steuart mentioned, I believe on July 22, that the pipeline would be practical for other stations in southern Maryland. A number of the citizens do not want to see a large expansion of an operation which has already done some damage to the environment.

Prior to 1968, the Steuart Co. regularly burned the "sludge oils" from their tanks. During the summer of 1968, the State health department ordered that this burning be stopped. Since that time, some of this oil has been dumped in an abandoned gravel pit and has subsequently started "leaching out" into Blake Creek, damaging private oysterbeds, causing an oily taste in crabs and fish. (See attached letter regarding this matter.) Some of the oil from the large June spill also entered Blake Creek from the Potomac.

One of the committee members wondered, I believe, why there have been no citizens suits against Steuart. The excessive cost of such a suit deters such action.

Mr. Steuart stated that the very best crabbing, fishing, and oystering could be done near his pier. I regret that the Committee did not question him closely regarding this. For instance, the Steuart oysterbeds in Piney Point Creek are not in the vicinity of the pipeline which crosses the Creek enroute from the pier in the river to the tanks on the mainland. I am told that private oysterbeds in the Creek in the vicinity of the pipeline have been ruined.

There have been occasions over the years where the large oil tankers have rammed the pier. We have been fortunate to date that the lines have not been broken when this has happened.

Mr. Steuart was questioned regarding the use of detergents during spills. We know that the company has used detergents twice. I am enclosing a newspaper article describing the use of detergents following a spill on February 24, 1969, plus some pictures taken by a resident on Potomac Shores showing the use of a detergent in the June 1970 spill and the tidewater police telling the Steuart employees not to use it. (The additional snapshots are of the same spill.)[1]

Occasionally we hear that the Coast Guard station at Piney Point is to be abandoned and a new station established on Smith Creek, south of Piney Point. The Piney Point Station is currently performing an excellent service with respect to observing and reporting oil spills. We hope this station will not be moved. There is also the "fear" that if this property is released for sale by the Federal Government, Steuart will succeed in buying it.

May I ask if your committee is concerned about conditions in the tributaries of the Potomac? The Seafarers International Union owns over 900 acres on the St. George Creek near Piney Point. The union has been constantly dredging in the creek for almost 2 years, and has applied for additional extensive dredging permits in numerous areas of the creek. Some of those permits have been refused due to the protest of the Potomac River Association, but many others have been granted. The union has plans for a long range project in this area. Our association has already had to spend over $4,000 on this dredging problem. The St. George's Creek is a large creek containing many large natural oyster beds. David Sayre has stated that oysters will grow in every part of this creek except the channel. Many families in this locality are supported during the winter by oystering in the St. George's. The statement has been made that if the SIU is allowed to continue dredging as they have been, the oysters, fishing and crabbing will be destroyed within the next 5 to 10 years. We would like very much to send you information regarding this problem if your committee considers it.

As our association has become more and more involved in conservation matters throughout the State, we increasingly realize the great need for regional planning.

Mr. Frederick Tilp has asked if I know any of the history of Piney Point as a resort area. I have talked with Mrs. Rose Tolson of Piney Point who has done some research on this subject. Mrs. Tolson said that Dolly Madison spoke of Piney Point, referring to it as the first summer resort in America. It was known as the Summer White House of Franklin Pierce. Andrew Jackson and Teddy Roosevelt enjoyed visiting Piney Point. Piney Point has had a lovely and interesting history as a summer resort.

We would like to thank you and your committee members for your interest in and concern for our problems in this part of the Potomac. We are certain that the problems can be solved by the cooperation and efforts of all involved. If our association can be of any further help to you in your deliberations, please do not hesitate to ask us.

Sincerely yours,

CATHERINE W. BARNES, *Cochairman.*

(This resolution was unanimously adopted by the Legislative Council of Maryland on August 6, 1969.)

A LEGISLATIVE COUNCIL RESOLUTION REQUESTING THE SECRETARY OF THE INTERIOR TO DENY THE APPLICATION OF THE STEUART REFINING CO. FOR AN IMPORT QUOTA OF RESIDUAL FUEL OIL

The Steuart Refining Co. has filed an application with the Department of the Interior for an import allocation of 100,000 barrels per day of residual fuel oil. If this application is approved, it appears that the company plans to expand its operations at its site on Piney Point in St. Marys County, to include an oil refinery and desulfurization plant.

The County Commissioners of St. Marys County, reflecting the feelings of the residents of the County, oppose the building of an oil refinery on this site. The chairman of the County Commissioners has written the Secretary of the Interior requesting denial of the import quota.

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[1] SUBCOMMITTEE NOTE.—The materials referred to are in the subcommittee files and are not reproduced here.

Piney Point is a scenic peninsula on the lower Potomac River, with tremendous tourist and recreational potential. It is an agricultural area, devoid of industrialization, one of the few such areas left so near the megalopolis of the eastern United States. There are valuable marine resources in the waters of this region, and many livelihoods depend on the maintenance of these natural resources. St. Marys County is one of the most historic regions of the Nation, being the first settlement in Maryland and the home of religious freedom, and this region should be maintained in such a manner as not to ruin its attractiveness as a historic shrine.

The Potomac River is one of the main sources of the Chesapeake Bay, and the establishment of these facilities not only endangers this river but also the Chesapeake Bay. The bay's fisheries are the most valuable in the Nation, and if industrial pollution causes it to become a dead body of water such as Lake Erie and some other former productive areas in the country, it would be a national disaster.

The Maryland Legislative Council feels that it would be detrimental to the best interests of the State of Maryland to have the Piney Point area change from its present character into an industrial complex. Also, the council feels that the establishment of the facility planned by the applicant would be a very real danger to the valuable aquatic resources of the State: Now, therefore, be it

Resolved by the Maryland Legislative Council, That the Secretary of the Interior is requested to deny the application of the Steuart Refining Co. for an import quota of fuel oil; and be it further

Resolved, That a copy of this resolution be sent to the Honorable Walter J. Hickel, Secretary of the Interior.

MECHANICSVILLE, MD., *August 2, 1970.*

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, Rayburn House Office Building, Washington, D.C.

DEAR MR. REUSS: At the end of the July 22, 1970, hearing on the Lower Potomac, I indicated to you that Steuart Petroleum Co. and its representatives had not been candid regarding the proposed pier for loading barges on the more protected side of Piney Point. They attempted to convey the impression that this was environmentally desirable and that their desire to construct the pier indicated their sincere concern for preserving the environment.

The facts are quite the contrary. The attached map indicates the location proposed for the pier. It does not convey, however, the fact that this pier would jut out many feet beyond a series of recreational piers in front of a long row of houses facing the arc of beautiful beach where Route 498 runs along the shore. The pier would destroy the recreational and esthetic values of this entire arc of beach. It would also cause navigational hazards for small boats because of the dangerous currents which develop around and under ships and barges at this location.

There has already been experience with Steuart operations at this spot. They bought a lot and cottage some years ago and have been running their barges up on the shore or tying them offshore for the period since. These have obstructed the use of the adjoining landowner's property and pier. Detergents and other waste materials from the barges have made swimming unpleasant. The banging of the barges at night has caused much distress to the people in the area as has also the sweeping of the beach with brilliant searchlights when a barge is brought in at night.

Whether deliberately or not, the company has made their neighbors miserable. The Corps of Army Engineers was informed of all these problems at the hearing on the proposed pier. Indeed, out of some 250 to 300 persons who attended the hearings only the Steuart lawyers had anything favorable to say about this proposed ruination of a splendid recreational area of beach. Beyond this, when Steuart was asked if they might intend to load or unload barges at this pier, they denied it. They claimed that the pier was only for tying up the barges when laying over. Much disbelief was expressed at this reply in view of the nature of the proposed pier, and the very interesting fact was brought out that an earlier drawing of the pier shown the Army Engineers had shown a pipeline on the pier. Thus, this was one more bit of evidence that Steuart cannot be trusted in their allegations and promises.

In my view Steuart should not be permitted to spread like a cancer, destroying the entire Piney Point area. If a more protected facility is needed for load-

ing and unloading their ships and barges, let them construct it by dredging a slip into Piney Point Creek. Or, better, let them place any further expansion in Baltimore Harbor where the water is protected and the environment already despoiled.

Sincerely yours,

NORTON T. DODGE.

DEPARTMENT OF THE ARMY,
BALTIMORE DISTRICT, CORPS OF ENGINEERS,
Baltimore, Md., February 26, 1969.

NABOP-P (Steuart Investment Co.) 1

PUBLIC NOTICE

To whom it may concern:

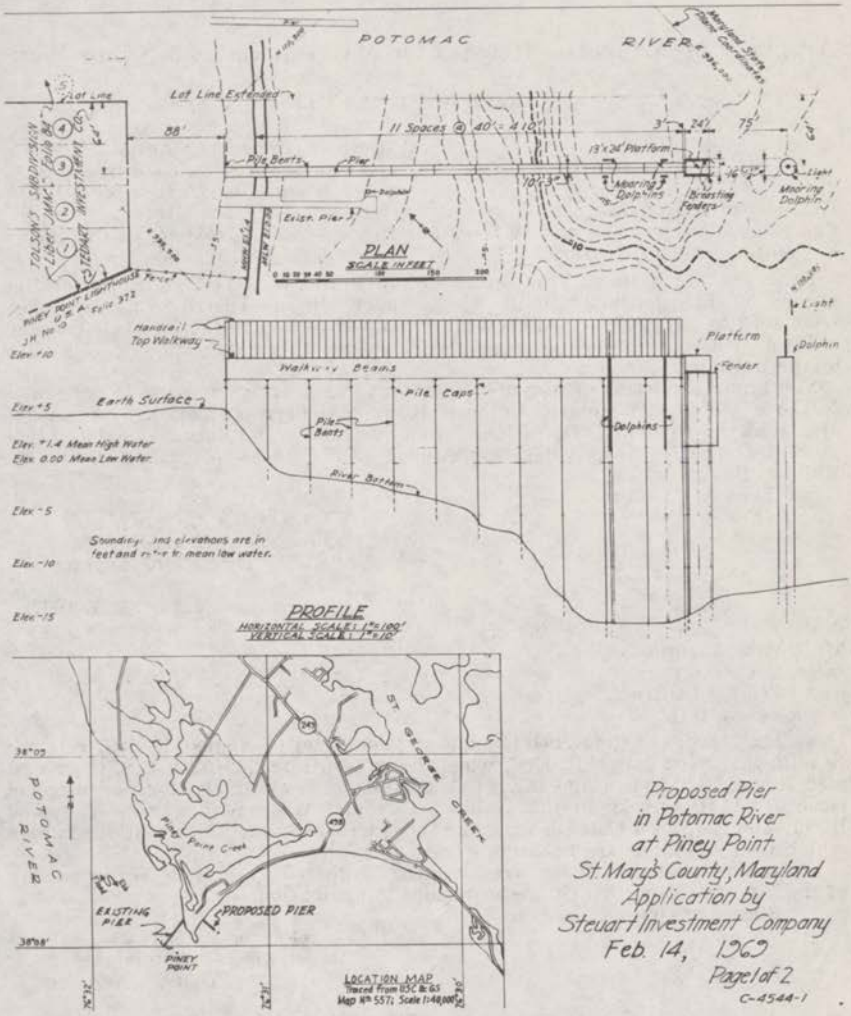
The U.S. Army Engineer District, Baltimore has received an application from Steuart Investment Co., 4646 40th Street, NW., Washington, D.C. 20016, for a Department of the Army permit to construct a pier and to install mooring dolphins in Potomac River at Piney Point, St. Marys County, Md.

Plans showing the proposed work are on file in the Operations Division, 1628 Federal Building, 31 Hopkins Plaza, Baltimore, Md. 21201, and may be seen by interested parties. A copy of the plans is shown on the reverse side of this sheet. The plans indicate that none of the proposed work will extend more than 520 feet channelward of the mean high water shoreline at a point on the northerly shore approximately 500 feet downstream from Piney Point.

Any criticism or protests concerning the effect of the proposed work upon navigation and other matters affecting the public interest should be submitted in writing to his office on or before March 28, 1969; otherwise it will be presumed that no objections exist. All comments received will be made part of the record and will be considered in determining whether it would be in the best public interest to grant a permit.

It is requested that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who, not being known to this office, do not receive a copy of this notice.

JOHN L. REYNOLDS,
Chief, Operations Division,
(For the District Engineer).



Proposed Pier
in Potomac River
at Piney Point
St. Mary's County, Maryland
Application by
Steuart Investment Company
Feb. 14, 1969
Page 1 of 2
C-4544-1

APPENDIX 2.—MATERIALS RELATING TO MALLOWS BAY AND SANDY POINT

A. MALLOWS BAY HULKS

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D.C., June 3, 1969

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee of the Committee on Government Operations, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This refers to your letter of May 20, 1969 requesting a copy of each document in the file of the Baltimore District Engineer office from 1963 to date concerning the hulks in Mallows Bay in the Potomac estuary.

I am pleased to inclose a copy of each document as submitted to this office by the Baltimore District.

You advise by letter of May 27, 1969, that the hearings previously scheduled for June 5 and 6, 1969, on the Potomac River have been postponed. I have asked Mr. John L. Reynolds, Chief, Operations Division, Baltimore District, to be present at the hearings, when rescheduled, as a witness to further clarify the Mallows Bay situation.

Sincerely yours,

WILLIAM F. CASSIDY,
Lieutenant General, U.S.,
Chief of Engineers.

SEPTEMBER 1, 1967.

NABOP.

Mr. PHILIP A. DOUGLAS,
Executive Secretary,
Sport Fishing Institute,
Washington, D.C.

DEAR MR. DOUGLAS: Reference is made to your letter of August 30, 1967 relative to bills H.R. 2402 and H.R. 4506, which have been introduced by U.S. Congressmen Hervey G. Machen and Rogers C. B. Morton, respectively, for the complete removal of all wrecks in the Mallows Bay and Wide Water areas, Potomac River. You request a chart designating those wrecks in the aforementioned areas which in my opinion are hazardous to navigation.

I have no knowledge of any wrecks in the Mallows Bay or Wide Water sectors of the Potomac River which are hazardous to navigation.

Sincerely yours,

FRANK W. RHEA,
Colonel, Corps of Engineers,
District Engineer.

SPORT FISHING INSTITUTE,
Washington, D.C., August 30, 1967.

DISTRICT ENGINEER, U.S. ARMY CORPS OF ENGINEERS,
Baltimore, Md.

DEAR COLONEL: Rear Adm. E. C. Allen, Jr., Commander of the 5th Coast Guard District, referenced you as the agency that would determine the location of sunken ship wrecks in the Potomac River in Mallow's Bay and in the Widewater area.

Because of the value of certain underwater objects in the development of sport fishing areas we are investigating the possibility of selective destruction of such wrecks that are hazardous to navigation in the areas of the Potomac River noted above. You may be aware that H.R. 2402 introduced by Mr. Machen and H.R. 4506 introduced by Mr. Morton would provide for the complete removal of all wrecks in the above noted areas.

The Sport Fishing Institute has been instrumental on a nationwide basis in helping to encourage the establishment of artificial reefs in coastal State waters in order to improve the habitat for various forms of salt water game fishes to benefit the sport angler. On barren, generally dish-pan-shaped, bottoms where there is a lack of inorganic cover and little in the way of vegetation it has been found that establishment of "reefs" has provided remarkable results in encouragement of the development of game fish populations where none existed previously. Actually this was discovered by some of the old fishing fleet captains many years ago, who found that they were more apt to have fishing success in the vicinity of old sunken wrecks.

Fishery scientists have put this knowledge to use as a management tool in order to increase fishery resources and consequently harvest through establishment of cover. Such protection not only harbors and shelters small fish, but affords attachment points for vegetation and other growths which encourage the food chain organisms that attract larger fish to such areas.

I am enclosing a copy of the SFI Bulletin No. 170 for January 1966, which issue was entirely devoted to the subject "Artificial Reefs as Tools of Sport Fishery Management in Coastal Marine Waters."

We would certainly agree in principle that where these wrecks are in navigation channels they possibly should be removed if they are hazardous to ships or boats moving in and out of the area. We might maintain that not all of them could be considered detrimental to this degree. Therefore, in light of the above testimony, illustrating the value to the fishery resource of such "reefs", may we humbly request that your office supply us with a chart, designating only those wrecks considered in your opinion to be a hazard to navigation in the Mallow's Bay and Widewater sectors of the Potomac.

Thank you.

Sincerely,

PHILIP A. DOUGLAS,
Executive Secretary.

BUSHWOOD, MD., *September 9, 1964.*

Representative CARLTON R. SICKLES,
Congressman at Large, State of Maryland.

Mr. SICKLES: I have a suggestion concerning the old World War I ships located in the Potomac River in Charles County.

Since fish seem to be abundant near wrecks I was wondering if it would be possible to tow these vessels to areas downstream where they could submerge freely, and be no hazard to navigation. This could be a boon to our Southern Maryland areas where fishing has its ups and downs. Also this could conceivably be a less expensive operation than others I can imagine.

An interested citizen,

GEORGE L. QUADE.

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D.C., August 3, 1965.

Subject: H.R. 10018, to require the Secretary of the Army to remove certain abandoned ships from the Potomac River.

To: Division Engineer, U.S. Army Engineer Division, North Atlantic.

1. Referred for:

X Information as basis for a report to Congress to reach Office of the Chief of Engineers, attention Engineers CW–ON not later than August 24, 1965.

—Draft of reply.

—Direct reply, copy to Office of the Chief of Engineers.

—Direct reply to Office of the Chief of Engineers by district copy to Division Engineer.

—Appropriate action.

—Information, copy to Office of the Chief of Engineers reply.

—Your information.

X Comment and recommendation as to type of report which the Department should make on H.R. 10018.

2. Correspondent has not been informed of reference.

MARK S. GURNEE,
Chief, Operations Division, Civil Works
(For the Chief of Engineers).

[1st Ind]

U.S. ARMY ENGINEER DIVISION, NORTH ATLANTIC,
New York, N.Y., August 6, 1965.

NADCO–C (August 3, 1965)
Subject: H.R. 10018, to require the Secretary of the Army to remove certain abandoned ships from the Potomac River.
To: District Engineer, U.S. Army Engineer District, Baltimore,
Attn: NABOP–N, Baltimore, Md.

For the information requested not later than August 19, 1965.

JOHN G. PACK, Jr.,
Chief, Construction, Operations Division,
(For the Division Engineer).

[2d Ind]

U.S. ARMY ENGINEER DISTRICT,
Baltimore, Md., August 19, 1965.

Nabop (August 3, 1965)
Subject: H.R. 10018, to require the Secretary of the Army to remove certain abandoned ships from the Potomac River
Thru: Division engineer, U.S. Army Engineer Division, North Atlantic, Attention: NADCO–C.
To: Chief of Engineers, Attention: ENGCW–ON.

1. It is the opinion of this office that the subject bill should be more specific as to the need for removal of the subject ships in the public interest, as similar conditions exist throughout the waterways within this District. However, in those cases where such conditions do exist, action is taken where necessary in accordance with the River and Harbor Act of 1899 to protect general navigation.

2. In the instant case, because of the property owner's reluctance to permit the Department to take steps to assure permanent retention of the ships in their present location (see copy of inclosed report and related correspondence) constant surveillance is required to prevent the ships and debris from entering the navigation channel. At the present time the principal problem involves four or five of the vessels which in the past, during abnormal weather conditions, have floated into the channel area creating severe hazards to navigation. However, it is conceivable, although a detailed study of all the vessels (approximately 125) has not been made, that under severe weather conditions others may release themselves from the area and create a serious situation insofar as navigation is concerned. In addition, a general observation indicates that those ships which are located inshore appear to be secure, and the possibility of their getting into the waterway appears to be extremely remote.

3. In view of the foregoing and the reluctance of the property owner and the County authorities to sanction the proposal indicated in the inclosed report, it is recommended that the subject bill is revised to authorize the Secretary of the Army to make a detailed study of the ships involved and to effect removal of those ships which in his opinion are potential menaces to navigation. It is believed that such action, although not considered the most feasible, would relieve the Department of the need for permanent surveillance and resulting costs.

4. Favorable action on the subject bill as written is not recommended since it would result in the expenditure of public funds for the special benefit of private landowners. It is considered that any proposed legislation authorizing the removal of abandoned vessels other than those covered by present law should be general in application and should require a local contribution by non-Federal interests to the cost of removal.

FRANK W. RHEA,
Lt. Col., Corps. of Engineers,
District Engineer.

[3d Ind]

U.S. ARMY ENGINEERS DIVISION, NORTH ATLANTIC,
New York, N.Y., August 24, 1965.

NADCO–C (August 3, 1965)

Subject: H.R. 10018, to require the Secretary of the Army to remove certain abandoned ships from the Potomac River.

To: Chief of Engineers, Attention ENGCW–ON, Department of the Army, Washington, D.C.

1. This Division concurs generally in the views of the District Engineer in the preceding indorsement regarding the proposed legislation providing for the removal of abandoned ships' hulls from Mallow's Bay, Potomac River. The plan proposed by the District Engineer to make a detailed study of the vessels involved and to effect the removal of those which are considered potnetial menaces to navigation, is the most feasible under the circumstances.

2. In view of the foregoing, this Division recommends that favorable action on the subject bill be not taken since it would result in expenditure of public funds to the benefit of private interests.

CARL H. BROWN,
Colonel, Corps of Engineers,
Deputy Division Engineer,
(For the Division Engineer)

[H.R. 10018, 89th Cong., first sess.]

A BILL To require the Secretary of the Army to remove certain abandoned ships from the Potomac River

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Army is authorized and directed to remove from the Potomac River and to destroy the abandoned ships, ships' hulls, and pilings, located in Mallow's Bay, between Sandy Point and Liverpool Point, Charles County, Maryland, and at Wide Water, south of Quantico, Virginia, and any other abandoned ships formerly among those in Mallow's Bay or at Wide Water which have drifted from those locations.

SEC. 2. The Secretary of the Army is authorized to accept from the State of Maryland any contribution which such State may wish to make toward the removal and destruction of the ships, ships' hulls, and pilings referred to in this Act.

JANUARY 19, 1965.

NABOP.

Hon. CARLTON R. SICKLES,
House of Representatives,
Washington, D.C.

DEAR MR. SICKLES: In accordance with Miss G. Collier's request by telephone on January 18, 1965, the following information is furnished regarding the sunken hulks in Mallows Bay, Charles County, Md.

On December 22, 1964, a representative of this office met with the County Commissioners of Charles County to discuss the plan for depositing stone in the hulks located on the perimeter of the area, to prevent their getting into the navigation channel in the Potomac River. The County Commissioners said they would consider the matter and would advise this office of their reaction to this plan. To date no advice has been received. The estimated cost of this proposal is $50,000.

As no authority exists for the complete removal and disposal of the sunken hulks, no detailed survey of all the hulks has been made. However, in view of your request, it is estimated that the cost for complete removal and disposal of the hulks, based on general knowledge and observation, is between $250,000 and $300,000.

In the event additional information is desired, I will be pleased to furnish it upon request.

Sincerely yours,

ROY S. KELLEY,
Colonel, Corps of Engineers,
District Engineer.

MUDD & MUDD,
ATTORNEYS AT LAW,
La Plata, Md., November 4, 1964.

Re your file no. NABOP.

Mr. WILLIAM E. TRIESCHMAN, Jr.,
Assistant Chief, Operations Division, U.S. Army Engineer District,
Baltimore, Md.

DEAR MR. TRIESCHMAN: With further reference to the proposal of the U.S. Corps of Engineers regarding the sunken hulks in the Mallows Bay area, please be advised that the property owner has now had an opportunity to fully consider this matter.

I regret to advise that Idamont, Inc., owner of the Sandy Point property cannot agree to positioning the hulks around the perimeter of the area and filling them with stone, to form a barrier against the escape of other hulks from the Mallows Bay area. Such a barrier may prevent the hulks from becoming a future hazard to navigation in the Potomac River, but the proposal could place serious limitations on the development of the Sandy Point property.

Very truly yours,

F. DESALES MUDD.

OCTOBER 19, 1964.

NABOP.

F. DESALES MUDD, Esq.,
Mudd & Mudd,
La Plata, Md.

DEAR MR. MUDD: Reference is made to your letter of October 15, 1964, regarding the sunken hulks in Mallows Bay.

The proposal that was presented to you by this office in our letter of August 11, 1964, which would permanently confine the sunken hulks in their present location in Mallows Bay, has not been abandoned by this office. However, it is necessary that we obtain the approval of the property owners before any further consideration can be given to accomplishing the work as described in our letter of August 11, 1964. Accordingly, your further consideration of this matter will be appreciated.

JOHN L. REYNOLDS,
Chief, Operations Division.

MUDD & MUDD,
ATTORNEYS AT LAW,
La Plata, Md., October 15, 1964.

Re your file No. NABOP.

Mr. WILLIAM E. TRIESCHMAN, Jr.,
Assistant Chief, Operations Division,
U.S. Army Engineer District, Baltimore, Md.

DEAR MR. TRIESCHMAN: I have your letter of October 13th with further reference to the sunken hulks in Mallows Bay, and wish to confirm that the owner of the adjacent "Sandy Point" property had been giving consideration to your proposal.

Sometime ago Samuel C. Linton, Jr., who lives in the area and is a member of the house of delegates from Charles County, discussed this situation with me, and in fact I accompanied a group on a helicopter inspection tour of the area. Thereafter Mr. Linton asked me to attend a meeting in Baltimore with representatives of the U.S. Army Engineer Corps, but which meeting I was unable to attend. I did thereafter receive a secondhand report of this meeting to the effect that your department had disclaimed any responsibility for the sunken hulks. Accordingly, I concluded that the proposal you communicated to me sometime ago had been abandoned, and which accounts for my failure to reply.

If I am incorrectly informed as to the position of your department, please advise.

Very truly yours,

F. DESALES MUDD.

NABOP.

OCTOBER 13, 1964.

F. DESALES MUDD, ESQ.,
Mudd & Mudd,
La Plata, Md.

DEAR MR. MUDD: Reference is made to our letter of August 11, 1964, and your reply of August 18, 1964, regarding the sunken hulks in Mallows Bay. You advised that you were in the process of reviewing the work we have proposed to permanently confine the sunken hulks in Mallows Bay, to determine the effect it would have on the property owned by Idamont, Inc.

It is requested that this office be advised of the present status of your investigation.

Sincerely yours,

WILLIAM E. TRIESCHMAN, JR.,
Assistant Chief, Operations Division.

OCTOBER 6, 1964.

NABOP.

Hon. CARLTON R. SICKLES,
House of Representatives,
Washington, D.C.

DEAR MR. SICKLES: I refer to your letter of September 29, 1964, enclosing a letter you received from Mr. George L. Quade, Bushwood, Md., wherein he suggests that the wrecks in Mallows Bay be utilized for development of a fishing area in southern Maryland. You ask that I investigate the matter and forward to you information for a reply to Mr. Quade.

It is not unusual for fish to become abundant in areas of sunken vessels, as indicated by Mr. Quade. Such artificial areas have been established along the Atlantic Coast by various authorities, and by the Board of Natural Resources, State of Maryland, in the Chesapeake Bay. The growth of marine vegetation in such areas attracts the fish and makes excellent fishing grounds. However, utilization of the wrecks in Mallows Bay for such a purpose would, in my opinion, be costly and not commensurate with the benefits to be gained. As the hulks are wooden, they would be very difficult to sink unless they were loaded with heavy non-floatable materials. This is pointed out by the fact that three or four of the vessels, although almost totally submerged, have on occasion floated out of the area. In addition, those vessels which are presently secured in the area would be extremely difficult to remove because of the silting and growth which have taken place over the years. I also question the feasibility of towing the hulks because of their age and condition.

I hope the foregoing information meets your present needs. In the event additional information is desired, I will be pleased to furnish it upon request.

Sincerely yours,

ROY S. KELLEY,
Colonel, Corps of Engineers,
District Engineer.

MUDD & MUDD,
ATTORNEYS AT LAW,
La Plata, Md., August 18, 1964.

Re NABOP.

Mr. WILLIAM E. TRIESCHMAN, Jr.,
Assistant Chief, Operations Division, U.S. Army Engineer District, Baltimore, Corps of Engineers, Baltimore, Md.

DEAR MR. TRIESCHMAN: I thank you for your letter of August 11th with further reference to the sunken hulks in Mallows Bay.

Please be advised that we have referred this plat to our engineer, and apparently it will be necessary that we inspect the property to determine the probable consequences of what is proposed by the U.S Army Engineers.

We will advise you as to our position as soon as possible.

Very truly yours,

F. DESALES MUDD.

NABOP.

AUGUST 11, 1964.

F. DESALES MUDD, ESQ.,
Mudd & Mudd,
La Plata, Md.

DEAR MR. MUDD: Reference is made to your letter of July 30, 1964, regarding the sunken hulks in Mallows Bay. You request plans and specifications showing the Corps of Engineers proposal in connection with these hulks.

Over a period of the last few years, several of the hulks presently in Mallows Bay have, during periods of high tides and adverse weather, been subject to leaving the area and floating into the Potomac River. During this period, this office and the U.S. Coast Guard have been required to return the hulks to the area and secure them. In addition, this office has been conducting periodic inspections of the area in an effort to see that these vessels remain secure and do not escape into the river.

In view of the foregoing, this office proposes to take action to permanently confine the sunken hulks in their present location in Mallows Bay. The project, as proposed by this office, involves positioning hulls arounds the perimeter of the area and filling them with stone, thus forming a barrier to prevent the hulks within the area from floating into the Potomac River and becoming hazards to navigation. A general plan of the operation as proposed is indicated in red on the enclosed drawing.

It is requested that approval of the work, as proposed by the Corps of Engineers, be secured from the property owner and forwarded to this office so that the work may be accomplished.

Sincerely yours,

WILLIAM E. TRIESCHMAN, JR.,
Assistant Chief, Operations Division.

MUDD & MUDD,
ATTORNEYS AT LAW,
La Plata, Md., July 30, 1964.

Re Sandy Point; Idamont, Inc., property.

Mr. JOHN L. REYNOLDS,
Chief, Operations Division, U.S. Army Engineer District, Baltimore, Corps of Engineers, Baltimore, Md.

DEAR MR. REYNOLDS: I am sorry I was not in the office yesterday when you called to see us with reference to the above identified property. From the information you gave my partner, Mr. Flinn, I understand that the U.S. Army Corps of Engineers proposes to fill the hulls of the old ships now anchored in Mallows Bay, and construct some form of bulkhead across the entrance to the bay from the Potomac River in an effort to prevent the ships or debris from escaping into the Potomac River.

It is the disposition of Idamont, Inc., as the owner of the property fronting on Mallows Bay and Potomac River to be cooperative. However, we do not yet know the exact manner in which the Idamont property will be improved or developed, but of course access to, and use of the waterfront on the bay as well as the river, is the essence of the value of this property.

We assume that the project which you propose has been engineered, and that plans and specifications showing the detail of the project are or will be available. Accordingly, we feel that Idamont, Inc., should have detailed information of what is to be done before we are asked to consent, and I trust that you can forward the plans and specifications for our consideration.

Very truly yours,

F. DESALES MUDD.

U.S. ARMY ENGINEER DISTRICT, BALTIMORE,
CORPS OF ENGINEERS,
Baltimore, Md., April 9, 1964.

To: Chief of Engineers.
Subject: Request for authority to secure sunken hulks, Mallows Bay, Potomac River, Md.
Through: Division engineer, U.S. Army Engineer Division, North Atlantic.

1. In the late 1920's the Western Marine & Salvage Co., a Delaware corporation, grounded, burned and beached approximately 200 wooden vessels adjacent

to its land at Mallows Bay, Potomac River, Md. The work was authorized by Department of the Army permits and was done for the purpose of salvage. These vessels varied in length from 267 to 300 feet, and in breadth from 46 to 50 feet. In 1932 the Western Marine & Salvage Co. was dissolved. Subsequently, additional salvage operations have been performed, and ownership of the vessels and of the adjacent land area has changed from time to time.

2. It is the legal opinion of this office, based on a search of all available files and records, that the hulks are at present abandoned property. Copies of the statement of facts and chain of title, together with analysis of facts and law, are enclosed.

3. During the past year the vessels have been the subject of numerous complaints, and considerable difficulty has been experienced in securing them, pending a decision as to ownership, to prevent their floating into the navigable channels and endangering navigation. One of the vessels floated out of the area and is presently located on the south side of the Potomac River opposite Maryland Point. The areas involved are indicated on the enclosed section of U.S.C. & G.S. Chart No. 559. Also enclosed are a detailed drawing showing the hulks in Mallows Bay and photographs of the area taken on February 26, 1964.

(4) An inspection on February 26, 1964, disclosed that the hulks, particularly those on the channelward side of the area, will, during periods of high tides and adverse weather, continue to float out of the area, thereby endangering navigation. The hulks are, in the opinion of this office, serious potential menaces to navigation, and it is recommended that authority be granted under section 19 of the River and Harbor Act of March 3, 1899, to take action to prevent the hulks from leaving the Mallows Bay area and to permanently secure the one grounded opposite Maryland Point.

(5) The buoyancy of the hulks which have been burned to the waterline can, in the opinion of this office, be overcome by placing stone inside the hulls. Accordingly, it is proposed to place stone in approximately 30 of the hulls located on the perimeter of the Mallows Bay area, to permanently ground them in position to form a bulkhead to prevent the sunken hulks inshore of this point from escaping the area. A similar operation will be performed on the one located opposite Maryland Point.

(6) It is proposed to enter into one contract for the work after advertising for a period of 30 days. This method is considered to be the most economical and in the best interest of the Government. The estimated cost of the work is $50,000.

ROY S. KELLEY,
Colonel, Corps of Engineers,
District Engineer.

NADCO–C (9 Apr. 64)

[1st Ind.]

To: Chief of Engineers, attention: ENGCW–ON, Department of the Army, Washington, D.C.

Subject: Request for authority to secure sunken hulks, Mallows Bay, Potomac River, Md.

U.S. ARMY ENGINEER DIVISION, NORTH ATLANTIC,
New York, N.Y., June 4, 1964.

The sunken wooden hulks now located in Mallows Bay and in Potomac River, Md., are considered a potential source of obstructions that would endanger general navigation in the Potomac River. The method proposed by the district engineer to eliminate this source of obstructions from becoming hazards to navigation is considered feasibe. Accordingly, it is recommended that authority be granted to the district engineer to perform the necessary work by contract at an estimated cost of $50,000 to eliminate this source of navigation hazards.

ALLEN JENSEN,
Colonel, Core of Engineers,
Deputy Division Engineer,
(For the Division Engineer).

[2d Ind]

ENGCW–ON (9 Apr 64)
Subject: Request for authority to secure sunken hulks, Mallows Bay, Potomac River, Md.

HEADQUARTERS, DIVISION OF THE ARMY, COMPANY OF ENGINEERS,
Washington, D.C., July 17, 1964.

To: Division engineer, U.S. Army Engineers Division, North Atlantic.

(1) From the recent article which appeared in the Washington newspaper and from information furnished by telephone that Congressman Sickles interest was to have the derelicts removed primarily because of their effect on property values and for esthetic reasons, the Chief of Engineers believes that the action proposed by the district engineer would not be acceptable to State and local interests and property owners.

(2) Since the wrecks in their present location are not obstructions to navigation, the Department is without authority and funds to effect their removal. The proposed plan for securing the vessels could be accomplished legally however, as a means of preventing future potential menaces to navigation.

(3) Since there is real doubt that the plan would be acceptable, approval is not granted at this time. However, in the event the proposal meets with the approval of State and local interests and property owners, and evidence is furnished to that effect, the recommendation may be resubmitted.

(4) The district engineer should continue to maintain careful surveillance over the derelicts to insure that they do not break away and become obstructions to navigation.

JACKSON GRAHAM,
Major General, U.S. Army,
Director of Civil Works,
(For the Chief of Engineers).

[3d Ind]

NADCO–C (9 Apr 64)
Subject: Request for authority to secure sunken hulks, Mallows Bay, Potomac River, Md.

U.S. ARMY ENGINEER DIVISION, NORTH ATLANTIC,
New York, N.Y., July 21, 1964.

To: District engineer, U.S. Army Engineer District, Baltimore, Baltimore, Md.

The decision of the Chief of Engineers in the preceding endorsement on securing the sunken hulks in Mallows Bay, Md., is furnished for your information and guidance.

GARRETT J. BYRNES,
Deputy Chief, Construction, Operations Division,
(For the Division Engineer).

[4th Ind]

U.S. ARMY ENGINEER DISTRICT,
Baltimore, Md., March 12, 1965.

NABOP (April 9, 1964)
Subject: Request for authority to secure sunken hulks, Mallows Bay, Potomac River, Md.

Through: Division engineer, U.S. Army Engineer Division, North Atlantic.
To: Chief of Engineers.

1. In accordance with the recommendations contained in OCE 2d endorsement, this office has contacted the property owner and requested comments on our proposal to secure the vessels in their present position. The plan did not meet with the approval of the property owner since securing the vessels, as proposed, would place serious limitations on the development of the Sandy Point property.

2. The county commissioners of Charles County were also contacted with regard to the proposed plan. The overall problem was discussed with them, and their attention was brought to the reaction of the property owner. The commissioners made an investigation of the matter, and they advised that their invesigation disclosed that the property owner feels that it is a Federal responsibility to remove the sunken vessels, and in view of the legislation being considered by Congressman Sickles to require that the sunken vessels be removed by the Federal Government, no further action is contemplated by the county commissioners.

3. In view of the foregoing, this office will continue to maintain careful surveillance over the derelicts, as directed in paragraph 4 of 2d endorsement.

ROY S. KELLEY,
Colonel, Corps of Engineers,
District Engineer.

DISPOSITION FORM

Office symbol or file reference: NABOC.
Subject: Status of vessels abandoned at Mallows Bay, Md.
To: Chief, Operations Division.
From: Office of Counsel.
Date: February 14, 1964.

In reply to your verbal request for information relating to ownership or title to vessels anchored at Mallows Bay, Potomac River, Md., an examination was made of the land records of Charles County, Md. Charles County adjoins Mallows Bay. All available files and records of the National Archives and Records Service of the General Services Administration, on the subject, were likewise examined. Finally, legal research was done for pertinent court decisions.

STATEMENT OF FACTS AND CHAIN OF TITLE

1. On June 30, 1923, the Western Marine and Salvage Co., a Delaware corporation, bought 232 vessels from a George D. Perry, of the city of San Francisco, Calif., formerly the property of the Government of the United States, the purpose of the purchase being to salvage, dismantle, and remove all portions of the vessels which might be marketable and then destroy the remains.

2. By deed April 21, 1924, and recorded among the land records of Charles County, Md., in liber No. WHA 42, folio 65, Harry Kaester conveyed to Western Marine and Salvage Co. the Sandy Point Farm containing 566¼ acres, a tract of land nearly surrounding Mallows Bay. The Western Marine and Salvage Co. then began its salvage operations after installing on Sandy Point farm such machinery and equipment as was necessary to the operation. The method and scope of the operation was to remove all machinery, boilers, pipes, and engines, and to strip the vessels of all metal easily removable; the vessels were then towed to Mallows Bay, where they were burned to the water's edge and then pulled as near to the shore as possible and the salvaging of metal continued until the spring of 1931.

3. After the hulls were burned, the company continued its salvage operations until March 1931, when it abandoned the project, leaving a watchman in charge of the personal property in the Sandy Point farm who remained there until the summer of 1932.

4. The above salvage operations were done under a permit granted on July 24, 1925, to the Western Marine and Salvage Co. by the War Department of the Government to "ground, burn and beach in Mallows Bay, Potomac River, about 200 hulls. The time limit of this permit was December 21, 1928. The War Department, on January 3, 1931, granted another permit to the same company, wherein it was recited that application had been made "for authority to extend the area in Mallows Bay, Potomac River, now used for grounding, burning and beaching wooden hulls, 200 feet channelward". In that permit it was stated, "that if the structures or work herein authorized is not completed on or before December 31, 1931, this permit, if not previously revoked or specifically extended, shall cease and be null and void." From the examination of the Bureau of Archives files, it appears that no such permit or extension has since been granted. It appears that none was granted to anyone since December 31, 1931.

5. The Western Marine and Salvage Co., by deed dated November 30, 1932, and recorded among the land records aforesaid in liber W.M.A. No. 56, folio 306, conveyed the Sandy Point farm to the Potomac Realty Co., Ltd., a corporation of the State of California, without mentioning the remains of the burned and sunken hulls. In December 1932, the Western Marine and Salvage Co. was dissolved.

6. On December 22, 1934, a Harry Steinbraker filed a suit in the Circuit Court for Charles County, Md., wherein he alleged that by a deed of assignment dated December 3, 1934, and recorded among the land records aforesaid in liber W.M.A. No. 60, folio 204, from the Potomac Realty Co., he had acquired "all right, title, and interest of the said Potomac Realty Co., Ltd., in and

to all lead, copper, brass and other metals of whatever nature owned by it, or to which it has any title, in and around the 169 vessels, which said vessels were formerly owned by the Western Marine and Salvage Co., the said vessels being located in Mallows Bay, near Sandy Point in Charles County, Md."; that a certain Lorenzo D. Crouse, has "entered upon and seized said vessels and is at present engaged in shipping and selling such metals", etc. The suit asked for an injunction. The court dismissed the suit and Steinbraker appealed to the Court of Appeals of Maryland. The Court of Appeals, in *Steinbraker* v. *Crouse*, 182 A. 448, affirmed the lower court's decision and said, in part "* * * the invasion for over 2 years of the wrecked and sunken vessels, and the continuous, uninterrupted, and open carrying away of the scrap therein, without compensation or permission asked, shows clearly, in our opinion, an intention to abandon and an actual abandonment, not to be recalled by the subsequent negotiations and agreement between the former owners and the plaintiff, and the decree of the chancellor should be affirmed".

7. On December 1, 1938, by deed recorded among the land records aforesaid in liber No. 69, folio 512, the Potomac Realty Ltd. conveyed the 566.25 acre farm to the Anglo California National Bank of San Francisco, Calif., a national banking corporation, without mentioning the remains of the burned and sunken hulls.

8. By deed dated February 14, 1941, and recorded among said land records in liber No. 73, folio 537, the Anglo California National Bank of San Francisco conveyed to Walter R. Wilson and Blanche B. Wilson, his wife, the Sandy Point tract. No mention was made of the burned hulls.

9. Walter R. Wilson and Blanche B. Wilson, his wife, conveyed their interest in the 566.25 acre farm to Frank O. Morgan and Mildred C. Morgan, his wife, by deed dated December 29, 1942, and recorded in liber No. 77, folio 463. No mention of the hulls was made in the deed.

10. On October 27, 1942, Frank O. Morgan was served a requisition by the War Production Board by which the Government obtained use of "all metal constituting a part of the approximately 100 vessels abandoned in Mallows Bay on the Potomac River at or near Sandy Point in Charles County, Md. (exhibit 1). The War Production Board assigned salvaging rights to the Bethlehem Steel Co. See disposition form dated May 22, 1963, acting chief, real estate division to chief, operations division (exhibit 2).

11. By Executive Order 9638 of October 21, 1945, the War Production Board was terminated and the Civilian Production Administration established. This new agency consolidated with other agencies to form the Office of Temporary Controls. The Civilian Production Administration functions of the Office of Temporary Controls were transferred, for liquidation, to the Department of Commerce, which retired the records to the General Services Administration.

12. On August 15, 1963, the Office of Counsel requested that a search be made by the General Services Administration for additional information (exhibit 3). By letter dated October 15, 1963 (exhibit 4), General Services Administration replied that they were not successful in locating records on the vessels except a control card which cited the decision in the *Steinbraker* v. *Crouse* case (exhibits 5 and 6).

13. On August 20, 1954, by deed recorded in liber No. 113, folio 238, Frank O. Morgan and wife conveyed Sandy Point Farm to Sandy Point Estates, Inc., a Maryland corporation. No mention was made of the hulls in question.

14. Sandy Point Estates, Inc., by deed dated October 31, 1963, and recorded in liber No. 166, folio 164, conveyed the Sandy Point Farm to Idamont Inc., a Maryland corporation. No reference was made to the sunken vessels.

15. For the report of chain of title, see disposition form dated January 28, 1964, from I. M. Warder, assistant district counsel for real estate to Office of Counsel (exhibit 7).

16. Exhibits 8, 9, 10, 11, 12, 13, 14, 16, and 17 are photographs of sunken vessels at Mallows Bay.

ANALYSIS OF FACTS AND LAW

1. So far as available records show, the Government divested itself of title to the vessels by sale to a George D. Perry in 1923. Further, the vessels at all times have been and are located on soil belonging to the State of Maryland to which the Federal Government never asserted title. The interest of the Federal Government extends to control of the water over the land, not to the soil. *Sollers* v. *Sollers*, 77 Ind. 148, 151, 26 A. 188. Under these circumstances, title does not vest in the Federal Government.

2. Maryland is owner of legal title to all beds on navigable streams within its boundaries. While the vessels are located on land belonging to the State, it never asserted title or dominion over the vessels in any form.

3. Title examination discloses that at no time were the vessels conveyed to the owners of the adjoining property. This, together with the fact that the hulls are not located on their property, precludes vesting of the title in them.

4. In the case of Steinbraker versus Crouse, previously cited, the Court of Appeals of Maryland ruled that the vessels were abandoned. "Brantly on Personal Property," section 133, states that "a thing is abandoned when the owner throws it away, or leaves it without custody because he no longer wishes to account it as his property; whence it follows that he ceases at once to be the owner. Both the intent to abandon and the fact of abandonment are necessary. Whether property has been abandoned depends upon the intention of the party, the length of time during which the owner has been out of possession being only important as showing this intention." *Black's Law Dictionary* in defining abandonment, states: "The giving up of a thing absolutely, without reference to any particular person or purpose. * * *; leaving a thing to itself, as a vessel at sea; * * *".

CONCLUSION

It is our legal opinion that ownership of the hulls is not vested in the Federal or State governments nor in any individual or corporation, but that in fact, the vessels are abandoned property and belong to anyone who can reduce them to possession. Since the hulls are abandoned property, the question of ownership is not applicable in regard to the disposition of the hulls.

Therefore, removal by the United States or other action as may be deemed necessary in the interest of navigation, may be taken immediately.

C. F. BIHY, *District Counsel.*

(NOTE.—Copies of the exhibits referred to are in the subcommittee files.)

HOUSE OF REPRESENTATIVES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., June 3, 1969.

HON. MARVIN MANDEL,
Governor of Maryland,
State House,
Annapolis, Md.

DEAR GOVERNOR MANDEL: This subcommittee is conducting a study of problems of the Potomac environment, upon which we hope to schedule hearings in the near future.

The abandoned hulks in Mallows Bay are one of the problems we have identified. Section 116 of the River and Harbor Act of 1968 (Public Law 90-483, 82 Stat. 731, 737) authorizes and directs the Corps of Engineers to remove and destroy these hulks. A Federal appropriation of not to exceed $175,000 is authorized, subject to a requirement that local interests contribute 50 percent of the total cost. The Federal share has not yet been appropriated.

The Corps of Engineers has estimated that it could stabilize the hulks in place, and thus eliminate the hazard to navigation, for $50,000. Such a solution, the corps reports, would be unsatisfactory to the adjacent landowners, Idamont, Inc., a real estate development firm.

We are examining whether expenditure of public funds in excess of the minimum cost of abating the hazard to navigation can be justified in the absence of assured public use of the adjacent land. We also understand that the hulks now form a fishing reef, which would be destroyed by their removal.

Your answers to the following questions would greatly aid our study of the Mallows Bay problem:

1. Does the State of Maryland have any definite plan or program to develop a park or otherwise assure public access to the shores of Mallows Bay if the hulks are removed?

2. Does your administration have available or plan to request the legislature to appropriate State funds for contribution toward the cost of removal of the Mallows Bay hulks, and if so, in what amount?

3. Do you know of any public interest that would be served by removing the hulks instead of having them stabilized by the Corps of Engineers to terminate hazards to navigation?

In addition to your answers to the above questions we would be pleased to receive your views of any other problems of the Potomac of common interest to the State of Maryland and the Federal Government which you believe should be included in our study.

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

HOUSE OF REPRESENTATIVES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., June 24, 1970.

Hon. MARVIN MANDEL,
Governor of Maryland,
State House, Annapolis, Md.

DEAR GOVERNOR MANDEL: Last June, I wrote to you asking three questions concerning Mallows Bay and the hulks therein. Enclosed is a copy of my letter of June 3, 1969. Our subcommittee staff advises me that we did not receive your response. If it was lost in the mail, we would appreciate receiving a copy.

Since the date of my letter, we have been informed that the shore behind Mallows Bay is owned by the Potomac Electric Power Co., and that the company plans to build an electric generating station on the site. We therefore assume that question 1, concerning the plans of the State of Maryland to develop a park or assure public access on the shore of the bay, is no longer relevant. However, we would appreciate receiving your response to questions 2 and 3, concerning the State's plan to contribute to the cost of removing the hulks, and the nature of the public interest served by such removal.

You will note that section 116 of the River and Harbor Act of 1968 mentions "local interests" as source of the matching funds. These "interests" could be the State, the county, or even private parties. If your office has information that the "local interest" matching funds may be forthcoming from a source other than the State of Maryland, we should appreciate your sharing it with us.

Your help is much appreciated.

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

STATE OF MARYLAND,
DEPARTMENT OF NATURAL RESOURCES,
STATE OFFICE BUILDING,
Annapolis, July 2, 1970.

Hon. HENRY S. REUSS,
House of Representatives, Washington, D.C.

DEAR CONGRESSMAN REUSS: Governor Mandel has referred to us your letter of June 24, 1970, and your letter to him under date of June 3, 1969, regarding the abandoned hulks in Mallows Bay, a branch of the Potomac River. Governor Mandel regrets very much that your letter of June 3, 1969, had not been brought to his attention.

In reviewing our files, I find that correspondence regarding the removal of these abandoned hulks from the Potomac River dates back to March 21, 1966. For your information, I am enclosing copies of several letters from our files relating to this subject matter. You will note that this correspondence stems from various sources.

Your letter of June 3, 1969, requests answers to three questions. The answer to each of these questions at this time is "No." The State has no definite plan to develop a park or otherwise assure public access to the shores of Mallows Bay if the hulks are removed. There are no current plans at the present time for a request to the legislature to appropriate State funds to match Federal funds. (If we could have definite figures as to the amount the State would be required to appropriate, we would be glad to give it consideration.) Further, we know of no public interest that would be served by removing the hulks instead of having them stabilized by the Corps of Engineers to terminate hazards of navigation.

If additional information is desired, and you will so advise us, we shall be glad to furnish it to the extent of our ability to do so.

Sincerely yours,

J. MILLARD TAWES, *Secretary.*

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C.

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

DEAR MR. FALLON: This is in response to your request for the views of this Department on H.R. 11537, a bill "To require the Secretary of the Army to remove certain abandoned ships from the Potomac River," and a similar bill, H.R. 10018, which is pending before your committee.

Both of the bills authorize and direct the Secretary of the Army to remove from the Potomac River and to destroy the abandoned ships, ships' hulls, and pilings, located in Mallows Bay, between Sandy Point and Liverpool Point, Charles County, Md., and at Wide Water, south of Quantico, Va., and any other abandoned ships formerly among those in either the above locations which have drifted from those areas. H.R. 10018 differs from H.R. 11537 in that H.R. 10018 would allow the Secretary of the Army to accept from the State of Maryland any contribution the State might wish to make toward such removal and destruction, while H.R. 11537 places the full cost of the project on the Secretary of the Army.

The bills are in harmony with the job given this Department by the President to turn the Potomac River into a model river for the whole Nation to use as an example and of which the Nation's Capital can be proud. In the future course of such plans, it is probable that the abandoned ships will have to be removed from the river. However, we believe that it would be better to leave the question of the removal and destruction of these ships, ships' hulls, and pilings until such time as it can be considered as part of the overall coordinated plan on the river. In this way, we can work with the States that are our partners in this project and arrive at a coordinated plan on this question as well as on other questions that may affect the Potomac. Removal of the abandoned ships, ships' hulls, and pilings from the river would benefit boat fishermen and other boaters from the standpoint of safety. Yet, sunken ships and hulls in selected locations can improve fishing conditions and fisherman success because such objects attract and serve as concentration points for many species of fish. Since the removal could affect fishing conditions in that region of the Potomac where the abandoned ships are located, it is our desire that the Bureau of Sport Fisheries and Wildlife be given an opportunity to review and recommend any appropriate modification of the Department of the Army plan for ship removal should this legislation be approved. While we concur in the purpose of these bills, we recommend that action to remove and destroy the ships, ships' hulls, and pilings specified in this bill be left until such time as a coordinated plan for the development of the Potomac River has been worked out.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

_____,
Secretary of the Interior.

DEPARTMENT OF THE ARMY,
Washington, D.C., April 1, 1966.

Hon. GEORGE H. FALLON,
Chairman, Committee on Public Works,
House of Representatives.

DEAR MR. CHAIRMAN: Reference is made to your requests for the views of the Department of the Army with respect to H.R. 10018 and H.R. 11537, 89th Congress, bills "To require the Secretary of the Army to remove certain abandoned ships from the Potomac River."

These bills would authorize and direct the Secretary of the Army to remove from the Potomac River and to destroy the abandoned ships, ships' hulls, and pilings, located in Mallows Bay, between Sandy Point and Liverpool Point, Charles County, Md., and at Wide Water, south of Quantico, Va., and any other abandoned ships formerly among those in either of the above locations which

have drifted from those areas. H.R. 10018 would authorize the Secretary of the Army to accept from the State of Maryland any contribution the State may wish to make toward such removal and destruction.

In the 1920's the Western Marine & Salvage Co. purchased 232 vessels, formerly the property of the Government of the United States, with the intention of salvaging, dismantling, and removing all portions of the vessels which might be marketable and then destroying the remains. The salvage operations were conducted at Sandy Point Farm, a tract of land nearly surrounding Mallows Bay. The method and scope of the operation was to remove all machinery, boilers, pipes, and engines, and to strip the vessels of all metal easily removable; the vessels were then towed to Mallows Bay, where they were burned to the water's edge and then pulled as near to the shore as possible.

The Western Marine & Salvage Co. sold the Sandy Point Farm in November 1932, without mentioning in the conveyance the remains of the burned and sunken hulks. In December 1932, the Western Marine & Salvage Co. was dissolved. Subsequently, the Court of Appeals of Maryland ruled that the vessels were abandoned. (*Steinbraker* v. *Crouse*, 182 A. 448.)

Since the wrecks in their present location are not considered obstructions to navigation, the Department of the Army is without authority and funds to effect their removal. However, the Department is maintaining careful surveillance over the derelicts to insure that they do not break away and become obstructions to navigation.

While these wrecks may possibly represent a potential source of hazard to navigation, it is considered that this hazard could be resolved at a lesser cost than by removal. The buoyancy of the hulks which have been burned to the waterline can be overcome by placing stone inside the hulls located on the perimeter of the Mallow's Bay area. This would ground them in position and form a bulkhead to prevent the sunken hulks inshore of this point from escaping the area. The estimated cost of this work is $50,000. However, it is understood that this plan does not meet with the approval of local interests or the adjacent property owner since securing vessels would place serious limitations on the development of the Sandy Point property and would perpetuate this unsightly nuisance. It is estimated that the cost for complete removal and disposal of the wrecks is between $250,000 and $300,000. The Department of the Army considers that a significant benefit would accrue to adjacent property owners.

The Secretary of the Interior at the direction of the President is currently preparing a report and recommendations designed to make the Potomac River a model of scenic and recreational value for the entire Nation. To accomplish this the Secretary of the Interior has established a Federal task force which includes representatives of the Department of the Army. Since removal of the wrecks properly falls within the purview of this report, the Department of the Army defers on its comments on H.R. 10018 and H.R. 11537 until such time as the report of the Secretary of the Interior is completed. We understand the report is to be submitted to the President in January 1967.

The Bureau of the Budget advises that, from the standpoint of the administration's program, there is no objection to the presentation of this report for the consideration of the committee.

Sincerely yours,

STANLEY R. RESOR,
Secretary of the Army.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., May 17, 1966.

Hon. HERVEY G. MACHEN,
House of Representatives,
Washington, D.C.

DEAR MR. MACHEN: You have asked me, in your letter of April 5, to comment on a letter dated April 1 from Secretary of the Army Stanley R. Resor to Chairman George H. Fallon, Committee on Public Works, House of Representatives, which expresses the Army's views on H.R. 10018, "To require the Secretary of the Army to remove certain abandoned ships from the Potomac River." I am happy to do so.

As you know, President Johnson has asked Secretary Udall to develop a plan for the Potomac that is a model of conservation and scenic beauty. Secretary

Udall has asked me to chair the Federal Interdepartmental Task Force in developing this plan from the Federal point of view and he has asked me to coordinate this work with the Interstate Advisory Committee established for the same purpose by the Governors of the affected States and Commissioner Tobriner of the District of Columbia.

Our job is a difficult and complicated one that, of necessity, forces us to consider a wide variety of subjects that affect the beauty and utility of the Potomac and its basin. Certainly the abandoned ships, ships' hulls, and pilings in the river and its tributaries do affect the attractiveness and usefulness of the river. We have given some thought to what might be done about them and their relationship to other values, including fish and wildlife. We have not reached any conclusions at this time as to what should be done. Unfortunately, I am not in a position at this time to predict what our recommendations, if any, might be when our group has completed its work and made its recommendations to Secretary Udall and he, in turn, has made them to President Johnson.

We do appreciate very much your keen interest and support of our effort to develop a plan for the Potomac that is "a model of conservation and scenic beauty."

Sincerely yours,

KENNETH HOLUM,
Assistant Secretary.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., February 13, 1967.

RAYMOND RADCLIFFE,
President, Izaak Walton League of America, Inc.,
Hyattsville Chapter, Lanham, Md.

DEAR RAY: Many thanks for your kind letter of February 9 expressing your interest in my bill to remove the abandoned ship hulls in the Potomac River.

I must say your suggestion that these hulls be used as manmade reefs in the Potomac River and Chesapeake Bay is a good one and obviously would save a lot of money that otherwise would have been spent to destroy these hulls. In addition to that, they are still floating and under the appropriate conditions of safety and protection of water traffic undoubtedly could be relocated, thus removing them from sight and locating them permanently where they would not constitute a potential hazard.

With kindest personal regards, I am,

Sincerely yours,

HERVEY G. MACHEN, M.C.

STATE OF MARYLAND,
MILITARY DEPARTMENT,
Baltimore, Md., April 20, 1967.

Hon. SPIRO T. AGNEW,
Governor of Maryland,
Annapolis, Md.

DEAR GOVERNOR AGNEW: In reply to your memo routing slip on April 6, together with correspondence from Congressman Machen, the following information is submitted concerning removal of World War I ship hulls from the Potomac River at Mallow's Bay.

The hulls, completely sunken, are located as stated at Mallow's Bay (see map marked inclusive No. 1), covering an area of several acres. I understand the adjacent land is owned by Idamont, Inc., a corporation of which a Mr. DeSales Mudd, of LaPlata, is president. I discussed the matter with him and he states that the hulls preclude use of Mallow's Bay for fishing and other recreational uses, and are also a serious navigational hazard; the hazard being not so much where they are located but that they are breaking up and large pieces are drifting into other navigable areas.

Mr. Mudd further stated that long-range planning for the area, an economically depressed one, is for use as park land.

Two aerial photos of Mallow's Bay (inclusive No. 2 and No. 3) are attached which depict the appearance and extent of the area. I visited Mallow's Bay on April 14 and can assure you that it is most unsightly.

A magazine article from the Washington Star for March 5, 1967, is attached as inclusive No. 4 and gives rather a complete story of the problem.

Attached as inclusive No. 5 is a letter from Department of the Army, dated April 1, 1966, addressed to Congressman Fallon stating the Army's position and responsibility. Your attention is invited to par 7 (as numbered by me) noting that the Army deferred comments on the House bill (now H.R. 2402 as proposed by Mr. Machen) pending the report of Federal task force appointed by the Secretary of the Interior designed to make the Potomac River a model of scenic and recreational value for the entire nation. It would appear that this would be accomplished by Federal funds.

Lastly, I discussed the bill with Mr. Peter Masley of Congressman Machen's office. I am under the impression that they would like to press for passage of the bill and that a contribution from the State of Maryland would be of assistance in gaining a favorable report.

I am at your service to go further into the matter if desired.

Respectfully yours,

GEORGE M. GELSTON,
Major General, the Adjutant General.

EXECUTIVE DEPARTMENT,
STATE OFFICE BUILDING,
Baltimore, Md., May 16, 1967.

Mr. JOSEPH H. MANNING,
Director, Department of Chesapeake Bay Affairs,
State Office Building, Annapolis, Md.

DEAR MR. MANNING: Enclosed herewith is a letter to Governor Agnew from General Gelston, dated April 20, 1967, complete with six enclosures.

Will you please review this matter, obtain necessary background information and suggest a course of action, especially as to what Maryland's contribution would be in order to obtain a favorable report.

I would appreciate your returning all enclosures to me along with your suggestions.

Sincerely,

VLADIMIR WAHBE,
Program Executive for Urban Affairs.

JUNE 7, 1967.

Mr. DAVID FENTRESS,
Maryland National Relations Office, Washington, D.C.

DEAR MR. FENTRESS: This will confirm our telephone conversations of June 5 and June 6 concerning the derelict ships in Mallows Bay.

Recently I directed our Engineering Division to conduct a study of this problem and I am expecting a report shortly. When I have had an opportunity to review the report, I will advice you concerning the possibility of State participation in the solution of the problem.

Sincerely yours,

JOSEPH H. MANNING, *Director.*

STATE OF MARYLAND,
DEPARTMENT OF CHESAPEAKE BAY AFFAIRS,
STATE OFFICE BUILDING,
Annapolis, Md., June 7, 1967.

From: M. M. Cook.
To: J. H. Manning.
Subject: Mallows Bay—World War I Hulls, removal of.
Enclosure: (1) Mr. Wahbe's letter of May 16 with six enclosures.

1. Enclosure (1) requested a review of subject problem and to obtain necessary background information and suggest a course of action as to what Maryland's contribution should be in order to obtain a favorable report.

2. The suggestion of bulkheading the area and overfilling the hulls should be discarded for the following reasons:

(a) Scaling the enclosed area as shown on USC & GS chart 559 delineates an area of approximately 600 yards by 700 yards.

(b) Assuming the area is to be filled to a depth of 10 feet, 1,400,000 cubic yards of spoil would be required.

(c) Estimated cost of dredging and pumping spoil at $.75 per cubic yard would total $1,050,000. Even if a cost of $.50 per yard was obtained, the total cost would amount to $700,000. Bulkheading cost has not been included because the esti-

mated cost of dredging exceeds the estimated cost of $300,000 submitted by the Corps of Engineers.

(d) Further, the only location to obtain such a quantity of spoil would be from the west of the main ship channel leading to Alexandria, Va. and Washington, D.C.; and the discharge pipe would, in all probability, block the channel for some time. It is extremely doubtful whether the Navy, Corps of Engineers, Coast Guard or Merchant Marine would allow such action.

3. I personally believe the entire cost of removal should be borne by the Federal Government as it was initially at fault in allowing such action to occur.

4. If, however, the estimated cost of $300,000 for removal contained in the Secretary of the Army's letter of April 1966 is within reason, and I believe it could go as high as $500,000. Maryland may be justified in going as high as $100,000, with stipulation that the adjacent land be obtained for public use prior to the commencement of removal operations.

5. It is suggested the Governor request Congressman Machen to inquire of the Secretary of the Interior what action is contemplated as a result of the Federal task force report on the Potomac River Basin which was to be submitted to the President in January 1967. Further, since the Department of the Army deferred its comments on H.R. 10018 and H.R. 11537 until such time as the report was completed, it may be an opportune time to request same.

MARSHALL M. COOK.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., June 27, 1967.

Mr. JOSEPH H. MANNING,
Director, Department of Chesapeake Bay Affairs,
State Office Building, Annapolis, Md.

DEAR MR. MANNING: I haven't had any luck in running down any information here on the need for Maryland to share costs of the Mallow's Bay hulk removal. I hope the Corps was able to be more helpful.

Copies of the bills introduced in Congress are enclosed along with the Interior and Army reports of 1966. We are trying to pull our final Potomac report together now and I'm sure we will make a general recommendation on debris, trash (and old ship) removal.

Sincerely yours,

ROBERT M. PAUL, *Staff Assistant.*

JUNE 26, 1967.

Mr. VLADIMIR WAHBE,
Program Executive for Urban Affairs,
Executive Department, Baltimore, Md.

DEAR MR. WAHBE: Inclosed is your file on Mallow's Bay, transmitted with your letter of May 16. Also enclosed are copies of other pertinent documents I have obtained.

On June 15 I discussed this matter with Assistant Secretary Robert Paul of the Department of Interior. Mr. Paul advised that H.R. 10018, 89th Congress, similar to H.R. 2402, 90th Congress, was opposed by the Bureau of the Budget on the ground that a precedent would be established which would lead to excessive future Federal expenditures for solution of similar problems in other areas.

I have been unable to learn when the Secretary of Interior expects to submit to the President his recommendations regarding the Potomac River, which may or may not encompass Mallow's Bay. No one seems to feel that Interior's report will be published soon.

Congressman Machen's office advises me that, in their opinion, an offer by Maryland to share in the cost of removal of the ships would obviate objections of the Bureau of the Budget and greatly improve the chances of obtaining a favorable committee report on H.R. 2402. There is no question in my mind concerning the legality of cost-sharing by Maryland on this project. Section 12F of article 148 of the Code enumerates the purposes for which the Waterways Improvement Fund may be expended, including "Clearing of debris, aquatic vegetation and obstructions from navigable waters of the State." Legislative approval would be necessary, however, for a contribution of more than $5,000.

We suggest that, if the Governor (Agnew) is disposed to commit Maryland to cost-sharing on this project, he advise Congressman Fallon, chairman of the Committee on Public Works, that the executive budget request for fiscal year

1969 include funds for that purpose. We suggest that Maryland's contribution should not exceed one-third of the total cost of the project, which is estimated at $250,000 to $300,000.

We feel that the Mallow's Bay project is important, and that Waterways Improvement Funds would be well spent in removing a hazard to navigation and an eyesore. The current balance of the Waterways Improvement Fund is $293,013.52, and anticipated income is about $500,000 annually.

We believe that the value of the abandoned ships in Mallow's Bay as attractants to fish is greatly overemphasized by the Sport Fishing Institute. Our personnel, including marine inspectors in the area and our helicopter pilot, who routinely observe Mallow's Bay, report that very little fishing is done in the vicinity of the wrecks. If they are removed, the Department will be glad to include Mallow's Bay among the locations where we are now building artificial fishing reefs of a type which has been demonstrated to be effective.

In General Gelston's letter to the Governor dated April 20, 1967, he mentions the planned use of land adjacent to Mallow's Bay as park land. This is a matter we should very much like to see pursued, in view of the critical shortage of State-owned waterfronts.

Sincerely yours,

JOSEPH H. MANNING, *Director.*

JULY 3, 1967.

Gen. GEORGE M. GELSTON,
The Adjutant General, Military Department,
State of Maryland,
Baltimore, Md.

DEAR GENERAL GELSTON: This letter will follow my letter of May 16, 1967, regarding the removal of World War I ship hulks from the Potomac River at Mallow's Bay.

I have since requested the Director of the Department of Chesapeake Bay Affairs to look into this situation. Mr. Manning has prepared a very comprehensive report on the matter, a copy of which I am enclosing for your information.

I am in agreement with the findings of this report especially with the proposal that a park be developed on the Mallow's Bay site. Of course, the State of Maryland will have to share in the costs both of removal of the ship hulks and in the development of the park. I am therefore requesting the Director of the Department of Forests and Parks to investigate costs for park development.

As Mr. Manning indicates, the State would probably have to put up approximately $100,000 as its share for removal of the abandoned ships. I plan to write to Governor (Agnew) and request that funds in this amount be included in the 1968–69 State budget—with the proviso that the Federal authorities assume two-thirds of the total costs involved in the project.

Obviously these hulks represent a menace to navigation and you may rest assured that we will take all steps possible to deal with this problem.

Sincerely,

VLADIMIR WAHBE,
Program Executive for Urban Affairs.

JULY 5, 1967.

Mr. VLADIMIR WAHBE,
Program Executive for Urban Affairs,
Executive Department, Baltimore, Md.

DEAR MR. WAHBE: Since writing you recently concerning the old ships in Mallow's Bay, I have received a letter from Bob Paul, Staff Assistant to the Secretary of the Interior, in which he states that "We are trying to pull our final Potomac report together now and I'm sure we will make a general recommendation on debris, trash (and old ship) removal." This is the first indication I have had that the In'erior Department report is imminent.

It may be that the Governor will wish to withhold any cost-sharing commitment pending the publication of Interior's report.

Sincerely yours,

JOSEPH H. MANNING, *Director.*

B. PROPOSED SANDY POINT POWER PLANT

BEFORE THE PUBLIC SERVICE COMMISSION OF MARYLAND

(Case No. 6356)

IN THE MATTER OF THE APPLICATION OF POTOMAC ELECTRIC POWER COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF A FOSSIL-FUELED ELECTRIC GENERATING STATION ON THE POTOMAC RIVER AT SANDY POINT IN CHARLES COUNTY, MARYLAND, AND CERTAIN ASSOCIATED OVERHEAD TRANSMISSION LINES DESIGNED TO CARRY VOLTAGES IN EXCESS OF 69,000 VOLTS, PORTIONS OF WHICH ARE TO BE LOCATED IN SAID CHARLES COUNTY AND IN PRINCE GEORGES COUNTY, MARYLAND

APPLICATION

Pursuant to the provisions of § 54A of The Public Service Commission Law of Maryland and the provisions of Order No. 57340, dated August 8, 1968, entered by the Public Service Commission of Maryland (the "Commission") in its Case No. 6215, Potomac Electric Power Company (the "Applicant"), an electric company as defined in § 2 of such law, hereby applies for a certificate of public conveinence and necessity for the construction of the generating station and transmission lines hereinafter described:

1. The address of the Applicant's principal business office is 929 E Street, N.W., Washington, D.C. 20004.

2. The names, titles and addresses of the persons authorized to receive notices and communications with respect to this application are Richard W. Emory, 1400 Mercantile Trust Building, Baltimore and Calvert Streets, Baltimore, Maryland 21202 and Thomas E. O'Dea, 929 E Street, N. W., Washington, D.C. 20004, Attorneys for the Applicant.

3. (a) The Applicant proposes to construct a fossil-fuel-fired, steam-electric generating station, complete with all the usual appurtenances such as fuel handling and storage facilities, transformers, switchyard, microwave tower, etc., on a tract of land containing 524 acres located on the Potomac River at Sandy Point in the Third Election District of Charles County, Maryland. Sandy Point is approximately 27 miles upstream from the Potomac River (Route 301) Bridge. The principal generating unit proposed initially to be installed at the station will be a 415 megawatt ("MW") steam-electric cycling unit to be fired by residual fuel oil which is to be delivered by barge to the plant site. (A "cycling" unit is one designed for relatively low capital costs and the capability of relatively frequent stops and starts so that it may be operated as a peaking unit). In addition, the initial installation will include a 20 MW, distillate oil-fueled, combustion turbine intended to provide a source of power to permit the cycling unit to shut down without damage in the extreme emergency of its isolation from the transmission system, to provide prompt black start-up capability for the station, and to provide peaking capability.

(b) The project to be covered by the requested certificate will also include the following transmission lines and substation to be constructed by the Applicant:

(i) Two 500-kilovolt ("KV"), double-circuit, steel tower, transmission lines, one extending from the generating station across the Potomac River to the Virginia bank of the river where it will connect with a similar line, to be constructed and owned by Virginia Electric and Power Company ("Vepco") leading to Vepco's Possum Point generating station (the "River Crossing Line"), and the other extending from the generating station to a substation in the Burches Hill area ("Burches Hill") proposed to be constructed by the Applicant on a tract of land containing approximately 180 acres located in the Ninth Election District of Prince George's County, Maryland (the "Sandy Point/Burches Hill Line").

(ii) Two 230 KV, double-circuit, steel tower, transmission lines extending from Burches Hill to the Applicant's existing Palmers Corner/Talbert Transmission line, in the Ninth and Eleventh Election Districts of Prince George's County (the "Connecting Lines").

(c) The planned in-service date for the project is early 1974.

(d) Filed herewith as Annex A is a location map of the affected portions of Charles and Prince George's Counties showing the sites of the proposed generating station at Sandy Point and the proposed substation at Burches Hill, the route of the proposed River Crossing Line, the route of the proposed Sandy

Point/Burches Hill Line, and the routes of the proposed Connecting Lines; and filed herewith as Annex B is a map showing the generating station site in greater detail, on which has been indicated the general area selected for the location of the Station's facilities.

4. The Applicant estimates that the cost of the generating station, the transmission lines and the substation will be:

Generating station:	
Land	$325, 000
Facilities	49, 000, 000
Transmission lines:	
River Crossing Line:	
Land	150, 000
Facilities	1, 500, 000
Sandy Point/Burches Hill Line:	
Land	3, 600, 000
Facilities	6, 000, 000
Connecting Lines:	
Land	525, 000
Facilities	200, 000
Burches Hill substation:	
Land	1, 400, 000
Facilities	4, 000, 000
Total	66, 700, 000

5 The Applicant plans to finance the project as a component of its continuing construction budget, for which funds are provided, as required, from internal sources (depreciation provisions and retained earnings), from bank borrowings, and from the sale of securities.

6. (a) The proposed generating station is needed to provide the Applicant with adequate generating capacity in 1974 as outlined below (in megawatts):

Year	Estimated peak demand	Installed capacity (net)	Purchase or (sale)	Total available capacity	Reserve	
					Megawatts	Percent
1969 [1]	2, 815	2, 850	62	2, 912	97	3. 4
1970	3, 150	3, 487	0	3, 487	337	10. 7
1971	3, 500	4, 160	(300)	3, 860	360	10. 3
1972	3, 900	4, 435	(200)	4, 235	335	8. 6
1973	4, 300	4, 359	275	4, 634	334	7. 8
1974 (without project)	4, 800	4, 359	500	4, 859	59	1. 2
1974 (with project)	4, 800	4, 780	500	5, 282	482	10. 0

[1] 1969's figures are actual rather than estimated.

(b) The transmission lines included in the project are needed for two purposes: First, in order to get the output of the proposed generating station away from the station and into the Applicant's power supply transmission network; and, Second, in order to complete a high capacity transmission ring around the Applicant's service area, using the high voltage transmission circuits of Vepco and Alleghany Power System ("APS") which are already interconnected with those of the Applicant by the Dickerson/Pleasant View 230 KV transmission line which extends from Vepco's Pleasant View Substation in Loudoun County, Virginia, across the Potomac River, to the Applicant's Dickerson Generating Station in northwesterly Montgomery County, Maryland, and by the Dickerson/Doubs 230 KV transmission lines which extend from the Doubs Substation of APS in Frederick County, Maryland, to the Applicant's Dickerson Generating Station.

Filed herewith as Annex C is a schematic drawing showing the existing portions of such high capacity ring in relation to the additions proposed thereto as a part of the project.

(c) The proposed Burches Hill Substation is needed in order to make possible the connection of the proposed Sandy Point/Burches Hill Line and the Applicant's existing 230 KV system.

7. The project will provide essential electric energy for use by Pepco customers at reasonable costs consistent with their need for adequate and reliable

electric service. The estimated specific costs (other than for fuel), on an annual basis, related to the project are:

Operation	$645,000
Maintenance	430,000
Depreciation	1,506,000
Taxes	1,725,000
Total	4,306,000

8. The project will improve the reliability of the Applicant's system by adding to its power supply complex a new generating station having an initial net capability of 421 MW. Further, as indicated in item 6(b), above, the project will provide the necessary connecting link to complete a high capacity transmission ring around the Applicant's service area which will greatly increase the reliability of the Applicant's service by making possible the continuation of supply to all portions of the Applicant's 230 KV power supply ring area even if, at any particular point on the ring, there is a loss of all circuits, since the needed power will be able to be supplied from either direction on the ring to all lines tapping the ring.

The existence of such high capacity ring will also enhance reliability by increasing power exchange capabilities with Vepco and APS and will greatly improve stability since a major factor affecting the transient stability of a power system is the strength of the transmission network to tie together the generating sources and load centers of the system, and to tie the power system to its neighboring systems.

9. (a) The Applicant owns the site of the proposed generating station in fee simple, having acquired equitable title to such property on October 31, 1963. Record title was vested in the Applicant on April 15, 1970.

(b) For the River Crossing Line, the Applicant proposes to acquire the fee simple interest in a strip of land 200 feet wide extending across approximately 9 properties. The actual river crossing will be under permits to be obtained from the concerned Federal and State agencies.

(c) For the Sandy Point/Burches Hill Line, the Applicant proposes to acquire the fee simple interest in a strip of land 350 feet wide extending across approximately 167 properties.

(d) For the Connecting Lines, the Applicant proposes to acquire a right-of-way (250 feet wide) over one parcel of land, owned by the State of Maryland and occupied by Boys Village, for the east connecting line (the west connection line being wholly within the boundaries of the tract of land proposed to be acquired for Burches Hill).

10. The following is a list of agencies (other than this Commission) having requirements which must be met in connection with the construction or operation of the project:

U.S. Corps of Engineers
Federal Aviation Administration
Federal Communications Commission
U.S. Coast Guard
Maryland State Department of Health and Mental Hygiene.
Maryland State Department of Natural Resources.
Maryland State Roads Commission
Board of Commissioners of Charles County
Charles County Department of Public Works
The Maryland-National Capital Park & Planning Commission.
Board of Commissioners of Prince Georges County
Prince Georges County Department of Public Works
Public Service Commission of the District of Columbia

At the date of the filing of this Application no approval had been obtained (or sought) from any agency (except as noted below with respect to the generating station site zoning) because the Applicant believes that the orderly and economic way to obtain all the necessary approvals is first to file, and prosecute to a conclusion, this Application and then, if such conclusion is favorable, to proceed with the other necessary applications.

On April 15, 1970, the Applicant filed a petition with the Board of Commissioners of Charles County to rezone the proposed generating station site from its present zoning classification of R–A to the I zoning classification, which latter classification permits a generating station of the type planned by the Applicant.

In Prince Georges County, Maryland, the Applicant holds a franchise dated March 4, 1941 granted by the County Commissioners, a true copy of which is

filed herewith as Annex D. The exercise of such franchise was approved by this Commission by its Order No. 36839, dated March 19, 1941, entered in its Case No. 4450.

In Prince George's County, Maryland, the Applicant holds a franchise dated July 6, 1915 granted by the County Commissioners, a true copy of which is filed herewith as Annex E. The exercise of such franchise was approved by this Commission by its Order No. 2896, dated June 1, 1916, entered in its Case No. 1120.

As successor to Great Falls Power Company, a Virginia corporation, the Applicant also holds the statewide franchise which was granted to that company by Chapter 540 of the Laws of Maryland of 1894, as amended by Chapter 245 of the Laws of Maryland of 1900. For further information with respect thereto reference is made to this Commission's Order No. 50070, dated May 15, 1953, entered in the Commission's Case No. 5263, and to *Potomac Electric Power Company vs. Birkett, et al.* (1958), 217 Md 476, 143 A2d 485.

12. (a) The proposed general routes of the transmission lines which are involved in the project are shown on Annex A hereto.

The proposed route of the River Crossing Line gives it a length of 5 miles, of which 2 miles are for the actual river crossing. At the Virginia end of the line there will be about an additional one-quarter mile of line constructed and owned by Vepco.

The proposed route of the Sandy Point/Burches Hill Line gives it a length of approximately 31 miles, of which 22 miles will be in Charles County and 9 miles in Prince Georges County.

The proposed routes of the Connecting Lines give them each a length of approximately ½ mile, all of which will be in Prince Georges County.

(b) All of the proposed routes extend through gently rolling, partially wooded, rural countryside, except that in the case of the River Crossing Line the crossing of the Potomac River accounts for approximately 2 miles of the route.

(c) Filed herewith as Annex F is a map of the general area encompassing the proposed routes of the transmission lines on which are indicated various sites which might be considered "historic". In the area the Applicant has been unable to identify any sites which are peculiarly "scenic" (except, perhaps, the park areas indicated as shaded areas on the map), but it recognizes that throughout the area, and particularly along the Potomac River, there may be many locations which might be considered by someone to be "scenic".

13. (a) As stated above, the proposed generating station is to be located at Sandy Point in Charles County, Maryland.

(b) The station will be constructed along the Potomac River.

(c) Annex F shows the general area encompassing the proposed generating station site on which are indicated various sites which might be considered "historic". In the area the Applicant has been unable to identify any sites which are peculiarly "scenic" (except, perhaps, the park areas indicated on the map), but it recognizes that throughout the area, and particularly along the Potomac River, there may be many locations which might be considered by someone to be "scenic".

(d) The Applicant believes that the proposed generating station will have no material effect on air quality. The 415 MW steam cycling unit will be fueled with No. 6 residual fuel oil and the combustion turbine with No. 2 distillate fuel oil. The stack emissions from both units will meet all applicable requirements of the State of Maryland as presently in effect. The steam unit's stack will have a height of 600 feet.

(e) The proposed generating station will have no material effect on water quality.

At the station, the Applicant will install a sewage treatment plant, for handling the station's sanitary wastes, which will meet the applicable requirements of the State and local authorities having jurisdiction with respect thereto. It will also install facilities for collecting and neutralizing, prior to discharge into the river, all chemically-treated liquid wastes from the station, and such facilities, and their discharged effluent, will meet all applicable standards.

The Applicant does not plan to use a cooling tower for the station's condensing water because it does not believe that the nature of the relevant portion of the river is such as to make that technique either necessary or advisable.

Fuel oil for use at the generating station is to be delivered by barge and the station's facilities for the receipt and handling of such barge-delivered fuel will be designed so to reduce to an absolute minimum the possibility of any spillage into the waters of the river during the course of the discharging of oil into the

station's receiving facilities. Further, adequate facilities will be provided to contain, and to remove from the waters of the river any oil which might be spilled during such discharging and receiving operations.

(f) The probable thermal effect of the station on the river will be such as will meet all applicable governmental and regulatory requirements as presently in effect.

(g) Filed herewith as Annex G is a copy of a report made to the Applicant by Resources Research, Inc., entitled "Theoretical Ground Level Concentrations of Sulphur Oxides Due to Plant 'X' Emissions from Three Alternative Stack Heights", which was considered by the Applicant in selecting the 600 foot height for the steam unit's stack.

Prior to developing the design for the station's cooling water intake and discharge system, the Applicant will employ The Alden Research Laboratories of Worcester Polytechnic Institute to build a model of the relevant portion of the river which will then be used as a study tool to guide the Applicant in such design. In such design process the Applicant will also use limnology studies of the river which it will commission from The Academy of Natural Sciences of Philadelphia. Similar model and limnology studies have been a regular part of the Applicant's generating station design tools for more than ten years.

Wherefore, the Applicant requests that the Commission issue to it a certificate of public convenience and necessity for the construction of the project hereinabove described.

Respectfully,

POTOMAC ELECTRIC POWER CO.,
By D. F. HUGHES,
Senior Vice President.

WASHINGTON, D.C., *April 30, 1970.*
RICHARD W. EMORY,
F. DESALES MUDD,
CORNELIUS MEANS,
THOMAS E. O'DEA,
Attorneys,
Potomac Electric Power Co.

DISTRICT OF COLUMBIA, *ss.*:

Before me, Indiana C. Shepp, a Notary Public in and for the District of Columbia, on this 30th day of April, 1970, personally appeared in said District Dorsey F. Hughes, who, first being duly sworn, made oath and said that he is the Senior Vice President of Potomac Electric Power Company, and duly authorized to sign the foregoing Application, and that the statements therein are true to the best of his knowledge, information and belief.

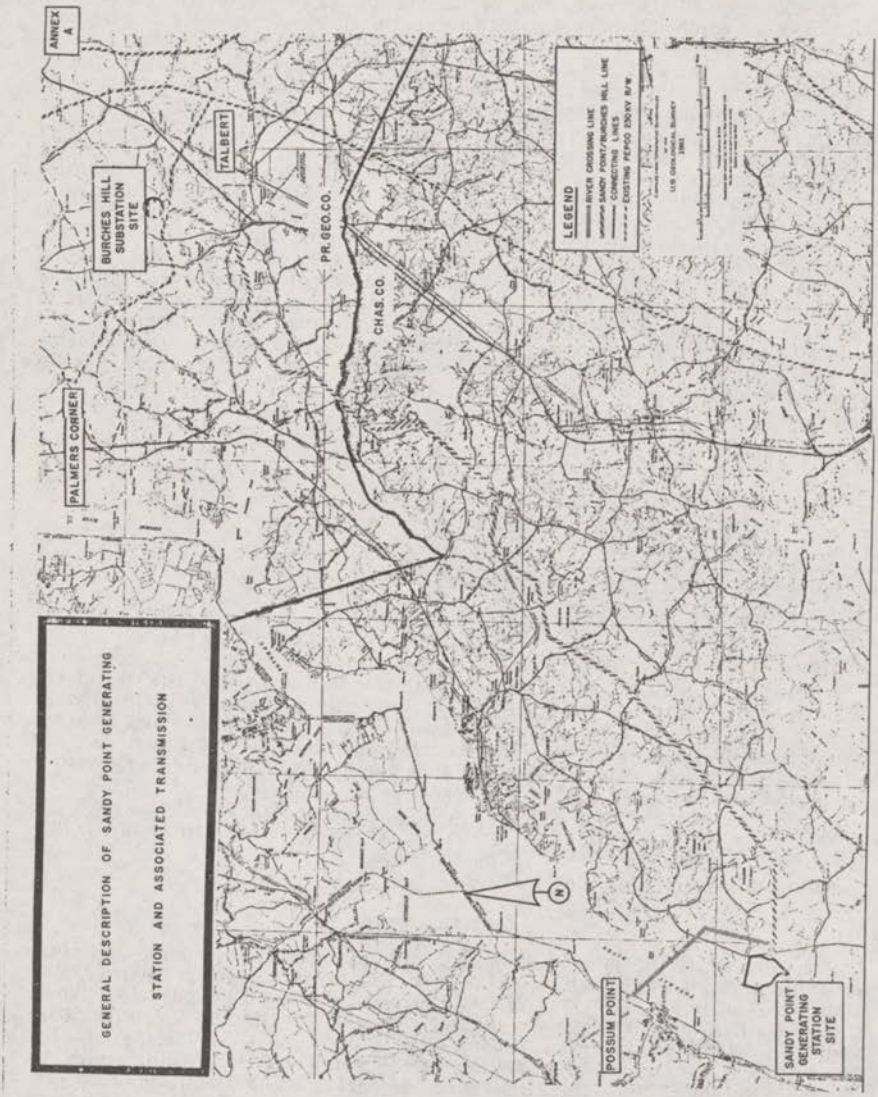
INDIANA C. SHEPP,
Notary Public, D.C.

[NOTARIAL SEAL]
My commission expires June 14, 1970.

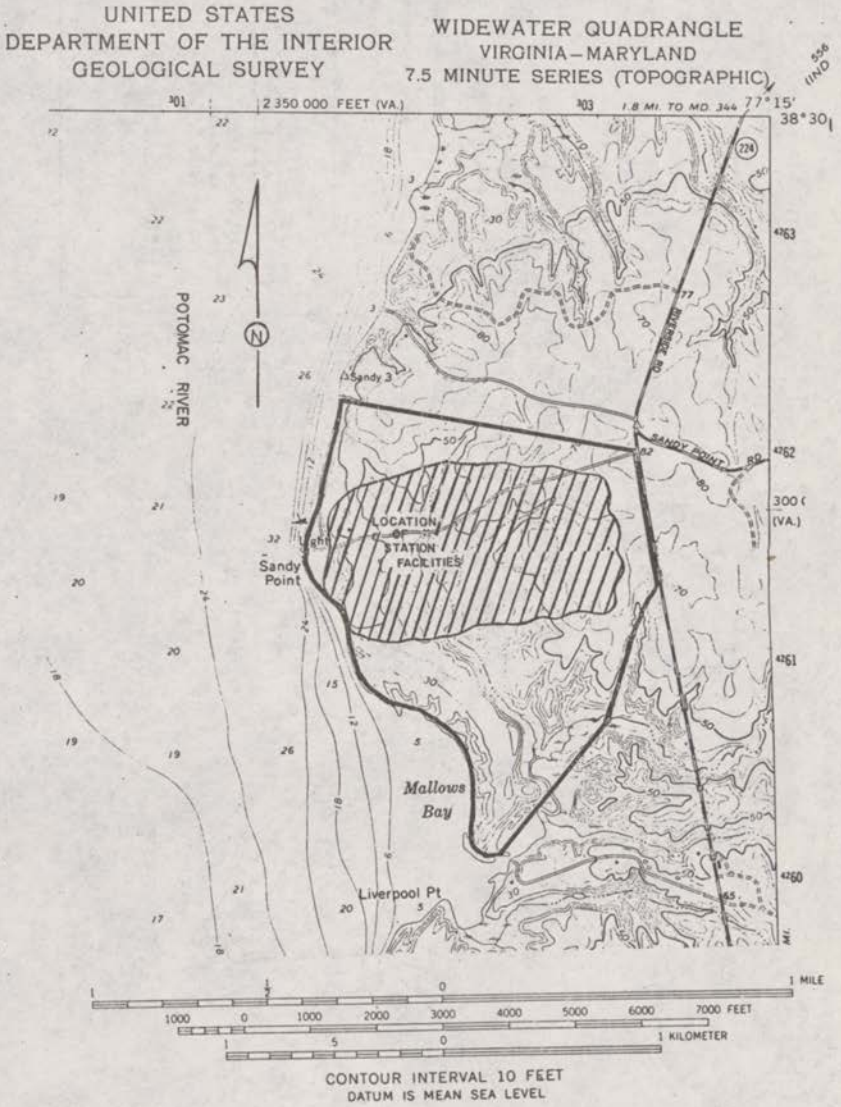
CERTIFICATION

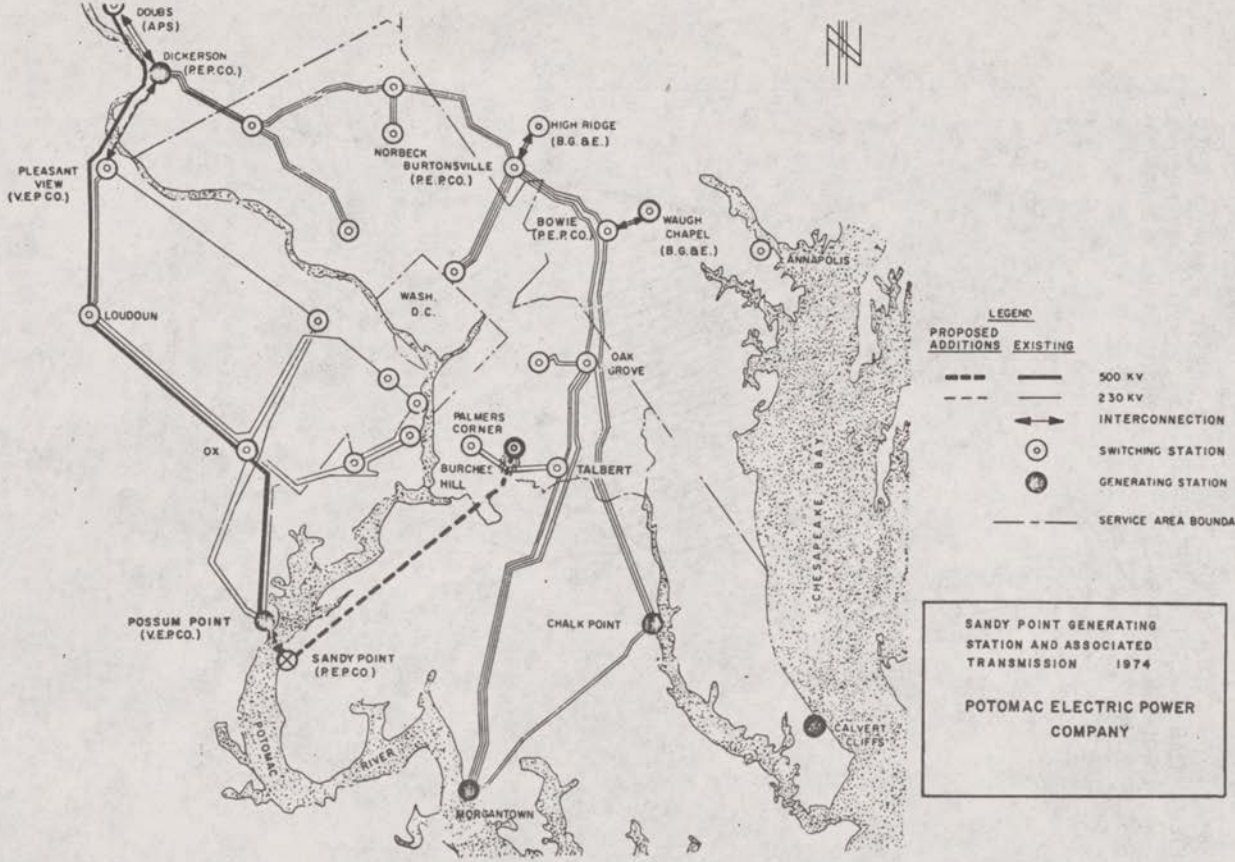
I hereby certify that a copy of the foregoing Application was mailed, postage prepaid, on April 30, 1970 to U.S. Corps of Engineers, Baltimore District, P.O. Box 1715, Baltimore, Maryland 21203; Federal Aviation Administration, Washington Area Office, 900 South Washington Street, Falls Church, Virginia 22046; Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554; U.S. Coast Guard, 5th Coast Guard District, 610 Federal Building, Portsmouth, Virginia 23705; Maryland State Department of Health and Mental Hygiene, 2305 North Charles Street, Baltimore, Maryland 21218; Maryland State Department of Natural Resources, State Office Building, Annapolis, Maryland 21401; Maryland State Roads Commission, 300 West Preston Street, Baltimore, Maryland 21201; Board of Commissioners of Charles County, Maryland, Court House, La Plata, Maryland 20646; Charles County Department of Public Works, Court House, La Plata, Maryland 20646; The Maryland-National Capital Park and Planning Commission, 6600 Kenilworth Avenue, Riverdale, Maryland 20840; Board of County Commissioners of Prince George's County, Maryland, Court House, Upper Marlboro, Maryland 20870; Prince George's County Department of Public Works, Court House, Upper Marlboro, Maryland 20870; and Public Service Commission of the District of Columbia, 1625 I Street, N.W., Washington, D.C. 20006.

THOMAS E. O'DEA


ANNEX A
PALMERS CORNER
BURCHES HILL SUBSTATION SITE
TALBERT
PR. GEO. CO.
CHAS. CO.
LEGEND
RIVER CROSSING LINE
SANDY POINT/BURCHES HILL LINE
CONNECTING LINES
EXISTING PEPCO 230 KV R/W
U.S. GEOLOGICAL SURVEY
1961
POSSUM POINT
SANDY POINT GENERATING STATION SITE
N
GENERAL DESCRIPTION OF SANDY POINT GENERATING
STATION AND ASSOCIATED TRANSMISSION

ANNEX B


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WIDEWATER QUADRANGLE
VIRGINIA–MARYLAND
7.5 MINUTE SERIES (TOPOGRAPHIC)
2 350 000 FEET (VA.)
1.8 MI. TO MD. 344
77°15'
38°30'
POTOMAC RIVER
SANDY POINT
LOCATION OF STATION FACILITIES
Sandy Point
Mallows Bay
Liverpool Pt
4263
4262
4261
4260
300 (VA.)
1 MILE
7000 FEET
1 KILOMETER
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL


DOUBS (APS)
DICKERSON (P.E.P.CO.)
PLEASANT VIEW (V.E.P.CO.)
NORBECK
BURTONSVILLE (P.E.P.CO.)
HIGH RIDGE (B.G.&E.)
BOWIE (P.E.P.CO.)
WAUGH CHAPEL (B.G.&E.)
ANNAPOLIS
WASH. D.C.
LOUDOUN
OAK GROVE
PALMERS CORNER
OX
BURCHES HILL
TALBERT
CHESAPEAKE BAY
POSSUM POINT (V.E.P.CO.)
SANDY POINT (P.E.P.CO.)
CHALK POINT
CALVERT CLIFFS
POTOMAC RIVER
MORGANTOWN
LEGEND
PROPOSED ADDITIONS
EXISTING
500 KV
230 KV
INTERCONNECTION
SWITCHING STATION
GENERATING STATION
SERVICE AREA BOUNDARY
SANDY POINT GENERATING STATION AND ASSOCIATED TRANSMISSION 1974
POTOMAC ELECTRIC POWER COMPANY

ANNEX D

BEFORE THE COUNTY COMMISSIONERS OF CHARLES COUNTY, MARYLAND

IN THE MATTER OF THE APPLICATION OF POTOMAC ELECTRIC POWER COMPANY

Whereas, the Potomac Electric Power Company, a corporation organized under an Act of Congress, has made application for a franchise or right to erect poles, string lighting and power wires, guy wires and guy stubs and other attachments and appliances for the purpose of supplying and selling electronic current for light, heat and power to consumers thereof along the public highways within Charles County in the State of Maryland; and

Whereas, it further appears to this Board that it is to the interest of the public and it is expedient and proper to grant such franchise.

Now, therefore, in consideration of the payment by the Potomac Electric Power Company of the sum of One ($1.00) Dollar the receipt of which is hereby acknowledged, and the assessments for taxation purposes now made, and to be hereafter made; upon the property of said company used in the construction of its lines and the taxes derived therefrom, and from the benefits and advantages that will accrue to the public and County by reason thereof, the County Commissioners of Charles County, in the State of Maryland, do hereby grant unto the Potomac Electric Power Company, its successors and assigns, forever, the right to erect poles, string lighting and power wires, guard wires, erect any guy stubs and other attachments and appliances and to do any and all other things necessary and proper in connection with the supply and sale of electric current for light, heat and power purposes, or any of them, to consumers thereof in said Charles County over, along and adjacent to any of the public roads, highways or public spaces within said Charles County, Maryland, and subject to the jurisdiction of the County Commissioners of Charles County, Maryland, not now occupied or used by any other public utility for electric power service.

Provided, that in cases of objection to the erection or extension of any such electric power line, or lines, this Board reserves the right to hear the same and determine the propriety of such erection or extension, and the grant herein made shall not take effect as to such proposed erection or extension, to which objection is made, until the further order of this Board.

Provided further, that all lines, poles, wires, guards, guys and other appliances and appurtenances to be erected in connection with said grant by said company shall be so located as in no way to interfere with the safety or convenience of persons travelling on or over said roads or the drainage thereof and in the work of installing or maintaining any underground system, if any, said company shall not open nor encumber more of said roads then will be necessary to enable it to perform the same with the proper economy and efficiency, nor shall it permit any opening or encumbrance of any kind whatsoever to remain for a longer period than will be necessary to do the work for which said opening shall have been made, without interruption to the free passage of persons and vehicles; nor shall any proposed underground system or extension be installed until the location thereof shall be filed with and approved by this Board.

Provided further, that whenever said streets or roads shall be legally closed or relocated by the said County Commissioners or municipal authorities of Charles County, the said Potomac Electric Power Company, its successors and assigns, shall remove its lines from any road so closed, or rebuild them on roads so relocated; and

Provided further, that before this assent shall be effective, the conditions hereto shall be accepted by the said Potomac Electric Power Company, and in said acceptance the said body corporate, its successors or assigns, shall agree to save harmless thereby the County Commissioners of Charles County and the said municipal authorities from any and all liability for or on account of any injury to any person, or to the property of any persons by reason of any act or thing authorized to be done under such assent, or in the maintenance of any structure or object directed under the authority of such assent, by the said Potomac Electric Power Company, its successors or assigns, and from any damages claimed against the said County Commissioners or said municipal authorities by reason of the granting of such assent, and from all action, claims, suits, charges and judgments for any such liabilities or damage, and all costs, counsel fees and expenses incident thereto; and it is further agreed that such assent is subject to the following distinct provisions:

1. Nothing in this assent shall give the said Potomac Electric Power Company, its successors or assigns, any rights along any road or roads in Charles County made and maintained by the State Roads Commission of Maryland, nor on or along any road or street within the limits of any incorporated town in Charles County, Maryland.

2. All electric lines and conductors and all appurtenances thereto erected by the said Potomac Electric Power Company, its successors or assigns in pursuance of this assent, shall be neat and symmetrical and shall be located so as not to interfere with the proper drainage of any of the public roads of Charles County.

3. All privileges given under this order or assent shall be operative only so far as the County Commissioners have jurisdiction and control over the said roads or highways, and the said Potomac Electric Power Company, shall be required to obtain any further rights and privileges from the abutting land owners or from whomsoever it may desire the same, or from whomsoever it may be required by law so to obtain.

4. Nothing herein contained shall be construed as waiving or relinquishing any right of taxation the said County Commissioners, or their successors, may have at any time, now or hereafter against the said Potomac Electric Power Company, its successors or assigns.

5. And the said Potomac Electric Power Company shall within ninety (90) days from the date of the passage of this order signify in writing its acceptance of all terms, conditions, regulations and restrictions contained therein, and in default of which the authority hereby given shall become null and void and of no effect.

In testimony thereof, the said County Commissioners of Charles County have caused its name to be hereunto subscribed by its President and the same attested by its seal and the signature of its clerk this 4th day of March in the year 1941.

COUNTY COMMISSIONERS OF CHARLES COUNTY, MD.,
By BURNARD L. PERRY, *President.*

Attest:

GEORGIETTA CROFT, *Clerk.*

ANNEX E

BEFORE THE COUNTY COMMISSIONERS OF PRINCE GEORGE'S COUNTY STATE OF MARYLAND

IN THE MATTER OF THE PETITION OF THE POTOMAC ELECTRIC POWER COMPANY, A CORPORATION DULY ORGANIZED UNDER AN ACT OF CONGRESS

Whereas, The Potomac Electric Power Company, a corporation organized under an Act of Congress has made application for a franchise or right to erect poles, string lighting and power wires, guy wires and buy stubs and other attachments and appliances for the purpose of supplying and selling electric current for light, heat and power to consumers thereof along all of the public highways within Prince George's County in the State of Maryland, and

Whereas, It now appears to this Board that the said Potomac Electric Power Company has for a number of years maintained poles, lighting and power wires and other attachments and appliances for the supply and sale of electric current for light, heat and power purposes along certain of the public highways within Prince George's County in the State of Maryland, which has largely inured to the benefit and convenience of the public and Prince George's County, and

Whereas, it further appears to this Board that it is to the interest of the public and it is expedient and proper to grant such franchise.

Now, Therefore, in consideration of the payment by the Potomac Electric Power Company of the sum of One Dollar ($1.00), the receipt of which is hereby acknowledged, and the assessments for taxation purposes now made and to be hereafter made upon the property of said company used in the construction of its lines and the taxes derived therefrom, and from the benefits and advantages that will assure to the public and County by reason thereof, the County Commissioners of Prince George's county, in the State of Maryland, do hereby grant unto the Potomac Electric Power Company, its successors and assigns forever, the right to erect poles, string lighting and power wires, guard wires, erect any guy stubs and other attachments and appliances and to do any and all other things necessary and proper in connection with the supply and sale of electric current for light, heat and power purposes, or any of them, to consumers thereof

in said Prince George's County over, along and adjacent to any of the public roads, highways or public spaces within said Prince George's County, Maryland, and subject to the jurisdiction of the County Commissioners of Prince George's County, Maryland.

Provided, that in cases of objection to any new extensions this Board reserves the right to hear the same and determine the propriety of such new extension, and the grant herein made shall not take effect as to such proposed new extension, to which objection is made until the further order of this Board.

Provided, however, that all lines, poles, wires, guards, guys and other appliances and appurtenances to be erected in connection with said grant by said company shall be so located as in no way to interfere with the safety or convenience of persons travelling on or over said roads or the drainage thereof and in the work of installing or maintaining any underground system if any, said company shall not open nor encumber more of said roads than will be necessary to enable it to perform the same with the proper economy and efficiency, nor shall it permit any opening or encumbrance of any kind whatsoever to reign for a long period than will be necessary to do the work for which said opening shall have been made and shall not interrupt the free passage of persons and vehicles; and

Provided further that no proposed underground system or extension shall be installed until the location thereof shall be filed with and approved by this Board.

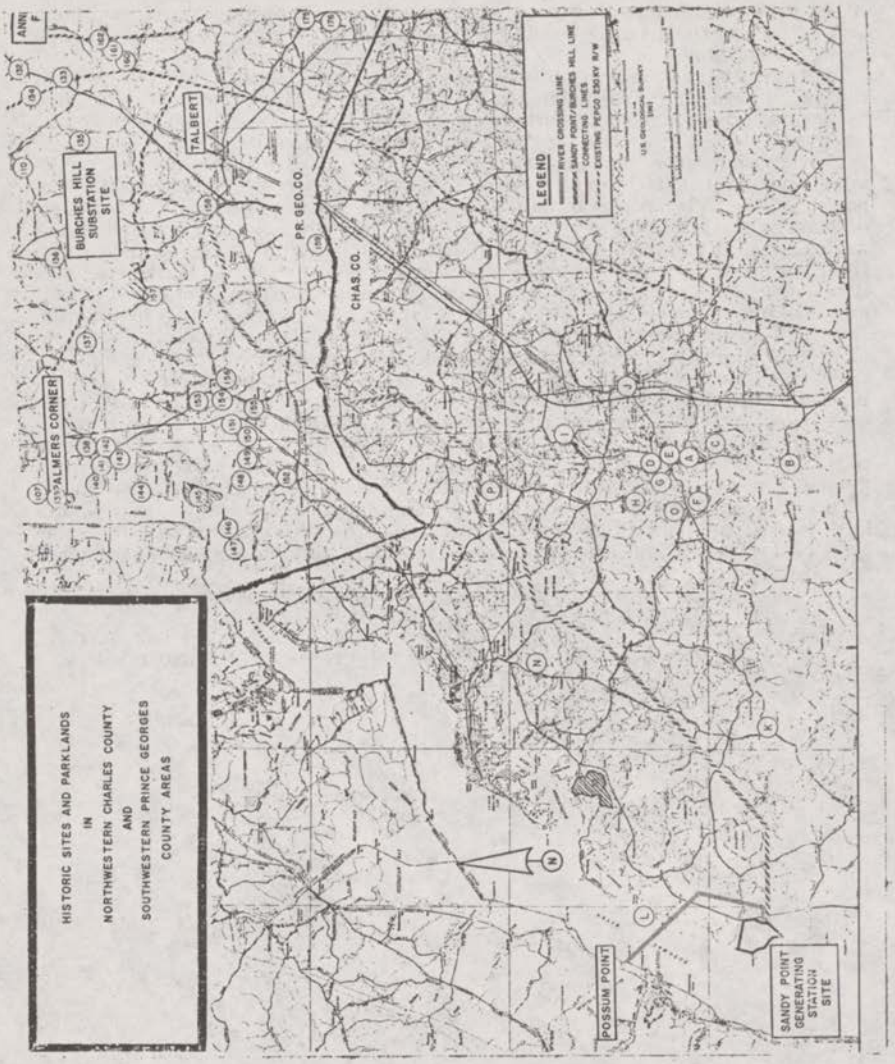
Provided, further, that said company shall maintain all its lines, poles, wires and appurtenances in good and safe order and condition and shall at all times fully indemnify, protect and save harmless the said County Commissioners of Prince George's County from and against all loss and damage by reason hereof.

In testimony thereof, the said county commissioners of Prince George's County have caused its name to be hereunto subscribed by its President and the same attested by its seal and the signature of its clerk this 6th day of July in the year 1915.

COUNTY COMMISSIONERS OF PRINCE GEORGES COUNTY,
By H. NEWTON BOWEN, *President.*

Attest:

HENRY ST. J. L. BRISCOE, *Clerk.*



ANNEX F

Historic Sites in the Northwestern Charles County and Southwestern Prince George's County Areas

I. CHARLES COUNTY SITES

A. *Chandlers Hope.*—About 1639 Job Chandler of London established himself in a small frame house on a steep eastern bank elevation that overlooked Potopaco and a broad southward stretch of the Port Tobacco River. A pioneer settlement grew up in the vicinity known as Chandlers Town. Little remains today of Chandlers Town except for the oldest part of the house at Chandlers Hope.

B. *St. Thomas Manor.*—Part of a 1638 land grant to Father Thomas Copley of the Society of Jesus. About 1644 the mission was confiscated under orders

of the Puritans in England. The mission was restored to Father Copley in 1648. In 1649 due to uncertain political affairs he transferred the manor deed to Thomas Mathews who held the land for the Society until 1662 when Lord Baltimore was once again in firm control of the province.

C. *Mulberry Grove.*—Home of John Hanson (1721–83) member of Continental Congress, President of that Congress under Articles of Confederation (1781–82).

D. *Stagg Hall (1732).*—One of the two remaining 18th century homes on Port Tobacco town square.

E. *Chimney House (1763).*—One of two remaining 18th century homes on Port Tobacco town square.

F. *Ellerslie.*

G. *Rose Hill.*—Home of Dr. Gustavus R. Brown (1747–1804). Foremost country doctor and Washington family physician. During the Civil War this was the home of Miss Olivia Floyd, a Confederate spy.

H. *Habre De Venture.*—Home of Thomas Stone (1743–87) signer of the Declaration of Independence, helped form Articles of Confederation, member of Continental Congress 5 years.

I. *Mount Carmel (1790).*—First Roman Catholic Convent in the original United States.

J. *Christ Church.*—One of the 30 Anglican parishes established 1692 by Act of Provincial Assembly. Supported by a yearly poll tax of 40 pounds of tobacco. Moved to present site from Port Tobacco in 1904.

K. *Old Durham Church (1732).*—Episcopal, contains handsome silver chalice and paten (1707). Graves date from 1695. Ancient sundial stands near front gate. General Smallwood served as vestryman for 16 years.

L. *Budds Ferry.*—Site of a Union Battery November 1861 to March 1862. Movements of Confederate troops across the Potomac River in Virginia were watched from this point.

M. *Smallwood's Retreat.*—Revolutionary War hero, Gen. Wm. Smallwood (1732–92) lived in this unusual small brick colonial home with detached frame kitchen. Smallwood's "Old Liners" saved Washington's army from annihiliation during the battle of Brooklyn. He became Governor in 1785.

N. *Araby.*—Built about 1700. The Widow Eilbeck, mentioned in Washington's diary, lived here. Her daughter, Ann Eilbeck, married Col. George Mason of Gunston Hall, Virginia.

O. *"The Retreat" circa 1730.*—Home of Daniel of St. Thomas Jenifer, signer of the Constitution of the United States. First President of the Maryland Senate (1777–81), and close friend of George Washington who visited here June 3, 1763.

F. *St. Joseph Catholic Church (1760).*

II. PRINCE GEORGES COUNTY SITES

107.* *Admirathoria.*—Large, red-brick, early 1800 house on site of two other houses. Curved mansard roof has replaced a gabled roof.

110. *His Lordship's Kindness (Poplar Hill).*—Reputedly the first house in America to be designed and supervised by an architect, circa 1725. Excellent example of Georgian architecture, named for 14th Earl of Shrewsbury. One wing used as a Roman Catholic chapel for many years. Prosperous farm; private dwelling. Large graveyard.

132. *Trump's Hill Farm.*—1820 Federal-style, two-story hip-roof, clapboard house.

133. *Woodstock.*—A wing built mid-1700's has a free-standing chimney; large part of house built mid-1800's.

134. *Mount Airy.*—Once a 17th century hunting lodge of one of the Lords Baltimore. Much of original house destroyed by fire in 1931, restored. Many outbuildings and cottages, brick stable, gardens, reputed to have been designed by L'Enfant, who drew up first plan for the city of Washintgon.

135. *Poplar Neck.*—Site of an old house or cabin which no longer stands, only old foundation is there. Present house late 19th or early 20th century private home.

136. *Mary Surratt House.*—John M. Lloyd operated a tavern in this house owned by Mary Surratt. After the assassination of President Lincoln, John Wilkes Booth and David E. Herold stopped here briefly before going on to the home of Dr. Samuel Mudd.

137. *Bellview.*—Fine small home, circa 1795. Old Steed home. Chimneys and window frames appear original. Several outbuildings and family grave.

138. *St. John's Church.*—One of the 30 Anglican parishes established in Maryland in 1692; replaced by present structure in 1723; portions rebuilt in 1767 for the price of 16,000 pounds of tobacco. Entrance and tinted glass date from 1820. Cemetery has 1760 tombstone. George Washington worshipped here.

139. *Fort Foote.*—Fort, built in 1863, was garrisoned throughout the Civil War. It is well preserved. Two 15-inch Rodman naval guns on the grounds.

140. *Archeological Site.*—Indian artifacts have been found on this property of the Smoot Sand & Gravel Co.

141. *Wantwater.*—Built circa 1710, fine small Queen Anne style house; is in ruins. Property of U.S. Government. Former owner removed and has stored the rich wood paneling and flooring.

142. *Piscataway House.*—Mid-18th century house, moved in 1942 from town of Piscataway. Woodwork, Victorian. Kitchen with brick floor was separate, but added to house when moved.

143. *Harmony Hall (Battersea).*—Built 1722, Georgian style, extensively remodeled. George Washington visited here often. Ancestral home of Magruder family. Later owned by Addison brothers who lived there "in harmony" with their wives—hence the name. Presently owned by the U.S. Park Service.

144. *Archeological Site.*—Indian artifacts have been found in this relatively undisturbed area.

145. *Fort Washington National Park.*—Fort was originally built on a site selected by George Washington to protect the National Capital. An outstanding example of early 19th century coastal defense. The present fort, completed in 1824, replaced the original which was destroyed by the British in 1814. Now maintained for the public by the National Park Service.

146. *Archeological Site.*—(Accokeek Creek)—Accokeek Creek site was intermittently occupied for 5,000 to 6,000 years dating from archaic times. Small villages developed where pottery was made. Around 1300 A.D. there was one large village with a palisade, ossuary burials and many houses, which existed until 1620. Captain John Smith, on his visit here in 1608, recorded it as "Mayoane."

147. *Archeological Site.*—Colonial Farm.

148. *Archeological Site.*—Known as the Farmington Landing Site; the Archeological Society of Maryland is now digging there.

149. *Archeological Site.*—Digging has been completed here by Mrs. Alice Ferguson, and the findings reported in American Antiquities Magazine, 1942, vol. 6, No. 1, pp. 4–18, in an article entitled "An Ossuary Near Piscataway Creek."

150. *Strawberry Hill.*—House, reputedly of the 18th century; originally in Charles County, was moved up the river on a barge 2 years ago by Mrs. Clagett. The house is now being restored. Tongue-in-groove floor boards on the first floor are supposed to be original.

151. *Archeological Site.*—Digging has been completed on this Piscataway site on Washington Suburban Sanitary Commission property.

152. *Christ Church of Accokeek.*—This structure built on the old foundation and part of the original walls of the original church, which was erected in 1698 but burned extensively in 1856. The Church of England was disestablished, and the original church was neglected. It was reconstructed in 1857.

153. *Hatton-Clagett Graveyard.*—Very old and falling apart, but burial there a few years ago.

154. *Piscataway (Clagetts) Tavern.*—Store and tavern, built late 1700's. Davis Boswell died here during the Revolution. Much remodeled, a hodgepodge of styles and additions.

155. *St. James Hill.*—A Flemish bond, a brick house, circa 1810, with a shake roof. A frame section, circa 1780, has an attached shed of rough hewn board, fastened with coarse nails. Peculiar features of the structure include the chimney and the brickwork immediately under its cornice. Dormers added subsequent to 1936.

156. *Edelen House.*—House may be a restoration or a modern imitation. It is a hodgepodge of assembled parts, giving it an extremely peculiar form. It is reputed to have been the home of James Edelen.

157. *Wyoming.*—Built circa 1756 on the site of an earlier house, this is an example of the Maryland telescoping house, of three sections with a gambrel roof on the largest section. Owned by the Marburg family, it was for years a great social center.

158. *Gwynn Park.*—A 1790–1820 Federal-style house. House and grounds are in good condition. A few small features and a cottage on the grounds are not of the original date.

159. *Pheasant's Thicket.*—A two-story, frame house, circa early 1700's. Was the home of John Robinson, who fought in the Revolution and lies buried here.

160. *Rawlings House.*—One of five manor houses built on a 2,503-acre parcel of land originally called "Brookfield Manor." The owner, John Rawlings, estimates the house to be 250 years old. The main house has two stories, with a central hall and a wing at the east end.

161. *Brookwood.*—After having been given the land by his uncle, John Smith, John Bowie built the house which stood here for 150 years. The courts, after untangling a dispute over wills, however, granted the property to William Bowie. The house located here now is doubtfully the original.

162. *Bellefields (Sim's Delight).*—The 1720 house was abandoned in early 1900's; restored in the 1930's and remains in excellent condition. Chimneys are half in and half out of the end walls, which some say is typical of this county. The wings had fallen down and were replaced with brick from Williamsburg. Old graveyard on the property.

175. *St. Paul's Episcopal Church.*—Present church, circa 1733, replaced the original 1692 frame structure erected when the parish was established; is in excellent repair. Has a window memorial to Thomas John Clagett who was rector here from 1780–86 and was made Bishop of Maryland in 1792, the first bishop consecrated in America.

176. *Horsehead Tavern.*—Building dates from late 18th century; large two-story portion with a wing remains of the original house, also the porch and door. The house is now covered with aluminum siding and is the private home of D. G. Boswell.

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*Index notation as per MNCPPC "Historic Site Identification Map," dated April 1965.

ANNEX G

Theoretical Ground Level Concentrations of Sulfur Oxides Due to Plant X Emissions From Three Alternative Stack Heights

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(Report of an Analytical Study for the Potomac Electric Power Co., Washington, D.C., March 1970, by Resources Research, Inc., Reston, Va.)

SUMMARY

This is a report on the potential impact on air quality of the Potomac Electric Power Co. (Pepco) generating station presently designed as plant X, planned for construction at Sandy Point, Md., about 25 miles south-southwest of Washington, D.C. The 415-megawatt (peakload) plant will have a single boiler and stack, and is designed to burn 265,000 pounds per hour of fuel oil. The study objective is to predict ground level concentrations of sulfur oxides attributable to stack emissions, based upon three alternative stack heights and three alternative percentages for fuel oil sulfur content. The stack height alternatives are 400, 600, and 800 feet. The sulfur content alternatives are 1, 1.5, and 2 percent.

Arithmetic average annual ground level concentrations of sulfur oxides are predicted by means of the "complete" Martin-Tikvart atmospheric dispersion model. Meteorological input data include the annual average afternoon mixing height for Washington, D.C., and a 480-point combined frequency distribution of wind direction, wind speed, and atmospheric stability developed from 5 years of hourly observations at Washington, D.C., and Quantico, Va. Emission data were calculated from boiler, fuel, and stock specifications provided by Pepco, using standard emission factors applied to rate of combustion. The computed average annual results are subjected to a Larsen model analysis, from which short time period concentrations could be predicted.

Comparison of predicted concentrations with the Maryland area IV "more adverse levels" for sulfur oxides indicates that compliance with regulations requires the use of fuel with sulfur content less than 2 percent and a stack height of 600 feet or more. Complete results are shown in the following summary table.

SUMMARY OF AMBIENT GROUND LEVEL CONCENTRATIONS OF SULFUR OXIDES

[Parts per million]

Time base:	Annual average (arithmetic)	1 day per year		1 hour per month		5 minutes twice a week	
Area IV more adverse level of secondary air quality standards.	0.015–0.030	0.050–0.100		0.100–0.200		0.250–0.500	
Predicted value at point of maximum ground-level concentration:							
400-ft. stack:							
1.0 percent S	.0033	.036	*.038	.130	*.075	.35	*.31
1.5 percent S	.0050	.054		.195		.53	
2.0 percent S	.0066	.072		.260		.70	
600-ft. stack:							
1.0 percent S	.0022	.024	*.030	.088	*.058	.24	*.24
1.5 percent S	.0033	.036		.132		.36	
2.0 percent S	.0044	.048		.176		.48	
800-ft. stack:							
1.0 percent S	.0016	.017	*.025	.062	*.049	.17	*.21
1.5 percent S	.0024	.026		.093		.26	
2.0 percent S	.0032	.034		.124		.34	

Note: Starred (*) entries were computed using Pasquill-Gifford equations in Turner's Workbook, assuming category B stability, mean wind of 2.5 miles per second, and Singer conversion factors on basis of 30-minute sampling time for computed concentrations.

Theoretical Ground Level Concentrations of Sulfur Oxides Due to Plant X Emissions From Three Alternative Stack Heights

1.0 SITE DESCRIPTION

1.1 Location

The Potomac Electric Power Co. (Pepco) generating plant presently designated as plant X will be erected at Sandy Point on the east (Maryland) bank of the Potomac River approximately 4 kilometers southeast and across the river from Quantico Marine Corps Air Station, Va. Upstream the Potomac River course is generally from northeast to southeast, but as it reaches Sandy Point it curves gently to the left. After passing the point the river is oriented north-south for the next 12 kilometers, and the river width broadens from 3 kilometers at the point to 5 kilometers farther south. Still farther downstream the river executes a sweeping curve to the northeast.

Since winds, particularly light winds, tend to follow paths of least resistance, the north-south river channel orientation is strongly reflected in the direction of reported winds at Quantico, the observational station nearest to plant X. The channeling effect on winds is aided by the natural obstacles of tall trees and rolling inland terrain.

1.2 Climatological factors

Adjacency of the broad waters of the lower Potomac tempers the extremes of heat and cold that occur even a short distance inland. Advection fogs associated with easterly, especially southeasterly winds are deeper and more persistent than those inland. Advection fogs are often associated with inversions that lie above the surface layers of air ranging from 450 meters high in winter to 1,200 meters in summer. Over the river and shoreline, inversions are seldom dissipated by afternoon heating even when they are weakly defined, unlike their extensions farther inland. Effluents carried upriver by a southeasterly flow normally travel for long distances in moderately stable atmospheric layers.

Measurable precipitation, on the average, is evenly distributed throughout the year, occurring about 1 day in 3 except 1 day in 4 during autumn. Weather changes are usually frequent. Periods when stagnating high pressure systems overlie the area with high air pollution potential seldom extend over 3 days, except during September and October, when stagnation periods of 4 days or more occur on an average of 1 year out of 3.

2.0 POWER PLANT SOURCE DATA

Table 1.—Source data for Pepco plant X

Stack height (m)	
Alternatives	122
Do	183
Do	244
Stack top diameter (m)	5.95
Gas exit velocity (m/s)	26.8
Gas volume (acfm X 10^3)	1460
Gas exit temperature (°K)	533
Heat emission (cal/sec x 10^6)	27.7
Average ambient temperature (°K)	287
Average wind at stack height [1] (m/sec)	4.75
Plume rise [2] (m)	280
Effective stack height (m):	
Alternatives	402
Do	463
Do	524
Process rate, full load, fuel oil (gal/hr)	33,125
Emission rate [3] (T/day) [4]:	
Sulfur oxides:	
(1 percent S)	62.4
(1.5 percent S)	93.6
(2 percent S)	124.8

[1] See sec. 2.2.
[2] See sec. 2.1.
[3] See sec. 2.3.
[4] Using emission factors listed in R. L. Duprey, "Compilation of Air Pollutant Emission Factors," Public Health Service Publication No. 999–AP–42, 1968, 3–7.

2.1 Effective stack height

Effective stack height is the sum of the physical stack height, h, and plume rise, $<$h. For the determination of plume rise, the optimized CONCAWE formula [1] was used, as follows:

[1] Tennessee Valley Authority, "Full Scale Study of Plume Rise at Large Electric Generating Stations." TVA Division of Health and Safety, Muscle Shoals, Ala., September 1968.

$$\Delta h = 0.414 \frac{Q_H.444}{\bar{u}_h.694}$$

where

Δh = plume rise (m)
Q_H = heat emission (calories/sec) = $27.7(10^6)$
$\bar{u}_h$ = average wind speed at stack height = 4.75 (see sec. 2.2)

The plume rise thus computed is 280 meters. A second calculation was made as a check, using the Holland Plume Rise Formula,[2] as follows:

$$\Delta h = \frac{v_s d}{\bar{u}_h}\left(1.5 + 2.68 \times 10^{-3} pd \frac{T_s - T_a}{T_s}\right)$$

where

v_s = stack gas exit velocity, m/sec = 26.8
d = inside stack diameter, m = 5.95
p = atmospheric pressure, mb = 1000
T_s = stack gas temperature, °K = 533
T_a = ambient temperature, °K = 287
and Δh and $\bar{u}_h$ are as defined above.

[2] Holland, J. Z., 1953. "A Meteorological Survey of the Oak Ridge Area," USAEC Report ORO–99, Oak Ridge National Library, 1953.

The plume rise computed by the Holland formula is 298 meters, which is within 6.5 percent of the CONCAWE result. The 280 meter value was used because (a) it results in slightly higher ground level concentrations than the Holland value, and (b) the Optimized CONCAWE Formula is strongly recommended by the TVA study.

Ground level concentrations of sulfur oxides are computed on the basis of three effective stack heights, as follows:

Physical stack height (m)	Plume rise (m)	Effective stack height (total) (m)
122	280	402
183	280	463
244	280	524

2.2 Average wind at stack height

For the calculation of plume rise (sec. 2.1), the appropriate wind speed to be used is not the reported wind near the surface but the wind at stack height, for which climatological data are not available. The following power law relation between wind speed and height was assumed for the atmospheric layer:

$$\bar{u}_h = \bar{u}_o (Z_h/Z_o)^n$$

where $\bar{u}_h$ = wind speed at stack height
$\bar{u}_o$ = wind speed near the surface, 2.5m sec.
Z_h = stack height
Z_o = anemometer height (assumed to be 15m)

n is a dimensionless parameter related to atmospheric stability. It ranges in value from 0.1 to 0.5, as stability increases from very unstable to very stable. The value of n used in this study is 0.25, which corresponds to the annual average and prevailing stability condition.

The use of three alternative stack height values leads to the following three wind speeds at stack height:

Stack height (m)	Wind speed (m/sec)	CONCAWE EQ. (wind speed) .694
122	4.3	2.7
183	4.7	2.9
244	5.0	3.1

As seen from the plume rise equations described in section 2.1, higher wind speeds result in lower values for plume rise. In turn, lower plume rises result in higher ground level pollutant concentrations. To simplify dispersion computations, it was decided that one wind speed would be used 4.75 meters per second, with the understanding that results for the worst case, the 122 meter (400 foot) physical stack height, would be slightly biased (by about 6.6 percent) toward higher concentrations. This error is small considering the overall level of accuracy associated with the dispersion model.

3.0 METEOROLOGICAL DATA

The atmospheric dispersion model used to compute average ground level concentrations requires input of the following meteorological data over a climatological time period:

1. Surface wind: direction and speed
2. Average afternoon mixing height
3. Atmospheric stability.

3.1 Surface wind

A frequency distribution of wind direction versus wind speed classes (wind rose data) for the Marine Corps Air Station at Quantico, Va., was obtained from the Environmental Science Services Administration (ESSA) National Weather Records Center, Asheville, N.C. The distribution, prepared from 43,803 hourly observations between January 1, 1960, and December 31, 1964, is given in annual summary and on a month by month basis. These data are later combined with a stability frequency distribution in the manner described in section 3.4. Since the stability frequency distribution is available only for the annual case, the monthly wind data cannot be used at this time.

3.2 Mixing height

Mixing height is the height above ground attained by turbulent motions associated with surface heating and wind flow across rough terrain. It defines the vertical layer of air within which the distribution of airborne pollutants is confined. The lower the mixing height, the greater the pollutant concentrations within the atmospheric mixing layer.

The closest upper air observational station for which mixing height data are available is Washington National Airport. From Holzworth's tabulation of average mixing heights,[3] the annual average of 850 meters for Washington was adopted for the plant X site.

3.3 Atmospheric stability

Stability is an atmospheric property that is related inversely to the degree of turbulent mixing within the layer for which it is defined. Stability is usually measured by the rate of temperature change with altitude (lapse rate) within the layer. However, since lapse rate determination requires vertical sounding equipment like radiosondes, and are therefore available routinely only from certain airport stations (including Washington), stability approximations are also made from hourly surface weather reports on the basis of wind and sky condition criteria.

Stability has been classified by Pasquill[4] into six categories ranging from extremely unstable (category A) to extremely stable (category F). The last of these occurs very rarely in urban areas because of the "heat island" effect resulting from the heat-retentive properties of massed urban structures. Also, heat retention by large bodies of water like the lower Potomac River prevents the occurrence of the strong nocturnal inversions along the shoreline. Hence, category F has been eliminated from the stability classification used for the plant X analysis.

A frequency distribution of stability prepared from hourly surface observations at Washington National Airport was adopted for plant X. The analyzed data were provided by the Meteorology Section of the National Air Pollution Control Administration, Durham, N.C. Over the 5-year period from 1960 to 1964, the following frequency distribution was found for stability categories:

Category and description	*Frequency percent*
A—Very unstable	0.8
B—Moderately unstable	5.6
C—Slightly unstable	11.4
D—Slightly stable	50.2
E—Moderately stable	32.0

The frequency distribution is for an annual average only. Monthly and seasonal frequency distributions of stability are not available at this time.

3.4 Combined frequency distributions

The atmospheric dispersion models described in section 4 require input of combined frequency distributions of wind speed, wind direction, and stability.

The complete table consists of 480 data combinations formed as follows:

(*a*) Wind direction: frequency distribution over 16 points of the compass using Quantico data.

(*b*) Wind speed: frequency distribution over 6 wind speed classes, using the Quantico data in the form provided by the National Weather Records Center. Wind speed classes are—

Class:	*Speed interval (miles per hour)*
1	0 to 3.
2	4 to 7.
3	8 to 12.
4	13 to 18.
5	19 to 24.
6	25 or more.

(*c*) Stability: frequency distribution over 5 stability classes, using the Washington data given in 3.3.

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[3] Holzworth, G. C., 1964. "Estimates of Mean Maximum Mixing Depths in the Contiguous United States". Monthly Weather Review, vol. 92, No. 5, 235–242, May 1964.

[4] F. Pasquill, 1962. Atmospheric Diffusion. D. Van Nostrand and Co., Ltd., London, p. 209.

The table of 480 wind direction-wind-speed-stability combinations used for the "complete model" analysis is given in Appendix A.

4.0 COMPUTATIONAL MODEL

4.1 Features of the Martin-Tikvart model

The model used in this analysis was developed in 1968 by D. O. Martin and J. A. Tikvart, meteorologists with the National Air Pollution Control Administration. The model permits calculation of average ground level concentrations of any air pollutant at one or many downwind receptor locations resulting from emissions from one or many sources. For each receptor location the model sums the effect of each source over a complete set of meteorological conditions recorded for a climatological period of time, ascribing to each condition a value proportional to its frequency of occurrence. The frequency distribution matrix of meteorological parameters includes sixteen wind directions, six wind speed classes, and five atmospheric stability classes, for a total of 480 combined subclasses. For each subclass, at each receptor point, an atmospheric diffusion calculation is made using a formula similar to No. 5.15 in Turner[5] with appropriate values for mean maximum mixing height. Because of the number of calculations required, a computer is used.

4.2 Uses and limitations of the model

Results obtained by the use of this model, as will all models, should be accepted only in full realization of the model's limitations. The following points should be noted.

1. Assumptions

The following simplifying assumptions are made:

Steady-state, equilibrium conditions.
Winds invariant in time and space.
Smooth, flat terrain.
No mechanisms for removal of airborne contaminants (for example, no clouds or precipitation, impact on structures, capture by surface bodies of water. and so forth.)

2. Prediction periods

The model is geared to climatological time periods and averages, and should not be used for analysis of short-term cause-effect relations between sources and pollutant concentrations. It is a stochastic, not a dynamic model, although physical principles are observed. Statistical relations that provide the substance of the model are derived from a variety of empirical test data, but they must be adjusted to fit other sites and test conditions.

3. Calibration

The model may be calibrated with actual ground level sulfur dioxide measurements through the use of regression equations. Without these measurements, which should be taken for at least a year, the model exercise can provide only the first approximation to ground level concentration values, although the overall pattern will still be valid. The more reliable the data used in model calibration, the greater the prediction accuracy.

5.0 RESULTS

5.1 Dispersion patterns

Figures 1, 2, and 3 show the predicted ground level concentrations of sulfur oxides, in micrograms per cubic meter, for plant X emissions from a 400-, 600-, and 800-foot stack, respectively. Plotted values are results for the burning of fuel oil of 1-percent sulfur content. Results for 1.5-percent sulfur and 2-percent sulfur content may be readily obtained by multiplying the plotted values by factors of 1.5 and 2, respectively. Results may be expressed in terms of parts per million by dividing the plotted values by 2,730, which is the conversion factor for the average annual Quantico temperature of 57° F. Table 3 presents the data in parts per million for the three stack heights and three cases of percentage sulfur content, at the predicted points of maximum concentrations.

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[5] D. Bruce Turner, "Workbook of Atmospheric Dispersion Estimates," Public Health Service Publication No. 999–AP–26, 1967, p. 6.

TABLE 3.—ANNUAL AVERAGE CONCENTRATIONS OF SULFUR OXIDES, IN PARTS PER MILLION, AT MAXIMUM LOCATIONS

Stack height (feet)	Percent fuel oil sulfur content		
	1	1.5	2
400	0.0033	0.0050	0.0066
600	.0022	.0033	.0044
800	.0016	.0024	.0032

All predicted (arithmetic) annual averages fall well under the range of 0.015 to 0.030 parts per million, which is the "more adverse level" for nearby area IV (Montgomery and Prince Georges Counties) under State of Maryland regulations. High concentrations occur most frequently to the north and southeast directions from the plant, with one major center of maximum concentrations located in the southeast sector. The downwind distance of the maximum depends upon the stack height, as follows:

Stack height (feet):	*Downwind distance (kilometer)*
400	3.2
600	4.0
800	6.5

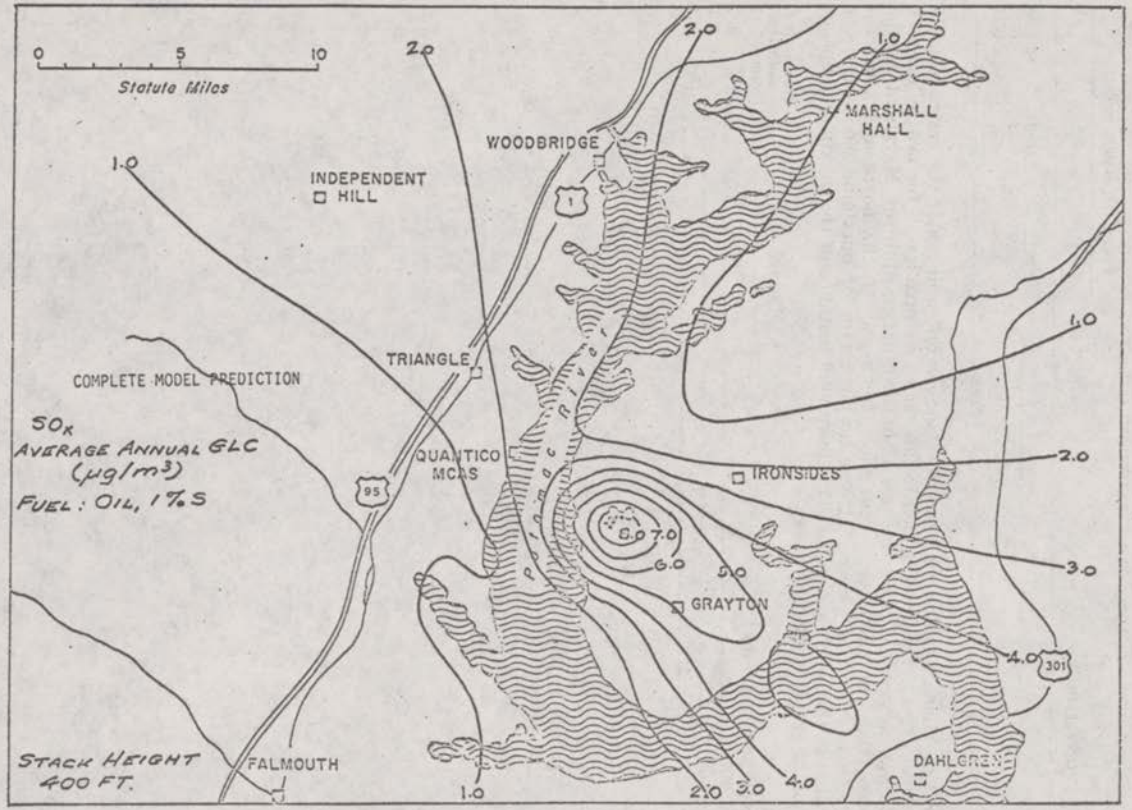


FIGURE 1. ATMOSPHERIC DISPERSION PATTERN DUE TO PLANT X EMISSIONS, 400 FT. STACK

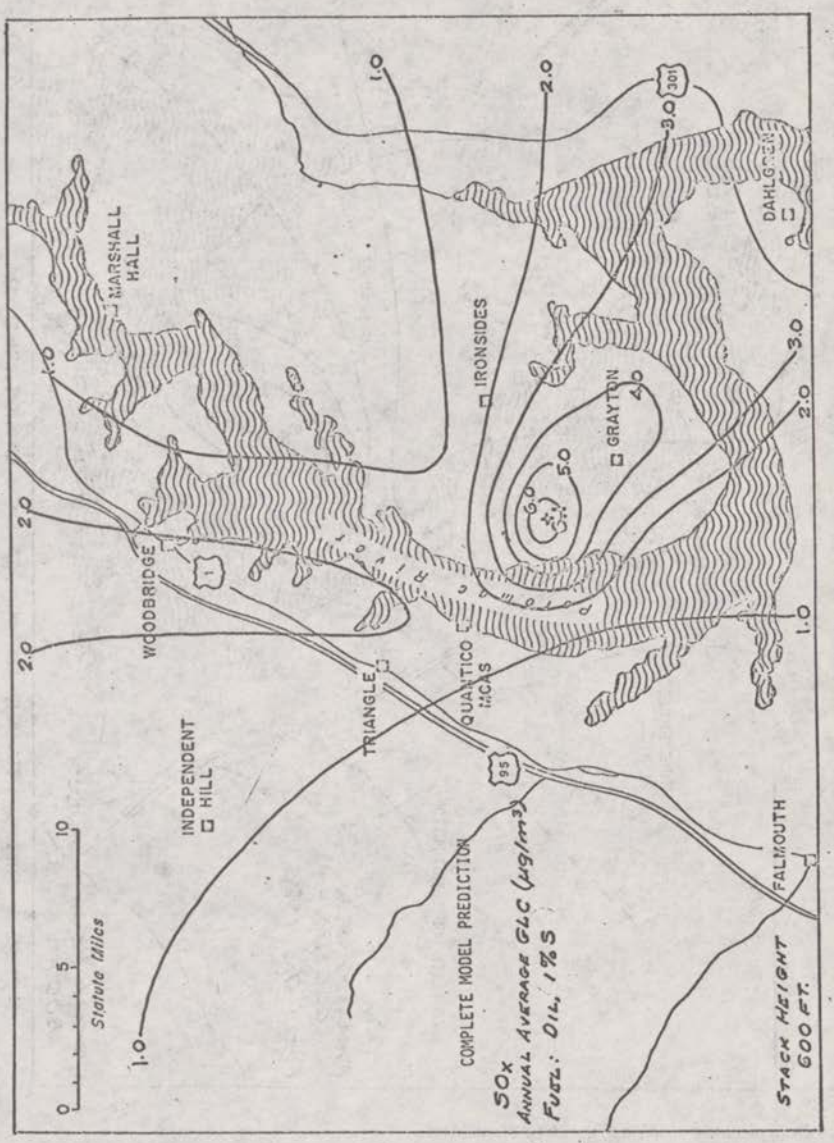


FIGURE 2. ATMOSPHERIC DISPERSION PATTERN DUE TO PLANT X EMISSIONS, 600 FT. STACK

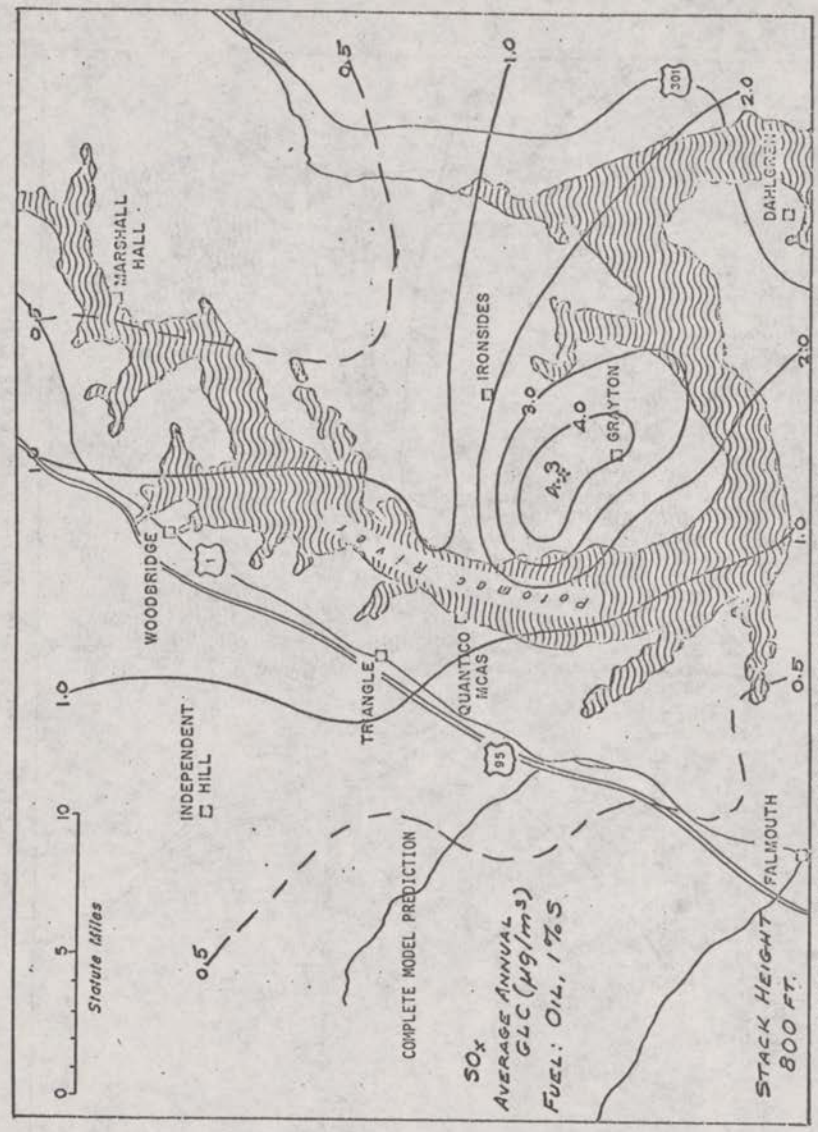


FIGURE 3. ATMOSPHERIC DISPERSION PATTERN DUE TO PLANT X EMISSIONS, 800 FT. STACK

5.2 Comparison with air quality standards

Specific ambient air quality standards have not been promulgated by the State of Maryland for Air Quality Control area V, southern Maryland, comprising the counties of Calvert, Charles, and St. Marys. Such standards have been promulgated for area IV, Montgomery and Prince Georges Counties. A comparison has been made on the basis of the ambient air quality standard proposed for area IV.

Basic ambient air quality standards are defined by the State of Maryland as "those lowest concentrations attainable by application of all reasonably available ways and means for reducing pollutant concentrations in the ambient air." It is further stated that "In situation of time and place wherein the lower concentration of any substance in the 'more adverse level' ranges * * * are not

exceeded, all necessary ways and means shall be required for minimizing increases in concentrations of such substances in the ambient air, to the end that said lower concentrations shall not be exceeded in the future, for any substantial number of years."

Interpretation of the total impact of a source on ambient air quality is pertinant only when all other sources contributing to the area are considered. It is beyond the scope of this report to determine the contributions to air pollution from other sources for this geographical area. It should be noted, however, that other emission sources are present nearby, and they may be responsible for high background levels of sulfur oxides.

In area IV, ambient air quality standards are defined in terms of "more adverse levels" for short periods as well as annual averaging times, as follows:

Averaging time	Frequency	"More adverse levels (ppm)"
5 minutes	Twice/week	0.25 to 0.50
1 hour	Once/month	0.10 to 0.20
1 day	Once/year	0.05 to 0.10

It should be recognized that these secondary ambient air quality standards at the more adverse levels are not to be interpreted as allowable ground-level concentrations. The range of concentrations of sulfur oxides denoting the more adverse level defines a situation where implementation for reduction of such concentrations is required and shall be accomplished within 10 years. These numerical values are used here because they are the lowest values which are numerically defined by the State of Maryland.

Unfortunately, no computational techniques or supporting data are currently available by which maximum concentrations due to plant emissions could be directly compared with above standards. At best, all techniques require assumptions that could be as vigorously challenged as supported. Several modified techniques were applied to the plant X data, with inconsistent results. Of these techniques, two for which some input data are available will be presently described. One is the statistical treatment developed by Larsen.[6] The other is based on expressions for determining downwind locations and levels of maximum concentrations presented in chart and nomograph form in Turner's Workshop.[7]

5.3 *Larsen Model*

The "Larsen Model" procedure, as here applied, is a means for projecting the annual average concentrations computed in 5.1 back to short-period averages. In studying data for a number of urban areas, Larsen found a log-normal relationship of concentrations with averaging time, with characteristic values of standard geometric deviation of 1-hour averages s_g, for each urban area. For sulfur oxides, the highest value of s_g found by Larsen was 2.54.

A Larsen model computation requires a value for the annual mean concentration, m_g. The following expression is used:

$$m_g = m/s_g 0.5\ 1n\ s_g$$

where

m_g = annual geometric mean
m = annual arithmetic mean
s_g = standard geometric deviation for 1 hour average concentrations.

The applicability of Larsen's model to the single-source, nonurban case has been open to serious question. Urban data reflect the contributions of many sources to the concentrations at one receptor. Regardless of wind direction, concentrations are invariably nonzero. In the single-source case, most hourly readings at a given receptor are zero, unless the wind happens to be directed from source to receptor. Even if the single source were surrounded by an array of receptors, and a standard geometric deviation were computed for the aggregate of those receptors showing nonzero readings, this value is not necessarily equivalent to a multisource urban standard deviation.

[6] R. I. Larsen, "A New Mathematical Model of Air Pollutant Averaging Time and Frequency." JAPCA, Vol. 19, No. 1, Jan. 1969, 24–30.
[7] Turner, ibid., sec. 4.1.

A recently completed study[8] conducted by TVA indicates that under certain conditions ground-level sulfur dioxide concentrations downwind of a single powerplant source are lognormally distributed. This was established by analyzing only those occurrences when the wind was blowing from the source toward the sampler. To assist in evaluation of the impact of plant X's ground-level sulfur dioxide contribution, data from an ongoing survey at PEPCO's Chalk Point, Md., station were considered. The Chalk Point location is similar to that of Sandy Point with respect to climatology, topography, vegetation, and hydrology. These data show a significant deviation from lognormality, with many zero readings and a few measurable concentrations. The standard geometric deviation for the full data set is 1.71 at one sampling site and 1.24 at the other. For both sites, the standard geometric deviation of those half-hour concentration in the top 20 percent of the frequency distribution is about 2.75. Computations for plant X were accordingly made using a standard geometric distribution of 2.75 for the annual data. This results in a tendency to overpredict the probability of occurrence of high concentrations.

Tables 3 to 5 and figures 4 to 6 show the results of the Larsen model computations applied to the annual arithmetic average determined for the maximum ground-level concentration location. Results are for the three different stack heights under consideration, 400, 600, and 800 feet.

In the following tables, predicted values that fall within the range of "more adverse level" are underlined. Boxed numbers exceed the range maximum.

TABLE 3.—COMPUTED LARSEN MODEL CONCENTRATIONS (P.P.M.) OCCURRING 1 DAY PER YEAR

["More Adverse Level" (Maryland regulations): 0.050 to 0.100]

Stack height (feet)	Fuel oil sulfur content		
	1 percent	1.5 percent	2 percent
400	0.036	0.054	0.072
600	.024	.036	.048
800	.017	.026	.034

TABLE 4.—COMPUTED LARSEN MODEL CONCENTRATIONS (P.P.M.) OCCURRING 1 HOUR PER MONTH

["More Adverse Level" (Maryland regulations): 0.100 to 0.200]

Stack height (feet)	Fuel oil sulfur content		
	1 percent	1.5 percent	2 percent
400	0.130	0.195	0.260
600	.088	.132	.176
800	.062	.093	.124

TABLE 5.—COMPUTED LARSEN MODEL CONCENTRATIONS (P.P.M.) OCCURRING 5 MINUTES TWICE PER WEEK

["More Adverse Level" (Maryland regulations): 0.25 to 0.50]

Stack height (feet)	Fuel oil sulfur content		
	1 percent	1.5 percent	2 percent
400	0.35	0.53	0.70
600	.24	.36	.48
800	.17	.26	.34

[8] Larsen, R. I., personal communication, January 1970.

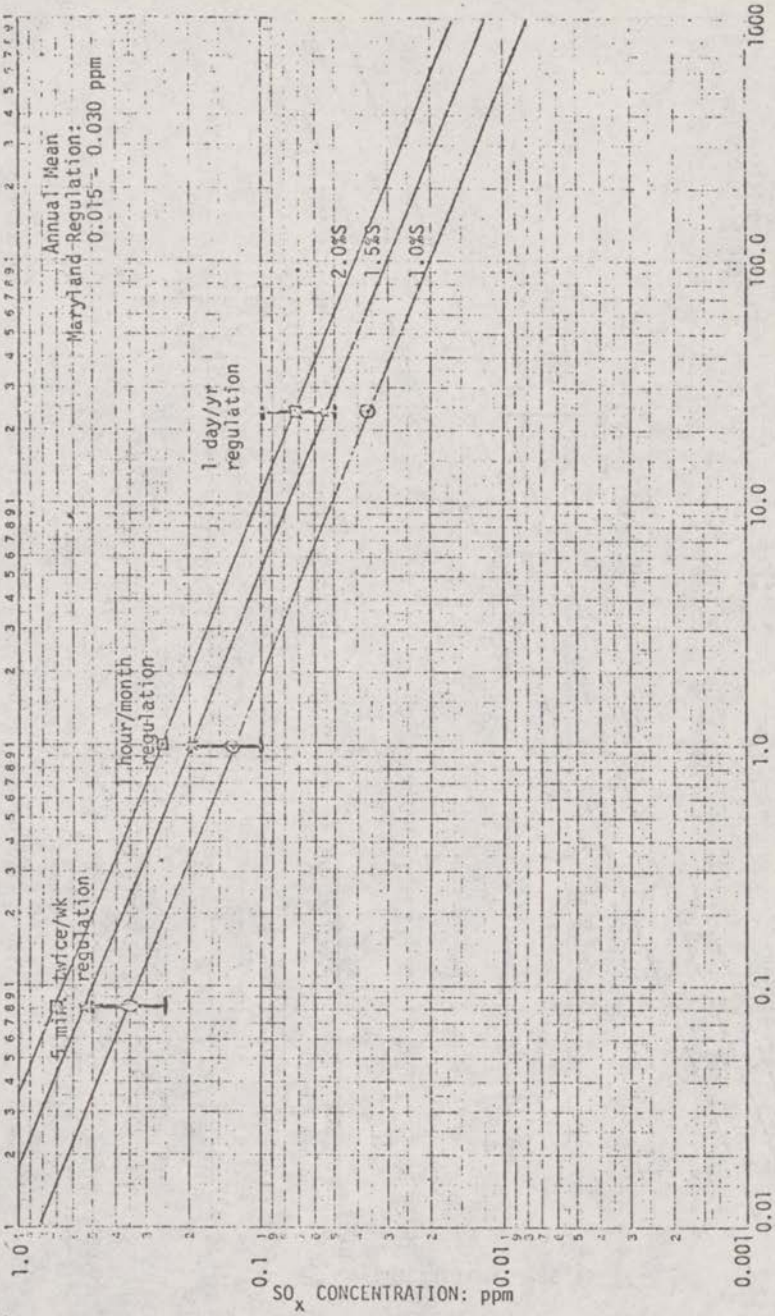


FIGURE 4. Comparison of Computed Maximum Concentration with Air Quality Standards: 400 foot stack

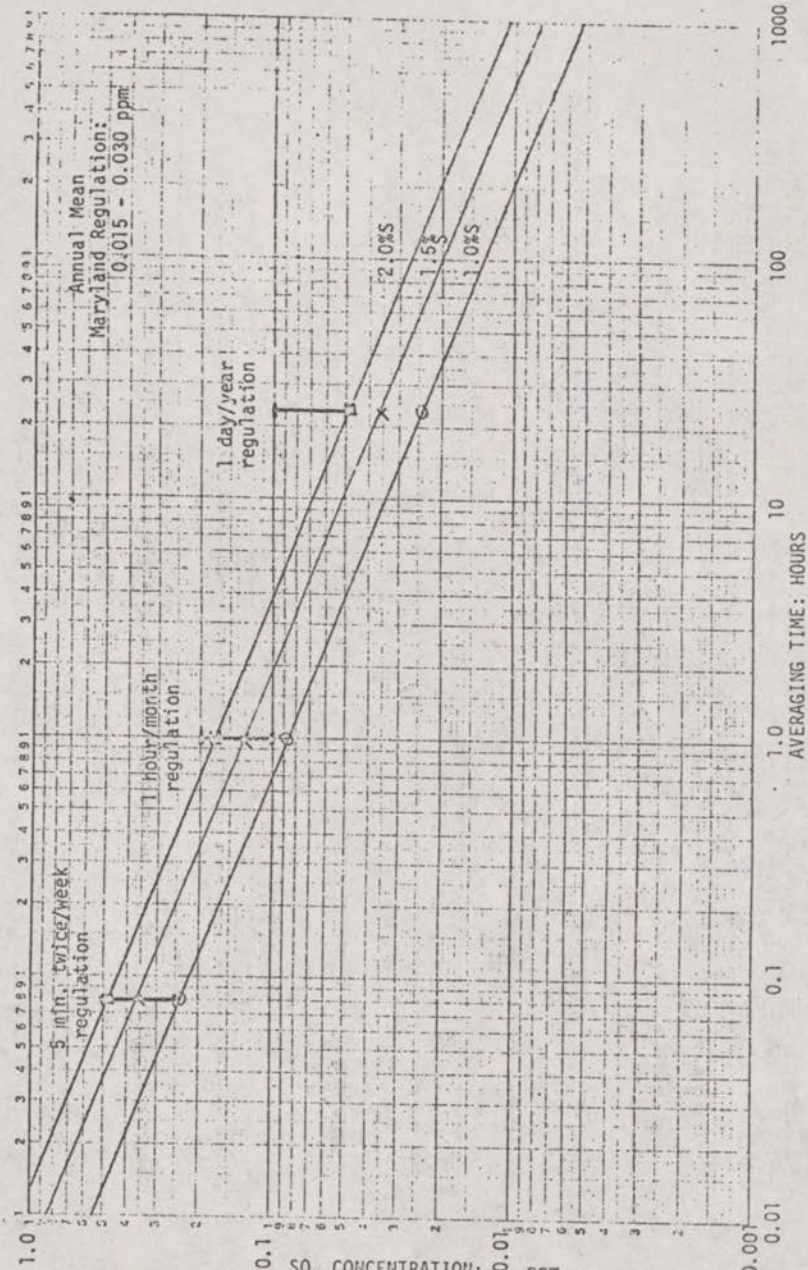


FIGURE 5. Comparison of Computed Maximum Concentration with Air Quality Standards: 600 foot stack

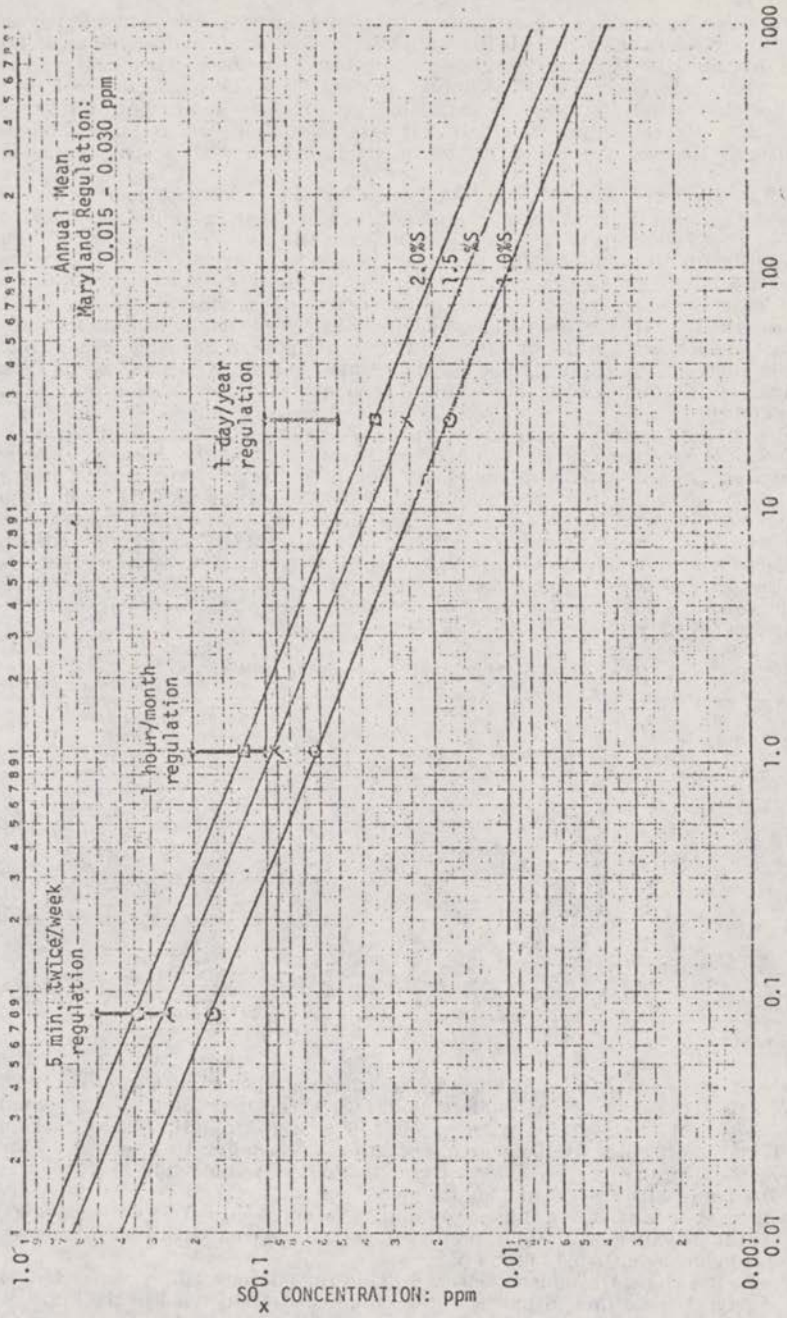


FIGURE 6. Comparison of Computed Maximum Concentration with Air Quality Standards: 800 foot stack

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5.4 Turner's Workbook procedure

The second procedure for estimating maximum short period average concentrations considers the results of Pasquill-Gifford atmospheric dispersion calculations described in Turner's Workbook, alongside the reported frequency (probability) for each result. The E. Stability (moderately stable) category is omitted because downwind distances of maximum ground level concentrations are so great that highest values would be far less than those under more unstable conditions. Results are shown in the following tables, with accompanying description.

As the first step, the critical frequencies for "more adverse levels" are expressed as probabilities of occurrence. The 1 day per year probability is 1/365, or .00274. The 1 hour per (30-day) month probability is 1/720, or .00139. The probability for "5 minutes twice per week" is not so clearcut. The single probability of 5 minutes once per week is 1/2016, or about .0005. The combined probability of two such events requires information on the degree of dependence between the two. If they are entirely independent, the combined probability is the product of each probability, or $(.0005)^2$. If they are part of the same larger event, the combined probability would be about the same as for one event alone, or .0005. Because of this ambiguity, the 5-minute standard will not be used as a point of reference.

Table I is an excerpt from the complete 480-point frequency distribution of appendix A, selected for the wind directions that have the highest reported frequencies. In the absence of month-by-month frequency distributions, it will have to be assumed that the annual distribution here presented is uniform throughout the year. Hence, to complete the first step, we use the critical probability 0.00139 to screen out the cases for which Pasquill-Gifford calculations are to be performed. This step immediately dispenses with all cases of category A, plus the 6.9 meter per second cases for categories B and C. For the rest, only the northwest wind direction need be considered, since the highest frequencies are associated with it.

TABLE I.—FREQUENCY DISTRIBUTION (EXCERPT FROM APP. A)

Wind	Direction	Stability category			
		A	B	C	D
Speed ($m\ sec^{-1}$):					
0.7 [1]	West northwest	0.0005	0.0036	0.0072	0.0319
	Northwest	.0005	.0038	.0076	.0334
	North northwest	.0001	.0011	.0023	.0099
2.5	West northwest	.0003	.0023	.0047	.0207
	Northwest	.0004	.0033	.0066	.0292
	North northwest	.0002	.0014	.0028	.0125
4.5	West northwest	.0001	.0010	.0021	.0091
	Northwest	.0001	.0018	.0037	.0162
	North northwest	.0001	.0014	.0029	.0127
6.9	West northwest		.0004	.0008	.0005
	Northwest		.0009	.0018	.0011
	North northwest		.0006	.0013	.0007

[1] See sec. 5.5.4.

Table II gives the downwind distance of maximum concentrations as a function of effective stack height, and table III lists the maximum concentration levels, $X\bar{u}/Q$, normalized for wind speed and source strength. The values in table III are multiplied by the source strength corresponding to 1 percent sulfur fuel oil, 655.2 grams per second, and results are shown as table IV, which is normalized only with respect to wind speed.

The next step is to insert the representative wind speed values of each class. Table IV then expands to show predicted maximum concentrations in micrograms per cubic meter listed in table V.

The ensuing steps are undertaken to develop the concentrations, converted to units of parts per million, adjusted to the sampling times defined in the State of Maryland standards for area IV. The concentrations calculated to this point are the predictions for sampling times up to 1 hour.[9] It is common practice to

[9] Turner, ibid., abstract, vii.

accept them for a single sampling time of 30 minutes. It must be emphasized that since the expressions are for steady-state, equilibrium conditions, they cannot discriminate short-period variations. Results could just as well be said to apply to a 10-minute average as to a 1-hour average. Nevertheless, we shall assume that they are for a 30-minute sampling time, which shall provide the basis for projection to both shorter and longer averaging times by the use of Singer's[10] relations, and supplemental factors given in Turner's Workbook.[11] Table VI gives the sampling time conversion factors to be applied to 30-minute concentrations.

TABLE II.—DOWNWIND DISTANCE OF C_{max} (km.)

Effective stack height (m)	Stability category		
	B	C	D
402	2.7	5.8	28
463	3.1	6.9	35
524	3.3	8.0	42

TABLE III.—MAXIMUM CONCENTRATION (NORMALIZED) (L^{-3})($\times 10^{-6}$)

Effective stack height (m)	Stability category		
	B	C	D
402	1.15	0.80	0.23
463	.88	.56	.16
524	.75	.43	.125

TABLE IV.—MAXIMUM CONCENTRATION NORMALIZED FOR WIND SPEED ONLY ($\times 10^{-4}$)
(VALUES ARE THOSE FOR TABLE III $\times 655.2$ g sec^{-1})

[Oil = 1 percent S]

Effective stack height (m)	Stability category		
	B	C	D
402	7.54	5.24	1.51
463	5.77	3.67	1.05
524	4.92	2.82	.82

TABLE V

$\frac{30 \text{ min}}{C_{max}}$ ($\mu g/m^3$)

[H = effective stack height; h = physical stack height; oil = 1.0%S]

	ū(mps)	Stability category		
		B	C	D
H = 402 m	[1] 0.7	1078	748.0	216.0
	2.5	301	210.0	60.4
h = 400 ft	4.5	167	117.0	33.6
	6.9	----	76.3	----
H = 463 m	[1] 0.7	825	525.0	150.0
	2.5	231	147.0	42.0
h = 600 ft	4.5	128	81.5	23.3
	6.9	----	53.1	----
H = 524 m	[1] 0.7	703	403.0	117.0
	2.5	197	113.0	32.8
h = 800 ft	4.5	109	62.6	18.2
	6.9	----	40.8	----

[1] See sec. 5.5.4.

[10] Singer, Irving A. "The relation between peak and mean concentrations." Journal of the Air Pollution Control Association, 11, 336–341.
[11] Turner, ibid., 37–38.

TABLE VI.—SAMPLING TIME CONVERSION FACTORS

[Base: 30 minutes]

Sampling time	Stability		
	B	C	D
5 minutes	2.85	2.3	1.7
10 minutes	1.9	1.7	1.3
60 minutes	0.68	0.74	0.80
24 hours	0.35	0.40	0.45

TABLE VIIa

[C_{max} (p.p.m.) Adjusted for sampling time (base=30 minutes). H=402 m., stack height—400 ft., oil—1.0%S]

$\bar{u}$(mps)	ta	Stability category		
		B	C	D
0.7 [1]	5 minute	1.12	0.602	0.134
	30 minute	.392	.262	.0787
	60 minute	.266	.194	.0630
	24 hour	.137	.105	.0352
2.5	5 minute	.312	.181	.0374
	30 minute	.1096	.0785	.0220
	60 minute	.0746	.0581	.0176
	24 hour	.0384	.0313	.0099
4.5	5 minute	.173	.0980	.0208
	30 minute	.0608	.0426	.0122
	60 minute	.0413	.0316	.0098
	24 hour	.0213	.0171	.0055
6.9	5 minute		.0639	
	30 minute		.0278	
	60 minute		.0206	
	24 hour		.0111	

[1] See sec. 5.5.4.

TABLE VIIb

[C_{max} (p.p.m.) adjusted for sampling time (base=30 minutes); H—463 m, stack height—600 ft., oil 1.0 percent S]

$\bar{u}$(mps)	ta	B	C	D
0.7 [1]	5 minutes	0.861	0.443	0.0934
	30 minutes	.302	.1924	.0549
	60 minutes	.205	.1425	.0439
	24 hours	.106	.0765	.0247
2.5	5 minutes	.241	.124	.0262
	30 minutes	.0846	.0538	.0154
	60 minutes	.0576	.0398	.0123
	24 hours	.0296	.0215	.0069
4.5	5 minutes	.135	.0648	.0145
	30 minutes	.0468	.0282	.0085
	60 minutes	.0318	.0209	.0068
	24 hours	.0164	.0113	.0038
6.9	5 minutes		.0422	
	30 minutes		.0184	
	60 minutes		.0136	
	24 hours		.0074	

[1] See sec. 5.5.4.

TABLE VIIc

[C_{max} (p.p.m.) adjusted for sampling time (base=30 minutes), H=524 m, stack height=800 ft., oil=1.0%S]

ū(mps)	ta	B	C	D
0.7 [1]	5 min	0.735	0.339	0.0728
	30 min	.258	.1477	.0428
	60 min	.176	.1091	.0351
	24 hr	.090	.0587	.0193
2.5	5 min	.206	.0952	.0204
	30 min	.0722	.0414	.0120
	60 min	.0492	.0316	.0096
	24 hr	.0253	.0166	.0054
4.5	5 min	.114	.0527	.0114
	30 min	.040	.0229	.0067
	60 min	.0272	.0169	.0054
	24 hr	.0140	.0090	.0030
6.9	5 min		.0344	
	30 min		.0149	
	60 min		.0110	
	24 hr		.0058	

[1] See sec. 5.5.4.

The final results are shown in table VII, which required expansion to parts a, b, and c corresponding to actual stack heights of 400, 600, and 800 feet, respectively. All listed values may occur at least as often as the ratio of 1 day to a year. However, the 24-hour averages are to be examined for compliance under 1 day per year regulation, which sets more adverse levels as 0.05 to 0.10 parts per million. It may be seen that these levels are equaled or exceeded in the light wind situation, for all three stack heights, even when 1 percent sulfur oil is burned.

The second examination of concentrations alongside more adverse levels applies to the 1-hour-per-month regulation, for which the standard is 0.10 to 0.20 parts per million. Here again the levels are equaled or exceeded with all three stack heights for the light wind situation.

The technique evidently leads to results that are more pessimistic for short-term averages than those of the Larsen model.

5.5 Discussion of Turner's workbook procedure results

Results developed in the previous section depend critically upon the underlying assumptions. The following four assumptions and their consequences require further exploration:

1. Pasquill-Gifford equation results are 30-minute sampling time averages.
2. A lateral Gaussian distribution of concentration about a center line maximum that is congruent with a recorded wind direction.
3. Representativeness of hourly data.
4. Validity of light wind situations.

5.5.1 The 30-minute time average assumption

The assumption that diffusion equation results are valid for a sampling time of 30 minutes is unquestionably arbitrary. In a previous edition of the workbook, the valid sampling time was given as 10 minutes; for the revised edition, the same equations and charts are said to be valid for sampling times up to 1 hour. Nor is this ambiguity clarified in other publications, like the ASME guide prepared by Smith,[12] where virtually the same equations are used for predictions of 1-hour average concentrations. For the purposes of testing conformance with regulations, it is vital to know whether a predicted value represents a 1-hour average or a 10-minute average. Table VIII shows results for the low wind situations, under B and C stability conditions if the concentrations listed in table VII as 30-minute averages were instead considered as 10-minute averages. From table VIII it appears that maximum 1-hour and 24-hour average concentrations for the 800-foot stack case would not reach more adverse levels.

[12] Maynard E. Smith (ed.), "Recommended Guide for the Prediction of the Dispersion of Airborne Effluents". American Society of Mechanical Engineers, May 1968.

TABLE VIII

[C_{max} (p.p.m.) adjusted for sampling time (base=10 min.)]

Sampling time	B		C	
	$\hat{u}$=[1] 0.7	2.5	$\hat{u}$=[1] 0.7	2.5
H=402 m, h=400 ft:				
5 min	0.587	0.164	0.354	0.099
10 min	.392	.110	.262	.073
60 min	.141	.039	.115	.032
24 hr	.071	.020	.060	.017
H=463 m, h=600 ft:				
5 min	.453	.126	.260	.073
10 min	.302	.085	.192	.054
60 min	.109	.031	.085	.024
24 hr	.054	.015	.044	.012
H=524 m, h=800 ft:				
5 min	.387	.107	.199	.056
10 min	.258	.072	.148	.041
60 min	.093	.026	.065	.018
24 hr	.046	.013	.034	.009

[Sampling time—conversion factors (base=10 min.)]

	B	C
5 min	1.5	1.35
60 min	0.36	0.44
24 hr	0.18	0.23

[1] See sec. 5.5.4.

5.5.2 Gaussian distribution assumption

The assumption that a reported wind direction such as northwest constitutes the center line of a Gaussian distribution of concentration is open to question. Wind direction is a physical continuum (as are wind speed and stability) which for reporting purposes is divided into discrete sectors each identified by its arbitrary center line. Not only is there directional fluctuation of a wind about a mean direction; the reported direction may itself be any line of orientation within the sector. However, toward the lateral fringes of the sector, there is an increasing probability that wind flow may be reported with the direction of the adjacent sector.

For calculating seasonal or annual average concentrations, Turner[13] recommends the assumption of a rectangular (homogeneous) distribution across the sector. For Martin-Tikvart computations, a triangular distribution is assumed. In either case, the net effect is that the maximum concentration is less than the Gaussian maximum by 30 percent to 50 percent.

The above reasoning is to a lesser degree applicable to 1-hour and 24-hour averages in the present analysis. As a result, all predicted concentrations could be fractionally lower than shown in tables VII and VIII, the reduction being undefinable at this time.

5.5.3 Hourly data assumption

Climatologies of most meteorological parameters measured at first order weather stations are based upon observations taken once per hour, generally beginning 5 or 10 minutes before the hour. So-called hourly wind observations at most stations are averages for only a minute. It is thereupon assumed that the reported wind is representative for the entire hour, particularly when the data are climatologically summarized. Strong representation could be made against the validity of these data to predict pollutant concentrations for a complete spectrum of sampling times, particularly if the predictions are to be used in litigations. It is one thing to assume a given wind speed and to perform a diffusion calculation that will result in ground level concentrations for some arbitrary averaging time, whether 10, 30, or 60 minutes. It is quite another to accept these results rigorously as the basis for action under dynamic, operational conditions, unless supporting measurements are made.

[13] Turner, ibid, 38.

5.5.4 Light wind assumption

Since the wind term appears in the denominator of the Pasquill-Gifford equation, the computation "blows up" when wind speed approaches zero. Wind speed cases under 1.0 m. sec.$^{-1}$ are usually considered to lie below the validity threshold. Hence, all concentrations calculated for 0.7 m. sec.$^{-1}$ in tables VII and VIII must be rejected even though the wind speed class represented by this value occurs with significantly high frequency. This shortcoming of the dispersion equation may itself be sufficient justification for deemphasizing the technique as a means of testing for compliance with regulations.

6.0 Conclusions

Results of the study indicate that the computed annual average concentrations are lower than the "More Adverse Levels" for neighboring counties by a comfortable margin but that concentrations for shorter time periods could reach or exceed corresponding "More Adverse Levels." Combinations of stack height and fuel sulfur content that could result in acceptable short-period concentrations cannot be accurately defined by current state-of-the-art analytical techniques. However, even under the most optimistic set of results, compliance dictates a stack height over 600 feet and fuel sulfur content less than 2 percent. A more pessimistic set of results suggests that all three anayzed stack heights are unsatisfactory even when 1 percent sulfur fuel is burned. In either case, the conclusions regarding the "acceptable" combination of stack height and sulfur content cannot be firmly established until background levels resulting from existing sources are known. Acceptable specifications may be contingent upon criteria other than those considered in this analysis.

APPENDIXES

Appendix A. Combined wind direction-wind speed-stability frequency distribution for the atmospheric dispersion model (total of all 480 entries equals 1.0000).

Note: (1) Stability classes 1 to 5 correspond to Pasquill categories A to E, respectively. (2) Wind speed classes 1 to 6 are defined in section 3.4b.

Appendix B. Estimate of accuracy.

B.1 Dispersion Model

B.2 Larsen Model

METEOROLOGICAL INPUT DATA FOR THE ANNUAL SEASON

Wind direction	Windspeed class					
	1	2	3	4	5	6
Stability class 1:						
North	0.0001	0.0002	0.0002	0.0000	0.0000	0.0
North-northeast	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000
Northeast	0.0001	0.0001	0.0001	0.0000	0.0000	0.0
East-northeast	0.0001	0.0001	0.0000	0.0000	0.0	0.0
East	0.0001	0.0001	0.0000	0.0000	0.0	0.0
East-southeast	0.0001	0.0001	0.0000	0.0000	0.0000	0.0
Southeast	0.0001	0.0002	0.0001	0.0000	0.0	0.0
South-southeast	0.0002	0.0002	0.0001	0.0000	0.0000	0.0
South	0.0003	0.0004	0.0002	0.0000	0.0000	0.0
South-southwest	0.0001	0.0001	0.0001	0.0000	0.0000	0.0
Southwest	0.0001	0.0001	0.0000	0.0000	0.0000	0.0
West-southwest	0.0001	0.0001	0.0000	0.0000	0.0000	0.0
West	0.0002	0.0001	0.0001	0.0000	0.0000	0.0
West-northwest	0.0005	0.0003	0.0001	0.0001	0.0000	0.0000
Northwest	0.0005	0.0004	0.0002	0.0001	0.0000	0.0000
North-northwest	0.0001	0.0002	0.0002	0.0001	0.0000	0.0000
Stability class 2:						
North	0.0011	0.0013	0.0011	0.0003	0.0000	0.0
North-northeast	0.0005	0.0007	0.0007	0.0002	0.0000	0.0000
Northeast	0.0006	0.0009	0.0008	0.0002	0.0000	0.0
East-northeast	0.0005	0.0006	0.0003	0.0001	0.0	0.0
East	0.0007	0.0007	0.0002	0.0000	0.0	0.0
East-southeast	0.0005	0.0005	0.0003	0.0001	0.0000	0.0
Southeast	0.0010	0.0012	0.0006	0.0000	0.0	0.0
South-southeast	0.0012	0.0014	0.0008	0.0001	0.0000	0.0
South	0.0023	0.0031	0.0014	0.0003	0.0000	0.0
South-southwest	0.0008	0.0011	0.0007	0.0001	0.0000	0.0
Southwest	0.0007	0.0006	0.0004	0.0001	0.0000	0.0
West-southwest	0.0006	0.0004	0.0003	0.0000	0.0000	0.0
West	0.0019	0.0010	0.0004	0.0001	0.0000	0.0
West-northwest	0.0036	0.0023	0.0010	0.0004	0.0001	0.0000
Northwest	0.0038	0.0033	0.0018	0.0009	0.0001	0.0000
North-northwest	0.0011	0.0014	0.0014	0.0006	0.0001	0.0000

METEOROLOGICAL INPUT DATA FOR THE ANNUAL SEASON—Continued

Wind direction	Windspeed class					
	1	2	3	4	5	6
Stability class 3:						
North	0.0022	0.0026	0.0023	0.0006	0.0000	0.0
North-northeast	0.0009	0.0014	0.0014	0.0003	0.0000	0.0000
Northeast	0.0012	0.0017	0.0015	0.0003	0.0000	0.0
East-northeast	0.0011	0.0012	0.0006	0.0001	0.0	0.0
East	0.0014	0.0013	0.0005	0.0001	0.0	0.0
East-southeast	0.0009	0.0010	0.0006	0.0001	0.0000	0.0
Southeast	0.0020	0.0024	0.0012	0.0001	0.0	0.0
South-southeast	0.0024	0.0029	0.0016	0.0002	0.0000	0.0
South	0.0047	0.0062	0.0028	0.0005	0.0000	0.0
South-southwest	0.0017	0.0022	0.0014	0.0001	0.0000	0.0
Southwest	0.0013	0.0012	0.0007	0.0001	0.0000	0.0
West-southwest	0.0011	0.0009	0.0005	0.0001	0.0000	0.0
West	0.0038	0.0019	0.0009	0.0003	0.0000	0.0
West-northwest	0.0072	0.0047	0.0021	0.0008	0.0001	0.0000
Northwest	0.0076	0.0066	0.0037	0.0018	0.0002	0.0000
North-northwest	0.0023	0.0028	0.0029	0.0013	0.0002	0.0000
Stability class 4:						
North	0.0097	0.0116	0.0101	0.0026	0.0002	0.0
North-northeast	0.0041	0.0063	0.0062	0.0015	0.0001	0.0000
Northeast	0.0052	0.0076	0.0068	0.0014	0.0000	0.0
East-northeast	0.0046	0.0053	0.0026	0.0005	0.0	0.0
East	0.0063	0.0058	0.0021	0.0003	0.0	0.0
East-southeast	0.0041	0.0046	0.0026	0.0005	0.0001	0.0
Southeast	0.0088	0.0105	0.0053	0.0004	0.0	0.0
South-southeast	0.0104	0.0128	0.0071	0.0008	0.0000	0.0
South	0.0206	0.0272	0.0123	0.0023	0.0001	0.0
South-southwest	0.0074	0.0099	0.0060	0.0007	0.0000	0.0
Southwest	0.0058	0.0051	0.0033	0.0005	0.0000	0.0
West-southwest	0.0050	0.0039	0.0023	0.0004	0.0001	0.0
West	0.0167	0.0085	0.0039	0.0011	0.0000	0.0
West-northwest	0.0319	0.0207	0.0091	0.0036	0.0005	0.0000
Northwest	0.0334	0.0292	0.0162	0.0080	0.0011	0.0001
North-northwest	0.0099	0.0125	0.0127	0.0057	0.0007	0.0001
Stability class 5:						
North	0.0062	0.0074	0.0064	0.0016	0.0001	0.0
North-northeast	0.0026	0.0040	0.0040	0.0009	0.0001	0.0000
Northeast	0.0033	0.0048	0.0043	0.0009	0.0000	0.0
East-northeast	0.0030	0.0034	0.0016	0.0003	0.0	0.0
East	0.0040	0.0037	0.0013	0.0002	0.0	0.0
East-southeast	0.0026	0.0029	0.0017	0.0003	0.0000	0.0
Southeast	0.0056	0.0067	0.0034	0.0003	0.0	0.0
South-southeast	0.0066	0.0081	0.0045	0.0005	0.0000	0.0
South	0.0131	0.0173	0.0079	0.0015	0.0001	0.0
South-southwest	0.0047	0.0063	0.0038	0.0004	0.0000	0.0
Southwest	0.0037	0.0032	0.0021	0.0003	0.0000	0.0
West-southwest	0.0032	0.0025	0.0015	0.0002	0.0000	0.0
West	0.0106	0.0054	0.0025	0.0007	0.0000	0.0
West-northwest	0.0203	0.0132	0.0058	0.0023	0.0003	0.0000
Northwest	0.0213	0.0186	0.0103	0.0051	0.0007	0.0000
North-northwest	0.0063	0.0080	0.0081	0.0036	0.0005	0.0001

APPENDIX B

ESTIMATE OF ACCURACY

B.1 Dispersion model

In the absence of corroborating data, it is important that the magnitude of errors associated with computer ground level concentrations from single sources be understood. In a number of past experiments, predicted values within about 5 kilometers of a source were found by actual measurements to be in error by factors between 2 and 5. These errors could be reduced to factors less than 2 by model tuning with measurement data, as described in 4.3.

For distances beyond about 5 kilometers, errors may well exceed an order of magnitude, particularly at the 25 kilometer distances where the maximum concentrations are computed to be in the present analysis.

A major part of the errors may be attributed to the assumptions listed in 4.2. Errors resulting from the assumption of equilibrium conditions are probably small, but the other assumption (invariant winds, smooth terrain, and nonremoval of contaminants) immediately introduce errors of factors up to 5. For example, the average wind speed at stack height was calculated to be about

twice that at ground level; yet it was the ground level wind speed that was used for the dispersion computation. Intuitively, one may reason that stack emissions are provided with an initial acceleration that is gradually lost by the lower half of the plume as it eventually descends to ground level. The net result would be to displace maximum concentrations even farther downwind than shown in the figures, and in doing so, lower concentrations by a factor of about 1.5. In other words, the concentrations shown on the maps are 50 percent higher than what they might be if a model using a more realistic wind profile were available.

The net effect of rough instead of smooth terrain, and of removal instead of nonremoval of airborne contaminants would also be in the direction of lowering concentration from those indicated. At first approximation of the magnitude of errors might be around a factor of three at the maximum points. However, rough terrain would also act to enhance atmospheric turbulence in the air moving over it, resulting in an increase in concentrations over computed values closer to the source. The net effect would be to flatten out the areas of maxima upwind toward the plant, and to lower the values by another 25 percent or so.

The scavenging effect of precipitation is also neglected in this analysis. Measurable precipitation occurs, on the average, one day out of three. Precipitation is over 90 percent effective in removing airborne particulates; its effect in scrubbing sulfur dioxide from the air is probably far less, especially if it is shower or intermittent. Overall, a 20-percent estimate for sulfur dioxide removal is probably conservative.

Diurnal maximum concentrations of sulfur oxides and particulates occur within the first 2 or 3 hours after daybreak, when urban mixing heights are at their diurnal minima. By neglecting this factor, concentrations based upon maximum (afternoon) mixing heights could be too low by a factor of 3 to 5.

A rigorous error analysis cannot be made on the basis of estimates cited in the foregoing discussion. It would be easy to say that the pluses and minuses cancel out, but this assertion cannot be supported at the present time. In line with the state of the art of atmospheric dispersion modeling, all that can be said is that computed average annual concentrations should be accurate to about a factor or ± 2 within 5 kilometers of the source, but as the distance increases up to 25 kilometers or so computed for the maxima, accuracy degenerates to perhaps an order of magnitude.

It is interesting to note that when ground level concentrations are computed based upon multiple sources, overall error is generally lower than for a single source. The reason is that the concentrations at any point in the area is mostly attributable to emission from the nearest source. Hence as distance from one source tends to increase the margin of error, before long the tempering effects of the next source are felt.

B.2 Larsen's model

The foregoing results are presented in full awareness of the criticism that could be made on the use of Larsen's model on top of the Martin-Tikvart model, particularly in light of the primary applicability of the former and the errors and limitations of the latter. Furthermore, the only hourly data available for this analysis applies to another site.

On the other hand, results of the TVA study lend credence to a Larsen model analysis for the single-source case. The computed value of 2.75 for the standard geometric mean of Chalk Point hourly data comes as added support for this procedure, since by intuitive reasoning it is in line with and slightly exceeds the values computed by Larsen for urban areas. These premises do not of themselves validate the procedure or its results. However, until actual measurements and more refined analytical techniques are available, the Larsen model route may provide a useful first approximation.

Perhaps the chief justification for using the model is to explore a possible alternative to the methodology described here as the Turner Workbook procedure. There are certain nagging questions about the "correct" interpretation of Pasquill-Gifford equations presented in the workbook. Questions that bear upon the present analysis have already been raised and discussed in section 5.5. State of the art predictive techniques cannot be said to produce definitive, unambiguous answers to questions of compliance with air quality regulations. This being the case, the exploration of an independent, reasonable approach is justified.

BEFORE THE PUBLIC SERVICE COMMISSION OF MARYLAND

Case No. 6356

ORDER NO. 59057

IN THE MATTER OF THE APPLICATION OF POTOMAC ELECTRIC POWER COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF A FOSSIL-FUELED ELECTRIC GENERATING STATION ON THE POTOMAC RIVER AT SANDY POINT IN CHARLES COUNTY, MARYLAND, AND CERTAIN ASSOCIATED OVERHEAD TRANSMISSION LINES DESIGNED TO CARRY VOLTAGES IN EXCESS OF 69,000 VOLTS, PORTIONS OF WHICH ARE TO BE LOCATED IN SAID CHARLES COUNTY AND IN PRINCE GEORGES COUNTY, MARYLAND

WHEREAS, Potomac Electric Power Company has filed on July 30, 1970 a Motion with the Commission to postpone the hearing date in the above entitled matter to a later date because of developments which have taken place since the filing of the application, making it necessary for the applicant to consider certain changes in its plans for the proposed generating station which if adopted would require the amendment of the application; and

WHEREAS, upon consideration thereof, the Commission has concluded that the request of Potomac Electric Power Company may be reasonably granted.

IT IS THEREFORE, this 30th day of July, in the year Nineteen Hundred and Seventy, by the Public Service Commission of Maryland,

ORDERED: That the hearing in the above entitled proceeding, which was scheduled to be held at the Charles County Community in La Plata, Maryland on August 12, 1970 be, and the same is hereby postponed to a date to be hereafter fixed.

WILLIAM O. DOUB,
CHARLES E. EDMONDSON,
H. REESE SHOEMAKER, Jr.,
Commissioners.

HOUSE OF REPRESENTATIVES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., August 3, 1970.

CHARLES COUNTY PLANNING COMMISSION,
Court House,
La Plata, Md.

DEAR SIRS: This subcommittee has been making a study of possible use of the Sandy Point Farm tract bordering Mallows Bay on the Potomac by the Potomac Electric Power Co. as a site for an electric generating station.

Would you please verify whether the present zoning of this property does not permit its use as a powerplant site ,and whether Pepco has pending before your commission an application for rezoning to permit such use? We should like to use your answer to supplement the record of our recent hearing, which must go to the printer without delay. Therefore we will much appreciate your prompt reply.

If such an application for rezoning is pending, we should also appreciate being placed on the mailing list to receive advance notice of the time and place of your hearing.

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

CHARLES COUNTY PLANNING COMMISSION,
La Plata, Md., August 6, 1970.

Hon. HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee, Rayburn House Office Building, Washington, D.C.

DEAR CONGRESSMAN REUSS: This will acknowledge your letter of August 3, 1970, to the Charles County Planning Commission which has been referred to me for reply.

There is pending before the Charles County Planning Commission a petition filed by Potomac Electric Power Co. for the rezoning of 524 acres in the Sandy Point area from residential-agricultural (R–1) to industrial (I).

The current zoning of the property does not permit its use as a powerplant. If the pending rezoning is granted, use of the property as a powerplant site would be permitted.

We have directed that you be advised of any action taken in this matter.

Trusting that this is the information you desire, I am

Very truly yours,

THOMAS C. HAYDEN, Jr.,
County Attorney.

POTOMAC ELECTRIC POWER CO.,
Washington, D.C., December 29, 1969.

Hon. WILLIAM O. DOUB,
Chairman, Public Service Commission,
Baltimore, Md.

DEAR MR. DOUB: The information requested in your letter of November 28, 1969, is submitted herewith for each year of the 1970 through 1979 period.

1. The latest estimate of peak customer demand and capacity additions are shown on table I.

2. The number of nuclear powerplants planned for construction or operation is shown on table II.

3. A list of new generating stations with the year physical construction should begin, year of completion, location, plant capacity, and fuel is shown on table II.

4. A list of transmission lines with tie points, year construction should begin, year of completion, voltage, and purpose of line is shown on table III.

5. A system map showing location of present and proposed generating stations and transmission lines designed in excess of 69 kilovolts is attached. It should be noted that the dates shown on the system map represent the scheduled in service date of the particular facility.

I would like to point out that details of the generation and transmission plans for the latter years of the period are still under study and are subject to change.

Should you desire, we would be pleased to discuss our plans in greater detail or clarify any of the enclosed data.

Very truly yours,

S. R. WOODZELL, *President.*

POTOMAC ELECTRIC POWER CO.—1970 THROUGH 1979 REQUIREMENTS

TABLE 1.—SYSTEM LOAD AND CAPACITY ADDITIONS

Year	Addition of Pepco installed generation (megawatts)	Net system peak demand	Installed capacity	Capacity purchase (+) and sales (—)	Total capacity (megawatts)
1969	None	2,815	2,850	62	2,912
1970	Conemaugh, 81; Morgantown, 556	3,150	3,487	0	3,487
1971	Conemaugh, 80; Morgantown, 558; Peaking, 35	3,500	4,160	300—	3,860
1972	Benning Station "A", 275	3,900	4,435	200—	4,235
1973	Retirement, 76 (Benning)	4,300	4,359	275	4,634
1974	Station "G", 415; Peaking, 18	4,800	4,780	500	5,280
1975	Base, 768 (fossil); Peaking, 50	5,400	5,598	400	5,998
1976	Base, 768 (fossil); Peaking, 50	6,000	6,416	0	6,416
1977	Base, 1,050 (nuclear or fossil)	6,750	7,466	0	7,466
1978	Peaking, 1,000	7,550	8,466	0	8,466
1979	Base, 1,050 (nuclear or fossil)	8,500	9,516	0	9,516

TABLE II.—GENERATION ADDITIONS, POTOMAC ELECTRIC POWER COMPANY 1970 THROUGH 1979 REQUIREMENTS

Plant under construction	Type of fuel	Water source	Location	Construction schedule	
				Start	Finish
Morgantown:					
No. 1 (1970) 573	Coal or oil	Potomac River	Charles County		June 1970.
No. 2 (1971) 575	do	do	do		June 1971.
G.T. (1971) 34	Oil	None	do		

PLANS FOR GENERATING PLANTS IN MARYLAND

Year	Approximate size in mw	Type of fuel used	Water source	Location	Construction schedule	
				Start	Finish
1974	415	Oil	Potomac River	Charles County	January 1971	January 1974.
	18	do	None	do	do	Do.
1975	768	Coal or oil	Potomac River	Montgomery or Frederick County	January 1972	January 1975.
	50	Oil	None	do	January 1974	Do.
1976	768	Coal or oil	Potomac River	do	January 1972	January 1976.
	50	Oil	None	do	January 1974	Do.
1977	1,050	Nuclear or fossil	Potomac River	Charles County	January 1971 or January 1974	January 1977.
1978	1,000	Not determined	Possibly none	Not determined	January 1971	January 1978.
1979	1,050	Nuclear or fossil	Potomac River	Charles County	January 1973 or January 1976	January 1979.

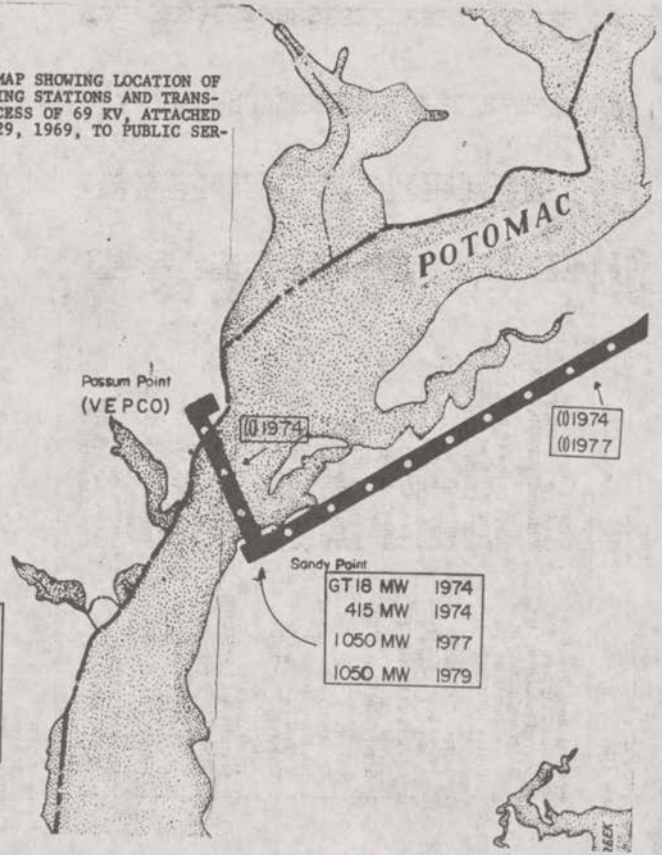
POTOMAC ELECTRIC POWER CO. 1970 THROUGH 1979 REQUIREMENTS

TABLE III.—TRANSMISSION ADDITIONS

No.	Lines From	Lines To	Year construction to begin	Year of completion	Voltage kilovolts	Purpose
4	Morgantown Station "F"	Talbert Substation 166	1968	1970	230	(1)
3	Talbert Substation 166	Oak Grove Substation 122	1968	1970	230	(1)
2	Lanham Substation 149	Wildercroft Substation 178	1968	1970	115	(2)
1	Dickerson Station "D"	Vepco	1970	1971	230	(3)
2	Bowie Substation 162	Waugh Chapel (B.G. & E.)	1970	1971	230	(3)
1	Ritchie Substation 123	Benning Station "A"	1970	1972	230	(2)
1	do	Buzzard Point Station "B"	1970	1972	230	(1)
1	Buzzard Point Station "B"	Southwest Substation 18	1970	1972	138	(2)
1	Talbert Substation 166	Palmers Corner Substation 84	1971	1973	230	(2)
2	Tuxedo Substation 148	Bladensburg Substation 175	1971	1973	115	(2)
1	Chalk Point Station "E"	Calvert Cliffs (B.G. & E.)	1972	1974	500	(3)
1	do	Burches Hill 500	1972	1974	500	(3)
1	Sandy Point Station "G"	do	1972	1974	500	(1)(3)
1	do	Possum Point (Vepco)	1972	1974	500	(3)
1	Mt. Airy	Triadelphia area	1972	1974	500	(3)
1	Triadelphia area	Waugh Chapel (B.G. & E.)	1972	1974	500	(3)
1	Dickerson Station "D"	Station "X"	1973	1975	500	(1)
1	Buzzard Point Station "B"	Palmers Corner Substation 84	1973	1975	230	(2)
1	Dickerson Station "D"	Burtonsville Substation 120	1974	1975	230	(1)
1	Station "X"	Triadelphia area	1974	1976	500	(1)
2	Triadelphia area	Mt. Zion Substation 165	1974	1976	230	(1)(3)
1	Charlotte Hall (SMECOOP)	Lexington Park (SMECOOP)	1974	1976	230	(2)
2	Burches Hill 230	Palmers Corner Substation 84	1974	1976	230	(2)
2	do	Talbert Substation 166	1974	1976	230	(1)
1	Palmers Corner Substation 84	Connecticut Ave. area	1974	1976	230	(2)
1	Benning Station "A"	do	1974	1976	230	(2)
1	Bells Mill Rd. Substation 121	Northwest District of Columbia area.	1974	1976	138	(2)
1	Sandy Point Station "G"	Burches Hill 500	1975	1977	500	(1)(3)
1	Benning Station "A"	Connecticut Ave. area	1975	1977	230	(2)
1	do	Bowie Substation 162	1975	1977	115	(2)

[1] Output capacity.
[2] Subtransmission.
[3] Interconnection.

EXCERPT FROM ITEM 5, SYSTEM MAP SHOWING LOCATION OF PRESENT AND PROPOSED GENERATING STATIONS AND TRANSMISSION LINES DESIGNED IN EXCESS OF 69 KV, ATTACHED TO PEPCO LETTER OF DECEMBER 29, 1969, TO PUBLIC SERVICE COMMISSION OF MARYLAND

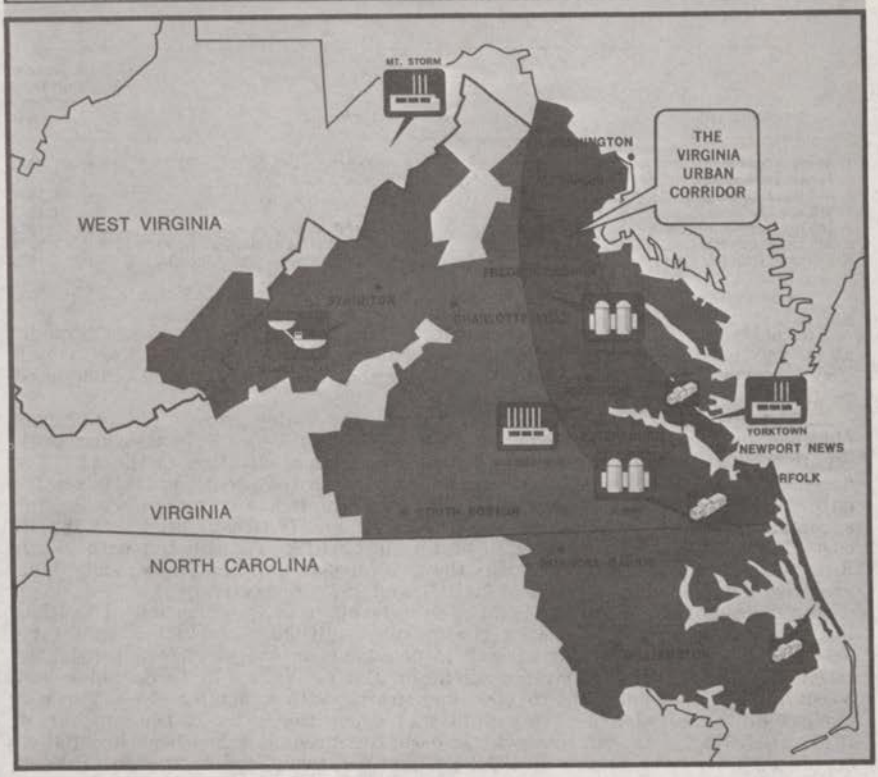


POTOMAC ELECTRIC POWER COMPANY
1970 THROUGH 1979 REQUIREMENTS
GENERATION
AND
TRANSMISSION

Vepco

GENERATING ADDITIONS

SCHEDULED BY
VIRGINIA ELECTRIC AND POWER COMPANY
1970—1976



C. ELECTRIC LOAD GROWTH AND ENVIRONMENTAL POLLUTION

VEPCO

This brief résumé describes the additional generating facilities planned by Virginia Electric & Power Co. through 1976 to meet the growing electrical needs of Virginia and its customers.

January 12, 1970

GENERATING ADDITIONS SCHEDULED BY VEPCO, 1970–76

Electric energy is one of the key resources supporting Virginia's vigorous growth. For this reason, electric requirements in Vepco's service territory necessitate constant review and studyof long-range needs, especially power generating facilities which are highly complex engineering projects. Many alternatives must be evaluated before the final decision is reached concerning the particular type of generating unit to be installed. Long leadtimes are required (5–7 years) for major power stations to provide adequate time to obtain permits and licenses from the many regulatory agencies and to design and construct these projects prior to the need for power by our customers.

Previously we announced the following generating plans in the Vepco service area:

Generating addition	Project or location	Planned commercial inservice date
1. 49 mw. (combustion turbines (oil)	Kitty Hawk, Dare County, N.C	May 1, 1970
2. 41 mw. (combustion turbines (gas)	Surry County, Va	Do.
3. 813 mw. (nuclear)	do	June 1, 1971
4. 813 mw. (nuclear)	do	Mar. 1, 1972
5. 555 mw. (coal-mine mouth)	Mt. Storm, W. Va	Mar. 1, 1973
6. 875 mw. (nuclear)	North Anna project, Louisa County, Va	Mar. 1, 1974
7. 1000 mw. (pumped storage)	Marble Valley project, Bath, Augusta, and Rockbridge Counties, Va.	Mar. 1, 1975

The delays encountered in our Marble Valley pumped storage project brought about by the duplicate application of 11 North Carolina municipalities, which Vepco serves at wholesale, make it unlikely that this project can be completed in 1975.

In anticipation of possible delays in the Marble Valley project, an option was obtained for a second 875 megawatt nuclear unit at Vepco's North Anna project at the time the first unit was ordered and our application to the AEC for a construction permit was based on two units with the second unit's in-service date specified as either 1975 or 1976. The second unit has now been ordered for a commercial operating date of March 1, 1975, and it is estimated that it will cost $184 million. The construction of the unit will be coordinated with North Anna Unit 1 in the same manner as the two nuclear units at Surry, Va., which are scheduled to begin operations in 1971 and 1972, respectively.

Our review of load estimates and reserve levels in conjunction with the other Carva Pool members* indicated that some additional generation would be needed because of continuing growth in peakloads in excess of that previously estimated. In addition, the replacement of Marble Valley in 1975, which had possibilities for development to 1,500 megawatts, with a smaller 875 megawatts nuclear unit, created a need for additional generation prior to the summer of 1975. Accordingly, an 845 megawatts fossil fuel-fired unit has been ordered to be placed in service March 1, 1974, at our Yorktown Power Station in York County, Va. It is expected that this unit will be oil-fired if a reliable source of suitable oil can be obtained. It is estimated that this unit will cost approximately $132 million.

*This refers to Duke Power Co., Carolina Power & Light Co. and South Carolina Electric & Gas Co. who, together with Vepco, form the Carva Power Pool.

It was determined from our engineering studies of the Marble Valley pumped storage project that the site could be developed for 1,500 megawatts of capacity. This is 50 percent greater than the 1,000-megawatts capacity originally scheduled and the installation can be accomplished with a 10-foot water level fluctuation in the lower reservoir rather than the 15-foot variation originally contemplated. Because of the delays encountered, the in-service date for Marble Valley has now been rescheduled for 1976.

The revised generating addition plan to provide adequate power for the period 1970–76 is shown in the attached tabulation along with the estimated total cost of each generating facility. A map showing the locations and expected in-service dates of each unit is also included.

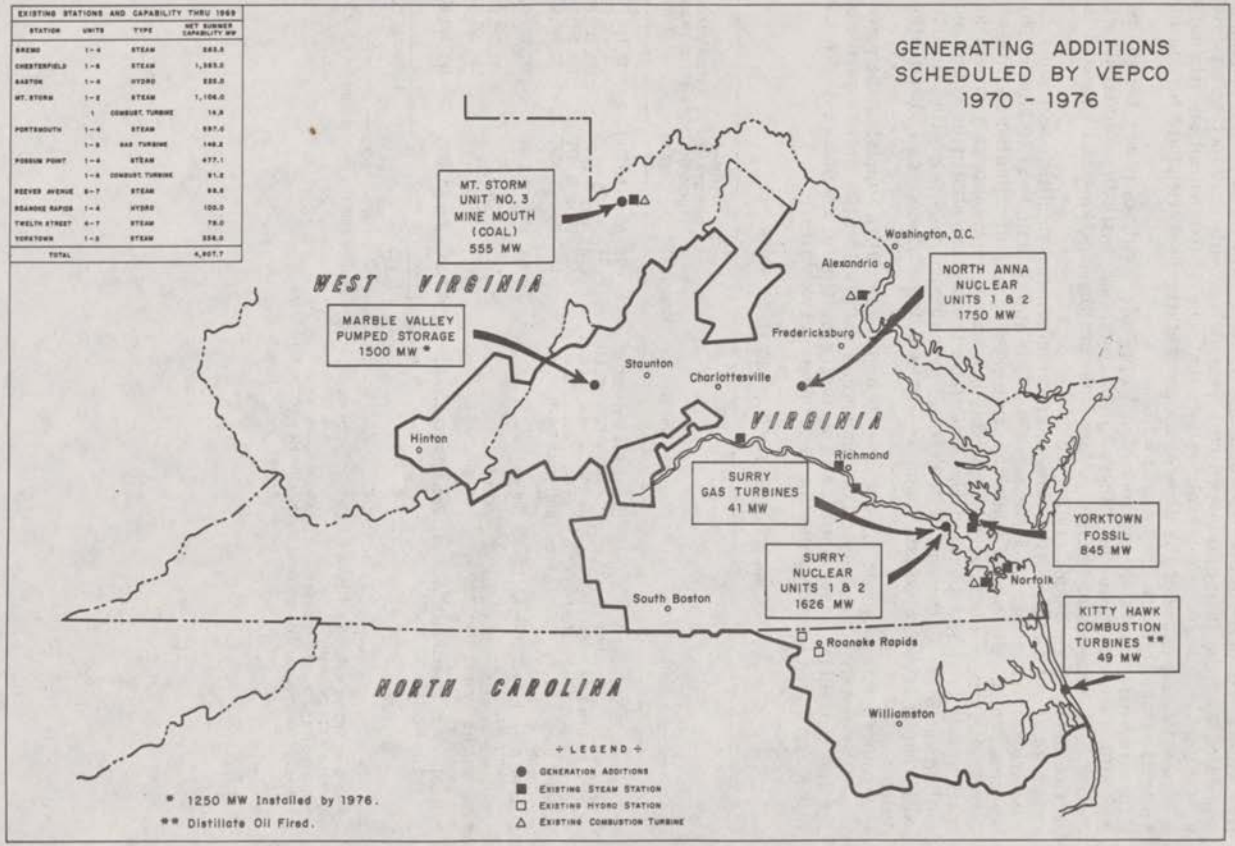
The total estimated cost of the electric generating facilities scheduled for completion during the next 7 years (1970–76) is approximately $1.19 billion. This does not include the cost of additional transmission and distribution facilities to deliver this power to our customers. This investment represents only generation costs and it is almost two and one half times the net investment in Vepco generating facilities at the end of 1969. Load growth and new generating capacity will require substantial additions to Vepco's transmission and distribution system.

A construction program of this magnitude is essential in supplying the power needs for the dynamic industrial, commercial, and residential growth predicted for the immediate years ahead, and is the expression of confidence Vepco has in the continued economic development of our service area.

GENERATING ADDITIONS SCHEDULED BY VEPCO 1970–76

Project and location	Generating additions	Megawatts	Planned commercial in-service date	Estimated cost at completion of project
1. Kitty Hawk, Dare County, N.C.	Combustion turbines, oil	49	May 1, 1970	$6, 125, 000
2. Surry, Va., Surry County, Va.	Combustion turbines, gas	41	do	4, 300, 000
3. Surry, Va. Unit 1, Surry County, Va.	Nuclear	813	June 1, 1971	189, 000, 000
4. Surry, Va. Unit 2, Surry County, Va.	do	813	Mar. 1, 1972	138, 000, 000
5. Mount Storm, W. Va. Unit 3, Grant County, W. Va.	Coal (mine mouth)	555	Mar. 1, 1973	92, 000, 000
6. North Anna Project Unit 1,[1] Louisa County, Va.	Nuclear	875	Mar. 1, 1974	[1] 281, 000, 000
7. Yorktown, Va. Unit 3, York County, Va.	Fossil[2]	845	do	132, 000, 000
8. North Anna Project Unit 2, Louisa County, Va.	Nuclear	875	Mar. 1, 1975	184, 000, 000
9. Marble Valley project, Bath, Augusta, and Rockbridge Counties, Va.	Pumped storage	1, 250	Mar. 1, 1976	[3] 162, 000, 000
Total		6, 116		1, 188, 425, 000

[1] Includes approximately $50,000,000 for dams, dikes, reservoir, road relocations and site development for 4,000,000 kw. ultimate site capability.
[2] Oil fired if an adequate reliable oil supply can be obtained.
[3] Includes provisions in dam and reservoir for ultimate capacity of 1,500 mw.


GENERATING ADDITIONS
SCHEDULED BY VEPCO
1970 - 1976
EXISTING STATIONS AND CAPABILITY THRU 1969
STATION | UNITS | TYPE | NET SUMMER CAPABILITY MW
BREMO | 1-4 | STEAM | 260.0
CHESTERFIELD | 1-5 | STEAM | 1,383.0
BASTON | 1-3 | HYDRO | 225.0
MT. STORM | 1-2 | STEAM | 1,106.0
| 1 | COMBUST. TURBINE | 16.8
PORTSMOUTH | 1-4 | STEAM | 297.6
| 1-2 | GAS TURBINE | 148.2
POSSUM POINT | 1-4 | STEAM | 477.1
| 1-4 | COMBUST. TURBINE | 81.2
REEVES AVENUE | 6-7 | STEAM | 88.8
ROANOKE RAPIDS | 1-4 | HYDRO | 100.0
TWELTH STREET | 6-7 | STEAM | 78.0
YORKTOWN | 1-3 | STEAM | 336.0
TOTAL | | | 4,907.7
MT. STORM UNIT NO. 3 MINE MOUTH (COAL) 555 MW
MARBLE VALLEY PUMPED STORAGE 1500 MW *
NORTH ANNA NUCLEAR UNITS 1 & 2 1750 MW
SURRY GAS TURBINES 41 MW
SURRY NUCLEAR UNITS 1 & 2 1626 MW
YORKTOWN FOSSIL 845 MW
KITTY HAWK COMBUSTION TURBINES ** 49 MW
WEST VIRGINIA
VIRGINIA
NORTH CAROLINA
Washington, D.C.
Alexandria
Fredericksburg
Staunton
Charlottesville
Hinton
Richmond
Norfolk
South Boston
Roanoke Rapids
Williamston
LEGEND
GENERATION ADDITIONS
EXISTING STEAM STATION
EXISTING HYDRO STATION
EXISTING COMBUSTION TURBINE
* 1250 MW Installed by 1976.
** Distillate Oil Fired.

POTOMAC ELECTRIC POWER CO.,
Washington, D.C., August 12, 1970.

Mr. LAURENCE DAVIS,
Natural Resources Subcommittee, Government Operations Committee, Rayburn Building, Washington, D.C.

DEAR MR. DAVIS: Transmitted herewith is the following information which you requested recently:

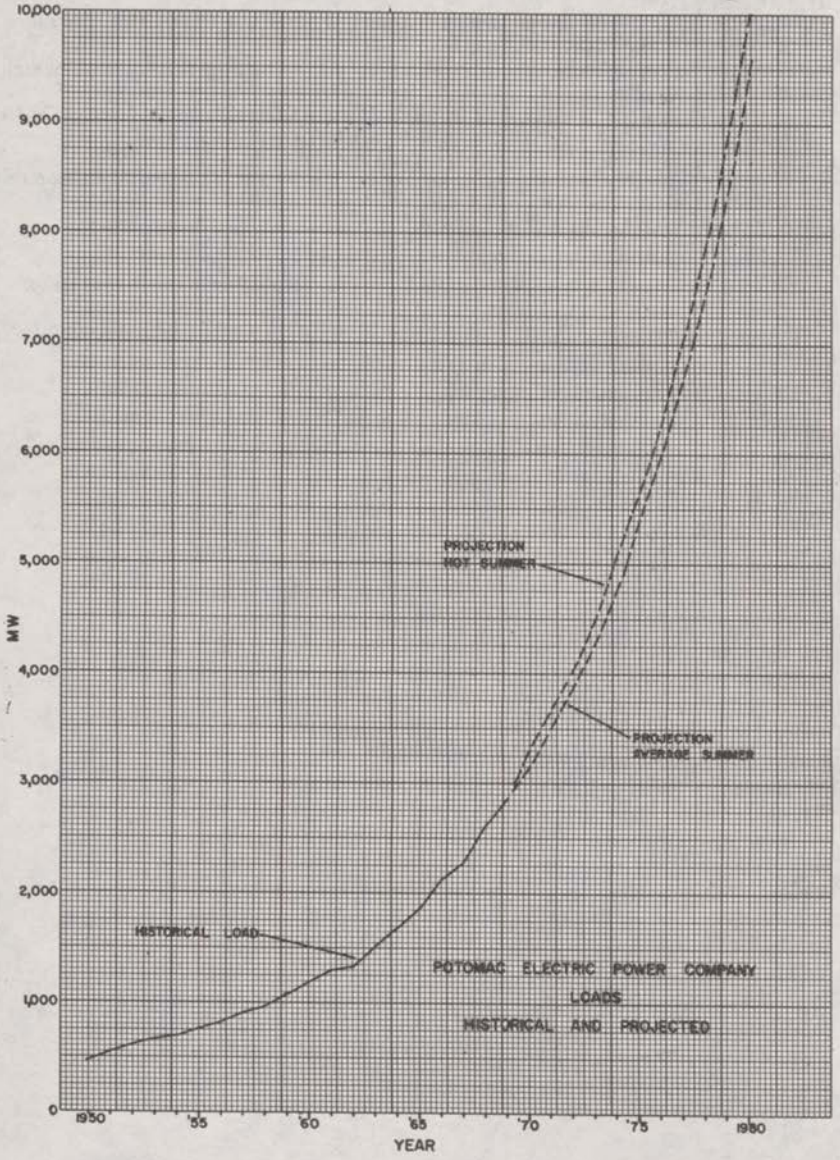
1. Pepco graph showing historical load growth (solid line) from 1950 to 1970 and projected load growth (broken line) from 1970 to 1980.
2. Pepco booklet—General Statistical Data, 1935–69.
3. Pepco graph showing "Average Annual Usage Per Residential Customer, 1960–69."

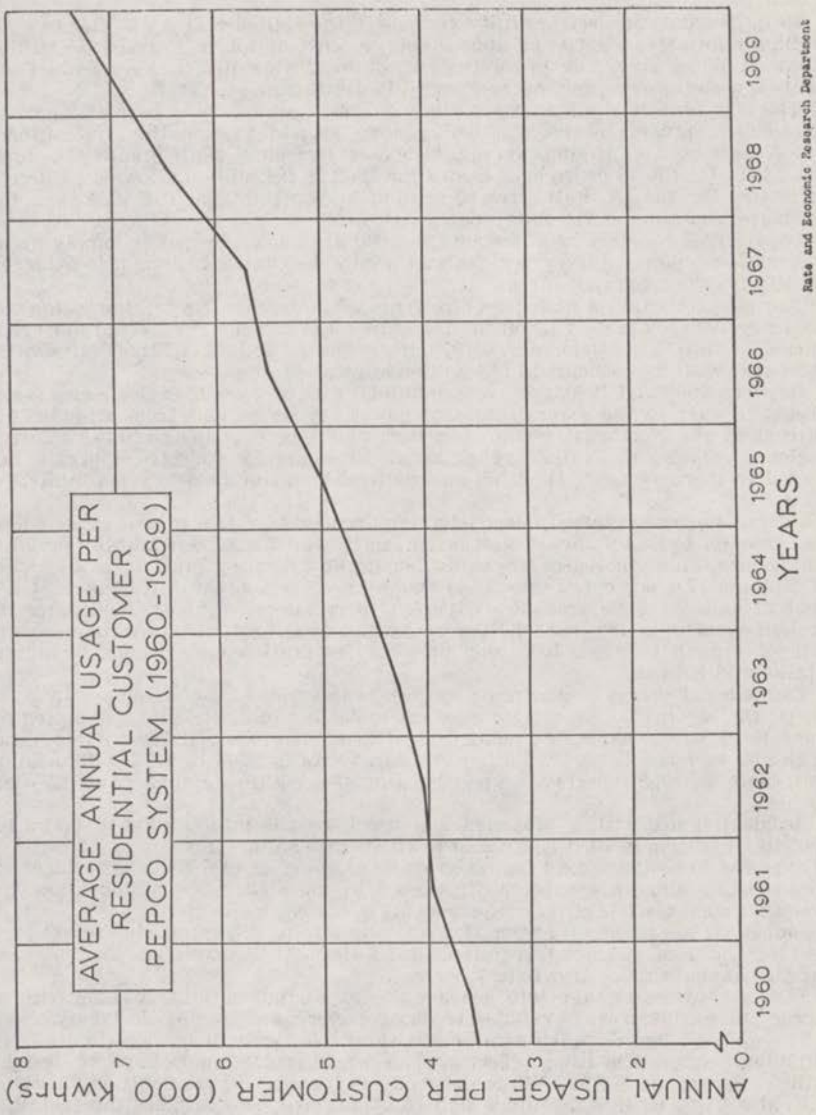
We trust the above data will be helpful.

Very truly yours,

L. W. CADWALLADER,
Vice President, Generating.

(Subcommittee note.—Item 2 above, omitted here, is in the subcommittee files.)


10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
MW
PROJECTION HOT SUMMER
PROJECTION AVERAGE SUMMER
HISTORICAL LOAD
POTOMAC ELECTRIC POWER COMPANY
LOADS
HISTORICAL AND PROJECTED
1950
'55
'60
'65
'70
'75
1980
YEAR


AVERAGE ANNUAL USAGE PER RESIDENTIAL CUSTOMER PEPCO SYSTEM (1960-1969)
ANNUAL USAGE PER CUSTOMER (000 kwhrs)
0
2
3
4
5
6
7
8
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
YEARS
Rate and Economic Research Department
August 7, 1970

FPC Releases Estimates Showing Peak Demands of Nation's Electric Utility Systems Will Reach 1,056 Million Kilowatts by 1990

Peak demands of electric utility systems in the United States will rise to 1,056 million kilowatts by 1990 and annual energy consumption will exceed 5.8 trillion kilowatt-hours, according to forecasts made by the six Regional Advisory Committees with the assistance of the Federal Power Commission staff.

The new forecasts, which cover all 50 States, were made as part of the Commission's appraisal of electric utility load growth in updating its national power survey. The original survey, issued in December 1964, predicted a total peak load for the 48 contiguous States for 1980 of 494 million kilowatts. Current estimates for the 48 States are 60 million kilowatts higher for 1980 than the estimates contained in the 1964 report.

Capacity and energy requirements to 1990 are shown by power supply areas and national power survey regions in the attached table I. A map is attached identifying the geographic areas.

The new forecast of power requirements of more than 5.8 trillion killowatt-hours by 1990 compares with about 1.5 trillion kilowatt-hours expected to be consumed in 1970. Peak demands in 1970 are projected to be 277,921,000 kilowatts, compared with the estimated 1,056 million kilowatts in 1990.

Between 1965 and 1990, the average annual rate of growth of electricity is expected to vary in the several national power survey regions from a low of 6.2 percent in the Northeast region to a high of 8.4 percent in the South Central region. In the South Central region, actual consumption of electric energy is expected to increase from 118.6 billion killowatt-hours in 1965 to 900.4 billion in 1990.

During the same period, electricity requirements in Alaska are expected to rise from 0.7 to 7.8 billion kilowatt-hours; in Hawaii from 2.6 to 16.2 billion kilowatt-hours. These increases are equivalent to an average annual rate of growth of 10.1 and 7.6 percent, respectively. Only three regions—the Northeast, East Central and West Central—are expected to register average annual rates of growth equal to or less than 7.1 percent, which is the estimated average annual rate of growth between 1965 and 1990 for the Nation as a whole, including Alaska and Hawaii.

Estimates of energy consumption by major categories of use are shown in table II. Of the several major categories, commercial use of electricity is expected to show the greatest average annual rate of growth between 1965 and 1990. The projected increase from 191 billion kilowatt-hours in 1965 to 1,142 billion kilowatt-hours in 1990 reflects a 7.4 percent annual growth rate during this 25-year period.

Residential use with a projected increase from 255 billion kilowatt-hours in 1965 to 1.4 trillion in 1990, equivalent to an average annual increase of 7.1 percent is expected to be the second fastest growing category of use. By 1990 residential requirements alone are expected to exceed by more than 350 billion kilowatt-hours the total electric energy requirements of the Nation in 1965.

Industrial use is the largest category in absolute terms, accounting for 41 percent of the total national requirement in 1965. It is expected to show an average annual rate of growth of 7 percent.

The new forecasts take into account the expanding national income with a larger purchasing power available to pay for increased uses of electricity.

The updated figures make greater allowances for growth in elec ric air conditioning and space heating, reflecting widespread promotional efforts of electric utilities across the Nation. While these efforts have been reasonably productive, only about 3⅓ million dwellings had complete electric space heating installations at the end of 1968. Many millions of additional homes are expected to be heated electrically within the next 20 years.

Table 1 shows estimated capacity and energy forecasts both nationally and on a regional basis. Table II shows estimated requirements by categories of use, including residential, commercial, and industrial. Requirements are shown in terms of million killowatt-hours and peak demands in thousands kilowatts.

September 24, 1969.

TABLE I.—ELECTRIC UTILITY ENERGY REQUIREMENTS AND PEAKLOADS BY POWER SUPPLY AREAS AND REGIONS

[Energy in million kilowatt-hours; peaks in thousand kilowatts]

Power supply area and region	1965		1970		1975		1980		1985		1990	
	Energy	Peak	Energy	Peak	Energy	Peak	Energy	Peak	Energy	Peak	Energy	Peak
Northeast:												
1	4,126	765	5,340	995	6,920	1,285	8,950	1,655	11,590	2,140	15,000	2,760
2	37,656	7,821	53,000	10,805	73,780	14,915	102,050	20,445	141,110	28,060	194,800	38,540
3	36,080	6,043	46,100	7,730	58,700	9,850	74,900	12,600	95,700	16,150	122,200	20,650
4	36,830	7,538	48,700	9,930	64,400	12,900	85,100	16,700	111,700	21,800	147,200	28,600
5	81,041	14,615	116,640	21,070	163,030	29,370	218,770	39,270	292,920	52,410	388,380	69,280
6	8,002	1,874	12,740	3,050	18,280	4,340	25,490	6,000	34,780	8,120	47,120	10,910
Total	203,735	36,842	282,520	51,230	385,110	69,590	515,260	92,770	687,800	123,770	914,700	164,640
East Central:												
7	23,885	3,948	31,100	5,140	40,400	6,660	52,600	8,640	68,400	11,250	88,900	14,600
8	11,574	2,002	15,400	2,590	20,530	3,450	27,350	4,590	36,400	6,110	48,500	8,140
9	51,753	7,832	63,600	10,250	96,480	15,110	131,101	20,570	172,610	27,330	230,010	36,660
10	13,770	2,273	18,300	3,020	24,400	4,010	32,500	5,310	43,300	7,080	57,700	9,410
11	39,807	7,145	56,210	9,900	75,900	13,250	102,000	17,600	137,000	23,400	181,000	30,600
12	45,640	8,149	63,120	11,500	88,900	16,000	123,000	22,000	169,000	30,000	233,200	41,400
19	4,897	964	8,770	1,770	13,080	2,470	18,080	3,470	27,080	5,280	38,080	7,490
Total	191,326	31,910	256,500	43,950	359,690	60,710	486,640	81,920	653,790	110,170	877,390	147,990
Southeast:												
18	14,994	2,923	23,790	4,770	37,780	7,460	57,420	11,170	82,830	15,960	114,240	21,760
20	77,378	12,804	96,720	18,050	135,900	25,260	185,550	33,610	218,760	40,210	253,160	47,010
21	41,374	7,322	66,500	11,460	99,230	17,000	143,650	24,560	209,320	35,650	313,880	53,300
22	20,391	3,896	32,180	6,080	47,560	9,090	67,930	12,940	96,850	18,350	126,890	23,970
23	20,916	3,882	33,890	6,320	44,880	8,300	66,150	12,190	96,120	17,670	137,790	25,260
24	28,092	5,274	46,060	9,100	74,170	14,100	115,510	22,020	174,780	33,530	258,620	50,260
Total	203,145	33,811	299,140	52,960	439,520	76,690	636,210	110,010	878,660	152,230	1,204,580	211,906
West Central:												
13	18,881	3,344	27,400	4,660	37,800	6,380	50,500	8,510	67,700	11,370	91,300	15,290
14	35,325	6,773	52,300	10,070	57,800	14,350	105,000	19,810	143,000	27,060	195,000	37,020
15	13,800	2,943	20,400	4,530	3C,000	6,650	43,800	9,720	61,200	13,540	85,100	18,770
16	15,562	2,984	23,800	4,280	34,800	6,230	52,800	9,210	74,600	13,020	105,000	18,350
17–17F[1]	12,604	2,471	19,600	3,730	27,400	5,260	38,100	7,160	53,300	9,680	74,600	13,120
40	18,249	3,094	22,200	4,070	33,400	6,230	44,300	8,090	59,100	10,590	79,600	13,990
26	2,987	649	4,300	960	6,000	1,320	8,400	1,820	11,600	2,480	16,100	3,390

See footnote at end of table.

TABLE I.—ELECTRIC UTILITY ENERGY REQUIREMENTS AND PEAKLOADS BY POWER SUPPLY AREAS AND REGIONS—Continued

[Energy in million kilowatt-hours; peaks in thousand kilowatts]

Power supply area and region	1965		1970		1975		1980		1985		1990	
	Energy	Peak	Energy	Peak	Energy	Peak	Energy	Peak	Energy	Peak	Energy	Peak
West Central—Continued												
27	3,471	627	4,800	910	6,800	1,310	9,500	1,900	13,200	2,650	18,300	3,680
28	5,957	1,444	9,100	2,220	13,000	3,160	18,100	4,390	24,500	5,940	33,300	8,070
Total	126,836	23,718	183,900	34,420	265,000	50,220	370,500	68,870	508,200	94,990	698,300	128,610
South Central:												
17F[1]	6,479	1,448	9,380	2,100	12,860	2,850	17,580	3,860	24,510	5,330	34,080	7,340
25	21,049	4,135	34,340	7,260	53,130	11,170	78,440	16,400	110,610	23,000	152,300	31,500
29	5,235	1,196	7,710	1,760	10,550	2,400	14,350	3,250	19,280	4,350	25,630	5,760
33	15,833	3,642	26,540	6,120	40,840	9,400	60,080	13,800	84,630	19,400	116,270	26,600
34	7,285	1,570	11,200	2,460	16,200	3,530	23,000	4,950	31,800	6,780	42,900	9,070
35	13,285	2,344	24,000	4,240	40,600	7,140	64,500	11,240	97,700	16,900	141,300	24,250
37	22,633	4,972	35,600	7,970	55,300	12,250	82,000	18,000	118,600	25,800	168,000	36,200
38	26,842	5,297	43,600	8,510	67,700	13,100	102,680	19,700	152,425	29,000	219,900	41,500
Total	118,641	24,589	192,370	40,301	297,180	61,678	442,630	90,980	639,555	130,259	900,380	181,811
West:												
30	6,630	1,089	8,830	1,460	11,740	1,940	15,680	2,590	21,070	3,490	28,390	4,700
31	2,853	474	4,253	715	6,370	1,070	9,390	1,570	13,400	2,250	18,800	3,150
32	7,790	1,497	11,500	2,130	16,500	3,020	23,400	4,230	32,700	5,860	45,300	8,030
36	6,452	1,238	9,170	1,790	13,000	2,510	18,200	3,480	25,100	4,770	33,800	6,380
39	3,664	687	5,426	1,035	7,980	1,520	11,500	2,180	16,100	3,060	21,600	4,090
41	11,119	2,044	15,680	2,840	22,210	4,020	31,420	5,690	44,510	8,060	63,210	11,460
42	10,871	1,562	13,400	2,190	15,800	2,580	18,100	2,950	20,700	3,380	23,000	3,750
43	20,412	4,048	30,300	5,760	43,500	8,280	61,900	11,780	86,000	16,360	118,700	22,580
44 and 45	33,522	6,013	49,700	8,930	69,800	12,550	96,800	17,400	133,300	23,960	183,000	32,900
46	42,654	7,639	63,400	11,200	92,900	16,500	136,000	24,100	199,000	35,300	291,000	51,600
47	51,129	9,451	72,500	13,300	106,000	19,400	151,000	27,700	213,000	39,200	298,000	55,000
48	15,452	2,941	23,600	4,490	34,400	6,550	50,300	9,570	73,800	14,000	108,000	20,600
Total	212,548	37,545	307,759	54,035	440,200	77,280	623,690	109,420	878,680	154,250	1,232,800	216,420
Contiguous United States	1,056,231	188,415	1,522,189	276,896	2,186,700	396,168	3,074,930	553,970	4,246,685	765,669	5,828,150	1,051,377
Alaska	720	164	1,150	257	1,840	408	2,970	653	4,820	1,050	7,830	1,690
Hawaii	2,628	513	3,980	768	5,850	1,120	8,400	1,610	11,800	2,260	16,200	3,100
United States	1,059,579	189,092	1,527,319	277,921	2,194,390	397,696	3,086,300	556,233	4,263,305	768,979	5,852,180	1,056,167

[1] Power supply subarea 17F transferred to the South-Central region effective Jan. 1, 1969.

Note: 1965 data actual; other years estimated. Each power supply area peak represents the sum of individual utility system peaks occurring in the same month. The month of peak varies among power supply areas. Each regional peak represents the sum of individual utility system peaks occurring in the same month and is not necessarily equal to the sum of its power supply area peaks. The U.S. peak is the sum of the regional peaks shown.

TABLE II.—ELECTRIC UTILITY POWER REQUIREMENTS, UNITED STATES,[1] BY CATEGORIES OF USE, 1965–90

[Million kilowatt-hours]

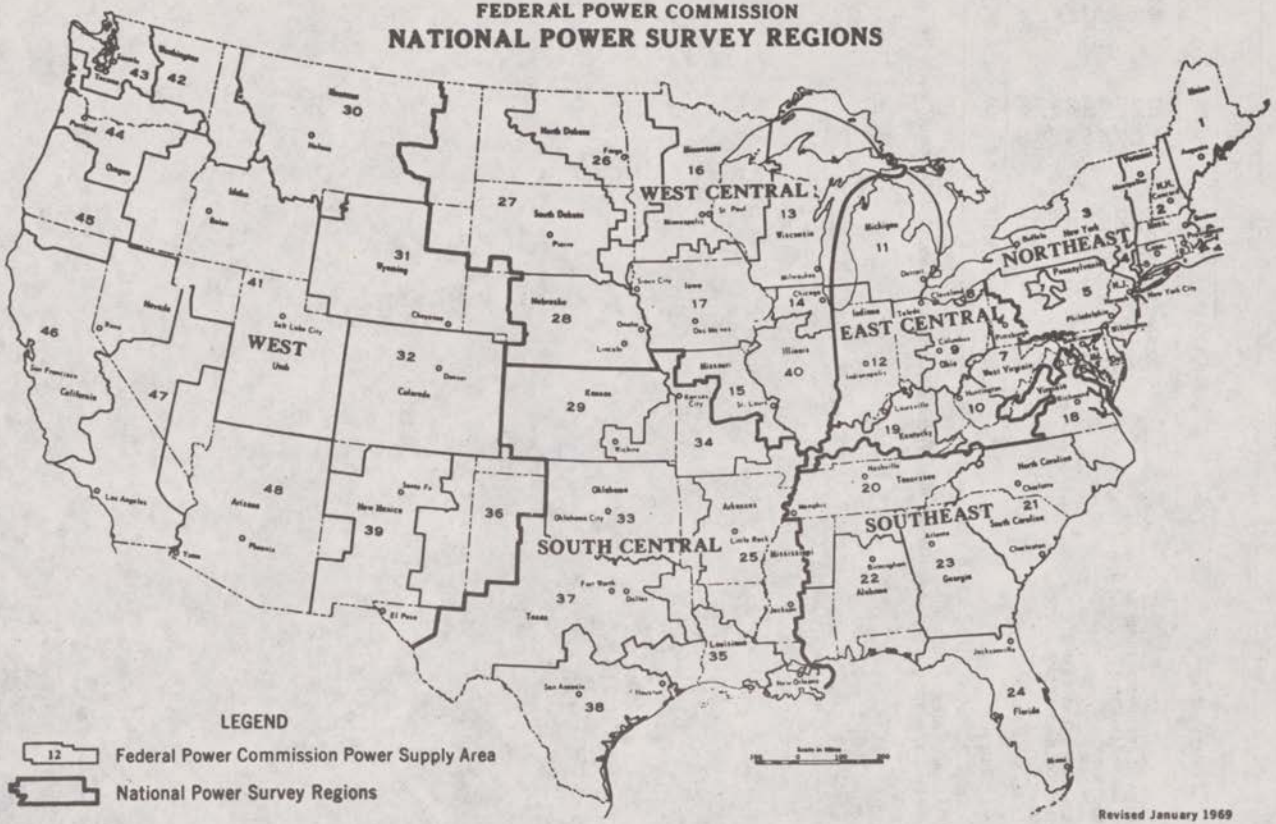
Category of use	Actual, 1965	Estimated		
		1970	1980	1990
Farm[2]	26,974	36,718	60,471	96,790
Irrigation and drainage pumping	10,917	14,946	22,762	34,779
Residential (nonfarm)	255,281	381,262	758,849	1,416,623
Commercial	190,916	279,149	578,378	1,141,697
Industrial	436,434	613,550	1,260,145	2,392,820
Street and highway lighting	9,159	12,841	23,355	40,388
Electrified transportation	4,885	5,418	6,995	8,435
Other uses	33,004	48,280	106,350	216,242
Losses and unaccounted for	92,009	135,155	268,995	504,406
Total	1,059,579	1,527,319	3,086,300	5,852,180

[1] Includes Alaska and Hawaii.
[2] Includes farms actually used for farming; other residential uses in farming areas included under "Residential."

No. 16323

FEDERAL POWER COMMISSION

NATIONAL POWER SURVEY REGIONS



Revised January 1969

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(C. & E.N. editorials are signed and represent only the views of the signer. Unless stated to the contrary they do not represent the official position of the American Chemical Society. Rather they are aimed at focusing attention on some controversial point, at sparkling intelligent discussion, at raising legitimate questions)

Editorial—Electrical Heating and Thermal Pollution

Electrical resistance heaters indirectly cause a substantial amount of unnecessary thermal pollution

Of the various kinds of pollution confronting the world, one of them, thermal pollution, is relatively little understood. It is easy to see litter or smog and to smell or be irritated by offensive materials. On the other hand, raising the temperature of a river or a lake by several degrees does not produce any immediate human discomfort; hence thermal pollution generally does not excite people as much as the other kinds do. Moreover, a group of volunteers can scarcely go out and extract heat from our lakes or streams as they might pick up empty cans and other debris from our roadsides. Nevertheless, thermal pollution in some specific geographic sectors is a serious problem, a problem that is recognized by ecologists, many of whom have expressed concern about the long-range effects.

But it is not my purpose in writing this editorial to emphasize the gravity of the problem, for I am quite prepared to accept the conclusions of experts in this regard. However, I do want to comment on what I believe to be unnecessary thermal pollution and what steps might be taken to diminish it. By "unnecessary" I refer to that which can be avoided, at least in part, by alternative means for achieving otherwise desirable ends.

For reasons indicated below, it is clear that a substantial amount of unnecessary thermal pollution indirectly accompanies the use of electrical resistance heaters. Examples of offending devices include hot water heaters, excepting, in principle, those using efficient heat pumps. I do not have precise estimates of the extent to which this is going on, but it is certainly substantial. From basic thermodynamic considerations, it follows that electrical resistance heating not only contributes unnecessarily to thermal pollution, but also wastes fuel. Since elimination of unnecessary thermal pollution would also help conserve fuel, there is a double reason for initiating appropriate corrective measures.

The specific arguments supporting these assertions follow. Suppose a certain amount of combustible gas would serve to heat some water; then in accordance with the second law of thermodynamics, a much greater quantity of gas or equivalent fuel would have to be burned to produce the electrical energy required to heat that water by the same amount. This follows because no cyclical heat engine, however perfect, can convert more than a fraction of the heat supplied into electrical energy. The most efficient fossil-fueled steamplants convert about 40 percent of the heat of combustion of the fuel into electricity and the nationwide average is less than 33 percent. The substantial amount of heat (about two-thirds of the total) not converted into electricity at the powerplant must be discharged into the surroundings, such as a lake or river. This is the principal source of thermal pollution, which in many instances has serious consequences depending upon where and how the heat is discharged.

Even if the heat effect at the powerplant were of no consequence, the overall process still wastes fuel. Accordingly, it is definitely more efficient to burn gas in a hot water heater than to burn gas to generate steam to make electricity for the heater. I use gas as an example, but the argument is valid irrespective of the kind of fuel employed as long as one deals with thermal equivalents. (Through gasification of coal, one can use gas in a home, for example, without depending on natural gas alone.)

People generally think of electric heat as clean and hence desirable from the standpoint of keeping our environment unspoiled. This is true where the electricity is *used* but it is not necessarily true at the powerplant. Although there is some compensation in the efficiency attending the operation of a large-scale powerplant, the conclusion is still inescapable that, from the standpoints of thermal pollution and fuel conservation, we would be better off using directly the heat resulting from burning a fuel instead of going through an electrical intermediate. (The foregoing argument is not valid if reasonably efficient heat pumps are employed, nor would it apply to hydroelectric power sources, which account for a small fraction of the total.)

It is interesting to note that thermal pollution, like other kinds of pollution, and waste of fuel, like other kinds of waste, correlate rather directly with degree of affluence. Even though electric heat is more costly, an affluent society has no

compunctions about using electrical heating devices because of the immediate convenience and apparent local cleanliness. Since, however, a modern electric home is in fact coupled with a powerplant located elsewhere, it is the combination that must be judged; unhappily that combination gives rise to more, not less, undesirable effects on our total environment than would direct combustion in a properly designed heating device.

What can be done about this? In the first place, the use of electrical resistance heating should be severely restricted wherever electrical energy is generated by steamplants whose operations seriously affect the environment. Prompt action might give us enough time to determine more precisely what further measures, if any, must be taken to avoid serious, irreversible consequences. The development of means for the direct conversion of nuclear energy into electrical energy might, of course, solve the problem. A return to individual coal-burning furnaces is not advocated; this can be avoided by gasification of coal, which would make available a convenient, not too costly, and relatively nonpolluting fuel for small heating units.

It should be emphasized that I am not suggesting the elimination of electric lights, minor heating appliances, or electric motors that perform work. I do want to focus attention on space and water heating, since the energy required for such can be very large, with a correspondingly large wasteful thermal discharge in the neighborhood of a powerplant. At the same time, the use of heat pumps should be encouraged as an alternative both to cut down on thermal pollution and to save fuel. Finally, our people should be reminded that what they see or feel in their houses does not disclose all of the environmental effects attending living in those houses.

F. T. WALL, *ACS Executive Director.*

MARKET FOR ELECTRIC HEATING (AN UNPUBLISHED PRELIMINARY STUDY PREPARED BY THE FEDERAL POWER COMMISSION STAFF)

In mid-1963 the electric utility industry through its Power Requirements Special Technical Committee projected the number of fully electrically heated homes in 1980 at 19 million homes. This level was set more as an objective for the industry rather than a prediction of industry success in penetrating the home heating market and was adopted by the committee in spite of a dissenting opinion that projected only 14 million homes.

The concept of the fully electrically heated home includes not only electric space heating and cooling but also electric cooking, electric water heating, electric snow removal from doorways and entrances, driveways, and sidewalks, extending even to the radiant heating of outdoor patio areas. Supplementing the fully electrically heated home market is a large number of homes partially heated by electricity. This number can be expected to increase also as families take advantage of the relatively low cost of supplemental electric heating devices to heat home spaces inadequately served by existing flame-type central heating systems or room units.

In 1970 it is becoming increasingly evident that the 19 million all-electric homes by 1980 is illusory. While the industry still feels the 1980 objective can be achieved, there is nothing in the industry's success since 1963 to indicate that the projected target can be met without extraordinary effort on the part of the industry. This pessimism is reflected in some industry opinion which attributes initial success in penetrating the space heating market to lack of competitive zeal in the gas and oil industries, both of which underestimated the resistance of the home heating market to the allurement of electric heat. The competition has now been aroused and alarmed and is fighting hard to preserve its dominance of this segment of the market for its products.[1]

The disappointing record of the industry is reflected in the statistics. Between the end of 1963 and 1968 the number of electrically heated dwellings (new and converted existing structures) increased 1.8 million units while the number of total dwelling units[2] added amounted to 7.1 million.

Table III–8 shows the growth of electric heating in the United States from 1963 to 1968. Between the end of 1964 and the end of 1968 the number of

[1] John H. K. Shannahan, executive director, Electric Heating Association, Inc., "Growth of Electric Heating," June 1968.

[2] Includes single family houses with central heating and cooling systems, apartments, structures with space heaters, vacation cottages, and mobile homes. Statistics on electric heat are plagued by ambiguities arising from varying definitions of what constitutes an electrically heated house. Some respondents include structures with moveable space heaters with central heating system equipped houses.

single family houses heated entirely by electricity increased 43 percent compared to an increase of 125 percent for electric heated apartments. A more rapid rate of growth of electrically heated apartments is expected for two reasons. The first is the advantage of lower first cost of electric heating and cooling installations which appeals to apartment owners and the second is the growing preference among apartment dwellers for rent payments which include the cost of electric services.

It will be noted in table III–9 that during the 5-year period ending with 1968 that the electric utility industry was able to achieve a penetration of the new dwelling market of about 20 percent, or about one new dwelling for every five new dwellings added. At the end of 1968 there were 3.4 million electrically heated dwelling units in the United States, according to "Electric Heat and Airconditioning," which conducts the most comprehensive annual survey of electric heat installations.

TABLE III-8.—ELECTRICALLY HEATED DWELLINGS IN THE UNITED STATES, 1963-68

Year	Total dwellings	Single-family houses [1]	Apartments [2]
1968	3,388,460	2,604,964	783,496
1967	3,040,923	2,419,065	621,858
1966	2,698,009	2,186,842	511,167
1965	2,378,718	1,926,666	452,052
1964	2,173,833	1,824,931	348,902
1963	1,600,000	1,482,372	[3] 117,628

Source: Annual market surveys of Electric Heat and Air Conditioning.

[1] Includes an unknown number of mobile homes.
[2] Data on apartments was not collected prior to 1964.
[3] Estimated by Electric Heating Association, Inc.

TABLE III-9.—COMPARISON OF ANNUAL CONSTRUCTION OF DWELLING UNITS AND INCREASES IN NUMBER OF ELECTRIC DWELLINGS, 1964-68

Year	New dwelling [1] units added (thousands)	Increases in electrically heated [2] dwellings			Conversion [5] ratio (percent)	Penetration [6] of new dwellings market (percent)
		Total [3] (thousands)	New dwellings (thousands)	Conversions [4] (thousands)		
1968	1,548	347.5	273.7	73.8	27.0	22.4
1967	1,322	342.9	266.8	76.1	28.5	20.2
1966	1,196	319.3	248.3	71.0	28.6	20.8
1965	1,510	204.9	168.1	36.8	21.9	11.3
1964	1,562	573.8	471.9	101.9	21.6	30.2
Total	7,138	1,788.4	1,428.8	359.6		
Annual average	1,428	357.7	285.8	71.9	25.2	20.0

[1] Economic Report of the President, February 1970, p. 224.
[2] Electric Heat and Airconditioning magazine, annual surveys.
[3] Houses, apartments, and an unknown number of mobile homes.
[4] 10 percent reported apartments assumed to be conversions.
[5] Ratio of conversions to new dwellings with electric heat.
[6] Ratio of new dwellings with electric heat to total dwelling units added.

With regard to conversion of existing dwellings from gas and oil fuel to electric heat, there is little data relating to gas-to-electric-heat conversion. "Fuel Oil & Oil Heat," however, published the following data relating to oil customer changes to electric heat:

Year	Conversions		Ratio (percent)
	Oil to gas (thousands)	Oil to electric heat (thousands)	
1968	108.7	24.7	4.3
1967	92.6	15.1	6.1
1966	84.8	13.5	6.2
1965	83.5	13.2	6.3
1964	108.3	17.9	6.1

Source: Fuel Oil and Oil Heat, January 1968, p. 33–37, and telephone conversation, January 1969, p. 31–37, and Janauary 1970, p 44–49.

This suggests that in regions of the Nation where oil heat is popular there is only one chance in seven that an oil heating customer who is about to convert to another fuel will select electric heat. It appears that conversions from gas to electric heat are taking place in large numbers in the southern and southwestern regions where gas fuel is commonly available. Based on the conversion assumptions in table III–9, there were about 60,000 conversions from gas to electric heat in 1967, compared to the 15,000 conversions from oil to electric heat.[3] The large number of gas to electricity conversions can be explained in part by the fact that about half of the electric heat conversions are reported in the South where many homes are heated by gas space heaters rather than by central heating systems.

During the 12-year period from the end of 1968 to the end of 1980 the number of households is projected to increase by 16.4 million according to a higher series of projections and 14.3 million according to a lower series published by the Bureau of the Census.[4] Each series reflects different assumptions relating to population growth and the marriage rate. We can assume on the basis of the data shown in table III–10 that the future increase of occupied dwellings will follow closely the number of household formations.

TABLE III–10.—CORRELATION BETWEEN OCCUPIED HOUSING UNITS AND TOTAL HOUSEHOLDS, 1930–60

Year	Occupied housing units (thousands)[1]	Total households (thousands)[2 3]	Ratio of households[4] to occupied housing units (percent)
1960	52, 814	53, 021	100. 4
1950	42, 826	42, 857	100. 1
1940	34, 855	34, 949	100. 3
1930	29, 905	29, 905	100. 0

[1] Statistical Abstracts, 1968; p. 707, table 1087.
[2] Statistical Abstracts, 1968; p. 35, table 39.
[3] As of Apr. 1.
[4] By definition, a "household" comprises all persons who occupy a "housing unit"; that is, a house, an apartment, or other group of rooms or a room that constitutes "separate living quarters." Differences are due to census procession.

Any projection of the number of electrically heated homes in 1980 and 1990 should take account of the following parameters: (1) the number of dwelling units constructed during those periods; (2) the penetration of the new dwelling market by the electric utility industry; and (3) the conversion ratio achieved by the industry, that is, the percent of electric heating installations in existing structures displacing old gas, oil, and coal fired heating systems to the number of installations in new structures.

If it is assumed (1) that the higher projections for household formation accurately reflects population growth during the next two decades; (2) that the industry's penetration of the new dwelling market will range between 25 to 40 percent; and (3) that the industry can achieve a conversion ratio ranging from 25 to 75 percent, then it might be expected that the number of electrically heated dwellings in 1980 will range between 8.6 million and 15 million. On the basis of the lower projection of household formation, this range can be expected to be from 8 million to 13.5 million.[5] These data are shown in table III–11.[6]

[3] Conversions from coal to electric heat may have occurred but these can be regarded as negligible.
[4] "Projections of the Number of Households, 1967–1985" Bureau of the Census, series P–25 No. 394. June 6, 1968.
[5] In the 13th Annual Market Analysis published in the March–April 1969 issue of *Electric Heat and Airconditioning*, the number of electrically heated homes (excluding apartments and mobile homes) is projected to be 7.5 million in 1975 and 12.4 million in 1980.
[6] The number of dwellings actually equipped with electric heat may exceed these numbers because some of the new housing units may not be immediately occupied. The vacancy rates for all dwellings during the past decade have been running about 10 percent.

TABLE III-11.—ESTIMATE OF NUMBER OF ELECTRICALLY HEATED DWELLINGS IN 1980

	Higher household formations			Lower household formations		
Penetration rate, new dwellings (percent)	25	30	40	25	30	40
New dwellings won to electric heat	4,099	4,919	6,558	3,578	4,294	5,725
Existing electric dwelling in 1968	3,500	3,500	3,500	3,500	3,500	3,500
Conversions to electric heat:						
Conversion ratio:						
25 percent	1,025	1,230	1,640	895	1,074	1,431
50 percent	2,050	2,460	3,279	1,789	2,147	2,863
75 percent	3,074	3,689	4,919	2,684	3,221	4,294
Total electric dwellings in 1980:						
Conversion ratio:						
25 percent	8,624	9,649	11,698	7,973	8,868	10,656
50 percent	9,649	10,879	13,337	8,867	9,941	12,088
75 percent	10,673	12,108	14,977	9,762	11,015	13,519

Note.—Conversion ratio is defined as the number of older dwellings converted from coal, oil, or gas heating divided by the number of new dwellings with installed central electric heating systems.

Thus, under the most favorable assumptions, the industry will be missing the projected goal of 19 million electrically heated homes set in 1963 by about 4 million homes or by about 21 percent.

The same kind of an analysis can be made for the decade of the 1980's. The number of households is expected to increase by 12.3 million based on the higher Bureau of the Census projections and 11.5 million based on the lower projection. With the anticipated increasing popularity of electric heating, it is reasonable to assume that the industry's conversion ratio during the 1980–90 period will be somewhat higher than that achieved during the preceding decade. The analysis for 1990 is therefore based on three cases, each with an increasing combination of conversion ratios for the period before and after 1980.

Under the most optimistic assumptions of the higher projection of household formation, a 40 percent penetration of the new dwelling market for the period from 1968, and a conversion ratio of 75 percent in the period before 1980 and a conversion ratio of 100 percent after 1980, the number of occupied electric homes in 1990 can be expected to approach 25 million. Table III–12 shows the various projections for 1990 based on the various other assumptions. The effect of increasing penetration of the new dwelling market and increasing conversion ratios is illustrated in figure III–3 for the higher projection of household formations.

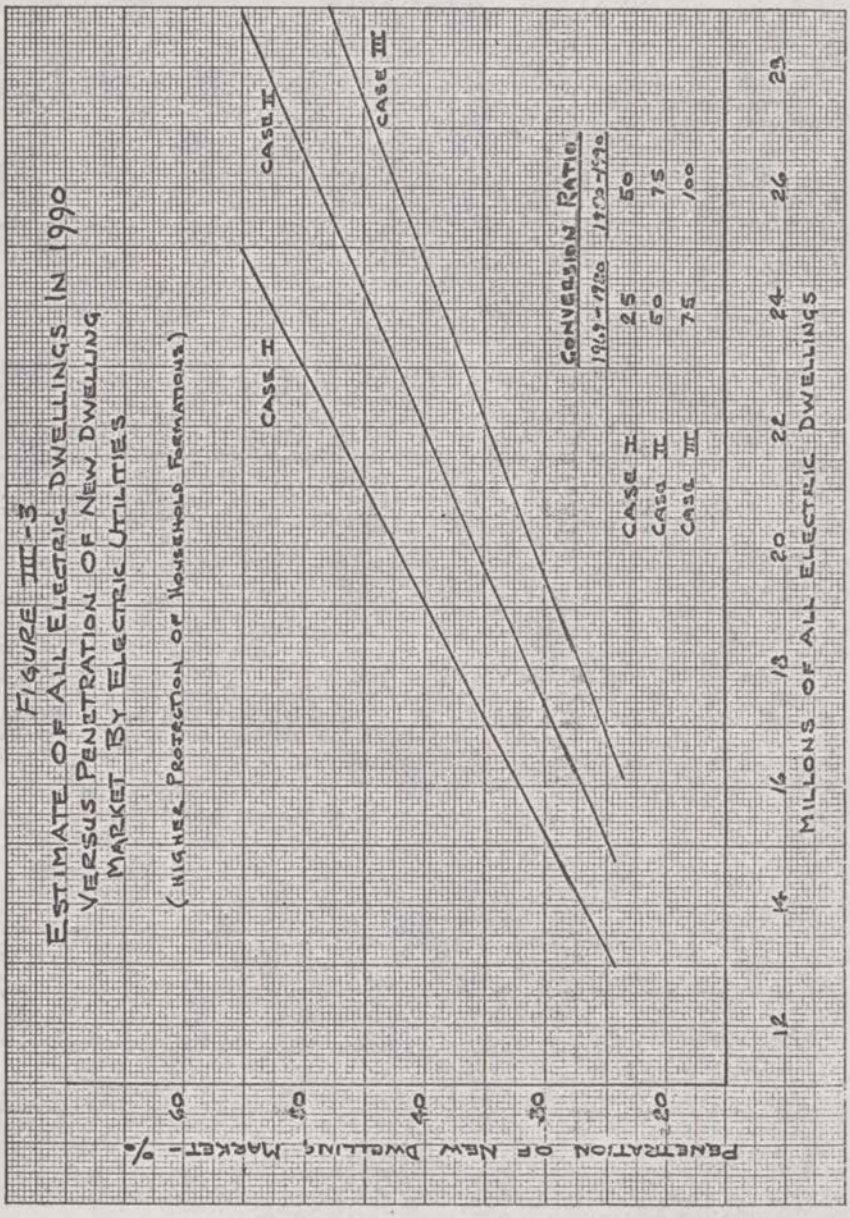
TABLE III-12.—ESTIMATE OF NUMBER OF ELECTRICALLY HEATED DWELLINGS IN 1990

[Thousands]

	Penetration rate, new dwellings					
	Higher household formations (percent)			Lower household formations (percent)		
	25	30	40	25	30	40
New dwellings won to electric heat, 1980–90	3,081	3,697	4,929	2,885	3,462	4,616
Estimated existing electrically heated dwellings in 1980:						
Case I [1]	8,624	9,649	11,698	7,973	8,868	10,656
Case II [2]	9,649	10,879	13,337	8,867	9,941	12,088
Case III [3]	10,673	12,108	14,977	9,762	11,015	13,519
Conversions to electric heat, conversion ratio:						
50 percent	1,541	1,849	2,465	1,443	1,731	2,308
75 percent	2,311	2,773	3,697	2,164	2,597	3,462
100 percent	3,081	3,697	4,929	2,885	3,462	4,616
Total electric dwellings in 1990:						
Case I	13,246	15,195	19,092	12,301	14,061	17,580
Case II	15,041	17,349	21,963	13,916	16,000	20,166
Case III	16,835	19,502	24,835	15,532	17,939	22,751

[1] Conversion ratio of 25 percent prior to 1980 and 50 percent after 1980.
[2] Conversion ratio of 50 percent prior to 1980 and 75 percent after 1980.
[3] Conversion ratio of 75 percent prior to 1980 and 100 percent after 1980.

Note.—Conversion ratio is defined as the number of older dwellings converted from coal, oil, or gas heating divided by the number of new dwellings with installed central electric heating systems.


FIGURE III-3
ESTIMATE OF ALL ELECTRIC DWELLINGS IN 1990
VERSUS PENETRATION OF NEW DWELLING
MARKET BY ELECTRIC UTILITIES
(HIGHER PROTECTION OF HOUSEHOLD FORMATIONS)
CASE II
CASE III
CONVERSION RATIO
1969-1980 1973-1990
CASE II 25 50
CASE III 50 75
CASE III 75 100
PENETRATION OF NEW DWELLING MARKET - %
60
50
40
30
20
12
14
16
18
20
22
24
26
29
MILLIONS OF ALL ELECTRIC DWELLINGS

It appears from the preceding analysis, that optimistically, 1980 will see in existence about 15 million dwellings heated electrically and that by 1990 this number may reach 25 million, or about one dwelling out of every four in the United States. To achieve these levels of marketing success, the electric utility industry will have to capture four out of every 10 new dwellings constructed during the period to 1990 and to take away from aggressive competitors three existing dwellings for every four new dwellings won during the decade of the 1970's and four existing dwellings for every four new dwellings during the decade of the 1980's.

The assumption of a 40-percent penetration of the new dwelling market by the electric utility industry can be regarded as reasonable as well as optimistic in the light of the industry's record of less than 20-percent penetration during the period 1963–68. Favoring this assumption are recent industry surveys revealing a growing consumer preference and acceptance of electric heating, a trend to electric heating of apartments, and the growing mobile home market. A shadow of doubt, however, is cast upon this assumption by the gas and oil industries, not yet fully arrayed against electric heat intrusions, but preparing to preserve traditional markets for their products.

The same sense of "stretch" attaches to the assumptions about conversions to electric heat. The conversion ratio of 22 to 29 percent which characterized the industry sales effort during the period to 1968 reflects the difficulty of selling electric heat for existing structures. Cost of raising the levels of insulation and rewiring to higher electric service tends to offset lower equipment costs of a conversion electric installation. The burden of proof of alleged savings in operating costs rests with the new and untried system. In the light of expected competitive pressures the 75 percent conversion ratio assumed for the period to 1980 and the 100 percent conversion ratio assumed for the period to 1990 appear to be optimistic in spite of the growing customer preference for the convenience and cleanliness of electricity uncovered in recent industry surveys.

HEATING AND COOLING ENERGY REQUIREMENTS

The reasonableness of the 25 million electric homes projection for 1990 can be checked against the reasonableness of the energy requirement for heating and cooling of all-electric home customers implied in the 1970 National Power Survey projections for energy requirements for the farm and nonfarm residential categories. Such a check is made in the analysis that follows:

The 1990 projected power requirements for residential nonfarm users has been set at 1,409 billion kilowatt-hours. This projection does not include the residential electric power used on farms, which according to the Farm Electrification Bureau can be taken on a per customer basis as equal to that of the nonfarm customer. In 1968 the average annual use of electricity on the American farm was 9,216 kilowatt-hours, while the use per nonfarm residential customer was 5,577. If the FEB assumption is correct, 60 percent of farm use electricity is consumed in the farm residence and for the purpose of an analysis of electric homes can be added to the projection of nonfarm residential use of electricity in the United States in 1990.

The 1990 projection of power requirements on the farm other than for irrigation and drainage pumping has been set at 97 billion kilowatt-hours. If 60 percent of this amount (farm home use service as nonfarm use) is assumed to be farm residential consumption, the total residential electric power consumption, farm and nonfarm, will amount to 1,467 billion kilowatt-hours. Table III–13 compares on a per customer basis average annual electricity consumption of residential utility customer, all-electric home customers, and farm customers.

In an analysis of power requirements for all-electric homes in 1990 it is useful to divide total residential use of power into three components: (1) power used in non-all-electric homes for all purposes; (2) power used for lighting and other electric appliances in all-electric homes; and (3) power used solely for space heating and cooling in all-electric homes.

From the preceding table it will be noted that in 1967 the average residential utility customer used 5,577 kilowatt-hours annually while the average all-electric home customer used 17,598 kilowatt-hours of which 8,609 were for purposes other than heating and cooling. While the figure for the average utility customer includes the existing all-electric home customers in 1967 the number of such customers was so small that the figure can be taken as fairly representative of the electric enrgy consumption of a dwelling which was not fully electrically heated and cooled. These data indicate that in 1967 the all-electric cus-

tomers with installed electric heat and total cooling consumed about 3,000 kilowatt-hours more for purposes other than heating and cooling than did the non-all-electric home customer. This difference is significant and reasonable because an electric home can be expected to be equipped with more electrical appliances and to be more liberal in their use.

TABLE III–13.—AVERAGE ANNUAL KILOWATT-HOURS USED BY RESIDENTIAL AND FARM CONSUMERS, 1960–68

Year	Annual average EEI residential customers [1]	FPC all-electric homes [2]				Average farm use [3]
		Total	Heating	Cooling	Other appliance	
1968	(4)	(4)	(4)	(4)	(4)	9,816
1967	5,577	17,598	4,035	4,954	8,609	9,216
1966	5,265	17,397	3,955	5,006	8,436	8,984
1965	4,933	17,104	3,608	5,053	8,433	8,592
1964	4,703	17,341	3,929	5,012	8,400	8,400
1963	4,442	16,819	3,376	5,357	8,086	8,244
1962	4,259	(4)	(4)	(4)	(4)	7,980
1961	4,019	(4)	(4)	(4)	(4)	7,740
1960	3,854	(4)	(4)	(4)	(4)	7,404

[1] EEI yearbook.
[2] FPC all-electric home reports.
[3] Farm Electrification Bureau.
[4] Not available.

By 1990 a significant increase in the power requirements of the non-all-electric home can be expected as more homes acquire more electrically powered appliances and as the market for the standard electric appliances approaches saturation. Table III–14 shows the changes in market saturation in major appliances between 1960 and 1968.

TABLE III–14.—SATURATION LEVELS FOR SELECTED ELECTRICAL APPLIANCES

[In percent]

Appliance	1960	1965	1968	Average annual consumption (kilowatt-hours)
Electric range	37.3	42.4	49.9	1,160
Water heater	18.9	23.4	27.8	4,400
Freezer	23.4	27.2	28.5	1,300
Air conditioners	15.1	24.2	42.5	1,250
Washers	85.4	87.4	94.8	105
Dryers	19.6	26.4	38.8	965
Vacuum cleaners	74.3	83.5	93.1	45
Dish washers	7.1	13.5	20.8	360
Waste disposals	10.5	13.6	20.5	25
Television (B. & W.)	89.4	106.6	143.2	400
Average residential cost per kilowatt-hour (cents)	2.47	2.25	[1] 2.17	

[1] 1967.

Sources: Statistical issues of "Merchandising Week," EEI.

On the basis of these trends it is possible to project the power requirements of an average non-all-electric home equipped with the following appliances:

Appliance	Number	Kilowatt-hour [1] consumed per unit	Annual consumption of appliances
Airconditioners (window)	2	1,250	2,500
Broiler	1	145	145
Clocks	3	17	51
Clothes dryer	1	965	965
Coffee maker	1	100	100
Dehumidifier	1	265	265
Dishwasher	1	360	360
Fans	3	45	135
Food freezer	1	1,120	1,120
Food disposal	1	25	25
Iron (hand)	1	150	150
Radio-phonograph	2	110	220
Electric range	1	1,160	1,160
Refrigerator (12 cu. ft.)	1	1,040	1,040
Television	2	400	800
Washing machine	1	105	105
Water heater	1	4,170	4,170
Total annual requirement			13,311

[1] 1966 national average, EEI.

Note: This list of appliances must be regarded as conservative. By 1990 the average non-all-electric dwelling may have many other electrically powered services such as outdoor safety lighting, and several electric battery charging stations to service cordless lawnmowers, a variety of hand power tools, as well as automotive and shopping cart batteries. Home elevators and closed circuit television for household monitoring may also be in evidence by 1990.

In 1990 not all non-all-electric homes will have the appliances listed, but the selections are an indication that an assumption of 10,000 kilowatt-hour consumption in the 1990 for the non-all-electric dwelling can be regarded as reasonable, if not as representative. On this basis the all-electric dwelling should have even more electric appliances and according to available data would be more liberal in their use. We can reasonably assume that the all-electric dwelling could use 12,000 kilowatt-hours annually for purposes other than heating and cooling.

What remains to be established is the annual power requirements in 1990 of the all-electric dwelling for purposes of heating and cooling. If we assume that there will be 25 million all-electric homes in 1990 the remaining estimated 64.6 million households will be occupying non-all-electric homes. If it is assumed that the non-heating and cooling requirements of the all-electric homes amount to 12,000 kilowatt-hours annually, the consumption in 1990 for this purpose could be 300 billion kilowatt-hours. Further, if it is assumed that annual consumption of the non-all-electric home for all purposes in 1990 amounts to 10,000 kilowatt-hours, the 1990 consumption of all non-all-electric homes would be 646 billion kilowatt-hours. Thus, the three classes of the total residential power requirements will be:

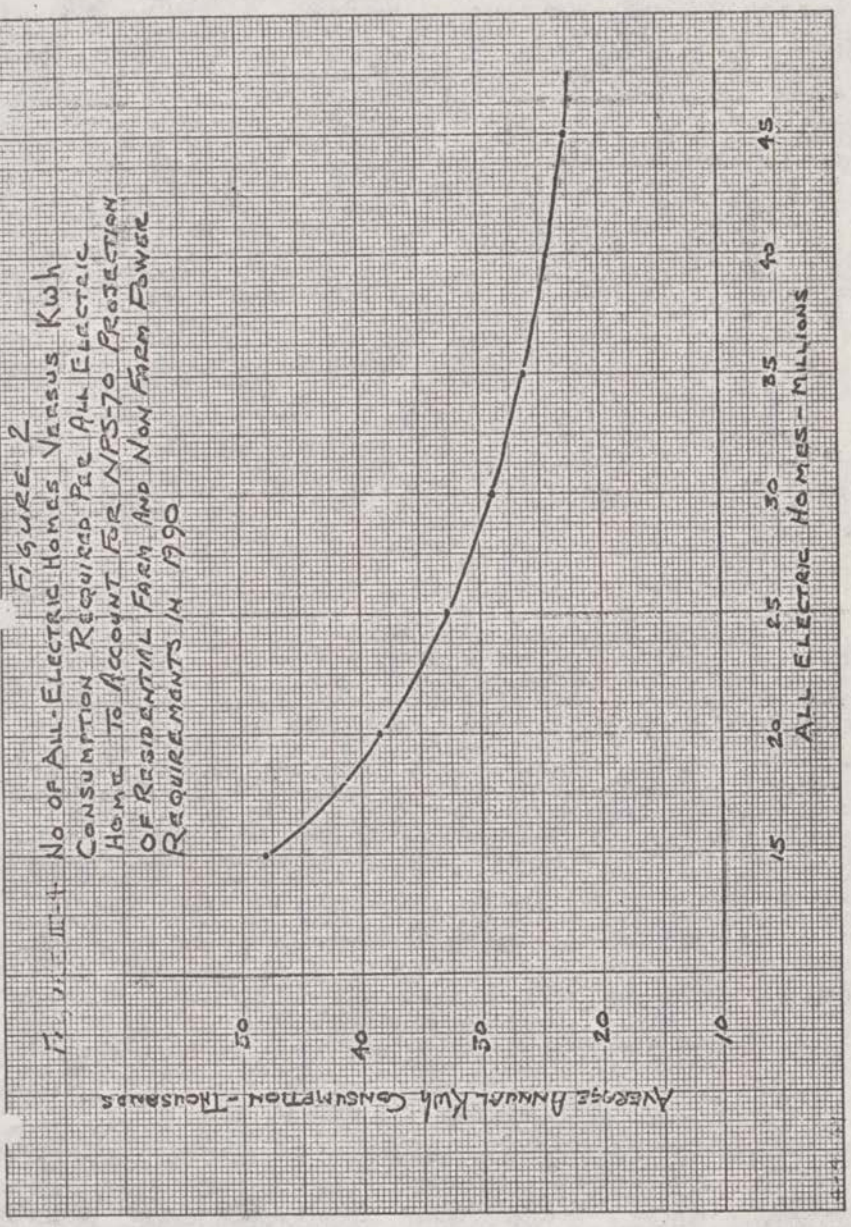
	Billion kilowatt-hours
All-electric homes except heating and cooling	300
Non-all-electric homes, all purposes	646
All-electric homes, heating and cooling only	521
Total residential requirements, farm and nonfarm	1,467

Since the 521 billion kilowatt-hours will be shared by 25 million all-electric homes the average annual heating and cooling requirement per home would be 20,840 kilowatt-hours.

In addition each all-electric home will be consuming an estimated 12,000 kilowatt-hours for lighting and other electrically operated appliances. The total average electric energy requirement for the all-electric home is therefore projected as 32,840 kilowatt-hours per year.

On the basis of the assumptions made and given the projection of residential power requirement in 1990, the estimated power requirements of all-electric homes would decrease as the projection of the number of all-electric homes in 1990 increases. This relation is shown in figure III–4.

It remains to be determined whether the projected consumption for heating and cooling alone of 20,840 kilowatt-hours per electric home per year in 1990 is reasonable. In 1967 when there were 3 million electric homes the average annual consumption for all-electric homes with heating and cooling was almost 9,000-kilowatt-hours for heating and cooling alone. In 1990 when it is assumed that 25 million homes will be fully electrically heated and cooled, the analysis indicates that average annual consumption for heating and cooling alone can be 20,840 kilowatt-hours. This is more than twofold increase in the energy consumed for heating and cooling alone, which appears to be reasonable.


FIGURE 2
No. of All-Electric Homes Versus Kwh
Consumption Required Per All Electric
Home To Account For WPS-70 Projection
Of Residential Farm And Non Farm Power
Requirements In 1990
Average Annual Kwh Consumption - Thousands
50
40
30
20
10
15
20
25
30
35
40
45
All Electric Homes - Millions

During the next two decades two principal factors will operate to increase the heating and cooling component of the all-electric home average cost per kilowatt-hour of electric energy which will encourage more liberal use of heating or cooling or the relative increase in the cost of gas or oil energy, which will improve the competitive position of electric energy. The second is the density factor in the northern tier of States where the heating season is longer. As more electric homes are served in the colder parts of the country, more electric energy will be consumed per home, and this in turn will increase the national average annual consumption. For example, in 1967 for every 900 kilowatt-hours consumed in the all-electric home for heating and cooling, approximately 400 were used for heating and 500 for cooling. This means that in 1967 the national electric heating and cooling market had a southern orientation. As the center of gravity of this market moves north it can be expected that first the heating and cooling kilowatt-hours will become equal and later that the more energy will be used for heating than for cooling. That the market may already be moving north is suggested by the following data from FPC "All Electric Homes in the United States" for 1964 and 1967.

Year	Average annual consumption for all-electric customers (kilowatt-hours) with heating and cooling			
	Total	For heating	For cooling	For all other appliances
1964	17,341	3,929	5,012	8,400
1967	17,598	4,035	4,954	8,609
Difference	+257	+106	−58	+209

Even though it can be anticipated that the national average use for heating and cooling alone will tend to increase during the period to 1990, it is more difficult to support the specific projection of 20,840 kilowatt-hours indicative of 25 million all-electric homes in 1990. In judging the reasonableness of such a high consumption, it is useful to consider the amounts of energy used for heating and cooling by all-electric home customers of systems reporting the highest such usage in 1967, the last year for which data is available.

Table III–15 lists the 15 systems reporting for 1967 the highest energy use by all-electric home customers with installed heating and total cooling solely for heating and cooling. The table shows that 68 customers were reported as having an average consumption of more than 25,000 kilowatt-hours and that 6,067 customers averaged more than 20,000 kilowatt-hours for heating and cooling. These data were abstracted from a tabulation of the consumptions for heating and cooling purposes of 568,278 customers. Even though some of the data on the highest users may be questionable, this level of use is significant and casts light on the possibility of attaining a national average consumption of 20,840 kilowatt-hours of heating and cooling energy for the projected 25 million all-electric homes in 1990.

TABLE III–15.—FIFTEEN HIGHEST CONSUMPTION LEVELS FOR ALL-ELECTRIC HOMES WITH INSTALLED HEATING AND TOTAL COOLING IN 1967

State	Utility	Average cost (cents per kilowatt-hour)	Number of customers reporting	Consumption for heating and cooling
Wisconsin	Madison Gas & Electric Co	1.54	4	34,385
Michigan	Lansing Board of Water & Light	1.36	1	30,810
Missouri	Independence Power & Light Department	1.48	6	27,631
Do	St. Joseph Light & Power Co	1.39	57	25,700
Tennessee	Knoxville Utilities Board	.86	5,540	22,150
Massachusetts	Massachusetts Electric Co	1.88	15	22,000
Minnesota	Northern States Power Co	1.56–1.65	310	22,000
Indiana	Anderson Municipal Light & Power	1.45	100	21,606
Iowa	Iowa-Illinois Gas & Electric Co	1.93	9	21,082
Wisconsin	Wisconsin Electric Power Co	1.55	25	20,500
Rhode Island	Narragansett Electric Co	1.88	10	20,000
New Hampshire	Public Service Co. of New Hampshire	1.91–1.97	1	19,840
Ohio	Cincinnati Gas & Electric Co	1.79	61	19,000
Pennsylvania	Pennsylvania Electric Co	1.56	180	18,900
Do	Pennsylvania Power & Light Co	1.47	3,291	18,771

Source: FPC "All-Electric Homes in the United States, 1968."

A comparison of the heating and cooling energy consumption of electric heating and total cooling customers of the Knoxville Utilities Board, the average annual consumption for this purpose by the 15 highest levels, and the national average annual consumption for similar all-electric home customers reported in 1967 is shown in table III–16.

It will be noted that the reported average consumption of the 5,540 all-electric customers with installed heating and total cooling of the Knoxville Utilities Board in 1967 was 22,150 kilowatt-hour. In this area which enjoys one of the lowest electric rates in the Nation, the average heating and cooling consumption of electric energy in 1966 was 6.3 percent higher than that projected for the national average for 25 million electric heating customers in 1990.

In the preceding analysis it was shown that the estimate of 25 million homes was arrived at on the basis of projected dwellings in 1990 and assumptions with regard to the penetration of the new dwellings market and conversion ratios achieved by the electric utility industry. These assumptions were shown to be optimistic but reasonable.

The projected national average consumption for heating and cooling by all-electric home customers began with the projections for energy requirements for residential farm and nonfarm customers and the number of household formations to 1990. On the basis of 25 million all-electric homes in 1990, it was concluded that the heating and cooling energy requirement per customer would be less than the energy consumption for the same purposes reported by more than 5,000 customers of the Knoxville Utilities Board in 1967. This conclusion casts an aura of reasonableness over the projection of 25 million electrically heated homes in 1990, not as a precise estimate, but as a goal which might be won if the electric utility industry can mount a sales effort sufficiently aggressive to achieve the new dwelling market penetration and the conversion sales ratios upon which the preceding analysis was based.

TABLE III–16.—COMPARISON OF AVERAGE CONSUMPTION LEVELS OF ALL-ELECTRIC HOME CUSTOMERS WITH INSTALLED HEATING AND TOTAL COOLING IN 1967

	Number of customers reported	Kilowatt-hour used for heating	Kilowatt-hour used for cooling	Total kilowatt-hour for heating and cooling [1]
Knoxville utility board	5,540	17,650	4,500	22,150
15 highest systems	9,610	17,768	3,156	20,924
All systems	568,278	4,035	4,954	8,989
Projected consumption—all-electric homes in 1990	25,000,000	(2)	(2)	20,840

[1] Does not include consumption for electric appliances.
[2] Not Available.

PRESENTATION BY S. DAVID FREEMAN, DIRECTOR, ENERGY POLICY STAFF, OFFICE OF SCIENCE AND TECHNOLOGY, WASHINGTON, D.C.

SITING AT "A BRIEFING ON NUCLEAR DEVELOPMENT," FOR STATE AND LOCAL OFFICIALS—SPONSORED BY SOUTHERN INTERSTATE NUCLEAR BOARD AND ATOMIC ENERGY COMMISSION, COLUMBIA, S.C., MAY 22, 1970

It is always a pleasure for a person who was born and educated in the South to return to his part of the country. I am therefore glad to participate in this very timely and important program here in Columbia. I have observed, and in a small way participated, in the very worthwhile work of the Southern Governors Conference over the years in fighting freight rate structures which discriminated against the South and solving other regional problems. Today we are participating in yet another public interest program which that group is pursuing—the development of nuclear energy to play an increasingly important role in our high energy civilization.

My topic poses somewhat of a dilemma. The subject of powerplant siting is as broad as your entire program and yet at this stage of your meeting you have been briefed by so many nationally known and respected authorities in the field that surely there is a very little left to be said. But the question of siting is, to a certain extent, unique. Certainly the problems that utilities throughout the

country are facing in finding acceptable sites for new powerplants is evidence that it is a subject that warrants special and increasing attention.

Our energy policy group in the President's Office of Science and Technology has been studying the powerplant siting problem for the past 2 years in cooperation with the concerned agencies in the Federal Government. Our task force includes the Atomic Energy Commission, Federal Power Commission, Tennessee Valley Authority, Rural Electrification Administration, Department of the Interior, and the Department of Health, Education, and Welfare. Our study by no means is confined to nuclear powerplants because the siting question is very much a powerplant siting problem and not a nuclear problem.

Our study group has already issued one report in early 1969 entitled "Considerations Affecting Steam Power Plant Site Selection."* It was an attempt to bring together in a single volume a factual presentation of the public interest considerations that affect site selection. The report identified the various environmental problems and the present state of knowledge and lack of knowledge concerning them. It did not attempt to provide the answers but hopefully has supplied a factual basis to channel the controversies into more rational grounds.

The basic question that our first report raised was what planning mechanisms, institutional arrangements, and research programs are needed to facilitate the resolution of the powerplant siting problem.

For the past year we have been studying these very difficult questions and we hope that before the summer is over to complete and publish our second report which will make recommendations as to institutional arrangements, planning horizons, and research and development programs. Let me hasten to add that no report or legislation is going to give us a complete answer to the conflict between environmental protection and power supply. But major improvements can and should be made.

We have not completed our study effort, but I should like to share with you today a few of the points which seem to me to be important, I am sure you understand that on an issue as important and fluid as this one, which is still under study, that my views are subject to change. Many of the points that I shall make perhaps seem elementary and obvious but perhaps that's all the more reason for making them.

First of all, it seems to me that the utilities themselves in each segment of the industry should continue to shoulder the basic responsibility for planning their system expansions. But the utilities must recognize that they are now in a new ball game. Their future plans will have to pass inspection by agencies of the Government to assure that they are compatible with the Nation's growing concern for the environment. The surest and most efficient way of securing such approvals is to bring the environmental protecion agencies into the planning process as early as possible. And in order to bring the public agencies into the planning process early, each utility must engage in long-range planning in coordination with the other utilities in the region.

It therefore seems to me that a basic step in resolving the siting problem is for the utility industry to extend its planning horizon. The utilities in each region should work together to develop a fully coordinated long-range planning effort in which they will continually be taking a 10- to 15-year look ahead. This planning process must be to a large extent worked out in a fish bowl where the agencies who are responsible for the quality of our air and water and for the wise use of our land can examine all the alternatives that are considered. These public agencies must be satisfied that the sites selected are the optimum from an environmental point of view long before construction deadlines are upon us.

What I am suggesting is going to make life a great deal more difficult for the utilities. But the fact of the matter is that life is already difficult for the utilities. The alternative of planning their facilities in splendid isolation and revealing them to the public only shortly before land is cleared and concrete poured is just not satisfactory for the future. The public is insisting that its voice be heard on these questions of major industrial expansions that threaten the environment and I have no doubt that the people's voice will be heard. The long-range planning process which I have suggested will help the utilities to satisfy the legitimate concerns of the environmental protection agencies that speak for the public well in advance of construction deadlines. A long-range planning process will also help satisfy the other side of our environmental power supply coin—the problem of

*Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

building plants in a timely fashion to avoid power shortages or even regionwide blackouts.

As I said earlier, the utilities should continue to shoulder the responsibility for planning their system expansion because it is an essential management responsibility and requires the expertise that the power industry possesses. But site selection also requires knowledge of environmental factors. And in my view the electric power industry needs to acquire its own professional competence in environmental matters. If the utilities are to plan their system expansions to minimize pollution and eyesores, they need expertise within their own organization in the fields of land use planning, ecology, and other environmental sciences. It is not sufficient to make an engineer who has worked on other matters all his life responsible for environmental protection. It is an area that demands specialized professional competence just as transmission line planning or nuclear reactors demand specialized engineering training.

I do not mean to leave the impression that the utilities are oblivious to the need for bringing the public agencies into their planning at an early stage and developing their own competence in environmental matters. Many utilities are beginning to do just that. But it is not easy to change old habits and no one jumps into an environmental fish bowl unless, to a certain extent, he is pushed. I believe that the public is pushing very hard and that the utilities in all regions of the Nation should get the message before the siting problem overtakes them.

A second ingredient in resolving the siting problem is the establishment of a public agency in each State or region of the Nation to review the specific powerplant and EHV line projects before construction commences. At present these preconstruction reviews are fragmented among a number of agencies and in many States the coverage of environmental concerns is incomplete.

Several States have taken recent initiatives to develop coordinated institutional arrangements to review the siting of powerplants and routing of transmission lines. But it seems to me that we need coordinated institutional arrangements to resolve these siting problems in every State or region. Nuclear powerplants presently and in the future require a license from the Atomic Energy Commission to assure that the public health and safety is protected insofar as radiation damage is concerned. And recent amendments to the Water Quality Act requires preconstruction certification that future nuclear plants will comply with water quality standards. However, the AEC does not have jurisdiction to consider the land use questions in selecting the site itself. And there is no coordinated system of review applicable to the fossil fuel plants at all.

Enforcement of the air and water quality standards should be handled at the State level utilizing existing agencies where available. Better coordinated procedures, similar to those provided under the Water Quality Improvement Act, are needed to assure that all environmental standards will be met before construction commenced. These procedures must assure that construction can proceed as needed to meet growing loads.

Power supply networks, however, span State boundaries and the Nation has a strong interest in developing institutional arrangements at the State level to assure that the goals of environmental protection and adequate power supply are met. In addition to the AEC's special role on nuclear plants, the Federal Government can assist by providing technical assistance, by making special studies of regional siting problems when requested, and by assuming the enforcement role in those States that do not carry out their responsibilities.

It seems to me that there is a useful role for regional agencies to play in resolving the powerplant siting issue. The expansion plans of the utilities should be made as part of a coordinated regional plan and for that reason in some regions the States themselves choose to form regional entities to work with the utilities. This might permit an earlier resolution of the land-use problems involved in site selection and would then leave the approvals of particular projects to be confined largely to the questions of control technology and other issues involved in how the site is to be used. In New England, for example, the New England River Basin Commission is already performing very useful work in bringing the interested agencies together and making an input into the preconstruction planning of the utilities. Perhaps the Southern Governors conference could play a similar role in the Southeast, although the States involved are much larger in size and the problem may not lend itself to the same sort of regional treatment.

Long range open planning by the utilities and coordinated institutional arrangements to review the detailed plans are certainly major steps that need to be taken, but there is a third, and in the long run more important, part of the package of remedies needed to resolve the siting problem.

I refer to what I consider an urgent need for a much more extensive research and development effort in the energy field. It is interesting that a great many of the siting problems such as thermal pollution, low-level radiation, air pol ution from fossil fuel plants, and the unsightliness of large EHV transmission lines all occur over and over again no matter what site is selected and no matter what transmission line route the utility wishes to acquire. These environmental problems are the root of our siting problem and they can be resolved only by research and development to develop more efficient powerplants, technology for undergrounding transmission lines, and better control equipment that will more strictly limit the discharge of contaminants in the air and water. Better technology will provide us with much greater flexibility in selecting sites.

The President's fiscal year 1971 budget contains funds to go into the demonstration phase of the breeder reactor program, and to make a start in Federal contributions to an R. & D. effort on undergrounding high voltage transmission lines and perfecting MHD for central station power. The electric power industry, with revenues of some $20 billion annually, has the ability to make the major contribution to the R. & D. effort.

In closing let me leave one additional thought which may be disturbing to the utility but which I believe must be faced. There are a growing number of citizens who genuinely and seriously question the need for new powerplants. There was an interesting television quiz on the environment earlier this week. One question that was put to nationwide sampling of viewers was whether they were for progress in the form of new powerplants, highways, and airports to meet the growing needs of society or whether they were for conservation to preserve the environment against the damage caused by such developments. A sizable majority voted for "conservation" over "progress."

Those of us who have worked on natural resource questions over the years have for a long time accepted the high rate of growth of the electric power industry as essential to national progress. And indeed it has made a magnificent contribution to our present way of life. But I believe that until we develop technology that will enable us to produce electric power or other forms of energy with much less damage to the environment, we will be faced with a continuing challenge to the construction of new facilities. I personally believe that the demand for energy is going to continue to increase because few people in our generation are willing to give up the conveniences of our high energy civilization and we hope that those citizens now living in poverty will stoon begin to enjoy some of the benefits of affluence. But it seems to me that if we are to take the environmental concern seriously—and I believe we must—then we should reexamine the policies which tend to promote the use of energy perhaps at a more rapid rate of growth than is actually needed to meet the real needs of society.

One reason that energy use is growing so fast is that the price of energy today really doesn't reflect all the costs to society of producing it—the damage to the land, the water, and the air, as well as Government policies which tend to subsidize the price of energy. The Federal Government is taking steps that will bring these costs into the price of power. We should also be sure that we are not continuing subsidies and promotional policies that were useful decades ago but which may be counterproductive in the 1970's and 1980's. And we should pay a great deal more attention to the question of efficiency in the use of energy, not only at the point of generation but also at the point of consumption. The utilities should look at their advertising budgets and compare them with their R. & D. budgets and reverse existing priorities. They should also examine their rate structures that reduce the unit price with increased volume and recognize that striving for a somewhat lower rate growth would reduce the number of plants needed in the next few decades and might be a more desirable objective.

It may seem to some of you that these last thoughts are somewhat defeatist. However, I believe they are realistic if we face the fact that the earth is really just another spaceship embarked on an endless journey and we, too, have only a limited volume of resources that must last mankind a long, long time. Our resources include not only our fuels but the air we breathe and our water and land. I believe that we are going to have to start practicing conservation and recycling our supply of materials if future generations are to survive and enjoy that journey.

Nuclear energy will no doubt be the fuel of the future. But compared to the breeder reactors and fusion power which we hope will someday be available, present nuclear plants are somewhat primitive in their low efficiency and the resulting waste heat they produce and their other impacts on the environment. We will certainly need to build many of the present generation of nuclear plants to meet the legitimate needs of society including the uses of electricity as a substitute for other forms of energy to help clean up the environment, such as mass transit to replace automobiles. But we will certainly do well to conserve our fossil fuels and limit the number of nucear plants that must be built to the minimum required in the coming decades.

I beieve that with a program of advanced planning, coordinated institutional arrangements, and intensive research that we can assure the public that the needed plants will be built with the least possible impact on the environment. But we are dealing with one of the root issues facing the Nation in developing a policy of national growth and at this stage none of us can be quite sure of the right answer. It is an issue that warrants the attention of anyone concerned with energy and the environment and that includes us all.

Before the Public Service Commission of Maryland

(Case No. 6090, Order No. 57044)

IN THE MATTER OF THE COMPLAINT OF SUBURBAN MARYLAND HOME BUILDERS ASSOCIATION, ET AL.

v.

POTOMAC ELECTRIC POWER COMPANY

In accordance with the opinion of the Commission filed herein on the date hereof, which opinion is hereby referred to and made a part hereof,

It is this 14th day of February, in the year Nineteen Hundred and Sixty-eight, by the Public Service Commission of Maryland,

Ordered: (1) That effective with the date of this order, Potomac Electric Power Company shall, when installing underground residential electric distribution service, make charges in accordance with the following provisions:

(1) The builder shall pay Potomac Electric Power Company $100 per lot for each lot being served. No waiver of this charge shall be permitted except that in lieu thereof the builder shall provide all of the required trenching and backfilling in accordance with the specifications of the utility.

(2) If the average lot width exceeds 100 feet then the builder shall pay Potomac Electric Power Company $4.00 per foot for the total number of feet in excess of 100 feet multiplied by the number of lots.

(3) If any building has a service connection point more than 50 feet from the property line the builder shall pay Potomac Electric Power Company $1.00 per foot for the distance in excess of 50 feet.

(2) That Potomac Electric Power Company shall promptly file with the Commission appropriate amendments to its tariff for furnishing electric service, implementing the provisions of paragraph (1) of this order.

(3) That this order shall become effective on the date hereof and shall remain in effect until the further order of the Commission in the premises, or until the passage of an order of general application to electric utilities, relating to the installation of underground residential electric distribution service.

SOLOMON LISS,
CHARLES E. EDMONDSON,
H. REESE SHOEMAKER, Jr.,
Commissioners.

Before the Public Service Commission of Maryland

(Case No. 6090)

IN THE MATTER OF THE COMPLAINT OF SUBURBAN MARYLAND HOME BUILDERS ASSOCIATION, ET AL.

v.

POTOMAC ELECTRIC POWER COMPANY

OPINION

Appearances:

I. John Ritterpusch, Esq., for Suburban Maryland Home Builders Association, et al.

Richard W. Emory, Esq., and Cornelius Means, Esq., for Potomac Electric Power Company.

Joseph Sherbow, Esq., and Oscar Berry, Esq., for Washington Gas Light Company.

Roger W. Titus, Esq., for City of Rockville.

Herbert C. Malone, Esq., for Montgomery County.

William O. Doub, Esq., People's Counsel.

By the Commission. Filed February 14, 1968.

Suburban Maryland Home Builders Association, an association composed of builders, and three members of the association, Community Associates-Joint Venture, Edmund J. Bennett Associates and Plymouth Green Homes, Inc., owners and developers of subdivisions of land within the limits of the City of Rockville, Maryland, on December 21, 1966, filed a formal complaint against Potomac Electric Power Company (Pepco) before the Public Service Commission.

The complaint alleged among other things that: (1) the laws of Rockville required all wiring for new housing developments of twenty units or more to be placed underground; (2) Pepco required complainants to pay an installation charge for the required underground electric utility lines of $300 per single family house, and $175 per town house; and (3) that the foregoing charges were waived in their entirety if the builders agreed to install electric space heating, water heating and other electric appliances in the dwellings so as to create a "total electric community," the charges were to be partially waived, if less than total electric communities were created.

The Complainants contended that these requirements were in violation of the Commission's Order No. 56351 in Case No. 6016 and were also in violation of Pepco's General Terms and Conditions and Rate Schedules for Electric Service, Sections 10 and 11. The Complainants also contended that acceptance of the conditions proposed by Pepco, and particularly the provisions concerning a possible waiver of charges, would have the effect of denying the home buyer the choice of gas, oil or electricity for such things as space heating, water heating, etc., and was therefore in their opinion contrary to public policy and should be prohibited by this Commission. A further contention was that Pepco by its policy of alleged tie-ins was in violation of the Anti-Trust Laws of the United States of America.

Washington Gas Light Company (Gas Company) a utility engaged in the business of purchasing, storing, distributing and selling natural gas for cooking, heating, cooling and other purposes within the metropolitan area of Washington, D.C., including Rockville, petitioned the Commisison for leave to intervene. Pepco strenuously opposed the proposed intervention and the Complainants supported the intervention by Gas Company.

The Commission heard oral arguments on the petition for leave to intervene, considered briefs filed by the parties and granted permission to Gas Company to intervene. The Mayor and City Council of Rockville and Montgomery County also filed petitions to intervene and permission was granted.

The major issues in this proceeding can be stated as follows:

I. Is there a cost differential, between an underground (URD) and an overhead installation of residential electric distribution service and if there is a cost differential, what is the amount of difference in a typcal subdivison installation?

II. Who should bear the cost of a differential between URD and an overhead installation?

III. Should Pepco be permitted to waive any excess cost for URD contingent upon the installation of specified electric facilities?

I. IS THERE A COST DIFFERENTIAL BETWEEN AN UNDERGROUND (URD) AND AN OVERHEAD INSTALLATION OF RESIDENTIAL ELECTRIC DISTRIBUTION SERVICE AND IF THERE IS A COST DIFFERENTIAL, WHAT IS THE AMOUNT OF DIFFERENCE IN A TYPICAL SUBDIVISION INSTALLATION?

The two principal witnesses produced on the cost differential between a URD and an overhead installation of residential electrical distribution service were Edward F. Mitchell, Pepco's Assistant to the Vice-President-Electrical Engineering and Hugh H. Hunter, Chief Engineer of the Public Service Commission.

Mr. Mitchell testified that the $300 charge, representing the excess cost of URD, was developed from a hypothetical, but typical, sub-division of 47 detached dwellings and that the charge of $175 per town house was developed from a similar sub-division of 186 town houses. He emphasized that URD costs vary from sub-division to sub-division but that in order to develop a proper flat charge, the typical sub-division was utilized. An exhibit prepared by Mr. Mitchell (M–9) summarized the total cost of URD for the sub-division as $30,447, or an individual average cost of $648 per lot. The overhead installation for the 47 lots was estimated at $15,435 or $329 per lot. It was on this basis that Pepco defended its charge of $300 per lot for single family dwellings.

Gas Company in extensive cross-examination suggested that the computation was inaccurate and that, in fact, use of materials and methods other than those used by Pepco would substantially reduce the actual difference in cost to a minimal sum. Gas Company objected strenuously to a comparison of a computation of the overhead installation on the basis of single phase service with a three phase service installation for URD. It was conceded that the installation of single phase for URD would be uneconomical in that it would not provide for future growth, but Gas Company contended the comparative costs were a comparison of apples and oranges rather than apples and apples.

Other revisions suggested by Gas Company included the use of No. 2 aluminum instead of No. 2/O aluminum for the service cable, the use of 350 mcm aluminum instead of 500 mcm aluminum for secondary cable, and the substitution of aluminum for copper in the primary cable. Gas Company also pointed out that the cost shown on Exhibit M–9 of Pepco did not allow for reimbursement from The Chesapeake and Potomac Telephone Company for its share of trenching and back filling when its facilities were installed in the same trench. The Gas Company computation, if accepted, would indicate a reduction in cost of URD of some $12,030 and would then leave the difference in cost of URD as opposed to an overhead installation at approximately $65 a unit.

After the cross-examination of Mr. Mitchell of Pepco, it was obvious that there were some errors in Pepco's computation and the witness was requested to recompute the exhibit furnished by him. A supplementary exhibit furnished by him as filed with the Commission on August 11, 1967, and as argued in Pepco's brief, indicates the cost differential between URD and an overhead installation is $226 per unit in the typical subdivision.

The Commission, on its own motion at the hearing on August 23, 1967, directed its Chief Engineer, Hugh H. Hunter, to review the Record and Exhibits in this proceeding as they pertained to the comparative cost of underground electric service and to prepare a report thereon, setting forth his conclusions, as to the difference in cost between URD and overhead in the typical subdivision. The Chief Engineer's report, consisting of 51 pages of text and 9 exhibits, was submitted to the Commission on November 15, 1967 and was sent to all parties in the case on November 16, 1967.

The report is, in our opinion, an excellent and thorough analysis of the contentions of each of the parties in this case. In addition it makes an honest, and we believe, an acceptable adjustment of the positions of the contending parties and furnishes us with a useful tool in reaching a decision as to the cost differential between URD and an overhead installation. The nine exhibits filed by Mr. Hunter set out the basis for his conclusions and it would serve no useful purpose to analyze them in this opinion. Suffice it to say, they amply support the conclusions reached by Mr. Hunter.

Mr. Hunter concluded, on the basis of his study, and after giving effect to all the factors considered in his exhibits and testimony, that a cost differential does exist between underground and overhead installation. In his opinion the dollar difference in the typical subdivision was $136 per house in the single home development and $127 per lot in the town house development.

We accept these conclusions and express to Mr. Hunter our appreciation for a job well done.

Other testimony on cost was very brief. George William Higgs, Executive Vice President of Rocks Engineering Company, who testified that in three apartment

house developments, two of which were located in the Laurel, Maryland area and one in Baltimore County, Baltimore Gas and Electric Company, the supplying utility, made charges amounting to between $7 and $10 per unit for URD. The builder did the trenching, backfilling and provided the transformer pads at an estimated cost of $4 a unit. The witness contrasted this charge with two apartment developments located in Hyattsville, and Wheaton, Maryland, both in Pepco's service area, and according to Mr. Higgs were similar to the three developments in the Baltimore Gas and Electric Company service area. He said that the price quoted by Pepco for these two developments for URD were $100 and $55 respectively per unit.

Willard E. Bryant, Assistant Director for Technical Services of the National Association of Home Builders, presented a study that summarized data furnished by various electric utilities as to the differences between the costs of URD and overhead. The differences according to the summary ranged from $32.93 per lot to $316.29 per lot.

II. WHO SHOULD BEAR THE COST OF A DIFFERENTIAL BETWEEN URD AND AN OVERHEAD INSTALLATION?

Every witness on this issue was in complete agreement. They all agreed "the other fellow" should pay the excess cost of URD.

Mayor Frank A. Ecker of the City of Rockville and Cleatus A. Barnett, a member of the Montgomery County Council agreed that any excess cost should be borne by the builder who could pass the cost on to the home buyer. Both opposed a surcharge on a geographical basis that would result in customers being served by overhead lines paying a share of the excess cost for URD to new developments.

Complainants offered five witnesses, all of whom were builders and developers of residential homes in the Maryland portion of the Washington Metropolitan area. All of these witnesses were in agreement that URD should be provided for all new developments and that any excess cost should not be charged to the builder. Individually these builders were not, however, in agreement as to who should pay. The views advanced included such suggestions as (1) recovering the excess cost as a surcharge based on front footage of the benefited home owner; (2) difference should be paid in rates by all customers in the political subdivision where underground is required, (3) all rate payers should be assessed the cost (i.e., include in the rate base) and (4) recovered through the rate charged the ultimate consumer of the service.

Gas company offered the testimony of three builder witnesses on this issue, and they also agreed that URD was necessary and that the builder should not be charged for any excess cost. The suggestions of these witnesses as to who should pay the excess cost were similar to those mentioned by the five witnesses for the Complainants. In addition, Richard C. Vierbuchen, Vice President Marketing for Gas Company, said that any excess cost should be included in the over-all rate base particularly if it was not substantial. Another Gas Company witness, Irston R. Barnes, an economic consultant, testified that the excess cost should be imposed on the developer or the home owners rather than included in the rate base. Melwood W. Van Scoyoc, a public utility consultant, suggested that the increased cost of underground service should be assessed upon the customers who receive the underground service.

Finally two witnesses for Pepco, Thaddeus L. Sharkey, General Utility Consultant for Ebasco Services, Incorporated, and Frank S. Walters, Pepco's Manager of Rates and Economic Research, expressed the view that the differential should be paid for by the builder or developer and that a surcharge arrangement would be an impractical and awkward procedure from an accounting and billing standpoint.

The Commission has no difficulty in arriving at the conclusion that a major portion of the excess cost should be borne by the home builder as a charge per lot for the installation of URD facilities.

There is no question that a home in a subdivision which has URD facilities is more pleasing aesthetically than a subdivision with overhead wiring. This should make the URD home more valuable at the time of original purchase and should bring a higher price at the time of resale. It is no more than fair, however, to recognize that URD has advantages which are important to the general public as well as to the individual home owner. The beauty of a development with URD facilities is pleasing not only to the resident but to all who visit or pass the area. In addition, the Commission recognizes that URD has advantages of safety and freedom of interruption from service which are valuable to all customers of

the utility. For these reasons we believe that a portion of the excess cost for URD may be fairly included in the rate base of the utility.

We, therefore, find that a basic charge of $100, to be paid by the builder, for the installation of URD facilities is reasonable for both town houses and single family houses. We have no doubt that this charge will be reflected in the purchase price of the property. The remainder of the excess cost will be absorbed by Pepco and will be reflected in the rate base. The total charge to the builder shall be determined in accordance with the following provisions:

1. The builder shall pay the utility $100 per lot for each lot being served, or in lieu thereof the builder shall provide all of the required trenching and backfilling in accordance with the specifications of the utility.

2. If the average lot width exceeds 100 feet then the builder shall pay the utility $4.00 per foot for the total number of feet in excess of 100 feet multiplied by the number of lots.

3. If any building has a service connection point more than 50 feet from the property line the builder shall pay the utility $1.00 per foot for the distance in excess of 50 feet.

III. SHOULD PEPCO BE PERMITTED TO WAIVE ANY EXCESS COST FOR URD CONTINGENT UPON THE INSTALLATION OF SPECIFIED ELECTRIC FACILITIES?

This issue gave the Commission its greatest difficulty. The principal antagonists on this issue were Gas Company and Pepco. We recognize that these companies are fierce competitors and that each has a vital interest in the outcome of the issue. It is our purpose to approach the issue from the standpoint of what is best in the public interest.

Gas Company urged that the waiver of the URD charge denied the consumer his right of choice as between energy suppliers.

Its witness, Dr. Barnes, at (D–9) testified:

> It is, and certainly should be, a basic principle of regulatory policy to keep consumer choices open, not simply for the present generation of consumers, but also for future consumers, including those who may become purchasers of homes in the development several years hence. This is part of the basic concept that public service commissions are necessary to regulate monopolies in the public interest—the whole public interest.

Gas Company also charged that Pepco's practices amounted to undue discrimination in that a waiver of the charge for certain URD customers who are charged the same rates as overhead customers results in giving superior service at the same price to the customers served underground. It also amounts to undue discrimination between underground customers since the "all electric" underground customer receives what amounts to a rebate of $300 while the underground customer who does not elect "all electric" does not receive such a rebate or allowance.

Gas Company also urged that Pepco's practices amounted to violations of the Federal laws against restraint of trade.

Pepco defended its policy by calling the Commission's attention to Rule 3.3.2.1 of the Commission's Regulations Governing Service Supplied by Electric Companies quoting the rule for service extensions which concludes:

> The customer's payments under this plan should be related to the investment that the utility prudently can make in consideration of the probable revenue.

It also calls attention to Section 10 of Pepco's General Terms and Conditions which provides:

> . . . a portion or all of the charge will be waived by the Company when in its judgment, a part or all of the service connection investment is warranted by the additional revenue expected from the Customer.

Pepco further argues that the practice is permissible because of the advantages which accrue to other rate payers by the increased business secured by Pepco and its beneficial effect on the use of peak facilities which would not otherwise be utilized.

Pepco in its brief calls attention to the decisions of the regulatory commissions of the District of Columbia and Virginia and our own Maryland Commission [1] which have held that the scope of inquiry in these cases is not whether there is unfair competition but whether there is in fact rate discrimination.

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[1] See in Re: Washington Gas Light Co., 56 PUR 3d 1; Virginia Commission Case No. 17889. Investigation of Promotional Practices; Master Electricians of Anne Arundel vs. Balto. Gas & Electric, 54 PUR 3d 598.

It is conceded by all parties that promotional allowances have been approved by this Commission and others based on the investment of utility companies where the business in prospect has warranted an extension of facilities. (See Oil Heat Assoc. of Maryland, Inc. vs. Baltimore Gas and Electric Co. (Case No. 5472), 48 P.S.C. of Md. 41; 65 PUR 3d 405 (Conn.); Re Delaware Power and Light Co. 56 PUR 3d 1 (1964); Gifford vs. Central Maine Power Company 217 Atl 2d 200 (N.J. Rossi vs. Garton 60 PUR 3d 210 (N.J.); Watkins vs. Atlantic City Electric Co. 67 PUR 3d 483; 68 PUR 162 (N.Y.); 65 PUR 3d 283 (Va.) and 45 PUR 3d 88 (Ga.).

In deciding this issue the Commission does not find it necesary to consider whether Pepco has violated Federal anti-trust statutes. Nor does its decision in this case require any violence to our previous holdings on the right of a utility in proper cases to use promotional allowances for securing additional customers.

We find that the charging for URD and the rebating of the charge upon agreement to go "all electric" is undue discrimination as between customers of Pepco. The practice does, in fact, create a discriminatory pattern in that it gives the builder an improper incentive to elect "all electric" so as to save the underground charge, whereas the builder who does not or cannot make such an election receives exactly the same service and must pay what amounts to a penalty of $300 which is passed on to the purchaser in the cost of the house. The charging and waiving imposes unequal charges on the same types of customers for the same service. This is clearly illegal under the provisions of Section 26 of The Public Service Commission Law.

We think this conclusion is implicit in our recognition of the fact that URD is not in the future but is with us now. We do not believe that URD is a proper vehicle for promotional allowances.

An appropriate order will be entered in accordance with the conclusions herein.

[From the Washington Post, Aug. 19, 1970, p. B–1, col. 1]

Pepco Aid Given to Builders

MILLIONS SPENT IN PROMOTING ALL ELECTRICS

(By John Hanrahan)

The Potomac Electric Power Co. said yesterday it has given millions of dollars in rebates to developers to promote the all-electric concept in new housing and apartment developments in the Maryland suburbs.

A Pepco spokesman said that the company currently is negotiating a promotional deal of approximately $1 million with the Boise Cascade Corp. to make that firm's 5,000-unit Brandywine Country development in Upper Marlboro a total-electric Gold Medallion community.

Gene Otto, public relations chief for Pepco, said that the company's promotional ties to the developers were established to compete with the gas company and to get a foothold in the winter heating market.

Otto said that the rebates are "not direct cash outlays" by Pepco to the developers. Rather, he said, Pepco picks up part of the developer's tab for costs of advertising, construction of model homes for prospective buyers to visit, signs and special electrical equipment. The cost to the utility company is about $500 per house, Otto said.

The initial cost of the house is increased somewhat by having all-electric, rather than a combination of utilities, Otto said, but he added that he did not know how much.

Otto said that a key factor in establishing ties with builders is to see to it that the utility's generators are being used as much of the time as possible. Although Pepco's generator use is in the high 90 percent bracket during peak periods in the summer, the annual average use of the equipment is just 43 percent, Otto said. This, he said, compares with Potomac Edison's annual average of more than 70 percent.

Critics of the electric power industry have contended that the utilities' various promotional practices have caused summer loads to increase and helped bring on power shortages.

Otto said that the increase in the summertime load that will be caused by its promotional practices "has been built into our projections of future power needs" and will not result in power blackouts.

The Maryland Public Service Commission currently is investigating utilities promotional practices. The next in a series of hearings is scheduled for Sept. 2 in Baltimore. Peter Parker, the PSC people's counsel, has asked for ban on such practices in Maryland.

A spokesman for the Washington Gas Light Co. said yesterday that his firm has tie-ins with developers on Forecast Homes, in which the utility furnishes a model home and shares the cost of advertising with the developer.

Examples of such projects are St. Charles City in Charles County and Olney Mills in Montgomery. He said he had no figures on the amount of the rebate to developers, but said it was "considerably smaller" than Pepco rebates.

Otto said yesterday that the costs of the company's tie-in to developers and builders does not come out of the customer's pocket, but rather comes out of our profits, just like advertising and salaries.

Although the company has made all-electric arrangements with developers in the District of Columbia, the main emphasis of the promotional device is in Maryland where the heaviest development is occurring, Otto said. Of Pepco's 425,000 customers, more than half—231,000—are in Maryland.

Among the allowances given to developers by Pepco are: $184,740 to Construction General, Inc., for its Echo Dale project in Gaithersburg; $173,232 to County Builders, Inc., for its Indian Queen Estates development in Prince Georges County; $68,498 for the Mill Creek Towne development in Gaithersburg; $52,112 to Clinton Land Developers, for the Clinton Hills project in Prince Georges County; and $38,250 to Cohen-Meisel Associates for the Parkside subdivision in Chillum.

(309 Fed. Supp. 1119)

In the United States District Court for the Eastern District of Virginia, Alexandria Division

(Civil Action No. 4544)

WASHINGTON GAS LIGHT COMPANY, PLAINTIFF *v.* VIRGINIA ELECTRIC AND POWER COMPANY, DEFENDANT

MEMORANDUM OPINION

The Washington Gas Light Company, hereinafter called the Gas Company, brought this private antitrust suit against Virginia Electric and Power Company, hereinafter referred to as Vepco, for injunctive relief and treble damages.

The issues were severed. This phase of the hearing was limited to the determination of damages.

The Gas Company claims Vepco's underground electric service plans, as first adopted August 7, 1963, violates both the Sherman and Clayton Anti-Trust Acts.

Both companies are public utilities engaged in interstate activities. The Gas Company is the sole supplier of natural gas and Vepco is the sole supplier of electricity in certain parts of Virginia. Their respective franchises overlap in much of Northern Virginia where they compete in the sale of energy for space and water heating, cooking, air conditioning, refrigeration and clothes drying.

All residential buildings must have electricity. Builders need it for operating their power tools and for interior lighting. It is the only practical source of energy available for operating many of the modern-day home appliances, such as thermostats, vacuum cleaners, clothes washers, radios, televisions, and so forth.

Prior to 1960 practically all of Vepco's service connections were by means of overhead distribution lines. This service was furnished and installed by Vepco, at no charge to the builder.

Beginning in early 1960 many builders of new subdivisions became interested in underground electric service. Vepco made it available to those willing to pay the additional installation costs over and above the cost of overhead. The-

oretically, a customer could furnish, install and maintain his own underground service; however, it is not feasible for him to so do. (Out of some ten thousand installed in Northern Virginia, all but five were installed and maintained by Vepco.)

Mortgage bankers, local governments and the general public became interested in underground electric service because of its esthetic and safety appeal—FHA and VA and most of the mortgage bankers now require it where feasible. It is now, and has been since the middle of the '60s, a competitive necessity for the builders of residential subdivisions.

In November of 1962 Vepco reactivated its Residential Subdivision Underground Committee with instructions to develop a more liberal policy of furnishing underground electric service—One which is liberal enough to promote the use of electrical service—One that will make such projects either all electric or as fully electric as possible. The committee recommended a new plan expressly designed to accomplish that purpose.

Vepco adopted the recommendation and put the plan into effect August 7, 1963. Under its terms Vepco agreed to furnish underground electric service without charge to those builders who would go all electric—If the builder went all electric, except for space heating, he was required to furnish his own trenching and back-filling—If he would not agree to do either, he was required to pay $50.00 in addition to furnishing his own trenching and back-filling.

This plan remained in effect until 1964. Vepco then offered underground electric service without charge to builders agreeing to go all electric—For a builder who agreed to go all electric except for space heating, he could either furnish his own trenching and back-filling or pay Vepco $100.00. If he would not agree to do either, he had to pay $275.00 for his underground electric service even though he furnished his own trenching and back-filling.

The $275.00 charge was imposed to penalize builders if they used other forms of energy for water heating, cooking and so forth.

After these plans were put into effect Vepco substantially increased its total electric penetration in the new-house market in the overlap area.

Neither plan was ever approved by any regulatory agency. The Virginia State Corporation Commission disapproved the $275.00 plan October 17, 1966 because the waiver of the cost for underground electric service was tied generally to the total electric concept.

Vepco shortly thereafter—February 1, 1967—promulgated a new underground electric service plan, the installation charge being the average difference in cost between underground and overhead facilities, with a credit based on anticipated revenue. The cost differential was computed to be $280.00 per lot—A credit of $40.00 against this charge was allowed for each two thousand kilowatt hours above the first six thousand annual kilowatt hours of electricity used. The anticipated consumption was determined from a table listing the annual kilowatt hours' usage of various electrical appliances in homes of different sizes. Reduced to simplicity, a builder under this plan had to agree to go all electric to obtain underground electric service without charge. If he agreed to go all electric except for space heating, the charge was reduced to around $100.00. If he were to agree to neither, his charge for underground service ranged from $280.00 to $200.00, depending on the size of the house and whether electricity was used for air conditioning or clothes drying.

This suit was filed July 28, 1967. In August of that year the North Carolina Utilities Commission held the $280.00 plan unlawful and any charge Vepco makes for underground electric service must be in the form of a surcharge to the existing rates without any credit based on electric usage. Instead of following this procedure in Virginia, Vepco, on December 15, 1967, reduced its underground charge from $280.00 to $150.00 per lot, retaining the same schedule of credits based upon the same consumption tables as used in the $280.00 plan.

Under the 1967 plan it is not necessary to use electric space heating in order to obtain underground electric service without charge. Absent agreeing to use an electric water heater, the builder still has to pay approximately $100.00 per lot for installation of underground service.

When space heating ceased to be a requirement for the installation of underground electric service without charge, Vepco's total electric penetration in the overlap market dropped from 21.4 per cent to 4.5 per cent.

With the beginning of the 1963 plan the estimated charge for underground electric service has been somewhat wide of the actual installation costs. A Vepco official, in one of his interoffice memoranda, admitted Vepco started

with the answer ($270.00–$290.00 cost differential) and justified this with engineering estimates. Even now there is some question as to some items included in the estimated charge and some question as to the amount of credit that should be allowed for the differential in the cost of maintaining the underground system as compared to the cost of maintaining the overhead system.

Vepco has always required the estimated cost of underground installations for all the lots in the new subdivisions to be paid in advance.

Of the numerous builders who testified in this case, all felt underground electric service was a business necessity for the type of subdivisions they were then building—All said if given a free choice they would have used gas for space heating—Most said they would have used gas for water heating—Many said they would have given their customers a choice of using gas or electricity for cooking. All felt that they were induced—many thought they were coerced—into using electrical water heating in order to recoup a portion of Vepco's charge for installing its underground electrical system.

The statistical evidence in the case indicates that prior to 1963, 99 per cent of the builders used gas for space heating—95 per cent used gas for water heating—60 per cent used gas for cooking. After Vepco's '63 underground service plan and amended plans were put into effect, its share of space heating in the overlap area increased from one per cent to 21 per cent of the market—water heating, from five to 71 per cent—cooking: from 40 to 71 per cent—some 20.7 per cent of the homes using underground service went all electric compared with 3.2 per cent of the homes using overhead service. This percentage dropped to 4.5 in 1968 when the space heating requirement was eliminated.

Under the $275.00 and $280.00 plans the number of new homes using gas for space heating dropped to 79 per cent of the market. Those using gas for water heating dropped to 29.1 per cent. Those using gas for cooking dropped to 28.6 per cent of the market.

Section 1 of the Sherman Anti-Trust Act (Title 15 U.S.C.) declares:

> Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal. . . .

Although this section prohibits only unreasonable restraints, certain practices are unreasonable per se—that is, they "are conclusively presumed to be unreasonable and therefore illegal without elaborate inquiry as to the precise harm they have caused or the business excuse for their use." See Northern Pacific Railway Co. v. United States, 356 U.S. 1 (1958).

The stringency of the per se rule laid down in the Northern Pacific case was recognized by the Court of Appeals of this Circuit in Osborn v. Sinclair Refining Company, 286 F. 2d 832 (1960). The Fourth Circuit there said:

> The standard in Northern Pacific is a quantitative one. Just so the seller is of sufficient size to exert some power and the amount of commerce restrained is not insignificant, the standard is met. If all of the industry-wide economic data had to be shown for which (defendant) argues, it would convert tie-in cases to "rule of reason" cases with the requirement of public injury. When facts, as here, reveal a per se restraint of trade, it is not necessary for the plaintiff to prove, by voluminous economic data, that the public generally has been injured.

In the Northern Pacific case, supra, the Supreme Court said:

> . . . the vice of tying arrangements lies in the use of economic power in one market to restrict competition on the merits in another, regardless of the source from which the power is derived and whether the power takes the form of a monopoly or not.
>
> * * * * * * *
>
> They (tying arrangements) deny competitors free access to the market for the tied product, not because the party imposing the tying requirements has a better product or a lower price but because of his power or levearge in another market. At the same time buyers are forced to forego their free choice between competing products. . . .

The foregoing requirements for the finding of a per se tying agreement were reiterated by the Supreme Court in its most recent antitrust case. See Fortner Enterprises, Inc. v. United States Steel Corp., 394 U.S. 495 (1969).

Applying these teachings to Vepco's underground electric service plan, the Court finds Vepco had a monopoly in the installation of underground electric service, and was the sole seller of electricity in the overlap area.

From 1960 to 1963 Vepco made its underground electric service available to all builders on the same basis, without regard to the appliances used or the amount of electricity consumed—Builders were then only required to pay the additional cost of the underground installation. When the mortgage bankers, local governments, Federal agencies and the general public all began to show great interest in underground electric service in the new subdivisions, Vepco used its monopoly in furnishing this service in order to promote the use of electricity. This was accomplished, first, by tying the cost of the underground installation to the use of certain electrical appliances; later, by giving credits based on the amount of electricity used over the first six thousand kilowatt hours. If the builder agreed to go all electric or all electric except space heating, Vepco furnished the underground service without cost or at a substantially reduced price, otherwise the builder was required to pay a much larger fee for the same service.

Such a tie-in not only deprives the builder of a free choice in selecting what energy (gas or electricity) he and his customers want to use for space and water heating—it penalizes him if he elects to use gas. If he goes all electric his customer is prohibited from using gas for any purpose even though the record here discloses that gas is more economical for space and water heating than electricity.

The Maryland Public Service Commission, in refusing to allow the Potomac Electric Power Company to install a similar underground electric service plan in Maryland, said:

> The practice does, in fact, create a discriminatory pattern in that it gives the builder an improper incentive to elect "all electric" so as to save the undergrounding charge, whereas the builder who does not or cannot make such an election receives exactly the same service and must pay what amounts to a penalty of $300 which is passed on to the purchaser in the cost of the house. The charging and waiving imposes unequal charges on the same types of customers for the same service. Suburban Maryland Home Builders Ass'n v. Potomac Electric Power Co., 72 PUR 3rd 282 (1968).

The outlawed IBM tying arrangement which required all lessees of its business machines, except the United tSates, to purchase the necessary cards from IBM (the United States could use other cards if it paid a higher rental), embodies the same tying concept as employed by Vepco in this case; that is, a differential in the cost of the same service unless the user agreed to take the tied product.

The fact that the builder can retain his freedom of choice by paying Vepco's estimated charge for underground service is beside the point. Such option does not validate an otherwise invalid tying arrangement.

In the International Salt case the lessee was not obligated to buy salt from International if any competitor offered salt of equal grade at a lower price. The Supreme Court in that case—International Salt Co. v. United States, 332 U.S. 392 (1947)—held such an option.

> does not avoid the stifling effect of the agreement on competition. The appellant had at all times a priority on the business at equal prices. A competitor would have to undercut appellant's price to have any hope of capturing the market, while appellant could hold that market by merely meeting competition. . . .

Here the tied product—electricity—cost more than gas for space and water heating.

The Gas Company should not be required to subsidize the builders' payment of Vepco's underground installation charge in order to have free access to the new houses' space and water heating market.

Having determined that Vepco's underground service plans since 1963 are in fact and in law tying arrangements, the Court must next determine whether Vepco has sufficient economic power with respect to the tying product and whether it has used that power to appreciably restrict free competition for the tied product. The answer to both of these questions is yes. Vepco has a monopoly in the installation of underground electric service. It furnishes, owns and maintains practically 100 per cent of the underground service installed in the overlap area—it fixes the cost thereof, originally somewhat inflated. This charge is high enough, if waived or substantially reduced, to induce the builder to take electricity for space and water heating, and the evidence discloses that many builders in the overlap area have so done.

Next the Court must determine whether a "not insubstantial amount" of interstate commerce is affected. Measured by the yardstick laid down in the International Salt case, supra, and in United States v. Loew's, Inc., 371 U.S. 36 (1962), the answer is yes. Vepco derives more than four million dollars per year in additional revenue from the new homes which have gone totally electric or totally electric except space heating under the underground service plan in question—more than seven hundred thousand dollars of which are derived from new homes located in the overlap area where the parties compete.

The necessary interstate aspect of the commerce affected by the challenged tying arrangement to bring this case within the Sherman and Clayton Acts is beyond question. The defendant so concedes.

In defending the charges brought against it, Vepco has produced considerable evidence enumerating the business and economic justification for its underground service plans—such as creating competition in the space and water heating market where none before existed; recovering its investment in the underground service; and in promoting safety and community beauty, and so forth—all of which is immaterial when the tying arrangement complained of is found to be a per se violation of the Sherman Act.

The United States Court of Appeals for the Fourth Circuit, in rejecting a similar contention made by Consolidated in the Pennsylvania Water Power Company v. Consolidated Gas, Electric Light & Power Company case, 184 F. 2d 552 (1959), said:

> . . . the prohibitions of the statute apply even though the parties to a contract indulge the belief that the agreement may have beneficial results and actually show that in some respects the public is benefitted thereby. Congress has determined that the greater good is served by the maintenance of free competition and its decision in the field of interstate commerce must control.

Vepco further contends that this Court should not invalidate its underground service plan unless its finds that Vepco refuses to install underground service unless the builder makes certain uses of electricity—and that the tie-in carries with it the complete foreclosure of the Gas Company from the space and water heating market in the overlap area.

This Court does not read the cases cited by Vepco as so requiring. The legal test for determining whether a tie-in exists is whether the customers are deprived of their free choice between competing products and whether competitors are denied free access to the market for the tied product—not because the party imposing the tying product has a better product or a lower price but because of his power or leverage in another market. In Northern Pacific, supra (at page 6; see also Loew's, Inc., supra, at page 45), it was held that the typing was illegal if the arrangement gives the defendant economic leverage sufficient to induce his customers to take the tied product along with the tying item.

Clearly, Vepco's underground service plan does not give the builder a free choice. Making him pay a substantial fee for the service unless he agrees to use certain appliances is not a free choice.

Although, technically speaking, the Gas Company may not be completely foreclosed from the heating market in the overlap area, it is effectively foreclosed from all or part of the heating market in those cases where the builders go all electric or all electric except for space heating.

Vepco next contends there can be no compulsion when a builder can recoup his cost by increasing the sale price of his house—that the undisputed testimony of the expert real estate appraiser expressed the opinion that a house served by underground electric wiring will bring at least $300.00 more than an identical home served overhead. Although Vepco cites no authority that such would validate an otherwise invalid tying arrangement, the Supreme Court, in Hanover Shoe, Inc. v. United Shoe Machinery Corp., 392 U.S. 481 (1968), rejected this so-called "passing on" defense in antitrust cases and held that a buyer who is overcharged by a monopolist is injured even though he can pass the overcharge along to the ultimate consumer.

This Court further finds that Vepco's underground installation contracts violate § 3 of the Clayton Act, 15 U.S.C. § 14. That section reads as follows:

> It shall be unlawful for any person engaged in commerce, in the course of such commerce, to lease or make a sale or contract for sale of goods, wares, merchandise, machinery, supplies, or other commodities, whether patented

or unpatented, for use, consumption, or resale within the United States or any Territory thereof or the District of Columbia or any insular possession or other place under the jurisdiction of the United States, or fix a price charged therefor, or discount from or rebate upon, such price, on the condition, agreement, or understanding that the lessee or purchaser thereof shall not use or deal in the goods, wares, merchandise, machinery, supplies, or other commodities of a competitor or competitors of the lessor or seller, where the effect of such lease, sale, or contract for sale or such condition, agreement, or understanding may be to substantially lessen competition or tend to create a monopoly in any line of commerce.

Vepco's underground service agreement in part provides for the sale of electricity to the builder and his successor, the homebuyer. The builder indicates when he wishes to start using electricity—He pays for the electricity used until the house is sold and occupied—No new contract is then entered into with the homebuyer. The name on the service agreement is changed in Vepco's accounting department. The agreement further provides a fixed price for the installation of underground electric service; that full credit will be given if electricity is exclusively used for all purposes or for all purposes except space heating in all of the homes in the subdivision—The later agreements provide for a credit to the builder based upon the amount of electricity used over and above the first six thousand kilowatt hours. Unless he uses electricity for water heating he cannot recoup all of the charges for underground service.

Although this Court is not expressly ruling that these underground service agreements are binding on the builder's successors, the homebuyers, it obviously is—for all practical purposes—because once a builder goes all electric the homebuyer cannot use gas for any purpose; and in those cases where the builder goes all electric except space heating, the homebuyer cannot use gas for water heating, cooking, air conditioning or clothes drying unless he rips out and disposes of all the electrical appliances that are in the house and replaces them with gas appliances at his own expense.

The credit allowances mentioned in the later underground service agreements are in fact discounts in the price of electricity; when used as here used—to induce exclusive dealing—they are prohibited by § 3 of the Clayton Act.

Agreements coming within the ambit of the Clayton Act are condemned without proof of an accomplished restraint of trade; it is sufficient that the agreements may substantially lessen competition or tend to create a monopoly in any line of commerce. The evidence in this case clearly establishes that Vepco's underground installation agreements have substantially restrained free competition in the sale of energy requirements to new-home builders, especially for heating purposes.

Finally, although Vepco does not now contend that the Gas Company's promotional programs are unlawful, or suggest that the defenses of unclean hands or in pari delicto are applicable, it has asked the Court to carefully review the voluminous amount of evidence introduced re the Gas Company's business practices before concluding that its underground service plans coerce builders and foreclose the Gas Company from competing.

Although this Court has so done, the Gas Company's business practices, even though illegal (and no findings as to illegality are here made), are not a defense to the antitrust violations charged to the defendant. See Kiefer-Stewart Company v. Joseph E. Seagram & Sons, 340 U.S. 211 (1951).

As hereinbefore stated in this memorandum opinion, complete foreclosure from the market or coercion by force is not a prerequisite to a finding of invalidity under the Sherman and Clayton Anti-Trust Acts. The vice of the tying arrangement here lies in Vepco's use of its monopoly power in the underground service installation market to restrict competition on the merits in the use of gas or electricity in the space and water heating requirements of the new-home building industry.

Upon these findings, the Court concludes that Vepco's underground electric service plans, beginning with the plan adopted August 7, 1963 up to and including the plan now in effect, and the agreements made in pursuance thereof, affect interstate commerce within the meaning of § 1 of the Sherman Act and § 3 of the Clayton Act; that said plans and agreements as administered are per se tying arrangements prohibited by § 1 of the Sherman Act and that said plans and agreements as administered constitute unlawful exclusive dealing arrangements prohibited by § 3 of the Clayton Act; and that the Gas Company is, therefore, entitled to damages and costs in an amount to be determined later.

Counsel for the plaintiff should prepare an appropriate order declaring Vepco's underground service plans and agreements to be unlawful, together with an injunction restraining Vepco from continuing to use its underground monopoly to coerce or induce builders to use electricity, submit the same to counsel for the defendant for approval as to form, and then to the Court for entry.

The Clerk will send a copy of this memorandum opinion to all counsel of record.

(S) OREN R. LEWIS,
U.S. District Judge.

A True Copy, Teste:

W. FARLEY POWERS, Jr.,
Clerk.

(S) BETTY MATTOS,
Deputy Clerk.

JANUARY 30, 1970.

STATE OF MARYLAND,
DEPARTMENT OF NATURAL RESOURCES,
Annapolis, July 28, 1970.

MR. LAURENCE DAVIS,
Assistant Counsel, House Government Operations Committee, Subcommittee on Conservation, Washington, D.C.

DEAR MR. DAVIS: Attached is the draft report I mentioned to you yesterday. It is undergoing revision to more accurately depict our first year's effort and to include research categories which we want to look at but cannot initiate immediately because of shortage of funds and/or lack of institutional interest.

As soon as the revised report is available I will forward a copy to you. Meantime if anything in the attached report is useful to you, please do not hesitate to use it.

Sincerely yours,

L. E. ZENI,
Special Projects Engineer.

CHESAPEAKE BAY COOLING WATER STUDIES—REPORT OF THE COORDINATING COMMITTEE, JULY 7, 1970

INTRODUCTION

As an outgrowth of discussions between representatives of the U.S. Atomic Energy Commission and the Johns Hopkins University two informal meetings were held to review research activities and needs relative to the use of Chesapeake Bay and its tidal tributaries for cooling thermal-electric powerplants. Present at these meetings were representatives of industries, agencies, and institutions at present conducting research directly related to use of the bay system for cooling. The first meeting was held at the Johns Hopkins University on June 9, 1970, and the second at the University of Maryland on June 19, 1970.

It was the concensus that the first order of business was established of a coordinating committee and the group there assembled undertook to function in that capacity. The committee is in its formative stages and may be expected to grow and its activities to mature as time goes on. It is necessary to outline the present course being followed by the committee because this document is the first action taken. The objectives as stated in the proposal attached hereto are to help plan, assess, stimulate, obtain support for, guide and coordinate research which will improve the ability of those concerned, to predict the physical, chemical, and biological effects and the social and economic consequences of use of the tidewaters of Virginia and Maryland for cooling thermal-electric powerplants. Since the State of Maryland Department of Natural Resources is intensely interested in the use of the bay for cooling, a proposal is being submitted to that department for support of the direct expenses of the committee. It is hoped that the State of Virginia may also help in such direct support.

This document (1) states the nature of the problem (2) describes the environmental influences associated with the use of the bay for cooling, (3) outlines a program of study for the first year and (4) has attached to it summaries of the proposals which will constitute the first years program recommended by the Coordinating Committee.

The Coordinating Committee is not a contracting entity. Each institution, industry and agency will arrange for the financing of its own activities. The summaries of proposal attached hereto are based in each case on official proposals direct from the research institution to the supporting agency. Some of the proposals have already been submitted, others are in preparation. This Coordinating Committee report is intended to be a backup document for use by each group when seeking support for research activities related to the use of the Chesapeake bay system for cooling.

THE NATURE OF THE PROBLEM

The Chesapeake Bay is a unique estuary of large size, great biological productivity, and increasing importance to large numbers of people. The bay is located in a region of burgeoning population which places upon it continuing pressure for use by industry, marine commerce, and private individuals. The bay is used not only for navigation, fin fish and shellfish production, recreation, and industrial water, but as a place for disposal of municipal, agriculture, and industrial wastes. For many years the bay and its tributaries have provided sites for electric powerplants. Some of these are close to centers of demand while others are located at some distance on bodies of water that provide the capacity necessary for disposing of excess heat from the large plants designed in recent years.

The location of powerplants is determined by a variety of economic and social considerations. These include magnitude and location of demand, the availability of sites, the economics of alternative places and means of production of electric energy, the availability of adequate sinks for the dispersion of unused heat, and perhaps the social and political environment of the times.

In the past the principal elements considered when selecting sites have been the economics of alternative production technologies, and the opportunities for disposal of waste heat and for provision of supplies of raw materials. Each element in the decision regarding plant location involves a wide variety of alternatives. Power generation alternatives include engineering of the site, architecture, and safety features. The fuel supply may be coal, oil, gas or a nuclear fuel. Transmission alternatives alone include AC or DC, and above ground or underground lines. Lastly, a powerplant using the Rankine cycle to produce electrical energy most dissipate more than half of its thermal energy to the environment. Ultimately, most of this heat will make its way into the atmosphere either by discharge into rivers, lakes, estuaries, or the ocean or by discharge directly to the atmosphere through stacks or cooling towers.

Each alternative in the production and transmission process involves a set of environmental effects. For example, the effects of a release of heat may be simple and direct such as an increase in temperature of the air immediately adjacent to an effluent stack or they may involve complex alterations of a biological or ecological chain.

Three fundamental factors lie at the heart of the most recent siting controversies. The first concerns the necessity of providing the public with increasing quantities of electricity. At conflict with this objective is a second factor, the rising sensitivity of the public to the effects on the environment that result from large installations such as the ones projected for the future. There is generally little opportunity for direct negotiations between parties. Hence, the solution calls for public action. But public bodies have lacked both guidelines and the appropriate institutional arrangements that can lead to comprehensive planning and prompt decisions.

Among the many environmental influences associated with major powerplants, the dispersal of waste heat to the environment poses one of the most fundamental and pervasive problems. Of the total energy output from an electric generating station 60 to 70 percent will be in the form of waste heat, depending, of course, upon the plant's age, design, and fuel. Where an ample supply of water is available, such as from the Chesapeake Bay, the practice has been to pass large quantities through the plant to condense the steam and remove heat from within the plant. A major generating station may pump thousands of cubic feet per second of cooling water through the condensers. Depending upon design, the cooling water will be heated to varying amounts.

The biota of the surrounding environment are presumably adjusted to a normal range of seasonal variations in temperature as well as in salinity. In the Chesapeake Bay a wide variety of organisms not only live in the bay, but spawn there and many spend a portion of their life cycle in movement from one part of the bay to another. A change in temperature and perhaps a circulation and

density gradients might be presumed to have some effect on these organisms. Some may be tolerant at the adult stage to a great variation in temperature, but might succumb at younger ages. Others could conceivably withstand the effects of the variations in the bay itself, but would be unable to withstand passage through the plant when rapid temperature rises and intense turbulence may be experienced. Further, many organisms may themselves be unaffected, but the food upon which they prey may be diminished or augmented by the perturbation in flow and in temperature.

ENVIRONMENTAL INFLUENCES ASSOCIATED WITH COOLING WATER

While no single environmental effect may be considered alone, in reaching a decision regarding the desirability or undesirability of siting powerplants at specific locations on the Chesapeake Bay or its tidal tributaries, it is evident that cooling water effects must form an important part of any evaluation. These involve alternatives relative to (1) standards or values for the water body itself, (2) technologies in plant design and in intake and outfall arrangements, and (3) treatment of water by biocides to control unwanted growth of organisms. Because of the evident importance of these matters the environmental aspects of powerplant siting related to cooling have been selected for a coordinated study, recognizing that comparable coordinating efforts will be required with respect to other environmental elements considered when siting powerplants in the region.

In essence, a decisionmaker interested in assessing the values effected by the use of varying amounts of water for cooling of powerplants requires four interrelated pieces of information. First, for a given plant capacity at a given site one must be able to predict the physical distribution of the temperature field in the adjacent water body. Second, from the known temperature distribution one must then predict or estimate the effects of the new temperature distribution on the biota subjected to it. These biota include organisms which actually pass through the cooling system as well as those which reside or pass through the region affected by the new temperature field at some time during their life cycle. Third, in weighing the virtues and drawbacks of specific sites as well as the alternatives, values, either in monetary or other terms, must be assigned to the elements affected. Fourth, given an understanding of the physical system and the biological impact, and with estimates of the values affected, it becomes possible to compare the alterntaive technologies and to make trade-offs between such factors as the magnitude of the temperature rise, the volume of water diverted, and the area utilized for dispersion of the heat, and also to examine alternatives involving the use of direct dispersion to the air through cooling towers.

Any comprehensive research endeavor must eventually deal with each of the above four elements. It is clear, however, that the present level of knowledge of each is markedly different and hence an initial set of investigations must take cognizance not only of the necessity of understanding each facet, but of the current state of the art.

PROGRAM FOR THE FIRST YEAR OF STUDY

The proposals suggested below represent an initial 1-year program selected on the basis of two principles. First, a unanimous recognition by the coordinating committee that the development of a long-range research and management program requires a thoroughgoing assessment of existing information and current research. Second, while the planning of a long-term research program cannot be done overnight, specialists can specify a number of research topics of high priority which should be initiated or expanded now if the demand for better information is to be met.

The program for the first year's work encompasses four categories of activity. One, the establishment of a coordinating committee to plan and guide investigations of cooling water studies for the Chesapeake Bay and tidal tributaries; two, an assessment of the status of knowledge about the relationship between the use of water from the Chesapeake Bay for cooling and its effects on the Chesapeake Bay leading to development of a long-range program of investigations; three, economic studies including (*a*) initiation of the development of a framework for decisionmaking involving an economic analysis of environmental effects, private and social costs, and the values involved in the Chesapeake Bay area; (*b*) preliminary inquiry into the differential costs associated with differences in temperature rises, quantities of water used, and alternative technologies

such as intake designs, diversion structures, and cooling towers; and four, research proposals of high priority directed toward predicting the physical behavior of an estuarine system in the vicinity of powerplant intakes and discharges, and toward learning more about the biological effects of cooling water discharges on organisms found in the Chesapeake Bay.

The coordinating committee recognizes that a comprehensive approach to the management of the bay and to the research program on which it depends requires advances in several diverse areas ranging from studies of thermal diffusion to economic evaluation of wetlands. While priorities must be set among these diverse elements, it is equally clear that the research cannot be wholly sequential. For example, the economic and biological analyses cannot be deferred until the physical system is fully understood. The funds required for different investigations vary according to the nature of the study. Field investigations require large expenditures of money; laboratory or analytical studies demand less. The funds required are not in themselves a precise measure of the importance or priority of a particular piece of research, but instead reflect both the costs of a particular inquiry as well as the state of the art of a particular subject.

With these things in mind the coordinating committee recommends the following research proposals for support by the agencies named and in the amounts designated:

PROPOSAL NO. 1

To: The Department of Natural Resources, State of Maryland, Annapolis, Md.
From: The Department of Geography and Environmental Engineering.
Via: The Sponsored Research Administration, The Johns Hopkins University, Baltimore, Md.
Support for: Expenses of the coordinating committee.
Amount of: $10,000.

PROPOSAL NO. 2

To: The U.S. Atomic Energy Commission, Washington, D.C.
From: The Department of Geography and Environmental Engineering.
Via: The Sponsored Research Administration, The Johns Hopkins University, Baltimore, Md.
Support for:
(A) Assessment of current information and design of research program.
(B) Resource evaluations and economic studies.
Amounts of:
(A) $80,000.
(B) $100,000.

PROPOSAL NO. 3

To: The U.S. Atomic Energy Commission, Washington, D.C.
From: The Chesapeake Bay Institute.
Via: The Sponsored Research Administration, The Johns Hopkins University, Baltimore, Md.
Support for:
(A) Development of predicting models of the large scale circulation patterns and exchange processes in the Bay.
(B) Studies of medium processes of movement and mixing in a tidal segment.
(C) Hydraulic model studies of momentum jet entrainment in a cost-flow.
(D) Temperature distributions in the vicinity of powerplants.
(E) Development of models for the prediction of excess temperatures in thermal plumes.
Amounts of:
(A) $40,000.
(B) $40,000.
(C) $50,000.
(D) $40,000.
(E) $40,000.
Total, $210,000.

PROPOSAL NO. 4

To: The U.S. Atomic Energy Commission, Washington, D.C.
From: Department of Environmental Research, Natural Resources Institute, and Department of Chemistry, University of Maryland, College Park, Md.

Support for: Study of Ecological Effects of Nuclear Steam Station Operations on Estuarine Systems.
Amount of: $130,000 for first year.

PROPOSAL NO. 5

To: The U.S. Atomic Energy Commission, Washington, D.C.
From: Virginia Institute of Marine Sciences, Gloucester Point, Va.
Support for: Study of the Effects of Entrainment of Organisms from a Temperate Zone Estuary.

Proposal No. 1

COORDINATING COMMITTEE

With respect to Chesapeake Bay and tidal portions of its tributaries the coordinating committee will help to plan, assess, stimulate, support, guide and coordinate research which will contribute to improved ability to predict the physical, chemical, and biological effects and the social and economic consequences of the use of tidewaters of Virginia and Maryland for cooling thermal-electric powerplants.

The purpose is to develop information that will provide a more adequate basis for decisions with respect to the location and size of plants and which will result in improved designs of intake, discharge and other cooling water facilities.

As secondary objectives the coordinating committee may, if the institutions and agencies represented, so desire, undertake evaluation and coordination of research on other environmental effects associated with the production of electricity in the Chesapeake Bay region. The initial commitment is, however, with respect to various aspects of use of the Bay as a receptor of heat. Where deemed desirable, the committee will call upon expert assistance beyond its members to help in its evaluative and coordinating functions.

The Johns Hopkins University, Department of Geography and Environmental Engineering—here referred to as the department—will undertake, with support from the Maryland Department of Natural Resources, The Atomic Energy Commission and others, to perform the staff work necessary to make the Committee function in an effective manner. The staff activities to include: (1) preparation of material for the committee's consideration, (2) development of agenda, (3) arrangement of meetings, (4) management of committee correspondence, (5) engaging consultants to report on special topics and (6) preparation of committee reports and proposals. This work will be done as part of the assigned responsibility of staff that is also carrying on for the department sponsored research on the use of the Chesapeake Bay for cooling.

The institutions and agencies represented on the committee shall include, but not be limited to:

The Atomic Energy Commission
The Virginia Polytechnic Institute [1]
The Old Dominion College [1]
The Johns Hopkins University
The University of Maryland
The Maryland Department of Natural Resources
The Virginia State Water Control Board [1]
The Chesapeake Bay Institute
The Virginia Institute of Marine Science
The Maryland Natural Resources Institutes
The Federal Water Quality Administration [1]
The Naval Research Laboratory
The Baltimore Gas & Electric Co.
The Potomac Electric Power Co.
The Virginia Electric & Power Co.[2]
The Delmarva Light & Power Co.[1 2]

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[1] Not represented at the two initial meetings, but invited at suggestion of those present.
[2] It is understood that these companies will be represented not only by appropriate executives, but also by consultants and institutions that are carrying out research for them at plant sites on the tide waters of the Chesapeake Bay system.

It is estimated that $10,000 will be needed for initial support of the activities of the coordinating committee. These funds will cover secretarial assistance, travel, and preparation and reproduction of reports.

It is hoped that the Commonwealth of Virginia will provide similar support for the coordinating committee. There has not yet been time for the appropriate officials of the two States to correspond with one another concerning this possibility. In order to avoid loss of time the coordinating committee is proceeding with the submission of this proposal both without prejudice and in the hope that Virginia's interest will be signified later.

Proposal No. 2

A. ASSESSMENT AND RESEARCH PROGRAM DESIGN

To develop a comprehensive coordinated and long-range research endeavor, it is essential that an assessment be made of the information currently available on the use and effects of cooling water for powerplants in the Chesapeake Bay region. The assessment must include: evaluation of the fundamental scientific information available on the behavior of estuarine waters and the effect of heat on organisms in such waters, a collection of the information on the Chesapeake Bay and tidal estuaries themselves relevant to the distribution and effects of cooling waters and, lastly, an integration of the basic understanding of the effects of heat with existing information on the Chesapeake Bay. The result of such a yearlong assessment will be the preparation of a report on the "state of the art" coupled with the development of a research design for future inquiry including priorities based upon the results of the assessment.

The Coordinating Committee is aware of, and some of its members are participating in, assessments of knowledge of the Chesapeake Bay currently being undertaken by the Maryland State Planning Department, and the U.S. Corps of Engineers. The proposed assessment related to the use of the bay for cooling water will clearly form an integral part of these more extensive efforts related to planning and management of all the resource values of the Chesapeake Bay.

The assessment team will be expected to interview research investigators, administrators, and industrial executives in the region concerned with both management and research on the effects on the Chesapeake Bay and tidal tributaries on the use of water for cooling purposes. Extensive research programs are currently underway and new ones are planned in Virginia and Maryland. The results of research at existing powerplant sites both in the Baltimore region and elsewhere in the country will form a vital part of the assessment, and research funds already committed to specific areas will provide a vital ingredient of future coordinated studies.

It is proposed that the assessment be performed by the Coordinating Committee with the aid of a staff consisting of two full-time professional persons who are familiar with the physical and biological aspects of the bay and understand the economic and social importance of managing resources in the bay. In addition to the two full-time professional staff, provision is made for the equivalent of one additional person on a part-time basis. Cost of the study is estimated at $80,000.

Direction and guidance of the assessment will be the responsibility of the full Coordinating Committee itself. However, to insure close direction for this important effort, several members of the Coordinating Committee will be designated as a steering committee.

B. ECONOMIC STUDIES

As a part of the research program for the first year, two different kinds of economic studies are proposed. The first is concerned with the initial effort to establish a framework or matrix within which it will be possible to evaluate the social and economic implications of the use of the Chesapeake Bay for cooling water. The second is concerned with the establishment of general costs associated with alternative engineering or technological solutions to the problem of disposing of waste heat. The proposed work would contribute to the first part of the study. It would not involve detailed design of facilities for specific locations.

Framework for decisionmaking

If rational decisions are to be made both private and public agencies regarding the location of major installations, some framework must be developed for evaluation of environmental effects at alternative locations.

It has long been recognized that the byproducts of many industrial operations place demands upon the environment and upon society which are not reckoned in the decisions regarding total project investment, project scale, project location, and alternative production processes. Regulatory mechanisms have been established through the years which attempt to limit the levels of what are termed contaminants which may be dispersed to the environment in the air, water, or on the land. The computations, however, of the value of the product as well as the economics involved in producing the product rarely if ever include what appear to be the full costs of the use of the environment.

The current literature and public declamation suggest that "all" costs associated with production activities should be evaluated. In addition, it has been suggested that if these costs are to be evaluated and paid for, it is essential that there be an acceptable framework for considering what are termed the social or external costs as well as the traditional firm or production costs. Such a framework implies a more comprehensive analysis of the interrelationships of costs, demand, price, and environmental effects.

In the first year it is proposed that a beginning be made on the development of a matrix which would include the interactions between the projected demands for electricity in the region, the distribution of the effects of the use of cooling water in the Chesapeake Bay and tidal tributaries, and evaluation of the effects of cooling water uses on the diverse users of the Chesapeake Bay such as commercial fishing, sport fishing, boating, shipping, industry, municipalities, agriculture, aquaculture, swimming, hunting, and other recreation. Such a matrix of interactions is predicated, of course, upon a knowledge not only of the physical distribution of effects but of their biological impact, and on the knowledge of the socioeconomic values which different users ascribe to the portion of the resource in which they are interested.

From the point of view of the public the net result of a set of decisions concerning the siting of powerplants, should be expected to provide positive benefits or advantages to the society as a whole as well as to the individuals and groups within it. This can only be true if the decisions actually reflect not only the immediate costs incurred in constructing a plant and providing a product or a service, but also the external costs involved in the discharge of wastes to environment. These costs or externalities will be present regardless of whether the projected expenditure is by a private or by a public investor. It is proposed that an attempt be made to develop a model which measures both the private and "spillover" costs of externalities where these are directly related to the use of the environment.

It is perhaps important to spell out the direction which the development of research studies in this area might take. As noted below, however, for the first year the proposal calls for a preliminary study only to initiate the work. A more comprehensive view will eventually have to deal with the larger framework which might be approached as suggested below.

The basic problem of incorporating multiple objectives into the decisionmaking process can be approached in several ways. One method involves restricting the objective function to one objective, and maximizing it subject to other stated objectives. A second, analytically similar, approach involves applying weights to the arguments in the objective function, and calculating a single-valued measure of net benefits for various investment alternatives. Initially, an attempt will be made to utilize a third approach. This approach accepts the fact that the various possible objectives of public policy regarding the use and development of the bay region's resources cannot be measured in any simple way. Therefore, various kinds of information reflecting physical, technological, and economic tradeoffs associated with alternative policy options will be developed for use in decisionmaking.

This analysis would be approached along the following lines:

(1) Estimate the load demand as determined by the economic base of the region under consideration;

(2) Analyze the costs of alternative combinations of generating units to meet this demand. The result of this step is a determination of the location, type, efficiency, and magnitude and time pattern of energy generated by various units;

(3) Estimate the gross cooling loads on the basis of heat rates, efficiencies, and sizes of different units. These will be the thermal loads discharged to the water courses assuming a once through cooling system;

(4) Determine the impact of thermal discharges on water quality and the effects of the resulting special and temporal pattern of water quality on the uses of water (some of the effects may be negative and some positive);

(5) When sizeable external costs are imposed by thermal discharges (or where specific stream standards are not met) calculate the cost of alternative methods for reducing or offsetting thermal discharges—as by recycling or provision of additional cooling water in stream or some combination of the two;

(6) Select the combination which minimizes the present value of total costs. Recompute the power system costs under the new costs of cooling water to see if a shift in the mix or location of generating units might result;

(7) Explore the marginal cost aspects of alternatives in reducing environmental impacts and examine the possible influence that different charges for service might have on the manner in which the Bay is used for cooling.

Ideally, if demand and supply relationships could be established as well as "values" in the environment, one could presumably develop a model which would take into account both the size and number of plants needed, and in turn their location in relation to these environmental values.

Preliminary engineering analysis of alternative technologies

Because it is possible to alter designs to accommodate to different temperature standards and to different values placed on the use of water or air for disposal of waste heat, it is evident that a range of design possibilities could be envisioned in an analysis of alternative ways of removing heat at a particular site. Because condenser design is a fundamental element in the design of an entire powerplant, it is also evident that modifications in the design of a cooling water system could result in differences in the total cost at any given location. In addition, unique characteristics of specific sites would in turn result in differences in costs between sites. At the same time, experience has shown that it may well be possible to develop some broad relationships which might help in defining not only the costs involved in using significantly different technologies, but also the differences in costs associated with diffierent requirements for temperature rises over the condenser and for different temperature levels in the receiving water bodies.

It is proposed in the first year to attempt to establish relationships which define the differences in costs associated with such factors as the quantities of water diverted for cooling, temperature rise over the condensers, and magnitude and duration of temperature differences in the receiving water. In addition, the investigation will consider the costs of achieving the same dispersal of heat by alternatives such as cooling towers.

Absolute costs for different alternatives cannot be developed without detailed engineering designs. At a more general level, however, using current practice and experience relative costs or approximate differences in costs among different technologies can be evaluated. It is such comparisons which are proposed for this initial study. In addition, some consideration can be given to differences in costs associated with the incorporation of modifications of design at various stages of planning and construction.

Such a preliminary investigation of technological alternatives is an integral part of the evaluative processes associated with the development of the economic framework. In the last analysis, decisions regarding the siting of powerplants and in the environmental values to be gained or lost in using one or another technology must involve comparisons of the environmental impact of the technologies available. The preliminary study can begin to provide some guidelines for such an analysis. It cannot provide specific values or specific sites inasmuch as detailed designs and estimates of cost are required for this purpose. It is proposed to enlist on a consultant basis the services of experienced engineers to provide the generalized cost data required.

The economic studies outlined above will be completed within a 4-year period. The research that will be completed in the first year will include: (1) the development of the broad decisionmaking framework for evaluating environmental effects of using the Chesapeake Bay for waste heat discharges; and (2) the development of models and analysis of the data associated with the completion of the first three tasks enumerated on page 18.

The total costs associated with the first year's effort will be $100,000. It is anticipated that this annual cost figure will not be appreciably altered in the remaining 3 years required to complete the economic studies.

Proposal No. 3

INTRODUCTION

The Chesapeake Bay Institute (CBI) proposes to expand and accelerate the research program now underway directed toward the development of improved methods for the prediction of the distribution of excess heat and temperature in estuarine waters resulting from the discharge of condenser cooling water from steam generating plants. The purposes of this expanded program would be:

(1) To develop accurate methods for predicting the distribution of temperature, both in time and space, in estuarine waters adjacent to a proposed nuclear powerplant which would use these waters for cooling purposes, given the design plant size, condenser cooling waterflow, temperature rise at the condensers, and the characteristics of intake and discharge structures.

(2) To relate the time and space variations in the temperature regime in the estuarine waters affected by the thermal discharge to the natural time and space variations which would occur in the estuary in the absence of any heated discharge.

(3) To develop design criteria for minimizing the environmental impact of thermal discharges.

(4) To develop criteria for siting powerplants on the estauarine waters such that, for a given sized plant, the relative thermal impact on the environment would be minimized.

The distribution of excess temperature in the Chesapeake Bay or in any of its tributary estuaries which would result from the discharge of condenser cooling water to these waters depends upon the following processes:

(1) The rate of supply of available dilution water to the segment of the estuary receiving the thermal discharge.

(2) the large-scale exchange and diffusion processes which control the movement and mixing of the water (and its contained heat) from one tidal segment to the next.

(3) The medium-scale and small-scale processes of movement and mixing within the tidal segment which receives the thermal discharge.

(4) The rate of dilution of the thermal effluent by entrainment of the receiving waters into the thermal plume.

(5) The rate of loss of excess heat from the water surface to the atmosphere.

The CBI proposes to undertake studies which will fill the critical gaps in our knowledge of each of these processes. In addition CBI proposes to undertake a continuing synthesis of this new knowledge, as it develops, into improved analytical and/or numerical models for the prediction of the distribution of excess temperature.

A. Development of predicting models of the large-scale circulation patterns and exchange processes in the estuarine waters of the Chesapeake Bay

The purposes of this subproject are to develop methods for the prediction of: (*a*) the seasonal variations in the rate of supply of available dilution water to the tidal segment into which a thermal effluent may be discharged; and (*b*) the large-scale distribution of excess heat along the length of the estuary from any proposed discharge. The local distribution of excess temperature within the dispersing thermal plume in the segment of the estuary adjacent to the plant-site depends, in part, on the excess temperature of the diluting waters being entrained into and mixed with the thermal effluent. This "background" excess temperature depends in turn on the volume rate of supply of new dilution water to the tidal segment into which the thermal effluent is discharged, as well as on the rate of surface cooling. Ability to predict the large-scale distribution of excess heat from any given thermal discharge is required for an evaluation of possible interactions between several powerplants on the same estuary.

Much of the field data necessary for the development and testing of such predicting models has been obtained in past studies of the general kinematics and dynamics of the Chesapeake Bay estuarine system, or will be obtained on studies now funded or soon to be funded from other sources. A major part of the effort

under this subproject would involve the use of existing or soon to be available data in the development and testing of numerical solutions to the pertinent kinematic and dynamic equations, using computer techniques. However, some additional field studies using flourescent dye tracer techniques will be required to measure mixing and dispersion parameters so that the predicting model can be employed for a number of "typical" environments in the Chesapeake Bay System. Cost for first year $40,000.

B. Studies of medium-scale processes of movement and mixing within a tidal segment

The thermal plume resulting from the discharge of condenser cooling water into an estuary will be diluted by entrainment of receiving water into the plume as a result of the excess momentum of the discharge, and as a result of small-scale natural mixing processes. The tidal currents will cause the dispersing plume to oscillate up the estuary on floodflow and down the estuary on ebb flow. Medium-scale processes of movement and mixing within the tidal segment will lead to spread of the plume across the estuary, with a consequent further decrease in excess temperature.

The temperature of water which is entrained into the dispersing thermal plume depends upon the supply of new dilution water available to the tidal segment. The medium-scale mixing processes within the tidal segment are not only the primary factor in determining the lateral distribution of excess temperature, but also determine, in part, the fraction of available dilution water which is effectively mixed with the thermal effluent.

Field studies of the lateral mixing processes are particularly needed in the wider segments of the Chesapeake Bay and the major tributary estuaries. Such studies would involve relatively long period tracer dye experiments at several localities, including the tagging with tracer dye of the discharge of condenser cooling water from the Morgantown, Surry, and Calvert Cliffs plants after these installations start operations. Since the condenser cooling water circulating system is usually completed and test operated prior to the time that heat is generated at a new plant, such tracer studies might be carried out prior to thermal releases from these plants. Cost for first year $40,000.

C. Hydraulic model studies of momentum jet entrainment in a heated effluent discharged horizontally in the presence of a transverse current in the receiving waters

While a number of studies of momentum entrainment have been carried out in both air and water flumes, including a recent study by Carter of the Chesapeake Bay Institute on the trajectory of a bent jet discharged from the shoreline into a traverse flowing flume, some very basic information critical to the development of adequate models for the prediction of the temperature distribution in a thermal plume discharged into an estuary is still lacking. Studies are necessary to provide answers to the following questions:

(1) What is the trajectory and rate of dilution by entrainment in the plume from a heated jet discharge made from the shoreline, into a receiving water body having a uniform transverse ambient flow, and a sloping bottom such that the water depths increase with distance from shore, under various conditions of the ratio of speed of jet discharge to ambient current speed, various bottom slopes, and various densimetric Froude Numbers of the discharge, within the range of these parameters to be expected in practical cases?

(2) How does the trajectory and rate of dilution by entrainment in the plume from a heated jet discharge made into a receiving body of water having a uniform transverse ambient flow and a sloping bottom vary as the discharge orifice is moved offshore, with the connecting discharge pipelines buried beneath the bottom between the shore and the point of discharge?

(3) What effect does submerging the discharge orifice have on the answers to Question 2?

(4) What effect does shape of the submerged discharge have on the answers to Question 3?

(5) How does a periodically varying oscillatory ambient flow, such as the tidal current, have on the answers to the previous four questions?

Studies to date do not supply adequate answers to these questions because: (a) most have been carried out under an experimental design which provided an effective unlimited depth into which the discharges were made; or (b) as in the case of the studies conducted by Carter, any vertical processes were

eliminated by having a fixed, uniform bottom of the same depth as the initial depth of the jet discharge; or (c) were conducted in flumes of insufficient length and width; or (d) did not cover the range of densimetric Froude Numbers of practical interest.

We have contacted the U.S. Army Corps of Engineers Waterways Experiment Station and have obtained estimates of the costs for modification and operation of certain of their existing models to allow us to perform experiments designed to answer the questions posed above. The Chesapeake Bay Institute proposes to design the experiments, provide the model thermal discharge equipment and the temperature measuring instrumentation, carry out the observational program, and analyze the data, using the modified hydraulic models at Vicksburg. Cost for first year $50,000.

D. Field studies of the temperature distribution in the estuarine waters adjacent to existing plants, and to plants now under construction as such plants come into operation

The purpose of these field studies would be to provide information on the actual distribution of excess temperature to be used by biologists in other aspects of this joint study, and to serve as verification data for the thermal predicting models now in existence, as well as for improved models to be developed during the course of this study.

Comprehensive studies in the Chesapeake Bay estuarine system of the distribution of excess temperature have so far been made only in the Patuxent River adjacent to the Chalk Point plant. A number of relatively small plants discharge heated effluent to tributary estuaries of the Chesapeake Bay. A survey should be made to determine if any of these existing plants involve discharge design features, or are located in biological regimes of special significance, which warrant comprehensive field studies. Detailed studies of the temperature distribution adjacent to plants now under construction should be carried out as these plants become operative. Cost for the first year: $40,000.

E. Synthesis of the results of the above studies into improved models for the prediction of the distribution of excess temperature in the Chesapeake Bay estuarine system for any proposed distribution of discharges of thermal effluents

In addition to the synthesis of all pertinent information, as it becomes available, into improved thermal predicting models this subproject would be concerned with the development of design criteria and plant siting criteria for minimizing the environmental impact of thermal discharges. Involved in this study is the concurrent development of a conceptual theory of a model as the field and experimental studies develop the necessary input parameters. Cost for the first year: $40,000.

SUMMARY OF COSTS

The following very preliminary per year cost estimates are made on the basis of a 4-year research program. AEC now supports work at the Chesapeake Bay Institute which would come under the program as proposed above, at an annual the first year: $40,000.

Preliminary cost estimates by subproject

Subproject:	*Estimated average annual cost*
A	$40,000
B	40,000
C	50,000
D	40,000
E	40,000
Total	210,000

It is contemplated that the effort directed on each subproject would vary from year to year, such that in any given year expenditures on some subprojects would be greater than indicated above, while on others the costs for that year would be less than shown. However, the total costs per year would remain at about $210,000, and each subproject would involve an average cost over the 4-year period about as indicated above.

Proposal No. 4

INTRODUCTION

Field and laboratory studies are designed to meet the following objectives:

(1) to obtain adequate preoperational baseline environmental and biotic data in order to characterize any estuarine area which is to be used as a nuclear steam electric station, S.E.S., site (Calvert Cliffs),

(2) to determine the effects of a nuclear S.E.S. operation on an estuarine environment and the associated biota by appropriate post-operational field studies,

(3) to learn the limiting or stimulatory effects of S.E.S. related parameters such as temperature, salinity, light, heavy metals, and so forth, through laboratory and field research,

(4) to determine the biological effects of chronic exposures of oyster larvae and zoo- and phytoplankton to tritium and to determine the turnover of T in the DNA and RNA of oyster larvae,

(5) to develop models based on field and laboratory data in order to predict probable biological effects of various nuclear S.E.S. designs on estuarine systems.

FIELD PROGRAM

The field program is designed to obtain appropriate baseline ecological data from an estuarine area before the pertinent environmental change, operation of a nuclear S.E.S., has occurred. Sampling will provide data on standing crops, production rates, species composition, and spatial and temporal distributional data for the important estuarine organisms found in the area. "Important estuarine organisms" are defined as those species important with regard to biomass and energy flow as well as those that are valuable to recreational and commercial activity. Data will also give the seasonal biotic profile of the water column for those entrained species that may be pumped in with the cooling water supply for a S.E.S. A large amount of information is available in both published and unpublished form from studies by the Chesapeake Biological Laboratory in past years in the Bay region near the S.E.S. site and at a conventional fossil fuel plant on the Patuxent Estuary. These background data have permitted an efficient research design that will complement the existing data and focus on the stated objectives.

The location of field sampling stations are based on the anticipated distribution of S.E.S. discharge water. This information has been obtained from hydraulic model studies at Worcester Polytechnic Institute. Station locations will shift accordingly if the final model report indicates any radical change in previously observed patterns or engineering design. Water quality parameters to be measured and sampling frequency reflect existing knowledge concerning those factors, viz, nutrients, temperature, etc., pertinent to the project and to the ecology of the area to be studied.

Sampling stations

Principal field sampling stations will be located in a manner that reflects distribution of isotherms as predicted from hydraulic model studies. Present engineering designs indicate an intake channel 50 feet deep, the baffle, and a subsurface jet discharge 800 feet offshore and located 7 feet below mean low tide level. Stations will be located at the offshore intake site as well as at the near shore entrance to the S.E.S.

Temperature, salinity, dissolved oxygen, selected nutrients (e.g., inorganic reactive phosphate, nitrite, and nitrate), secchi disk and transmissiometer readings will be measured at each station. They will be measured routinely at selected biological sampling stations on a biweekly basis. Nutrient determination will be obtained at intervals coinciding with primary productivity sampling dates. The available nutrient data for the area is such that monthly or bimonthly data should be sufficient to determine the continued stability of the nutrient system during the 1970–73 study period.

Phytoplankton

The constant light incubator method, as used in the Patuxent River investigations, utilizes controlled light and temperature conditions and appears to measure the photosynthetic potential of the plankton community. Work is planned to provide confirmatory data for the Patuxent studies. Selected stations will be studied about every 6 weeks. C_{14} and dissolved oxygen techniques will be employed to measure photosynthesis.

One in situ reference station will be located in nearby waters that will permit a string of experimental bottles to be exposed to ambient light and temperature conditions. In conjunction with this study data will be compared from the constant light incubator method and a simulated in situ approach. Studies will employ replicate light and dark bottles and the C_{14} and dissolved oxygen method will be used on studies with the reference and simulated in situ methods. For example, samples obtained from depth where 95, 50 and 10 percent of the surface light penetration will be exposed at each of the other two light-depths plus the depth of the original sample. This should permit a better estimate of light saturation effects of the phytoplankton.

These studies will be conducted approximately at biweekly intervals. During the same week, simulated in situ studies will be conducted at selected stations near the powerplant study area.

Ecological relationships between food web components (phytoplankton-zooplankton, etc.) under field conditions will be done in a modification of the large plastic bag described by Strickland and Terhune (1961). The bag would be filled with various combinations of phytoplankton, herbivores and predatores. Any link in the food web (except the producers) could be excluded from the system and events followed. Nutrient chemistry, estimates of phytoplankton standing crop e.g., chlorophyll, particulate carbon, nitrogen, carbohydrate, and lipids will be followed. Zooplankton standing crop (when present) and predator standing crop (when present) will also be monitored. This system will permit energy flow blockage at a chosen level and enable the gain or loss of biomass at other levels to be followed. The bag experiments will respond to field or laboratory data that indicate possible limiting or stimulatory effects on food web components by S.E.S. activity.

Several 24-hour diurnal oxygen curve studies will be attempted at the intake area during appropriate months. A large number of approximately simultaneous samples will be obtained at the study area.

Taxonomy work will be contingent upon the appointment of a person who will be supported by NRI and the Department of Botany. Seasonal phytoplankton species composition of obtained field samples will be a valuable addition to biochemical data, viz., chlorophyll, C_{14}, etc. Such information is also necessary to properly design laboratory studies on this group.

Zooplankton

Movements, production, standing crops and species composition will be measured by analysis of quantitative field samples. Samples generally will be taken at surface, mid-depth, and near bottom at biweekly intervals. Stations will be located along transect plots and will coincide with phytoplankton stations. Periodic, detailed profiles will be made at intake and discharge stations.

American oyster and soft shell clams

Broods of hatchery produced stocks of oysters will be reared and set on asbestos-board panels during the spring of 1970 and at other appropriate times during the study. The C.B.L. pilot hatchery facility will be utilized for this purpose.

At the nuclear S.E.S. site an adequate areawide grid will be selected which will include stations in all areas of the expected thermal plume. In addition, control stations will be located at a sufficient distance up and down the bay, completely out of the suspected nuclear S.E.S. influence. At the selected stations pilings will be driven and panels of hatchery-reared oysters secured at several depths. Population characteristics will be measured in terms of growth and mortality on a monthly basis. Observations will also be made on associated organisms.

The population will be followed for the entire period of pre-S.E.S. operations in order to produce a family of curves which will be compared with similarly obtained postoperational data. These panel oysters will also be utilized for any soft tissue analysis of heavy metals or radionuclides.

A parallel study will involve the infaunal soft-shelled clam which occurs on the bay shelf. The sample stations will coincide with the oyster study but will be sampled quarterly with an escalator dredge. Quantitative $10M^2$ samples will be obtained and processed for density/area and size composition of the population. As with the oyster study, samples from these collections will be saved for any radionuclide or heavy metal determinations.

Smaller benthic components

Monthly samples will be obtained by anchor or van Veen dredge on a gridded station basis. Three 1/10-meter square samples will be taken per station per

collection. A total of 10 stations is anticipated and their locations will coincide with those established for the environmental, phytoplankton, and zooplankton programs. A sediment aliquot will be retained for sediment particle grain size and a subsample will be stored and entered into the C.B.L. sediment library for any possible future analysis. The remaining sample will be screened through 1 and 0.5 millimeter standard screens to retain specimens.

Species composition, standing crop, and growth increment for measurable species will be obtained for the 3-year preoperational period. These data will be compared with postoperational collections.

Fish eggs and larvae

An analysis of results from previous studies, including concentrated Patuxent effort and additional studies of the upper Chesapeake Bay has made possible a general characterization of the abundance, distribution, and movements of fish eggs and larvae of the upper part of Chesapeake Bay (Patuxent north). The bay water of the nuclear S.E.S. site serves both as the incubation area for pelagic fish eggs of dominant estuarine species and an area through which anadromous and catadromous fishes pass on their way to or from the primary estuarine nursery area. As an incubation area, the region includes shoal areas where demersal eggs are attached to the bottom and open waters where free floating eggs drift with water currents. The channel area off Calvert Cliffs is used by maturing fishes which are spawned at sea, but must pass up the bay to low salinity nursery areas. Most of this inshore movement takes place during late summer, fall, and winter. Movement along the same channel but in the opposite direction takes place in the fall when maturing young of anadromous species, as well as adult fish, move toward the sea. Deep holes or pockets along the channel appear to be favorite haunts for both young and old fish during periods of extreme cold.

Based on the above information, the following field program will be undertaken. Two 1-meter plankton nets (surface and near bottom) with attached flowmeters will be simultaneously towed for 5 minute durations on a biweekly frequency. Seasonal data from earlier bay studies that indicate a reduced field effort is permissible during winter months. The basic field sampling approach will follow that of previous studies, and will provide, in addition, seasonal quantitative data on the abundant centophore and jellyfish populations in the area. Stations will coincide with those established for environmental, phytoplankton, and zooplankton data.

Fish and crabs

C.B.L. presently maintains a field sampling program for size composition, standing crop, and distribution of blue crab in the S.E.S. vicinity. A monthly 40 foot otter trawl program for collecting finfish also is presently operative in the S.E.S. vicinity. Both of these studies will be continuing and will provide data to complement the present proposed field programs and can provide needed specimens for any radionuclide or heavy metal studies. The Fishery Department will make efforts to utilize poundnets operated near the plantsite for sampling of migratory fish and as a source of fish for tagging in order to observe behavioral response to plant operations.

Laboratory programs

The laboratory program on bay species will be of both single and multivariate design with variation in time exposure, temperature, salinity, dissolved oxygen, tritium, and heavy metal concentrations. Experimental work will be undertaken on those species and life history stages that can be pumped as entrained organisms in S.E.S. cooling water supplies and on those species and life history stages that are expected to be exposed to discharge water in the estuarine receiving system.

Bioassay, activity and metabolism

These experiments will include, traditional bioassay experiments using monofactorial design and polyfactorial bioassay experiments using a series of multidimensional environmental test chambers, both with mortality as a response end point. In addition, experiments will be carried out under sublethal conditions to determine effects of environmental conditions on performance and activity, and studies, using growth rates and oxygen consumption data, as well as radioactive tracers of critical isotopes, will be undertaken to determine effects of various test conditions on metabolic activity.

Biochemistry and radiochemistry

(*a*) Lipid composition of selected bay organisms and the content of the nucleotides (particularly AMP, ADP, and ATP) and nucleic acids (DNA and RNA) will be established. Analysis of the organisms for heavy metal concentrations will be made on field samples, and on animals in culture under laboratory conditions.

(*b*) The rate of incorporation of T (from water) into DNA and RNA of the organisms will be studied at different levels of T in water. The rates of elimination of T from DNA and RNA (so labeled) will be studied both in vivo and in vitro to establish the effects of varying levels of T in water in leaching out the radionuclide from labeled DNA and RNA. The purpose of these investigations is to accumulate baseline data from which the biological hazard of T to the bay organisms may be assessed.

(*c*) The uptake of Cu, Cd, Ni, Fe, and Pb by selected organisms will be studied at different concentrations of the nuclide in question. Nuclide elimination will be studied similarly, using "pulse labeled" organisms. Simultaneous estimates of the rates of turnover of DNA (cell division, DNA replication) RNA (protein synthesis), energy-nucleotides (AMP, ADP, ATP) and phospholipids (membrane phenomena) can be made using techniques recently developed in our laboratory. Such estimates will be made on the organisms with known body-burdens of heavy metals and compared with that of suitable controls. It is hoped that such a battery of tests will lead to the locus of any biochemical lesion associated with a body burden of a specific "heavy metal."

Environmental—Biotic predictive models

The laboratory data will be integrated to develop predictive capabilities concerning biotic responses to variation under different sets of environmental conditions. A first attempt has been made to develop a temperature-biotic predictive model for an estuarine system from similar data on thermal effects of a conventional fossil fuel S.E.S. on the estuarine environment of the Patuxent River. Generation of predictive models depends on several types of input data. In the Patuxent case these included metabolic and activity information and the development of efficiency curves relating energetic aspects to various behavioral or metabolic parameters under a variety of laboratory test conditions. Laboratory data may be used to extrapolate to the natural environment and to determine which temperature ranges are optimal or suboptimal for a particular orgnism or population. Data from the giant plastic bag experiments should provide energy flow data under various population structures and thus add another necessary dimension to the model work.

SCHEDULING

It is proposed to undertake research in the following phases:

First year—1970

1. Field investigations at the Calvert Cliffs nuclear S.E.S. site to develop baseline data on seasonal environmental conditions, species composition, seasonality, standing crops, spatial distribution and production of biotic components. All sampling techniques and designs will be tested and calibrated.

2. Initiation of basic work on the lipid and nucleotide composition of oyster larvae, two species of zooplankton and one of phytoplankton. Similar work will be done on mixed representative populations of plankters.

Budget request: $129,239.

Second year—1971

1. Modify field sampling effort on basis of first year's observations. This may simply involve less frequent sampling.

2. Begin phasing in laboratory research on effects of temperature on mortality, activity and metabolism on key estuarine species in both single variate and multivariate designs.

3. Start establishing conditions of pulse-labeling of the DNA of oyster larvae and plankton with tritium. Study the turnover rate of the tritium in the DNA of these organisms.

4. Initiate work on "heavy metal" composition of selected species under field and laboratory conditions. Items 3 and 4 will have the long-term objectives of establishing, at the biochemical level, the biological changes associated with burdens of tritium and of heavy metals.

Budget request: $219,778.

Third year—1972

1. Continue field observations, completing baseline data.
2. Initiate full-scale laboratory research to provide data for predictive model, including laboratory program to determine uptake and accumulation rates for tritium and heavy metals in key estuarine organisms.

Budget request: $211,008.

Fourth year—1973 (Note: First unit scheduled for operation)

1. Continue all laboratory research and refine predictive model.
2. Anticipate beginning full-scale field program following the initiation of nuclear S.E.S. electricity generation.

Fifth year—1974

1. Continue laboratory research and refine predictive model.
2. Continue full-scale field study as second unit is placed on the line.

Sixth year—1975

1. Complete laboratory studies.
2. Complete field studies.
3. Evaluate pre- and post-operational data.

Seventh year—1976

1. Complete reporting and evaluate value of developed models.

NOTE: The above schedule meets time requirements and nuclear S.E.S. planning at Calvert Cliffs. However, the proposal gives research design and budget requests only for the first 3 years of effort. Continued work should be subject to review and will depend to a degree on operational activities of the nuclear S.E.S. at Calvert Cliffs.

Proposal No. 5

INTRODUCTION

The objective of this proposed study is to determine if marine holoplankton, meroplankton (especially mollusc larvae), and nekton can tolerate thermal shocks of 5° to 10° C. and survive, develop, and reproduce.

Generally speaking, modern electrical generating facilities utilize mechanical methods for the prevention of condenser tube fouling. Organisms contained in the volume required for cooling are subjected only to moderate pressure changes while passing through multiple-stage, low-lift pumps before being exposed to an elevation of temperature of from 5° to 10° C. during the denser tubes. Plants designed to produce minimal damage to the environment have the shortest possible effluent canals with restricted openings to produce maximum mixing at the mouth so that entrained organisms may be exposed to ambient temperatures within 30 minutes after the thermal shock.

Many studies have been conducted on the thermal tolerances of aquatic organisms. At least five comprehensive literature reviews are available. Unfortunately, few of the data available are of aid to regulatory or management agencies (or their scientific advisers) which are charged with making decisions regarding the effects of thermal shock on marine and estuarine organisms which may pass through the influent canal screens and pass through the condenser system. This is because most of the available data derive from experiments which do not simulate operating conditions in electrical generating stations.

This proposal is designed to provide information which will be of value in evaluating the effects of the utilization of natural water for cooling purposes on the environmental health of the system.

Thermal studies were initiated at the Virginia Institute of Marine Science in 1962 to determine the effects of a steam electric generating facility on the estuarine environment (Warinner and Brehmer, 1966). More recently, these studies have been expanded to include long-term effects of thermal shock on phytoplankton and short-term (3-hour) mortality studies utilizing oyster (*Crassostrea virginica*) and hard clam (*Mercenaria mercenaria*) larvae as test organisms. The preliminary data indicate that adverse effects are minimal at the operational temperatures which are used today in order to comply with water quality standards. These data are only preliminary, however, and meroplankton must be cultured through setting and metamorphosis before conclusive statements can be made. We are aware that the environmental health of an estuarine system is dependent upon critical species at each trophic level and that our data are far

from complete. The proposed study is therefore designed to yield comprehensive data from both field and laboratory investigations which will aid in evaluating the effects of the utilization of natural waters for cooling purposes on the environment.

DESIGN OF STUDY

Approximately 30 species of estuarine and anadromous organisms considered significant to the environment are indigenous to the reach of the James River estuary which will provide cooling water for the facility under construction. Some are of considerable ecological and economic importance. This study is designed to test the tolerance of each species to short-term thermal shock and the ability of the organisms to complete their life cycle after being returned to ambient temperatures. Since salinity is also a factor in temperature tolerances, a multivariate design will be utilized.

Organisms will be cultured and reared to the desired stage in water of a defined temperature and salinity which approximate those found in the estuaries of the mid-Atlantic bight. Water containing the organisms will be cooled to ambient temperature and the organisms cultured through the sensitive stages in the life history or, in the case of zooplankton, to the next generation.

After the facility on the James River is operational, tests will be continued using organisms collected from the influent and effluent canals of the plant. Those field data will be used to verify the laboratory data.

Personnel will install asbestos plates on the instrument platforms to collect fouling organisms. These towers are scheduled for installation in 1970. The species diversity on the plates will indicate if the estuary is undergoing environmental degradation as the result of the thermal discharges.

THE ELECTRIC POWER INDUSTRY IN CRISIS AND TRANSITION: THE NEED FOR A NATIONAL ENERGY-ENVIRONMENT POLICY

(A Keynote Address by Carl E. Bagge, Commissioner, Federal Power Commission, Before the American Power Conference, 32d Annual Meeting, Sherman House, Chicago, Ill., April 21, 1970)

The privilege of keynoting this year's annual meeting of the American Power Conference is a distinct honor and I am grateful for a number of reasons—particularly since this conference comes at a time when the electric power industry apprehensively prepares for the dawn of a critical new decade. The appearance of the chronological milestone traditionally provides an opportunity to re-evaluate what has gone before and to redefine the relevant goals for the years that lie ahead. But more importantly, it also comes at a time when this vast industry—the Nation's largest—finds itself uniquely on the defensive as it has never been before. Indeed, it finds that its very right to expand and serve the growing energy needs of the Nation is seriously questioned and has become a national political issue. An earlier political confrontation faced by this industry resulted in broader economic regulation under the Public Utility Holding Company Act. The essential objective of this industry to serve the increasing power needs of the Nation has never before been subject to doubt, however, today it is being severely challenged by even some of our most respected thinkers. Thus, I regard this occasion as a unique opportunity to take advantage of an important forum, at a most critical time, to express the deeply felt concerns of one of the regulators of your industry.

I

In the title to this address, I have characterized the electric power industry as one in transition. I have done so because, upon analyzing the events of the past decade and relating them to the future, the overriding characteristic which manifests itself is the emergence of new industry goals and the shift of emphasis with respect to these objectives.

Does it seem possible that it was but 6 years ago, in November 1964, that the Federal Power Commission, in cooperation with all the segments of this industry, published the first National Power Survey? This comprehensive nationwide survey was undertaken in order to define and articulate the long-range goals of the industry. Some of the finest talent in government and industry studied the past performance of this highly fragmented industry; and as they observed

the developing trends in generation and transmission; and as they projected the future supply and demand for electricity, there emerged a concept—a vision, if you will, which was translated into presumably attainable objectives—which were characterized as "guidelines for growth." That goal of the mid-sixties was to provide greater impetus to the trend toward the integration of the Nation's power systems; to move from isolated or segmented operations and from existing pools of limited scope, to participation in fully coordinated power networks embracing entire regions of the country.

In time, when justified economically, all the regional systems in the Nation would be joined in a single interconnected network. From such coordinated regional and interregional planning, in which all ownership segments could participate and build facilities to meet their combined needs, there would inure vast economies of scale in generation and transmission to stimulate demand and afford the Nation continuously more increments of electric power, at lower costs, to the mutual advantage of both producer and consumer. More and even more electric power at lower costs. This, then, was the vision of the National Power Survey. It provided the goal of this industry in the mid-sixties.

Looking back only the few years since its publication, one is struck by what in retrospect was an inexplicable lack of humility on the part of the architects of the National Power Survey. Certainty must have existed even then in the thinking of the utility industry and its regulators. The questioning of the limitations of technology, its direction, and even its values, which was then being focused on other sectors of our society, apparently had not extended to the electric power industry. And if it was, we must have believed that the utility industry would remain immune from these forces.

How did this happen? How could we all have been so positive—so blindly certain—that the only challenge—the only goal—was the one which we conceived—that of continually reducing costs in order to usher in the era of unlimited power—the era of the gigawatt—the electric energy economy—under what we characterized as "guidelines for growth." I submit that it was engendered by a monstrous sense of intellectual and technological arrogance which ignored not only the limitations of technology but even more importantly, the limitation of the vision of its high priests. The arrogance of our high priests is spread across the pages of our technical journals and in the National Power Survey as an irrevocable indictment of our own myopia. Today we stand convicted by our own testimony.

The arrogance manifested in the National Power Survey was, however, to be short lived. For within exactly a single year after its release we were made humble. On November 9, 1965, the system fell apart in one awesome moment and, unfortunately, in the area of the Nation which exercises a disproportionate influence upon public opinion. Such an occurrence in any other area probably would not have led to the events which followed. In New York is struck as a national calamity and every American, as a consequence, was made insecure about the reliability of his power supply. Those of us on the Federal Power Commission at that time were summoned before congressional committees to give an accounting of our stewardship of the public trust and to defend the then severely questioned articles of faith underlying the power survey—the value of regional interconnection and coordination. Although these objectives survived the testing of the legislative crucible, the goal of this industry was significantly altered in the process.

I make no apology for having joined my colleagues in endorsing what became a highly controversial legislative proposal—the FPC sponsored Electric Power Reliability Act of 1968. Its very existence, and the reaction which it generated within the industry, in my opinion, constructively accelerated the evolution of regional and national reliability planning. This proposed legislation served a vital function simply by its introduction. Its enactment, in that or in any one of a variety of its existing forms, would now be a tragic mistake. The goal of this industry was broadened to embrace reliability. It is today being pursued in a meaningful way.

But even as the industry was striving to evolve the institutional framework necessary to cope with the problems of technological reliability and at the same time waging a defensive struggle in the Halls of Congress, a new issue began to take shaps on the horizon. At first it appeared docile enough to be manageable. You even coined a new term to deal with it. "Beautility" was this industry's response to its critics.

New designs for transmission towers and low silhouette transformers were introduced. Residential distribution facilities went increasingly underground. However, as the issue began to take on form and substance, much like a storm cloud, it quickly mushroomed and soon enveloped not only esthetics but also all aspects of the electric power industry. As a consequence, soon after it was coined, "beautility" was erased from the lexicon of the industry as a far too superficial characterization of its response to the issue.

The newly emergent environmental ethic with which this industry sought to deal constructively in its Report of the Electric Utility Industry Task Force on the Environment suddenly became radicalized. And, because its principle thrust was aimed directly at the heart of the industry—the right to expand—it has transcended all other goals and raised critical questions with respect to the adequacy of electric power to meet the existing and projected levels of demand and with respect to the level and configuration of future demand.

Thus, in the few years since the release of the National Power Survey, the goals of this industry have been radically altered. The emphasis has shifted from an unquestioned commitment to constantly lower costs, first, to greater reliability and quality of service; and now to an adequate power supply without degradation of environmental values. Today, these goals are but different facets of a broader national objective—one which President Nixon in his state of the Union address characterized as a concern for the quality of life. Surely both a reliable and adequate supply of electric power are just as vital to the achievement of that objective in contemporary society as is the urgent need to halt the destruction of our environment. And to the extent that these concerns are interrelated, all of us today, regulators, consumers, and utility managers alike, must be prepared to accept a posture which would have been unthinkable for all of us only a few years ago.

II

Today, the forces of transition are just as powerful and just as pervasive as those which led to the changing goals of the past decade. They are now at work shaping the goals of this decade. So it is with an awareness of change that an attempt must be made to come to grips with the future. None of us consciously seek the mantle of the doomsday prophet. But neither can we responsibly look to the future with blithe complacency. Already here are numerous signs which manifest a growing apprehension concerning the ability of this industry to meet even its most recent goal of achieving adequate electric power without environmental degradation.

The approach of summer, for example, arouses an uneasy feeling within many of us. It is caused by more than the dread of personal discomfort brought about by thoughts of heat and humidity. It is the result of an awareness that the turn of a page on the calendar may be accompanied by regional power shortages. Already there have been early forebodings of what may, in a few months, develop into the recurring annual drama which has become symptomatic of the electric power industry in some areas of the Nation. The signs are clear to even casual observers of this industry: newspaper advertisements alerting the public to possible power reductions, expressions of concern from many sectors of industry and government, critical manufacturers' strikes, threatened transportation strikes, fuel shortages, an abnormal number of production delays and equipment failures and a new militancy on the part of the public regarding the location of utility facilities.

Incredible as it may seem, there are those who scoff at the idea that the electric power industry could again suffer some agonizing moments. Even more remarkable is the fact that some of your industry leaders maintain that it is sheer nonsense to suggest, as many of us have, that there presently exists a power crisis of national significance. Yet, that is precisely what Mr. A. H. Aymond, president of the Edison Electric Institute, recently stated in a speech delivered to the security analysts in New York City. I sincerely wish that I could share his optimism regarding the present state of this industry. Faced, however, with the hard reality of the acute problems besetting electric manufacturing, generation and transmission, and recognizing further that these problems are likely to increase rather than decrease in the immediate future, I would be less than responsible as a regulator of this industry if I continued to permit this comment to go unchallenged. I am obliged to make use of this forum to take issue with Mr. Aymond and to describe the situation confronting the electric industry

today as one which constitutes a national crisis. Minimizing this fact will only make its eventual realization that much more devastating. Inducing the public to ignore it would be catastrophic.

To those of us willing to acknowledge the existence of the crisis there is raised the question of how it came about. What were the forces that created it, for obviously it did not just happen. It evolved out of a series of unrelated events—the cumulative effect of which gave shape to its existing form. The underlying factors must be understood if similar situations are to be avoided in the future and if the existing crisis is to be intelligently resolved.

Obviously, one of the most significant factors has been the sudden emergence of an almost religious fervor about the quality of our environment which has provided, within the political dynamics of this industy, a substitute for the old orthodoxy—the public's relentless demand for cheap power. Few issues have so captured the public's imagination. The speed with which it was transformed from a benign environmental ethic into a zealous ecologic faith has been nothing less than meteoric. Its sudden emergence as a national religion has profound implications to our theologians—and to the electric power industry. The environmental awakening will achieve even greater impetus throughout the Nation tomorrow when, to the accompaniment of teach-ins, marches and demonstrations, hundreds of thousands of converts rivaling the crusades of Billy Graham will make commitments to the new religion of ecology.

The growing national awareness of environmental quality has only now begun to make its presence felt on your industry. Yesterday, you were confronted only by groups of angry citizens. Today, counties and municipalities are expressing their concern by directing your choice of fuels for the generation of electric power. Tomorrow the Department of Justice may be opposing the generation of electric power by waging the battle of Turkey Point in every courtroom to prevent the boiling of plankton in the Nation's waters. The issue is incredibly comprehensive and defies easy resolution. It is crucial both to the reliability and the adequacy of the Nation's electric power. It must be faced and it must be resolved.

Of equal importance to an understanding of the existing crisis are the explosive population growth patterns of the Nation and their consequential affect upon the demand for electric power. Volumes have been devoted to studies of population expansion. Page after page of statistics point to an incredible population picture which at times defies comprehension. Some predict that this Nation's population will double by the end of this century. The impact on demand is obvious. Past experience indicates that demand has been doubling every 10 years and our latest studies predict an increase of nearly four times by 1990. Contributing to this is the fact that per capita consumption is expected to nearly triple during this period. Of profound importance, however, is the fact that since our population will increase absolutely, a tremendous surge in electric power demand will occur regardless of the rise in per capita utilization.

The commitment by this industry to nuclear power generation also lies at the root of the crisis. Stimulated by Government policy, utility planners envisioned nuclear power as the answer to future expansion of their generating capacity and placed an inordinate amount of their eggs in the nuclear basket. And now the chickens have hatched and come home to roost. Although these vast nuclear generating complexes were welcome additions in the fight against air pollution, they created a new problem of thermal pollution which this industry for awhile, insisted on characterizing as "thermal enrichment." Economy had also been one of the virtues of this mode of power generation. Now, however, the statistics from recently installed units were knocking earlier cost predictions out of the hat. The cost of skilled labor, quality control and stricter safety measures—all acted to skew investment curves beyond acceptable limits. New units did not become operational on schedule and suddenly the manufacturers were reporting that orders for new nuclear facilities had dropped to the level of the 1950's. The hard facts had to be faced—nuclear power generation was not the great panacea we had envisioned.

But there were more than merely economic factors which led to this crisis. Technology, which had so brilliantly brought forth nuclear generation, was at an impasse in developing the acclaimed salvation for the future power needs of this country—the fast breeder reactor. After the inauspicious record and nearly catastrophic disappointment of the Enrico Fermi facility, the AEC and the industry found that their ambitious endeavor had fallen far short of its projected goals. It would be at least 1985 before the fast breeder, even with a

sufficient commitment of funds at the earliest possible date, would have an impact on the Nation's power generation.

Faced with these pessimistic developments in the nuclear field, it has become evident that the need for fossil fuel generation will appreciably increase. Even if nuclear generation should emerge as originally envisioned, fossible fuel generation will nearly double in the next 20 years. To many, especially those who had counted so heavily on nuclear generation, this realization has been slow and difficult. It even caught some segments of the industry unprepared. After all, who wanted to consider the environmental ugly duckling—when the promise of nuclear generation was ultimately to redeem this industry.

The problem posed by the necessity to rely on fossil fuel generation as the backbone of the industry for many years to come is compounded by the fact that low sulfur fossil fuels are simply not presently available in sufficient quantities to clear the air pollution hurdle which now has been imposed upon the industry. Natural gas, the cleanest fossil fuel, accounts for one-quarter of all electric generation by steamplants and for one-sixth of the gas consumed in this country. It appears unlikely, however, that domestic gas supplies will be able to substantially alleviate the problem. While imported LNG and residual fuel oil hold out some promise, neither do their prospects appear sufficient to resolve the problem. Low-sulfur coal is plagued by problems of supply, location, and difficulty of extraction. Unfortunately, the deposits and markets do not coincide and one can only wonder about how feasible it is in the long run for the Chicago market to look to Wyoming and Montana for its fuel supply. Add to this the recent sanction of Commonwealth Edison's proposal to import Venezuelan low-sulfur residual oil, and one can begin to appreciate the agony this industry is presently experiencing in its effort to meet both its environmental and its energy service commitments.

Another factor contributing to today's crisis can be traced to the nature and scope of the industry's research and development program. Technology plays a unique role in the electric power industry—one need only glance at this conference program to appreciate this. As engineers, you have devoted your careers to this discipline. But despite the achievements of the past, the result is still far short of the goal. The delegation by this industry of its basic responsibility for research to its equipment manufacturers have proven insufficient. And to the extent to which you have discharged this responsibility yourselves, it has been largely in the form of market-oriented programs geared to a fast return on investment. It has not dealt meaningfully with equally vital concerns illustrated, most notably, by the existing environmental crisis. Moreover, the cash flow objective of your own research and the profitability criteria of your equipment manufacturers' research simply do not coincide completely with the needs of your industry and the public. The solution to such pressing problems as sulfur removal from the fuel or from the stack emissions to make all eastern coal usable, better methods of cooling generating facilities—especially "dry" cooling, and more economic underground transmission—cable insulation, d.c. converters and super conductors, have not received adequate attention.

The market-oriented philosophy reflected in your research effort has another outcropping in the form of promotional practices and promotional rates. While the industry has waged a campaign for an increasing share of the energy market, the success of these skirmishes has accelerated the already spiraling load forecasts and has created a level of demand which, in some cases, cannot now be met. It is paradoxical that the industry persisted in this objective at the very time there existed warning signs of forced load curtailments, through brownouts, voltage reductions and interruptions of service. In its quest for promoting greater electric use, this industry is now obliged to expend its resources to meet a market demand—which it has itself, in part, created while experiencing difficulties in meeting normal market demand.

Still another outcropping of the market-oriented mentality is reflected in the irrational competition for markets without concern for the superior adaptability of particular energy forms to specific functions. This has contributed to the existing power crisis. The validity of growth for growth's sake is now being questioned by even orthodox thinkers. An objective review of existing competitive marketing policies is now required to determine whether, for example, other energy sources can, in some instances, more rationally serve the space heating market.

III

The existing power crisis and each of the several forces which have created it must be met head on if this industry is to successfully bridge the period of transition which will run as a span across this decade and the decades to come. Because the environmental concern exists as the most pervasive factor in the present situation, I should like to deal with it here by recommending a fundamental step that I believe is essential to any meaningful solution of the crisis.

There is a tendency in all of us to refuse to come to grips with problems and formulate answers which necessitate a change in our thinking, attitudes and objectives. This is particularly evident on both sides with respect to the emotional issues raised by the concern for our environment on the one hand and the continuing growth of our needs on the other. The allegation that every environmentalist seeks to curtail all future growth is obviously an oversimplified rallying cry that has served only to polarize positions and encourage meaningless denunciations. The question facing this industry obviously is not one of either pollution or blackout. Except for the radical fringe, no one seriously advocates turning back the calendar. Anyone with a glimmer of real understanding of the nature of the problem realizes that substantial additional electric generating capacity must be constructed in the decades ahead just to keep pace with the essential and basic needs of our expanding population, irrespective of any increase in per capita utilization. Rational minds will also concede that even more substantial increments of additional electric energy must be produced in the future to successfully wage the entire environmental battle on many other relevant fronts such as meeting the growing requirements of the depressed areas of our Nation, the urgent needs of the inner city, urban and mass transportation and the staggering waste disposal problem.

In the past, all of us have paid the price for the devastation inflicted upon the household of mankind by an industrial society. But it was assessed as a social cost which could be measured only to the extent that the benefits of our natural environment were denied to us. The damage was not reflected in the prices paid by us. Thus, the true cost of goods and services were understated to their competitive advantage. Today, we acknowledge that industry and consumers must bear the cost required to put an end to environmental degradation. This social cost must as a matter of national policy be recognized as a cost of doing business just as the cost of preventive maintenance reflects the price paid by the consumer for safety and reliability.

I take profound issue with those observers of the industry who advocate the rationing of electric power as the answer to this dilemma. I do so because I am convinced that the economic impact of the transformation of the social cost of environmental degradation into the cost of service of the utility industry, channeled by means of a realistic rate design, and the elimination of certain attendant promotional practices, can provide this industry and its regulators with sufficient leverage to moderate and shape effective demand.

Overly emotional reaction to this issue necessitated that more time and effort be expended to create an awareness of the devastating impact on our lives and the urgent need to bring the abuse to an immediate halt. Unfortunately, there has been a tendency to become too preoccupied with the creation of the institutional structure and the forum necessary to consider the environmental issues and not enough attention has been devoted to fundamental solutions. More than enough rhetoric, and gratefully even some constructive dialogue, has been brought to bear upon the institutional questions which have already been identified and are, it appears to me, headed toward a constructive solution. State legislative action is beginning to provide the needed governmental forums for the resolution of the siting problems of both generation and transmission and the evolution by the Federal Government of minimum standards for thermal and air pollution are being created to determine the operational characteristics of these electric utility facilities. Furthermore, the acceptance of open and long-range planning by this industry and its eventual coordination into comprehensive regional planning will culminate the urgently needed institutional response. This much of the problem will soon be behind us.

Therefore, an urgent need now exists for a commitment to a course of action which focuses on a more fundamental solution. The question of whether we can meet our growing need for electricity without environmental degradation must be answered decisively and definitively by the leaders of this industry by a total commitment to providing for the essential growth consistent with our environmental goal.

In order to gain the confidence and the trust of a concerned public, this commitment, however, must be shared by both Government and the industry. It must be total and it must extend beyond merely providing an institutional apparatus for the siting of facilities and establishing operational standards. It is essential that we direct our attention to the more fundamental policy considerations which must set the parameters for the achievement of that goal and which are determinative of whether the goal can, in fact, be achieved at all. For reality requires that we recognize that this objective can only be achieved within the limitations of the available fuels and the existing fuel technology. Our commitment to this goal, therefore, involves nothing less than the dedication of national energy policy to its attainment.

IV

Energy resources are critical to the security and economic welfare of our Nation. So it follows that an objective of Government policy is to develop and maintain adequate supplies of low-cost energy. In the United States, unlike some other countries, this does not burden the energy industry with centralized production plans and allocation directives. The Government instead is called upon to establish an atmosphere conducive to the growth of the energy industry. Government is the economic climatologist charged to forecast only sunny days. But, unlike the weatherman, an error in prognosticating the practical effect of the particular Government fuels policy means more than just a foot in a puddle.

The collective impact of the numerous specific national fuels policies can be regarded as our national energy policy. This policy has evolved from the interaction of the response of both Government and industry to specific energy needs based upon two overriding national objectives: national security and economy or, perhaps more accurately stated, national security or economy because a single fuel policy cannot always accommodate both objectives.

National energy policy is wide ranging and includes programs to fund and encourage scientific energy research in order to increase supply, enhance utilization and decrease costs; to control the wellhead price of natural gas; to limit petroleum imports to encourage development of nuclear generation; to offer tax and other incentives to promote the exploration and development of various fuels; and to encourage the long-distance transmission and regional coordination of electricity. It embraces conservation laws to prevent the waste of valued resources. Interfuel competition is favored and when the muscle of competition does not flex, Government regulation and antitrust policy, which must be regarded as essential parts of national energy policy, is no 97-pound weakling.

Since the evolution of our existing national energy policy there has emerged and risen to the very highest position on our scale of national priorities a number of specific national environmental goals. Although it may have been too early for us to recognize all of the ramifications, their collective effect must now be regarded as our national environment policy. It is, of course, still in the process of evolution. Indeed, bits and pieces of that policy are being forged almost daily in legislative halls throughout the Nation. However we must now recognize the significant impact that the evolving environmental policy and our national energy policy have upon one another.

Obviously, national energy policy significantly affects what fuels are available to alleviate environmental concerns. On the other hand, clearly discernible now are the profound implications of that evolving national environment policy, as it has already been shaped, upon our existing national energy policy. For example, environmental goals have not only entered into the decisionmaking process whether it relates to coal, oil, or any other fuel—they have, in many cases, provided the decisive determinant. Indeed, in a constantly increasing proportion in the electric utility industry, these decisions have been wrested from the hands of management, and have been made a matter of Government fiat either by restrictions on the quality of fuel or absolute prohibitions on its utilization. And the pressure continues to mount.

Fuels which existing national energy policy has ordained to compete are thus removed from the marketplace by the new national goal. Fuels which, on the other hand, could serve these new goals are effectively foreclosed from the market by existing energy policy. And even when environmental goals have overridden existing energy policy, such as in the importation of Venezuelan oil to a generating plant in Chicago, it has been done in an atmosphere of crisis, as an ad hoc deter-

mination, and without the benefit of guidelines sensitive to the implications of the decision.

It is now clear that our national energy policy must consciously be directed to the attainment of the emerging national environmental goals. It must be transformed into an instrument of national environmental policy. The rationale for our national energy policy should now therefore be expressly extended beyond considerations of national defense and economy in order to encompass this equally paramount national objective. And, just as a new test of environmental feasibility has now been added to the longstanding prerequisites of engineering and economic feasibility in the construction of utility facilities, so must our national environmental goals now be added to the longstanding objectives of national security and economics in the formulation of national energy policy. I believe that this objective can best be achieved by the formulation of a coordinated national energy-environment policy.

What has the recognition of this fact to do with the electric utility industry as it faces a new decade and attempts to contribute to the quality of life? The coordination of our national energy policy and its goals with national environmental goals, in the final analysis, and in the most fundamental sense, provides the real hope for this industry if it is to continue to serve the Nation and its growth without degradation of the environment.

The development, articulation, and implementation of such a national energy-environmental policy provides the only cornerstone of such hope. We can no longer engage in the wholesale elimination of fuels, such as high-sulfur coal, without providing both for short-term substitutes and for the technology which will inevitably redeem them again for the marketplace. We can no longer, for example, prevent the economic transportation of gas in liquid form from Alaska to the west coast markets where it is urgently needed to provide a short-term substitute fuel. But this is precisely what we are doing by administering an energy policy which was designed to achieve other goals.

All aspects of our energy policy must, therefore, be reappraised. This includes tax incentives, oil import restrictions, gas producer regulation, regulatory policies, the Jones Act, and a score of other fuels policies which will determine whether we can achieve our goal of growth in the energy industry without environmental degradation. The most immediate need, however, is for a basic reappraisal of our R. & D. objectives.

National energy policy presently includes the expenditure of enormous sums for energy R. & D. A recent study by the Energy Policy Staff of the Office of Science and Technology reported that $368 million will be spent in fiscal year 1970 on civilian energy research and development through programs supported by Federal funds. About 90 percent of the Federal R. & D. expenses are addressed to the problems and opportunities of the electric power industry. The research and development effort for atomic energy received over 84 percent of all the Federal funds for energy R. & D. It has also received approximately $3 billion of Government expenditures in the past 20 years. Compared with this ambitious Federal commitment to atomic energy, the amounts of money which have and are being allocated for the improvement of fossil fuel generation and for other fossil fuel energy research are ridiculously small. It should be made clear that I am not advocating a reduction in the dollar allocation to nuclear energy research. Rather, I am suggesting that more money be appropriated for nonnuclear energy R. & D., so that we may strike a balance between the lure of unlimited energy through atomic power and the continued development of our other primary energy resources.

I believe that energy policy must drastically expand nonnuclear energy R. & D. for two essential reasons:

1. Fossil fuel will continue to be a major source of primary energy for electric power generation. In the Federal Power Commission's updating of the national power survey there appears to be ample evidence that even with the optimistic forecasts of nuclear growth in the next two decades there will be a continually expanding demand for fossil fuels for electric power generation. If the electric utilities are permitted to expand at their projected rates of growth, fossil-fueled, steam-electric generating capacity will increase from 261 gigawatts in 1970, to 559 gigawatts in 1990. Correspondingly, the electric power industry's annual demand for fossil fuels will nearly double in the next 20 years. By 1990 we will require coal, gas, and oil for electric power generation in quantities equivalent to nearly a billion tons of coal annually, in addition to nuclear fuels equivalent of about 1.1 billion tons of coal. There can be no question that the need for fossil-fueled generation will continue well into the 21st century.

2. Because of their own unique characteristics, fossil fuels can make invaluable contributions to the quality of life in the decades ahead. I think it is much too early for Government energy policy to write off fossil fuels. As long as nuclear energy research is concentrated in a single agency while fossil fuel production, transportation, utilization, conversion, and other research is divided among a dozen agencies, fossil fuels will inevitably be disadvantaged in the competition for the energy R. & D. dollar unless energy policy responds to this environmental need.

Except for the nuclear power field, most energy R. & D. programs exist on minimum subsistence budgets reflecting little or no relationship to our new environmental goals. For example, in the electric power industry alone every 1-percent improvement in fossil fuel utilization efficiency would lead to a saving of 10 million tons of coal annually by 1990. Correspondingly, there would be a reduction, however small, in the environmental problems.

Government policy must also stimulate through a variety of means, including tax incentives, an equivalent commitment in the private sector to R. & D. programs relevant to this goal. The market-oriented research of the past by the electric utility industry and its manufacturers must give way to programs which are addressed to the primary challenge of this decade of the seventies. Regulatory policy, both State and Federal, must also accommodate this goal. Corporate budgets must also be reexamined to reevaluate the relative significance at this time of promotional advertising and the commitment, measured by research dollars, to the achievement of this goal.

How well we respond to the need to limit emissions of air pollutants from fossil-fueled plants is to considerable measure a function of our research policies. A technology for the removal of particulate matter from powerplant flue gases is already available. This is not the case with oxides of sulfur. Although several technologies currently under investigation hold out promise of removing varying proportions of the sulfur oxides from the flue gases, none have been sufficiently developed to make them generally acceptable on a commercial scale. Keeping in mind that powerplants contribute about one-half of the sulfur oxide emissions in this country, it is crucial that research efforts be expedited toward the resolution of this problem in view of the significant role of fossil fuels in the future.

In this sense natural gas is the most desirable powerplant fuel. But, it is evident that we could not possibly replace all the uses of coal and oil in this country with natural gas as a preventive measure against air pollution.

The technology is presently available to substantially reduce the sulfur content of residual oil prior to combustion and, as a result, the electric utility demand for this fuel has increased rapidly in the past several years. Domestic production of residual oil, however, is continuing to decline and electric utilities are depending on foreign supplies for an ever-increasing share of their residual oil requirements.

Until recently this demand was largely limited to the east coast and, to a much lesser extent, the west coast. But the pressure for using low-sulfur fuels in electric power generation is so great, and the economically available domestic supply of these fuels so limited, that utilities as far inland as Chicago now find it necessary to import low-sulfur oil from abroad. Who here would have believed 5-years ago, that 4.5 million barrels of oil will be barged 1,000 miles up the Mississippi River to replace coal in Illinois? As a Chicagoan I would have been the first to question the rationality of such a decision only a year ago. I still feel very uneasy about it.

But can we expect a solution from the coal industry? Some relief—yes, but a solution—no—not without stack devices. The United States has large reserves of low-sufur coal—coal containing about 1 percent sulfur or slightly less. However, the bulk of these reserves are located in a continuing belt that stretches from North Dakota, west through Wyoming, Utah, and Colorado, and down into New Mexico and Arizona. Much of the coal production capacity in the East, however, is in high-sulfur coal. To the extent that low-sulfur coal is found in the East, a major portion of these reserves is dedicated to the steel industry and to export markets where it sells at substantially higher prices.

In time production of low-sulfur coal could be greatly increased. But the use of this fuel, with its 1 percent sulfur content, will not solve the air pollution problem, but merely keep it from becoming much worse. A major effort to redeem high-sulfur coal for the market must therefore be an essential element of a National Energy-Environment Policy.

A national program should now be instituted to achieve this objective and at the same time, the importation of low-sulfur fuels including oil and LNG must be encouraged to meet our present needs for clean fuel during the interim. It may be necessary to channel the available low sulfur fuels to those markets where sulfur oxide emissions are a critical problem. Substantial efforts must also be brought to bear upon the transportation problems relating to the cost of moving Western low sulfur coal and our policy with respect to the shipment of Alaskan oil and LNG so that these fuels can be made available to more markets in the continental United States.

The development of desulfurization programs will require capital investment as will the construction of equipment to provide for delivery and use of low-sulfur fuels. The leadtime required before facilities become operational and the long life of these installations call for a realistic evaluation of the conditions and future trends in both the power and fuel industries. Mistakes in judgment can be costly. Hence it is necessary to make plan as flexible as possible to be able to take advantage of new technology that is developed earlier than predicted, and to be able to avoid a crisis situation when the hoped for developments are delayed.

While all aspects of our National Energy Policy must now be reevaluated, I believe that the most significant area is that of energy R. & D. It is fashionable today to attack technology. The electric utility industry is presently experiencing the pressure of the critics of its technology. But technology is not the evil which it is portrayed. It is our failure to direct it—to channel it into the areas that are critical to contemporary needs—that is the real shortcoming of our existing technology. The success of this industry's effort to continue to meet essential power needs without environmental degradation. hinges, in the final analysis, upon the success of its technology and this, in turn, rests in your hands—the engineers and the technicians of this industry who, with a sense of purpose and vision can direct technology, stimulated by a relevant National Energy-Environment Policy, to the achievement of this goal in this new decade.

DEPARTMENT OF THE INTERIOR, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, WASHINGTON, D.C.

THERMAL POLLUTION—ITS EFFECT ON WATER QUALITY*

Discharge of heated wastewaters poses one of the most difficult problems in water pollution control today. We are just becoming aware of the complexities and hazards involved.

Thermal changes in the aquatic environment occur as natural phenomena, but man's activities can result in rapid and massive changes in surface water temperatures that can be extremely damaging. Waste heat discharges have been increasing rapidly since World War II. This type of pollution must be controlled, for the capacity of the aquatic environment to absorb heat without suffering damage is being exceeded in many places and it is almost certain to spread to new locations.

The magnitude of the problem can only increase, placing a new emphasis on the need for water quality management. Because it makes a large point-source contribution to thermal pollution, the power industry will have a key role in controlling temperature hazards to multiple use of the aquatic environment.

SOURCES OF THERMAL POLLUTION

Thermal pollution can be defined as man-caused deleterious changes in the normal temperature of water. Waste heat must be managed effectively along with our other wastes if a pleasant and productive water environment is to be preserved.

Thermal pollution results when industries use great quantities of water for cooling (or condensing) and return the heated byproduct to the waterways. In 1964, 90 percent of the nearly 50 trillion gallons withdrawn from natural water bodies by industry and thermalelectric utilities was used for cooling and condensing. Table I shows that, in 1964, the bulk of this cooling water was used by the commercial power industry.

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*This staff paper was prepared for the Feb. 2, 1968, meeting of the Federal Water Pollution Control Advisory Board.

TABLE No. 1.—*Use of Cooling Water in the United States—1964*

Use	*Water quantity, billion gallons per year*
Industrial:	
Steam electric power generation	2,850
Other	6,529
Commercial power	34,849
Total (once-through water)	44,234

Power production inherently involves the disposal of tremendous amounts of heat. The energy from fossil or nuclear fuel not converted into electric energy goes mostly into cooling water which circulates through heat exchangers. For each kilowatt-hour of energy produced in a modern, highly efficient cost fired plant, about 6,000 British thermal units (B.t.u.'s), or about two-thirds of the total, is waste heat, most of which must be dissipated to cooling water in heat exchangers. Nuclear plants are less efficient because of safety needs for lower throttle steam temperatures and pressures. Such plants heat up the water used for cooling about 40 percent more than coal-fired plants which dissipate some heat through the stack gases. For each kilowatt-hour produced in a nuclear reactor, about 8,500 B.t.u.'s must be dissipated into cooling waters. Thus, greater quantities of cooling water are required for nuclear than for coal-fired plants, and the great volumes of warmed water dumped back into the waterways have a proportionately greater effect on the environment.

About 95 percent of the steam-electric cooling water, heated 10° to 20° F. warmer than the stream, is dumped directly back into the waterways at this time. Only about 5 percent is treated in a cooling tower or pond before discharge.

An estimated 70 percent of the waste heat discharged in the United States today results from the steam-electric power industry. The other 30 percent comes from the petroleum, chemical, steel, and pulp and paper processing industries, plus a number of others. Also contributing to thermal pollution are waters warmed by the sun in impoundments and irrigation practice.

An example of the environmental threat is seen in the Vermont Yankee nuclear-powered plant proposed to be located on the Connecticut River in southeastern Vermont, just north of the Massachusetts State line. As initially proposed, the plant would require 60 percent of the flow of the Connecticut River for cooling and would raise the temperature of the river as much as 12° F.

THE INCREASE IN THERMAL POLLUTION

Because thermal pollution is closely associated with electric power production, our best single index of increase in thermal pollution at present is the increase in the production of electricity. New technology, economic expansion, increasing standards of living, and growing population all increase our per capita and aggregate use of electric power.

Thermal pollution is not new, but its troublesome magnitude is. The amount of heat to be dissipated will continue to skyrocket with our burgeoning power demands. Since World War II, U.S. production of electricity has doubled every 10 years. Thermal plants now generate about 75 percent of the electricity used, and hydroelectric plants, 25 percent. The fossil fuel plants account for 95 percent of the thermal generation; the nuclear plants, only 5 percent.

In the future, we can anticipate greater electric power demands, larger plants, a higher percentage of thermal plants, and more nuclear plants—all leading to more waste heat and an intolerable increase of thermal pollution in our waterways if corrective steps are not taken.

By 1980, the electric power industry will use one-fifth of the total fresh water runoff of the United States for cooling. As loads increase, electric power production must depend more and more on thermal sources, less on hydrogeneration, since few hydro sites remain that can be economically developed. Scenic and esthetic considerations preclude the development of some of the sites that remain. The Bridge and Marble Canyon Dam sites on the lower Colorado River are prime examples of this.

As the technology for nuclear generation of electricity has improved, more atomic than fossil-fueled plants have been constructed. While 95 percent of thermally generated electricity is produced by fossil fuel today, the proportion is expected to decline to 65 percent by 1980. This greater use of nuclear plants discharging their greater amounts of waste heat will compound the thermal pol-

lution problem in water. While nuclear plants produce considerably more water pollution than fossil-fueled plants, they produce considerably less air pollution than the burning of fossil fuels. This is one reason that nuclear generation has become so popular, and illustrates one of the complexities of our waste management problems. Perhaps recently adopted water quality standards and other control measures will shift the trend back to fossil fuels to some extent.

Research on nuclear breeder reactors is progressing and these may be commercially available sometime in the 1980's. These reactors will probably produce steam at temperatures approximating those now utilized in fossil-fuel fired boilers, so that the amount of waste heat to be dissipated by nuclear plant cooling systems will more nearly approach that of today's fossil fuel plants. Hopefully the waste heat discharged by large nuclear thermoelectric plants can be reduced by 1980 to about 25 percent more than for fossil-fuel plants. Research is underway to develop materials for nuclear-fuel systems which will also permit higher steam temperatures for nonbreeder reactors.

Technological improvements are not keeping pace with the increase in the number and size of nuclear powerplants, however.

Larger electric powerplants are being designed to achieve economies of scale. The National Power Survey of the Federal Power Commission reports savings of 30 to 40 percent in the unit cost of power from thermal plants of 1 million kilowatts as compared to plants of only 100,000 kilowatts. Regional pools are being developed to take advantage of these economies of scale and extra-high-voltage transmission lines are being developed which will permit larger-than-ever facilities for the production of power.

The average size of units (all fossil fuel) retired between 1961 and 1965 was 22 megawatts. The average size of the 217 new fossil-fuel units under construction or in the planning stages for operation by 1971 is 295 megawatts. The trend toward nuclear-fueled units means still larger plants. New nuclear plants planned for operation by 1973 average 624 megawatts per unit. As a result, larger, more concentrated loads of waste heat will be created and will have to be managed in a safe and efficient manner if aquatic life is to survive in the waterways on which these plants are located.

Table 2 details the possible thermal pollution from electric power generation in the United States if we assume "once through" cooling. This must be considered an upper limit, as many plants already utilize cooling towers or cooling ponds, thus reducing their impact on the surface water resources of the Nation.

TABLE 2.—ESTIMATE OF HEAT REJECTED BY POWERPLANTS

Year	U.S. electrical energy required [1] (billion kilowatt-hours)	Estimate of heat to be rejected [2] (billion B.t.u.)
1958	728	3,200,000
1980	2,161	10,400,000
2000	4,463	21,400,000

[1] Estimate of electrical energy requirements of U.S. Federal Power Commission. Report to Select Senate Committee on National Water Resources (Committee Report No. 10, Jan. 1960).

[2] It is assumed that: (a) steamplants will generate 80 percent of total energy required; 6,000 B.t.u.'s of heat will be rejected for each kilowatt-hour of electricity generated.

EFFECTS OF THERMAL POLLUTION

We must control waste heat if present and future uses of our aquatic resources are to be protected. Condenser discharges are often 10° to 20° F. warmer than the receiving water, while a mere 3° or 4° F. temperature change can have serious consequences to the biota under certain conditions. Conditions critical to the aquatic environment involve both the level and duration of adverse temperatures.

The ecological balance—the interrelationships of species, day length and water temperature—can sometimes be upset by small changes in water temperature, with far-reaching effects. For example, an insert nymph in an artificially warmed stream may emerge so early in the spring as to be immobilized by the low air temperature. A fish hatch might occur so early in the spring that the fishes' natural food organisms would be unavailable. Aquatic plants, the ultimate basis of the food chain, depend upon day length, as well as temperature.

Fish generally depend on temperature changes as a signal for migration and spawning. Trout eggs will not hatch if incubated in too warm water and salmon may not spawn. The inhabitants of a water body that in nature seldom becomes warmer than 70° F. are placed under stress, if not killed outright, by 90° F. water. Even at 75° or 80° F. they may be unable to compete successfully with other species for which the temperature is more favorable.

Thus, the sensitivity of all aquatic life to toxic substances is heightened at increased temperatures. Carp, for instance, are twice as susceptible to carbon dioxide in warm water as in water near the freezing point.

The oxygen consumption by aquatic vertebrates doubles for every 10° C. rise in stream temperature, but, as temperatures rise, the water can hold less oxygen in solution. Thus, while supplies of dissolved oxygen (DO) steadily dwindle with increased temperatures, the demand for DO increases. Eventually, aquatic life, especially the desired types, dies.

Another important element of the problem is that thermally polluted waters are less capable of assimilating other wastes. A stream receiving wastes from cities and industries does more than just carry it away. It assimilates organic matter through biochemical conversion. This process speeds up until the temperature reaches a given point, then slows down at higher temperatures. The assimilation of organic wastes further depletes the diminishing DO supply.

The value of water for drinking, recreational and industrial use usually decreases at higher water temperatures. Higher temperature waters which contain organic nutrients may promote the development of slime or nuisance aquatic weeds, which tend to thrive in warmer waters. When these aquatic plants die, taste and odor problems in drinking water sources may result.

Irrigation waters that are too hot or too cold may affect seedling emergence, plant growth rate, time of maturity, and crop yields.

In addition, the value of water for further cooling in industries of all kinds is reduced.

WATER QUALITY STANDARDS

Concern over the damaging effects of thermal pollution is growing among many water users and at all levels of government. Effective action was taken at the Federal level 3 years ago to control waste heat, as well as all types of water pollutants, when Congress passed the Water Quality Act of 1966, requiring water quality standards to be set and implemented for all interstate and coastal waters. The States first formulated these standards, which were then submitted to the Department of the Interior by June 30, 1967, for review and establishment as Federal standards. As of January 1, 1968, standards for 10 States had been approved by the Secretary of the Interior. Others have since been approved in whole or in part or are still under active review.

The standards designate desired beneficial uses for a stream or parts of a stream and establish the criteria necessary to protect these uses. One of the criteria in each of the approved standards is water temperature.

Waters are assigned temperature limits based on the natural type (warm, cold, or marine) and designated use (fish propagation, body contact sports, industrial, municipal supply). As an example, for warm water fisheries a maximum temperature of 90° F. may be acceptable, for cold water fish (such as salmonids) a 68° F. limit may be necessary, for trout streams a 65° F. limit may be desirable. Recognition is given to natural climatic changes, permissible deviations and length of time that the designated peak temperature may prevail.

The establishment of water quality standards at the State level with review and approval at the Federal level should balance society's many and varied interests in surface waters. Since we seek economic development along with ecological protection, the water quality standards must be reasonable and achievable both economically and technically. This involves the water uses designated by the States, the quality criteria established to achieve those uses, and the plans for implementing and enforcing water quality.

Water quality standards, once adopted, will be enforced by the States and by the Federal Government through active surveillance and monitoring of stream quality and in the courts, if necessary.

THERMAL POLLUTION CONTROL TECHNIQUES

As concern and the need to control thermal pollution mount, the electric power industry must apply more effective control techniques.

Control on thermal pollution are available or under construction at several levels of government:

State control—the water pollution control laws of many States limit thermal pollution. Permits for waste discharges, including heated waste waters may be required by State regulatory agencies. Many States license electric utilities. More and more States are adopting water quality standards for their intrastate waters, in part to take advantage of the higher Federal grants which may be secured for construction of waste treatment facilities if intrastate standards are in force. These standards, like the interstate standards, should set limits on temperature changes.

Federal facilities—the Federal Government is working to control water pollution from its own installations. President Johnson, in issuing Executive Order 11288, directed the Federal Government to set an example by its own efforts. The order clearly applies to thermal wastes from nuclear reactors owned and operated by the Atomic Energy Commission and all other Federal facilities.

Federal controls—concern with thermal damages to the aquatic environment, however, has not been dispelled by the establishment of interstate standards, since thermal electric power developments in intrastate waters would not be subject to Federal preview.

Additional specific controls on thermal pollution have been urged by some Members of Congress and the executive branch. Federal licensing has been proposed for all thermal electric power developments, such licenses to be issued only after the Secretary of the Interior has certified that thermal pollution will not occur, and that adequate cooling devices or other controls will be provided to prevent damage to the receiving waters. The Department of the Interior would review pending powerplant license applications and provide advice as to measures needed to assure that water quality standards will be met.

Some types of facilities have been in use for many years; the electric power industry has been concerned in the past with solutions to the thermal pollution problem resulting from recirculation, interference of heat from one plant to another, or situations where sufficient quantities of water were not available for once-through cooling purposes.

Now, with the added incentive of water quality standards, proposed laws, administrative regulations and public pressures, control of thermal pollution will have to be more refined and more frequently used. New solutions may have to be developed. On the whole, measures for control have not kept pace with the increased power production and attendant thermal pollution.

Methods for reducing thermal pollution, fit into five caterogies: (1) management of waste heat in the aquatic environment; (2) improved efficiency of thermal electric plants; (3) utilization of waste heat; (4) disposal of waste heat to the atmosphere; and (5) new methods of electric power generation.

(1) Management of waste heat in the aquatic environment

This first category seeks to adjust the receiving environment to minimize changes in temperature. These methods include increasing turbulence to provide aeration and cooling, introducing the heated effluent into deep portions of the receiving water and allowing natural convection to prevent stratification, and construction of partial dams and obstructions in the original watercourse to prevent stratification or to promote withdrawal of the coolest water available.

One approach to meeting thermal control for a powerplant may be to close down for normal maintenance during the months when the climate and other water-use factors combine to make additions of heat most hazardous.

Dilution is another possibility for controlling thermal impact on a receiving water. In essence, this means the release of water from storage reservoirs at the same time that heat is to be released from the powerplant. In some cases the cooler waters from the bottom of a reservoir can be released rather than the top, sun-warmed waters, with consequent reduced final temperature in the stream. While diluting heated effluent will reduce the impact on the entire stream, it does not necessarily protect the immediate aquatic environment from the impact of the heated effluent.

Dispersion is used to spread the heated discharge through a maximum volume of the receiving waterway. A jet of water may be used to spread the heated water over the surface of the stream, or multiple outlet conduits can be placed far out into the waterway. When considering dispersion as a solution, it is important to keep the natural requirements of the aquatic biota in mind. If the receiving water is a river used by anadromous fish, it may be better not to disperse the heated effluent across the entire river, as this could result in a thermal block, giving the fish no means of passage through the colder waters they require.

Another important means of reducing the impact of heated discharges on the total aquatic environment is sitting. Electric powerplants can be so located on a waterway as to produce the least impact on the total resources of the river. The plant may be located on a tributary of the river where aquatic life is least important so that the heated discharges are harmless by the time they enter the main stem. Or the best site may be on the widest part of the river, or on the ocean.

Effective management to reduce the impact of heat on waterways requires the ability to forecast the heat loss reliably under any sequence of hydrologic and meteorologic conditions. Management to minimize the impact of waste heat is an acceptable solution only when the waterway can absorb the heat without exceeding the established temperature limits.

All these techniques—essentially management techniques—are necessary ingredients to water quality control. Total river management using mathematical and hydraulic models, computers, and systems analyses is necessary in appraising, controlling, and/or accommodating all of the many variables affecting water quality. But the magnitude of waste heat loads anticipated in the future is so great that stream management alone will not protect the equatic environment. The heat output itself must be controlled.

(2) Improved efficiency of thermal electric plants

Attempts to limit the output of waste heat in coal and nuclear-fired electric plants are essentially means for improving the processes by which electricity is generated so as to achieve a better conversion of the heat into useful energy.

Energy conversion is more efficient today than 25 or 30 years ago. The average heat rate, or the amount of heat required to produce one kilowatt of electricity, is now about 10,000 B.t.u.'s as compared with 16,500 B.t.u.'s per kw.-hr. in 1938. Some of the highly efficient new plants are down to 8,900 B.t.u.'s per kw.-hr. (38.2 percent efficiency). The Federal Power Commission suggests that heat rates of 8,500 B.t.u.'s per kw.-hr. are likely by 1980. While this would reduce thermal pollution by almost 20 percent, it still means that only 40.2 percent of the heat will be converted to electrical energy. At best, then, by 1980, 60 percent of the heat input to a coal-fired plant (less stack and mechanical losses) is waste and will have to be put to other uses or dissipated to the environment.

(3) Utilization of waste heat

The heat which cannot be transformed into electric power can sometimes be put to use in some other beneficial manner. Some such uses are industrial process heating, desalting water, heating buildings, and heating irrigation water so that the growing seasons in select locations can be extended.

(4) Disposal of waste heat to the atmosphere

Another method for rendering harmless cooling water discharges is to transfer the waste heat to the atmosphere. These methods include evaporative cooling towers, nonevaporative cooling towers, cooling ponds, and spray ponds.

The evaporative cooling towers, both forced-draft and natural-draft, are currently the most widely used corrective devices. Evaporative cooling towers require about 0.02 c.f.s. per 10^{15} B.t.u. dissipated to the atmosphere. As a result of the high evaporative losses the cooling towers of this type may produce fog and icing under certain weather conditions.

"Dry" towers waste almost no water (about 0.002 c.f.s. per 10^{15} B.t.u.) and discharge no heat whatsoever into surrounding bodies of water. The nonevaporative cooling towers pass air over fin-tube heat exchangers.

The capital and plant operating costs of cooling towers are still high. The cost for an evaporative cooling tower system is estimated to be about $5 per kilowatt more than for a similar plant using river water on a once-through basis in its condensers. Capacity reductions and increased fuel costs due to lower efficiency also contribute to the cost of using evaporative systems.

Cooling towers themselves are esthetically undesirable, since they may rise as high as 30 stories and measure more than a city block in diameter. Two natural-draft towers recently completed by the Allegheny Power System in West Virginia are 370 feet high, 380 in diameter, and serve one 540 megawatt unit each. Cooling ponds cost less than cooling towers if the considerable land needed is available. Ponds also result in slightly less evaporative loss.

(5) New methods of electric power generation

The research and development efforts now underway to provide more efficient methods of electric power generation would reduce thermal pollution. Fuel

cells and thermal systems which do not require use of the steam cycle for electric power generation are being researched.

High temperature turbine blade cooling could reduce cooling water requirements as much as 50 percent. Electrogasdynamics, megnetohydrodynamics and thermionic electric power generation, if they can be developed economically, could greatly reduce our water and air pollution problems.

APPLICATION AND RESEARCH FOR THERMAL POLLUTION CONTROL

We must improve electric powerplant efficiency at acceptable costs and/or improve methods for removing waste heat from the cooling waters before discharge.

All of the above processes are under investigation, but their large-scale application is not likely in the immediate future. Much more research is needed before these new electrical energy sources can be applied commercially. Additional research should also be done on gas, oil, and coal turbines, which produce electricity without use of the steam cycle, as well as on new combinations of cycles, so as to reduce water requirements.

Additional research is needed on the effects of temperature changes on aquatic life, including incremental as well as sustained changes. The many gaps in our information must be closed so that we can effectively and economically control thermal pollution.

Research along these many lines is being conducted today by agencies of the Department of the Interior and by industries. The Federal Water Pollution Control Administration, for example, is studying thermal pollution on the Columbia River to clarify the problems we now confront in predicting the effects of incremental temperature increases on fisheries and in setting and implementing thermal criteria for particular water uses. The study is considering temperature effects of reservoir construction in the Columbia River.

The Federal Water Pollution Control Administration's Pacific Northwest Water Laboratory at Corvallis, Oreg., has as one of its principal research responsibilities the effects of thermal power generation on water use and quality. A major emphasis in the Federal Water Pollution Control Administration at this time is control of thermal pollution.

The following organizations, among others, have recently sponsored or carried out studies on aspects of thermal pollution.

Atomic Energy Commission.
Bonneville Power Administration.
Bureau of Commercial Fisheries.
Edison Electric Institute.
Johns Hopkins University.
National Council for Stream Improvement (of the pulp and paper industry).
Portland General Electric Co.

Research is vital to the control of thermal pollution. But research cannot be, and is not, a substitute for action to control thermal pollution today. Control of thermal pollution requires action supplemented by research to fill the gaps in our knowledge of the causes and of economical solutions to the problem.

More research will be required before we fully understand the complex nature of thermal pollution. But we cannot afford the luxury of waiting for "perfect knowledge" to act to limit damage from thermal pollution to our aquatic resources. The next 5 to 10 years will be critical to the future of these resources because of the staggering increases in electric power generation and waste heat. If positive action is put off until complete answers are available, the damage to our streams, lakes, and coastal areas will be great and could well prove irreparable in many areas.

Industries should know and observe the approved water quality standards. Companies must design, monitor, and operate heat control facilities or put their waste heat to work in a useful way. Thermal pollution control considerations must become an integral part of industrial decisions, and include plans for facilities to control such pollution.

The Federal Government must enforce water quality standards and provide technical and financial assistance for their implementation. In addition, Federal agencies must carefully review the many factors related to thermal pollution, including siting of electric powerplants and effectiveness of control facilities.

Beneficial Uses of Waste Heat (Preliminary Outline)

(By J. A. Nutant, Manager, Heat Utilization Project, Environmental Systems Department, Westinghouse Electric Corp.)

The discharge of heated cooling water from steam electric power plants to bodies of water may induce physical and biological changes that may be beneficial, detrimental or negligible, depending on the ecology of the receiving body. The purpose of waste heat utilization is to eliminate the detrimental effects and turn waste heat into a resource.

The difficulty in utilizing waste heat is that although there is an enormous amount of heat available, the heat is at a relatively low temperature. To put the scale of waste heat available into perspective, there is more than enough waste heat from powerplants than is required to heat all the homes in America.

I should like to review some of the applications of waste heat that have been suggested and indicate where current work in this field is being undertaken.

URBAN APPLICATIONS

First, I would like to discuss some uses of waste heat pertaining to urban systems. One promising application is that of heating sewage to improve the quality or increase the capacity of a sewage plant.

The form of secondary sewage treatment used most commonly in the United States and elsewhere is the activated sludge process in which sewage which has been prescreened for grit removal and subjected to preliminary settling is then fed into an aeration tank where it is acted upon by various micro-organisms. The micro-organisms feed upon the sewage and produce end products consisting of H_2O, CO_2 and sludge.

The temperature is a significant parameter in this process in that a 10° centigrade rise in temperature will approximately double the biochemical reaction rate. In addition, the increase in temperature decreases the water viscosity, thereby enhancing the sedimentation of activated sludge particles (70°–1 centipoise, 100°–0.7 centipoise).

The average temperature of domestic and most industrial sewage in the United States is approximately 70° F. with usually not more than 5° seasonal variation. If the sewage temperature could be raised from 70° to 100° F., say by passing it through the powerplant condenser, before entering the sewage plant, theoretically sewage could be treated at twice the rate of the facility operating at 70° F. There does seem to be some disagreement as to whether this theoretical value can be obtained.

Relatively little attention has been given the temperature factor in activated sludge processing. The reason for this has been that the great bulk of the efforts, to date, have been directed toward the problem of the activated sludge treatment process while neglecting temperature effects. Research on temperature effects is currently underway at Mississippi State University, but is in its early stages.

The problem of transfering the requisite heat to the sewage would be best solved if the prefiltered sewage could be routed through a portion of the powerplant condenser in which the water header has been modified to keep the flows separate. The potential problems of grease and micro-organism buildup on the insides of the tubes would have to be solved.

Not only the heat, but the fuel at a powerplant might be utilized for sewage treatment. A system whereby raw sewage or secondary treated sewage is filtered through coal has been demonstrated in pilot plant operation with success. If secondary treated sewage is passed through a coal filter, the BOD removal would be above 95 percent. The ratio of coal to sludge is on the order of 4 to 1. In a high temperature boiler, sewage sludge burns odorlessly and with less detrimental waste combustion products than coal.

Next, let us consider space heating. Forty years of application of hot water from geothermal deposits in Iceland and elsewhere to residential space heating have demonstrated that transport of hot water and distribution for space heating is economical and practical. Iceland experience is that the total cost of space heating with hot water averages only about 60 percent as high as similar heating with oil fuel. The National Energy Authority of Iceland is presently heating the residences of the city of Reykjavik—population 80,000—with hot water transported 10 miles. This authority is now planning additions, which will involve the transporting of hot water 20 miles.

There is less problem in finding a good use for additional heat in winter than in finding use for additional heat in summer. The key may be an ammonia or lithium bromide absorption refrigeration mechanism using an input energy of hot water, providing space cooling in summer. The ammonia-water system is usuable with an air-cooled condenser and absorber that requires a 250° F. heat supply. The lithium-bromide requires about 220° F. heat supply and is about 50 percent more efficient. Such heat-driven air conditioners can be modified with internal circuitry to supply heat during the cold seasons so that hot water can be distributed at 150° to 170° F. for space heating.

Matching of the peak heating and cooling requirements for a typical three-bedroom house is apparent from simple calculations. A winter requirement of 75,000 B.t.u.'s per hour matches 72,000 B.t.u.'s per hour required for summer cooling at COP of one-half that of the absorption air conditioning unit.

In adapting this concept for a new city, which is the only realistic application of this concept, thermal energy would be transmitted underground to substations throughout the town. Each substation will contain absorption refrigeration equipment. Each substation, in turn, will provide a distribution service into living space and working space for one or more large buildings or a cluster of single residences or townhouses to control air temperature. Within a residence, there will be the simplest of systems controlling the flow of chilled water in summer and the flow of hot water in winter. Heat exchangers on the roofs of the substations or large buildings would discharge unused energy to the air throughout the town where it is much less of a problem than it would be in the usual receiving waters. The effect should be superior to even the dry cooling tower approach, since the rate of discharge per unit area is markedly reduced.

Are we really using waste heat? Assuming a 1,000 MWE design nuclear plant providing electricity and heating and air conditioning by extracting steam at 220° F. from the powerplant to drive the lithium-bromide system, a population of approximately 450,000 could be served.

Waste heat could be utilized to deice and defog airports. Regarding defogging, steady state calculations indicate that approximately 700 megawatts of heat would be required to defog one runway and its approach path. This heat is available from larger powerplants. Using a bank of fan driven heat exchangers, heated air would be blown across the runway and rise to heat the fog droplets causing them to evaporate. However, the system has limited use—53 hours of fog at La-Guardia per year—for high capital cost equipment.

Using underground piping to deice airports on the basis of melting 1 inch per hour, the thermal discharge from a 1,000 MWE nuclear plant could deice over 2 square miles of runways. Again, high capital cost equipment would be required for limited use in time.

Another concept is the use of the condenser discharge for an aeration system. The purpose of the system would be to improve the water quality of the river by increasing its oxygen content. Aeration systems are being used more and more to improve water quality. Many experts feel it would be easier to treat the wastes in the river than add tertiary sewage treatment facilities.

This system suggested here is the injection of pure oxygen into the river. This system could be used only during those summer months of low flow when the dissolved oxygen levels are low. In this system, a small percentage of the condenser discharge would be diverted into separate loops and pressurized. Pure oxygen would be injected into the system and then returned to the condenser discharge and ultimately to the river. Efficiencies of this system are above 50 percent, according to results of operating systems in Louisiana run by a paper manufacturing company.

AQUACULTURE

An obvious use of heat is for aquaculture. Temperature plays a significant role in the reproduction process, the time it takes a fish's eggs to hatch and the growth rate of fish. There are temperature ranges where fish cannot reproduce. Excessive temperatures can prevent normal development of eggs. Regarding growth rate, a largemouth bass in an 81° F. environment can grow to twice the size of one at 68° F. Thus, use of the effluent from a powerplant to control the temperature would be beneficial to aquaculture.

The effects of temperature in regulating appetite and the conversion of the food into body weight can be used by hatcheries to maximize fish production in terms of weight. The food consumption of the brown trout, for example, is highest in the temperature range between 50° and 60° F. Within that range, however, the fish is so active that a comparatively large proportion of its food intake goes into mere maintaining its body functions. Maximal conversion of the food into a gain in weight occurs just below and just above that temperature.

Depending on the temperature extremes of the water, several species of fish can be raised. A most popular candidate for commercial use is the catfish due to its high preferred temperature and eating quality. Its popularity is illustrated by the fact that, in 1963, 2,370 acres were devoted to catfish culture. By 1969, this figure had increased to 39,300 acres.

Some experts from the Bureau of Sport Fisheries have stated, however, that the demand for catfish is not sufficient to provide any great economic benefits in the near future.

There are many experiments in marine aquaculture underway. Currently, sea water used in the condenser cooling system of a nuclear station in Britain is used to decrease the time to grow shrimp to maturity from 3 to 5 years down to 18 months. In the warmed water, the shrimp reach the first stage of growth in 4 weeks instead of the normal 10 to 12 weeks.

Studies in Maine using thermal discharge of the Central Maine Power Co. have shown increased lobster production. The University of Miami is studying shrimp farming in the effluent of the Turkey Point powerplant.

A most serious problem in aquaculture is the cost of feeding the fish. A fish will consume about 12 to 15 times his weight in food per year. These economics have led many experts to believe that aquaculture is better adapted to produce high-priced foods to improve the quality of life rather than a means of providing economical food for the world's undernourished millions.

AGRICULTURE

Waste heat has a use in agriculture to extend the growing season in suitable areas. In fact, the crops—fruit or vegetable—can be earlier or later, depending on the whims of the farmers and markets.

One method of delivering the waste heat for irrigation is spraying crops and fruit trees. A 1,000-MWE nuclear plant will be able to irrigate on the order of 100,000 acres. An experiment in Oregon using this concept irrigated 170 acres of fruitland and farmland with waste water at 95° F. from a pulp and paper plant.

The purpose was to prevent frost on the orchard crops and extend the growing season of the other crops. Results showed the spray system provided protection against temperature down to 27° F. As an example of economic benefits, farmers were able to introduce strawberries to the market 10 days earlier than normal and received 25 percent more profit.

Another application of the spray system of irrigation was developed by a Weyerhaeuser Co. scientist who showed that the Washington drought occurred during the prime growth period of forests. The trees lose more moisture through needles than is absorbed through the roots. A small-scale experiment indicated that a sprinkling system would help sustain growth.

Another system for agricultural application is pumping the waste heat through buried piping systems for soil heating in greenhouses to improve growth of root crops. Most root crops do best at soil temperatures above 70° F. with optimum about 75° F. Although dry soil is a good insulator, wet soil is a good thermal conductor which, under controlled conditions, would make this system feasible. Experiments are currently underway at Oregon State University on a laboratory scale.

Regarding greenhouses, heat can also be supplied to the greenhouses through conventional heating equipment. It is estimated that thermal effluent from a 1,000-MWE nuclear plant would provide environmental control for 400 acres of greenhouses. However, the economics of this system can only be estimated.

One problem is that a poor match exists between greenhouse heat load and plant electrical load. The daytime solar heat input greatly reduces the artificial heat requirements for the greenhouse at the time that a diurnal peak occurs in the electrical load. Thus, the plant must be designed so that the greenhouse can operate without waste heat utilization.

[Received by subcommittee from Federal Water Quality Administration]

Information Sheet

JUNE 11, 1970.

RESEARCH, DEVELOPMENT, OR DEMONSTRATION

This project is a demonstration grant, under section 5, Federal Water Pollution Control Act (Clean Water Restoration Act).

Grantee or Contractor.

Eugene Water and Electric Board, 500 East 4th Avenue, Post Office Box 1112, Eugene, Oreg.

Project Director.

Byron Taylor, 500 East 4th Avenue, Post Office Box 1112, Eugene, Oreg.

Title of Project.

"Thermal Water Demonstration Project"

Project Site.

Springfield, Oreg.

Program (Project) Number.

16130 EIK.

Date Offered.

June 4, 1970.

Grant or Contract Period.

From June 1, 1970 through May 31, 1971.

Eligible Grant Period Costs.

$210,965.

FWPCA Grant or Contract Amount.

$158,224.

Description of Project.

The objective of this project is to demonstrate beneficial uses to agriculture or water having sufficient heat to result in thermal pollution. The project will encompass the following areas: (1) soil heating with thermal water, (2) groundwater drain collection, (3) water blending system, (4) plant cooling, (5) irrigation, (6) environmental effects, and, (7) frost warning systems.

FWPCA Project Officer.

Alden G. Christianson, Corvallis Laboratory.

Inquiries.

Contact Project Coordination, Office of Research and Development, Federal Water Pollution Control Administration, U.S. Department of the Interior, Washington, D.C.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, D.C., August 26, 1970.

Mr. LAURENCE DAVIS,
Rayburn Building,
Washington, D.C.

DEAR MR. DAVIS: As per your request, I am sending you the section A—Objectives and section B—Scope of Work from the contract with Stanford Research Institute. I am sorry to have taken so long but the member of our staff handling this contract and his secretary have both been on leave and I didn't have any luck finding the contract on my own.

If I can be of further assistance please call me.

Sincerely,

MILTON F. SEARL,
Chief Economist, Energy Policy Staff.

Section A—Objectives

Several urgent issues concerning the availability of energy to meet current and future demands plus the impact of meeting these demands on the environment have pointed up serious deficiencies in our knowledge of energy consumption patterns. Although there is much talk of measures to conserve energy there is little data on what fraction of the total particular end uses constitute.

Existing statistics indicate how much fuel and energy is consumed in the aggregate, but they do not indicate how much of each form of energy is consumed to fulfill various functional needs such as space heating, air conditioning, cooking, or process steam industrial uses, transportation, et cetera. The technical efficiency with which fuels are used for various purposes is not well documented. In addition, we need to know the comparative market prices of these various uses. These data deficiencies seriously handicap our abilities to foresee the shifts between fuel types that can or should take plcae in order to reduce environmental degradation, to plan R. & D. programs for improving energy consumption technology and forecast energy consumption.

The first part of the study to be covered by this contract will develop the data necessary to determine the significant functional uses of energy, their shares of the total energy consumed, their rates of growth, and the prices at which the fuels or electricity are supplied. A second part will analyze the technical efficiencies at which the basic fuels are converted into the major end uses. Such efficiency information can serve to indicate which fuel or conversion process requireless of our resources when there is a choice and can point to areas where R. & D. on consumption technology would be most fruitful.

Section B—Scope of Work

1. Detailed consumption patterns. Residential and commercial consumption will each be divided into principal applications, for example, space heating, water heating, air conditioning, cooking, refrigerator/freezer, clothes washing/drying, lighting, and small appliances.

Industrial consumption will be considered by major industrial classification, as well as by type of application. The specific industrial classification to be used will be selected in the early stages of the study. There are some industrial categories, for example, that consume substantial amounts of energy, yet in total these industries account for well under half the total industrial energy consumption. On the other hand, it is not feasible, and probably not particularly useful, to develop a complete breakdown by two-digit SIC code and certainly not by the three- or four-digit classification. The breakdown will be developed using several criteria such as magnitude of use, probable growth in use, unusual characteristics in the utilization of energy, degree of interfuel competition and fuel interchangeability and possibly other considerations.

The breakdown by type of use in the industrial sector should include space heating, air conditioning, electric power generation, process steam, other process uses, and conversion to nonenergy materials.

Consumption will be considered in terms of the use of natural gas, hydroelectric power, distillate fuel oil, residual fuel oil, coal, LPG, and electricity.

An attempt will be made to delineate an historical series for the 1960's, with projections to 1980. Although the study is aimed at a total national appraisal, data on a regional basis will be reported to the extent they are developed.

It is contemplated that an additional $20,000 beyond the amount of the contract will be required to add information on average prices for each application by type of fuel, as well as by the range in price and the distribution of consumption over the range in price.

2. Technical efficiency. The object of this part of the study would be to determine the number of B.t.u.'s of fuel or kilowatt-hours of electricity required to accomplish the major end uses of energy using the specific conversion technologies currently available. Establishing useful measures of this efficiency will require some ingenuity since we are not interested in an abstract measure of output such as "work" but the accomplishment of particular useful tasks in a normal operating environment. On the industrial side measures such as B.t.u./ton of steel aluminum or other product for each specific manufacturing process may be useful. On the residential side the B.t.u.'s required to heat a "typical" house or to cook meals for a "family of four" may be most meaningful. Such estimates

will require a judicious use of both emperical data and theoretical analysis. Aggregation of consumption figures from a variety of dissimilar sources would probably not show the effects of significant technological differences such as insulation, whether a refrigerator is "frost free" or not and fluorescent versus incandescent lighting. On the other hand, theoretical calculations of the efficiency of a home heating system or hot water heater may not really account properly for losses due to routine maintenance or the lack thereof and the intermittent operation encountered.

A good deal of selectivity will be required in determining which end uses should be analyzed and how many technical alternatives of each should be considered. There are undoubtedly existing sources of data for a number of particular uses particularly on the industrial side. Consumers organizations and trade organizations have done limited work on residential uses which should also be helpful. The use of such data requires however a thorough understanding of the basis on which prepared. The work should result in a basis for comparing the technical efficiency of the various energy systems and end uses.

Contractor shall incorporate the results of the work described above in subsections 1 and 2 hereof into a final report satisfying the objectives of this contract and in a form suitable for publication.

Appendix 3.—Materials Relating To Piney Point

Congress of the United States,
Conservation and Natural Resources Subcommittee,
Committee on Government Operations,
Washington, D.C., June 6, 1969.

Hon. David Kingsley,
Commissioner, Property Management Disposal Service, General Services Administration, Washington, D.C.

Dear Mr. Kingsley: In connection with this subcommittee's current study of the Potomac environment, we have been informed that the land at Piney Point on the Potomac estuary in St. Marys County, Md., now occupied by the Steuart Petroleum Co.'s tank farm was the site of a naval torpedo testing range during the Second World War.

Would you please search your records and supply us with a plat of the former Navy land at Piney Point and a report of the date of sale, the purchaser, and the price received by the Government? Please inform us also of what, if anything, your records show about protests against the sale.

Sincerely,

Henry S. Reuss,
Chairman, Conservation and Natural Resources Subcommittee.

General Services Administration,
Washington, D.C., July 17, 1969.

Hon. Henry S. Reuss,
Chairman, Subcommittee on Conservation and Natural Resources, Committee on Government Operations, House of Representatives, Washington, D.C.

Dear Mr. Reuss: This is in further reply to your letter of June 6 concerning the sale of the Piney Point Annex of the U.S. Naval Gun Factory, St. Marys County, Md., by the General Services Administration.

The Piney Point Annex, consisting of approximately 112 acres of land and improvements, was sold by GSA as a result of a public sealed bid sale held on February 1, 1960. The property was subdivided into 16 tracts as shown in the enclosed brochure of the sale.

The Steuart Investment (Petroleum) Co. purchased tracts 3, 4, and 5, totaling 30.94 acres. Tract 4, consisting of 7.19 acres of vacant land, was contiguous to a bulk oil storage tank farm owned by the company.

We are also enclosing a listing of all the purchasers, selling prices, and dates the transactions were completed. Our records do not indicate that there were any protests against the sale.

We trust this information is helpful to you.

Sincerely,

Robert L. Kunzig, *Administrator.*

[Subcommittee note.—The brochure of sale is in the subcommittee files.]

Tract number	Acres	Selling price	Purchaser	Date of sale
1, 2	44.27	$349,835.00	Vincent A. Sheehy, Jr., Washington, D.C.	July 14, 1960
3, 4, 5	30.94	40,000.00	Steuart Investment Co. (Steuart Petroleum Co.), Washington, D.C.	June 29, 1960
6	.43	660.00	John J. Zemaitis, Pasadena, Md.	June 3, 1960
7	6.36	5,520.00	David L. Garrett and K. K. Skirpa, Takoma Park, Md.	Aug. 11, 1960
8	10.77	5,150.50	Christian Heurich, Jr., Washington, D.C.	June 9, 1960
9	12.00	11,200.00	Mrs. Muriel E. Wingard and Dr. Frank N. Masino, Washington, D.C.	Oct. 5, 1960
10	3.23	1,079.99	Joseph C. Harvey, Washington, D.C.	June 3, 1960
11	.51	250.00	L. I. Peak, California, Md.	Do.
12, 13	2.13	1,110.00	Edward G. Conway, Arlington, Va.	Do.
14, 15, 16	1.17	1,082.80	William V. Russo, Washington, D.C.	June 9, 1960
Total	111.81	415,888.29		

DEPARTMENT OF THE ARMY,
BALTIMORE DISTRICT, CORPS OF ENGINEERS,
Baltimore, Md., May 5, 1969.

NOTICE OF PUBLIC HEARING

A public hearing will be held by the U.S. Army Engineer District, Baltimore, to consider applications by the Steuart Investment Co., 4646 40th Street NW., Washington, D.C., for Department of the Army permits to construct a pier, to construct an addition to an existing pier, and to install mooring piles in the Potomac River at Piney Point, St. Marys County, Md. The hearing will be held at the firehouse at Valley Lee, St. Mary's County, Md., at 7 p.m. on June 3, 1969.

Plans showing the proposed work are on file in the Operations Division, 1628 Federal Building, 31 Hopkins Plaza, Baltimore, Md., and may be seen by interested parties. Copies of the plans are attached to this sheet. The plans were previously shown on the back of public notices which were sent to all known interested parties on February 26, March 17, and April 15, 1969.

All letters received in response to the aforementioned public notices will be made a matter of the record and will be considered by the Department of the Army in making a decision on the applications.

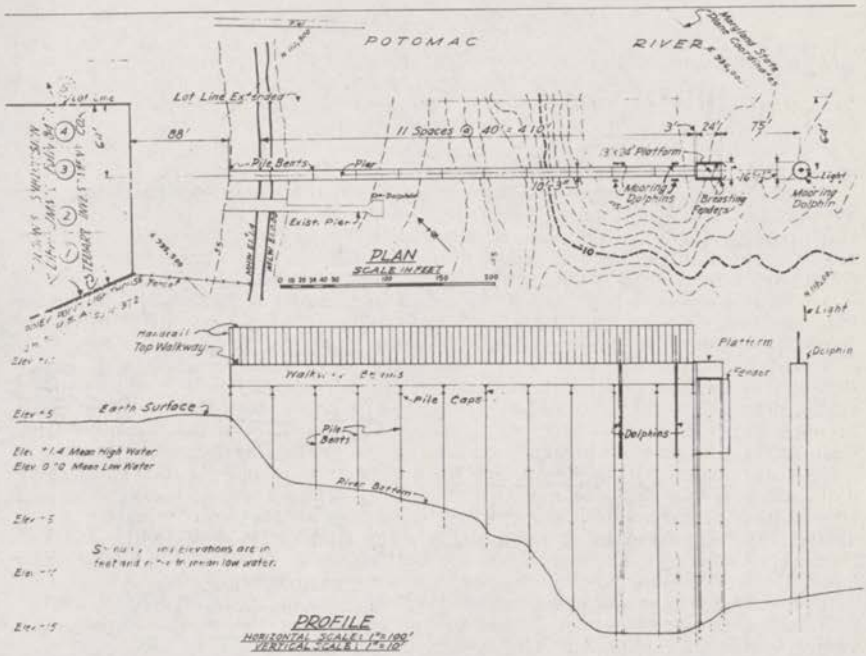
All interested parties are invited to be present or to be represented at the above time and place, particularly the officials of any county, city, town, or local association whose interests may be affected by the proposed work. They will be given an opportunity to express their views concerning the effect of the proposed work upon navigation and other matters affecting the public interest.

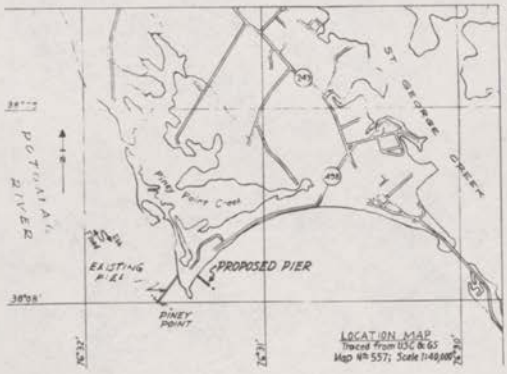
Oral statements will be heard, but for accuracy of record all important facts and arguments should be submitted in writing, as the records of the hearing will be forwarded for consideration by the Department of the Army. Written statements may be handed in at the hearing or mailed beforehand to the District Engineer, U.S. Army Engineer District, Baltimore, Post Office Box 1715, Baltimore, Md. It is requested that they be presented in quadruplicate.

It is requested that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who, not being known to this office, do not receive a copy of this notice.

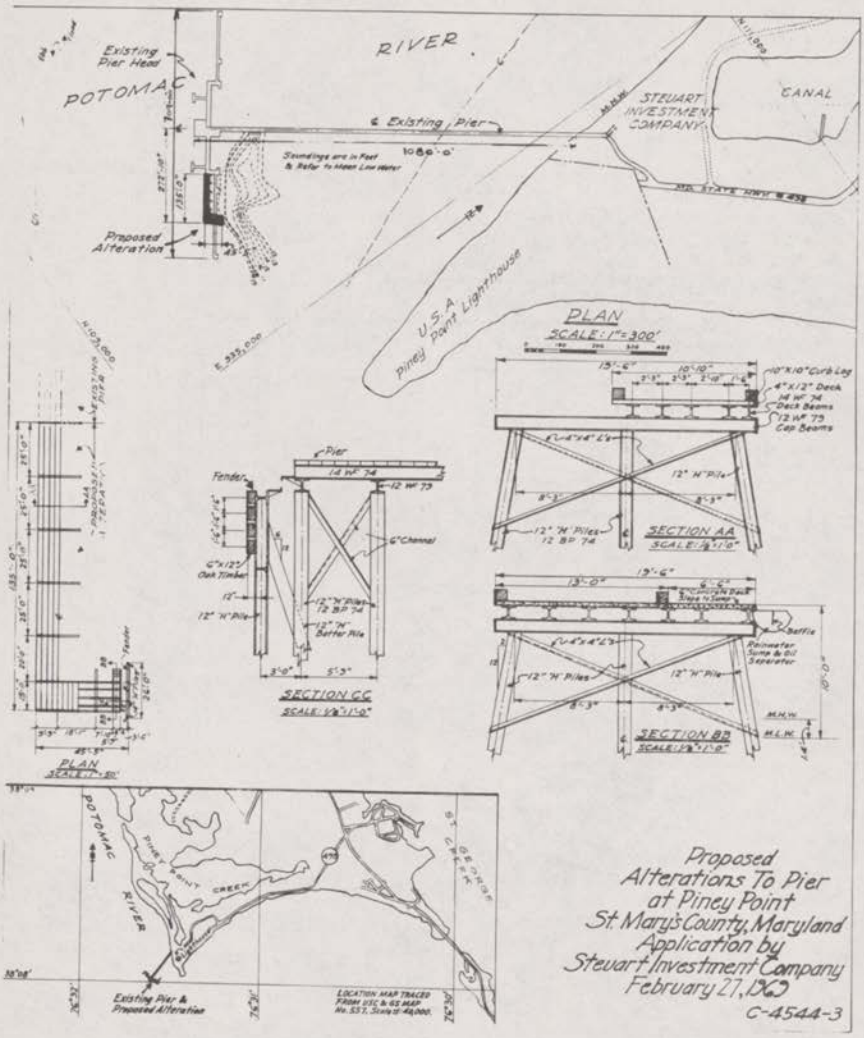
For the District Engineer:

JOHN L. REYNOLDS,
Chief, Operations Division.





Proposed Pier
in Potomac River
at Piney Point
St. Mary's County, Maryland
Application by
Steuart Investment Company
Feb. 14, 1962
Page 1 of 2
C-4544-1



Proposed
Alterations To Pier
at Piney Point
St. Mary's County, Maryland
Application by
Steuart Investment Company
February 27, 1960

C-4544-3

U.S. Department of the Interior,
Fish and Wildlife Service,
Bureau of Sport Fisheries and Wildlife,
Washington, D.C., July 15, 1969.

Hon. Henry S. Reuss,
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.

Dear Mr. Reuss: On June 19, in response to a request from Mr. Laurence Davis of your staff, we provided copies of certain reports and other material pertaining to the Potomac River; Neabsco Creek, Va.; and the Blue Plains sewage plant proposal, District of Columbia.

Mr. Davis had also requested a copy of our report on an application by the Steuart Investment Co. for a Department of the Army permit for work at Piney Point, St. Marys County, Md. At that time, we had not yet reported on the company's application. An investigation has since been made. Our findings were incorporated in a memorandum dated June 30 to the regional director, Federal Water Pollution Control Administration, Charlottesville, Va., who has been asked to do the staff work in consolidating the comments of all Interior agencies into the departmental regional coordinator's report. Copies of our memorandum of June 30 and the regional coordinator's report of July 2 to the Corps of Engineers district are enclosed.

You will note that neither our Bureau nor the regional coordinator in speaking for the Department recommended against issuance of the permit; however, both pointed to potential problems and made recommendations designed to prevent damage to the natural resources of the Piney Point Creek embayment.

The reporting procedure followed is in accordance with the July 13, 1967, memorandum of understanding between the Secretary of the Interior and the Secretary of the Army, a copy of which is enclosed for your ready reference. [Note.—The memorandum of understanding is in the subcommittee files.]

Please call on us if we may provide further information.

Sincerely yours,

J. P. Linduska,
Acting Director.

June 30, 1969.

Memorandum

To: Regional Director, FWPCA, Charlottesville, Va.
From: Regional Director, B.S.F. & W., Atlanta, Ga.
Subject: Application for Corps of Engineers permit by Steuart Investment Co. to construct a pier, to construct an addition to an existing pier, and install mooring piles in the Potomac River at Piney Point, St. Marys County, Md. (public notices dated February 26, March 17, and April 15, 1969).

The Bureau of Sport Fisheries and Wildlife submits the following comments for inclusion in the statement on the above permit applications.

"Plans for the pier and dock facilities do not indicate the anticipated use or measures that may be incorporated to prevent degradation of the marine environment. This general reach of the Potomac River is highly significant to wintering waterfowl populations. Concentrations of nearly 200,000 birds were reported during the last winter survey on the lower reach of the Potomac River below Governor Nice Memorial Bridge.

"We anticipate that the facilities may be used for handling oil. We therefore recommend that plans for the pier and dock facilities include measures to prevent or control oil spills, which would be very damaging to waterfowl. Fail-safe systems of controls should be included to prevent accidental spills. We also recommend that shore-based facilities be provided for adequate treatment of wastes and sewage from ships, the pier, and the land-based facilities to prevent damages to fish and wildlife resources.

"Should the proposed development result in the condemnation of commercial shellfish waters by the responsible State agency, the loss of commercial shellfish areas could constitute a violation of section 10(d) of the Federal Water Pollution Control Act, which states, in part, that the Secretary of the Interior shall call an enforcement if '* * * he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution. * * *' Therefore, if substantial shellfish losses are incurred

as a result of this project, the Federal Water Pollution Control Administration may be required to take action to restore the economic value of these resources."

Please provide us a copy of your letter to the District Engineer and a copy to the Director, Bureau of Sport Fisheries and Wildlife, Washington, D.C.

C. EDWARD CARLSON.

JULY 2, 1969.

Mr. JOHN L. REYNOLDS,
Chief, Operations Division,
U.S. Army Engineer District, Baltimore,
Baltimore, Md.

DEAR MR. REYNOLDS: The above referenced applications involve the construction of projects in coastal waters and are therefore subject to the water quality standards adopted by the State of Maryland and approved by the Department.

Should the proposed development result in the condemnation of commercial shellfish waters by the responsible State agency, the loss of these beds could constitute a violation of Section 10(d) of the Federal Water Pollution Control Act, which states, in part, that the Secretary of the Interior shall call an enforcement conference if ". . . he finds that substantial economic injury results from the inability to market shellfish on shellfish products in interstate commerce because of pollution . . ." Therefore, if substantial shellfish losses are incurred as a result of this project, the Federal Water Pollution Control Administration may be required to take action to restore the economic value of these resources.

It is desirable that the applicant give consideration to the installations of onshore facilities to accommodate the waste generated by those employed on the pier as well as ship personnel to prevent damage to fish and wildlife resources.

We have no objections to the construction of the proposed facilities, but we strongly recommend that a fail-safe system of controls be installed to prevent oil spillage. Current practices such as those specified by the American Petroleum Institute for preventing and minimizing oil spillage should be incorporated in the final design of the facility.

In summary, we stress that adequate precautions be taken such that there will be no interference with adopted water uses established for this segment of the Potomac River.

Sincerely yours,

MARK ABELSON, *Regional Coordinator.*

DEPARTMENT OF THE ARMY,
BALTIMORE DISTRICT, CORPS OF ENGINEERS,
Baltimore, Md., November 26, 1969.

PUBLIC NOTICE

To Whom It May Concern:

A public hearing was held by this office on June 3, 1969, at the firehouse at Valley Lee, St., Marys County, Md., relative to applications received by this office from the Steuart Investment Co. for Department of the Army permits to construct a pier, to construct an addition to an existing pier, and to install mooring piles in the Potomac River at Piney Point, St. Marys County, Md.

Subsequent to the public hearing, the applicant requested that action be deferred on its application for a permit for construction of the pier and installation of mooring piles at Tolson Shores and to continue to process its application for a permit to construct an addition to an existing pier.

After review by higher authorities of the Department of the Army and coordination with the Fish and Wildlife Service, the Federal Water Pollution Control Administration, and other bureaus of the Department of the Interior, in addition to the Board of Public Works, State of Maryland, a Department of the Army permit was issued today for the construction of an addition to an existing pier, as indicated on the plans shown on the reverse side of this sheet.

For the District Engineer:

JOHN L. REYNOLDS,
Chief, Operations Division.

CONGRESS OF THE UNITED STATES,
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,
COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C., June 16, 1969.

Lt. Gen. WILLIAM F. CASSIDY,
Chief of Engineers,
Department of the Army,
Washington, D.C.

DEAR GENERAL CASSIDY: We understand that the maximum depth of the channel into the Chesapeake Bay off Cape Charles is 39 feet. Modern supertankers, we understand, are of greater draft; and, therefore, cannot enter the Chesapeake to serve its various oil terminals.

Does the Corps of Engineers have any plans, now or in the future, to dredge the entrance to the Chesapeake so that it can be used by ships of greater draft? If so, to what depth?

Sincerely,

HENRY S. REUSS,
Chairman, Conservation and Natural Resources Subcommittee.

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D.C., July 17, 1969.

Hon. HENRY S. REUSS,
Chairman, Subcommittee on Conservation and Natural Resources, House of Representatives, Washington, D.C.

DEAR MR. REUSS: This is in further reply to your recent letter concerning dredging the entrance to Chesapeake Bay to accommodate ships of greater draft.

There are two deep-draft navigation channels off Cape Charles which connect the Atlantic Ocean with Chesapeake Bay. One of these entrance channels serves traffic to Baltimore Harbor, Md., and the other leads to Norfolk and Hampton Roads, Va.

The channel serving Baltimore has been completed and provides a depth of 42 feet. A study, authorized by a resolution adopted by the House Committee on Public Works, is considering further deepening to accommodate larger vessels and is now nearing completion. The necessary channel depth will be determined during the course of the study.

With respect to the channel serving Norfolk and Hampton Roads, dredging is currently underway and is scheduled for completion in the present fiscal year to provide a 45-foot depth. The advisability of further deepening of this channel and the determination of the necessary channel depth will be investigated under a study authorized by a resolution adopted by the Senate Public Works Committee. Initiation of that study is subject to availability of funds.

Sincerely yours,

F. J. CLARKE,
Major General, U.S. Army, Deputy Chief of Engineers.

U.S. DEPARTMENT OF THE INTERIOR,
FISH AND WILDLIFE SERVICE,
BUREAU OF SPORT FISHERIES AND WILDLIFE,
Annapolis, Md., February 14, 1969.

Regional Director, Atlanta, Ga.
U.S. Game Management Agent, Annapolis, Md.
Oil Pollution—Potomac River.

On February 10, 1969, I was advised by agent Kensinger that they had picked up several oil-soaked canvasback and redhead in the traps at the Cove Point Banding Station.

The next morning, I instructed agent Thurman to meet me at Cove Point with the floatplane. When I arrived at Cove Point, agent Kensinger had 20 ducks that had been picked up off the beach and out of the traps that were dead from the effects of oil. The oil on the ducks was thick and black and was almost as thick as roofing tar.

Agent Thurman and I flew the shoreline from Cove Point to the mouth of the Potomac and up the north shore of the Potomac. We landed several times and inspected diving ducks that we found sitting on the shore. We were able to determine that a minimum of 1,000 ducks were affected to some degree by this oil. We found heavy crude oil washed ashore from the mouth of the Potomac River upstream to the Steuart Petroleum Co. Above this company's loading dock we were not able to find any sign of oil and did not see any affected birds. There were several hundred whistling swans and several thousand divers in the area immediately above the Steuart Petroleum Co.

We made as thorough an investigation as possible, under the circumstances, and we were not able to pinpoint the exact source of this pollution; however, in cooperation with the Maryland Game Department, we plan to keep the oil unloading facilities at Steuart Petroleum Co. under rather close observation until the birds go north.

The very thought of oil pollution in this area is frightening, because, at one time or another during the spring months, the majority of the canvasbacks and redheads that winter in the Atlantic Flyway are found in this area. On our random surveys during the time the gunning season is open, we have seen a million ducks in this immediate area.

It is difficult to determine the precise extent of the damage caused by this incident. From observation I believe that this has caused the loss of approximately 500 diving ducks and an additional 500 old squaw.

We will keep you advised of further developments.

W. J. PARKER.

JULY 16, 1969.

Hon. HENRY S. REUSS,
Chairman, Subcommittee on Conservation and Natural Resources, House of Representatives, Washington, D.C.

DEAR MR. REUSS: Your letter of July 8, 1969 requested a copy of each report of oil spills in the Potomac estuary from July 1, 1949 to date.

The files of water pollution reports, CG–3639, are normally retained at the Fifth Coast Guard District office for a period of 3 years and are then disposed of. There are presently five reports of oil spills in the Potomac estuary that date back to June 20, 1966. A copy of each report is enclosed for your review.

The water pollution report, CG–3639, is used to report the results of an investigation of oil pollution giving the source of the pollutant and the identity of the suspected violator. The completed report is furnished to the District engineers, U.S. Army, Corps of Engineers for prosecution. If the investigation does not reveal the source of the pollutant and/or the parties responsible, no formal report is submitted. The Commander, Fifth Coast Guard District is notified by dispatch of the oil spill incident and is kept advised of the action taken by the on-scene-commander until the case is closed but no formal report is made of each incident.

The dispatch files are retained at the Fifth Coast Guard District for a period of 3 years. These files are being searched for reported oil spills in the Potomac estuary and you will be supplied with the findings of this search as soon as it has been completed.

It is suggested that you contact the office of the Commandant, U.S. Coast Guard (OLE), Washington, D.C., for information concerning oil spills reported in the Potomac estuary prior to June 1966 that may be stored at the Records Center.

I will be pleased to assist you and the subcommittee at any time.

Sincerely yours,

E. C. ALLEN, Jr.,
Rear Admiral, U.S. Coast Guard,
Commander, Fifth Coast Guard District.

[The reports referred to above are in the subcommittee files.]

AUGUST 25, 1969.

Hon. HENRY S. REUSS,
Chairman, Subcommittee on Conservation and Natural Resources, House of Representatives, Washington, D.C.

DEAR MR. REUSS: As stated in my letter of July 16, 1969, a search of the dispatch files of the Fifth Coast Guard District was initiated for additional information regarding reported oil spills in the Potomac River estuary over the past 3 years.

The search revealed rather limited information on only four reported spillages, two of which were in the lower Potomac River. They are described as follows:

April 25, 1968: An unknown quantity of No. 6 fuel oil covered 30 to 40 percent of the river (in the Washington, D.C. area).

July 12, 1968: A minor spill of aviation gasoline occurred at Piney Point, Md.

November 27, 1968: An unknown quantity of No. 6 fuel oil or bunker C type oil was reported in the Anocostia River.

February 4, 1969: A patch of oil approximately ½ mile long by 10 yards wide was reported on the beach at Point Lookout.

It is hoped that this information will be of use in your study, and I will be pleased to assist further at any time.

Sincerely yours,

E. C. ALLEN, Jr.,
Rear Admiral, U.S. Coast Guard,
Commander, Fifth Coast Guard District.

JUNE 24, 1970.

Hon. HENRY S. REUSS,
Chairman, Subcommittee on Conservation and Natural Resources, House of Representatives, Washington, D.C.

DEAR MR. REUSS: As requested in your letter of June 19, 1970, the following information is provided regarding reported pollution cases in the Potomac estuary subsequent to July 28, 1969:

October 30, 1969: An unknown quantity of Bunker C type oil was reported by Corps Engineers in Kingman Lake, Anacostia River. Source unknown (enclosure (1)).

January 24, 1970: A 200–400 gallon spill of No. 5 fuel oil occurred on the M/T *Glorious Colocotronis* at Steuart Petroleum Co., Piney Point, Md. (enclosure (2)).

March 31, 1970: An unconfirmed report of oil pollution in the Anacostia River was investigated (enclosure (3)).

April 17, 1970: Drain off from storm sewers formed slick from Pennsylvania Railroad bridge to 11th Street Bridge. Estimate 50–100 gallons (enclosure (4)).

May 2, 1970: M/V *Helgoland* pumped bilges at Robinson Marine Terminal, Alexandria, Va. (enclosure (5)).

June 16, 1970: Rupture of flexible pipeline caused a spill of No. 6 Bunker Oil at the Steuart Petroleum Co., Piney Point, Md., 5 miles of beach were affected and clean-up operations still continue (enclosure (6)).

No other pollution cases are on record in this office to date. It is hoped that you will find this information useful. I will be pleased to assist further at any time.

Sincerely,

S. G. CARKEEK,
Captain, U.S. Coast Guard,
Acting Commander, Fifth Coast Guard District.

Enclosures:

(1) Msg. reports of oil spill in Kingman Lake, October 30, 1969.
(2) Water pollution report (CG–3639)—vessel *Glorious Colocotronis*, January 24, 1970.
(3) Msg. report of oil pollution in Anacostia River, March 31, 1970.
(4) Msg. reports of oil pollution in Anacostia River, April 17, 1970.
(5) Water pollution report (CG–3639)—vessel *Helgoland*, May 2, 1970.
(6) Msg. reports of oil pollution at the Steuart Petroleum Co., June 16 1970.

[The enclosures, not reproduced here, are in the subcommittee files.]

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CG-3639 (Rev. 7-68)

REPORTS CONTROL SYMBOL OLE-2101

WATER POLLUTION (Check applicable violation(s))

- [ ] OIL POLLUTION ACT OF 1961 (Discharge of oil by vessels within prohibited zones of the high seas.)
- [ ] OIL POLLUTION ACT OF 1924 (Discharge of oil by vessels into navigable waters of the United States.)
- [X] THE REFUSE ACT OF 1899 (Discharge of refuse by vessel or shore facility into any navigable waters of the United States.)

REPORTING UNIT	CG DISTRICT	DATE OF VIOLATION
U.S. Coast Guard Station Baltimore, Md.	05	16 June 1970

SECTION I - VESSEL DATA

1. NAME OF VESSEL	2. OFFICIAL NUMBER	3. NATIONALITY
M/V OLIVA		German

4. TYPE OF VESSEL: [ ] DRY CARGO [X] TANKER [ ] TANK BARGE [ ] OTHER (Specify)

5. GROSS TONS	6. INTERNATIONAL CALL
54,430	DNCR

7. OWNERS (Name and address)	8. LOCAL AGENT (Name and address)
Shell Tankers, Hamburg, Germany	Furness-Withy and Co., Ltd. Baltimore, Md.

9. MASTER		10. CHIEF ENGINEER	
a. NAME AND ADDRESS (If available)	b. LICENSE NO.	a. NAME AND ADDRESS (If available)	b. LICENSE NO.
Hans Leonhardt	None	Walter Schacht	None

SECTION II - OIL RECORD BOOK DATA

1. REQUESTED RECORD BOOK FROM: [ ] MASTER [ ] CHIEF ENGINEER N/A

2. [ ] PROPERLY MAINTAINED [ ] IMPROPERLY MAINTAINED [ ] COULD NOT BE PRODUCED

SECTION III - SHORE FACILITY DATA

1. NAME AND ADDRESS OF COMPANY	2. TYPE OF FACILITY	3. TYPE OF REFUSE
Steuart Petroleum Co. Piney Point, Md.	Oil Terminal	#6 Oil.

SECTION IV - POLLUTION DATA

1. PLACE OF POLLUTION (Local name or geographical coordinates)	2. TIME	3. [X] EQUIPMENT FAILURE [ ] PERSONNEL FAILURE
Piney Point, Md. Pipeline Pier.	2145Q, 6/15/70	

4. OPERATING PERSONNEL INVOLVED	5. DUTY	6. MARINERS LICENSE NUMBER (If any)	7. SIGNED STATEMENT ATTACHED
Jerry F. Cutchember	Watchstander	N/A	Yes

8. EMERGENCY MEASURES TAKEN TO REDUCE FIRE HAZARD	9. POLLUTANT
None needed.	#6 oil

SECTION V - POLLUTION SAMPLES (Include this information on label of sample)

1. SOURCES A.	2. TIME A.	3. DATES A.
B. Not necessary.	B.	B.

4. NAME OF PERSON(S) TAKING SAMPLES	5. WITNESS(ES) TO TAKING SAMPLES

PERSON REPORTING POLLUTION	WITNESS	SIGNED STATEMENT ATTACHED
William H. Saul		[X] YES [ ] NO

INVESTIGATING OFFICER (Typed name)	SIGNATURE (Investigating Officer)
C. F. SCAMMON, Jr., LTJG, USCGR	C. F. Scammon Jr.

FIRST ENDORSEMENT
Forwarded.

DATE	SIGNATURE (Unit Commanding Officer)
20 July 1970	L. A. LEVINE, CAPT, USCG

SECOND ENDORSEMENT

DATE	SIGNATURE (District Commander)

Statement Concerning Oil Spill From M/V "Oliva" on June 16, 1970

On June 16, 1970 at 0005Q, Coast Guard Station Piney Point was notified of an oil spill at Steuart Petroleum Co. by Mr. William H. Saul, superintendent. The oil was No. 6 fuel oil, and the spill occurred in the process of fuel transfer with the German merchant vessel *Oliva*. The location of the spill was at the end of the pipeline pier at the Steuart Petroleum tank farm at Piney Point, Md.

Subsequent investigation showed that the spill occurred sometime during the night of June 15, 1970. The time was approximately 2200Q. By the time Coast Guard personnel from Station Piney Point were notified and on scene, several pieces of equipment had been deployed for cleanup, and an oil boom had been set out to attempt to catch some of the oil. It appeared to the investigators that these efforts were partially successful, but it was not until the next morning that the full extent of the damage could be ascertained.

In conversations with Mr. Saul following the incident, the full responsibility for the spill was accepted by the Steuart Petroleum Co. Mr. Saul described the spill as having resulted from a rupture in the hose being used by Steuart's Co. to transfer the oil. An inspection of the hose (Republic Rubber Co.) by Coast Guard personnel confirmed that the hose appeared to be relatively new and in good condition, except for a rupture approximately 8 inches long circumferentially at the midsection of the hose. It was reportedly in use about 3 years however, U.S. Army Corps of Engineers investigation indicates manufacture in 1964. The failed section is to be referred to an independent test company by the manufacturer.

It was reported by Mr. Saul—although there are no positive means of verification—that the hose had been used for several hours at the normal pumping pressure of around 90–120 gallons per minute. The hose has 150 pounds working pressure and 250 pounds test pressure limits set by the manufacturer. Sometime prior to the rupture of the hose the pressure was decreased, and thus there was reportedly no reason to suspect a failure.

Personnel at the scene report that when the rupture occurred a shower of oil came from the hose. The man on watch, Jerry Cutchember, called the ship to shut down their pumps, and proceeded to shut off the valve on the oil pier. According to Mr. Cutchember, the time between the first realization of the spill and the shutting off of the valves was approximately 2 to 3 minutes. During this period it was estimated that from 50 to 200 gallons escaped. This estimate was made by the company, although inspection of the beaches after the spill suggested that more oil may have been lost.

Cleanup operations were hampered by darkness, and the wave action common to Piney Point. During the night a southwest wind blew the escaped oil down the Maryland shore of the Potomac, for a distance of some 5 miles. The deposits of oil varied in amount from area to area, with some areas receiving no oil at all. Oil settled thickly in some of the residential areas and then wave and wind moved it to another area, leaving a black skim on the beach sand and structures.

Evaluation and cleanup were begun promptly the next day by Steuart, and monitored by the Coast Guard. Generally the oil company was responsive both to the citizens and to the Coast Guard personnel. The only criticism of the initial attempts at cleanup was the failure of Steuart to contain one pocket of oil in a small cove with the oil boom. The oil was subsequently lost. However, the total volume of oil involved was not great.

In the initial stages of cleanup an attempt was used to employ the Mop-Cat mechanical oil remover. This device has been used successfully in protected waters for picking up large quantities of oil, but its value at Piney Point is questionable. Although it was able to remove some oil, the choppy waters made the operations difficult and the Mop-Cat was eventually discontinued. Partly this was due to the inability of the Mop-Cat to operate effectively in the choppy water, and partly because the oil soon became spread over the beaches and lodged in coves where the Mop-Cat could not operate. Since the tidal and wind action at Piney Point are strong, it is doubtful that the Mop-Cat will be an effective cleanup device at Piney Point.

Once the oil had settled on the beaches, Steuart attempted to isolate the larger pools of oil and to formulate a cleanup plan. It was decided that the populated areas used for recreation would be worked on first, concentrating on the beaches. Later the discolored areas on wharfs and rocks would be cleaned and finally the unpopulated areas.

Steuart responded to complaints by sending personnel directly to the homes of the complainants and trying to eliminate the worst situations first. This was partially successful, but a lack of men and equipment hampered the initial cleanup operation. Once the company was able to hire additional help and obtain equipment the cleanup progressed satisfactorily, but in the initial stages it was difficult to cope with such an extensive area.

Cleanup was also hindered by the beach configuration. There were very few places for the introduction of heavy equipment, and almost all the sand which had to be removed was loaded by hand into small boats and taken to one or two central loading stations. This was a time-consuming and costly operation.

Total cost for cleanup is not yet available. However, it is estimated that at the heaviest part of the cleanup the cost was in the area of $2,000 a day. It is expected that the cleanup will continue for at least a month.

The cleanup force consisted of from five to 10 workmen from Steuart's, under the direction of Mr. Warren Delozier. These men directed a crew of up to 60 workers recruited for the cleanup operation. In addition to the men, the company rented several front-end loaders, trucks, small boats, and hand equipment such as shovels.

Oily sand was removed by shoveling it into boats for delivery to the front-end loaders. The sand was then taken to a protected area on Steuart property for off-loading. Oil seepage from the sand was not expected to be a problem due to the low concentration of oil compared to the volume of sand. The company has agreed to replace the sand removed with clean sand, although at this time this has not been done.

In the areas cleaned by Steuart's, almost all of the visible oily sand has been removed. There is some question as to the problem of buried oil which may resurface due to tide and wind action. There is also the possibility that some oil may have sunk and with warmer water temperatures may resurface. As of the present time, however, there is no indication that this has happened and there have been no complaints by the residents to the Coast Guard.

Oil on boats was removed by Steuart's using a cleaning process at their facility. Oil on permanent structures has been, or will be, removed using a chemical agent, subject to the approval of the Maryland Department of Water Resources.

Following the spill many complaints from residents were received by the Coast Guard. These were investigated by Chief Brizendine, officer in charge of Piney Point station, and by officers from Group Baltimore. In general, residents were very upset by the spill and the fact that it represented a great financial threat to themselves and a loss of recreation. Most residents were not critical of the cleanup effort, but felt that the whole incident should never have happened. Many insisted on better safeguards against spills, while others felt that the only solution was for Steuarts to move their facility. The majority, however, recognized the need for such oil storage facilities, but wanted assurance that spills would not threaten them in the future.

Several suggestions have been made concerning safeguards at Piney Point. Many devices which are used at other plants are impractical at Piney Point because of the unusual tides and winds and the exposed nature of the pier. Conferences with State and Federal agencies and representatives of the company have been held, and further discussion is expected on July 21 and 22 at the Conservation Subcommittee hearing in Washington, D.C.

C. F. SCAMMON, Jr.

JULY 20, 1970.

Endorsement of Group Baltimore commander: Oil pollution concerning M/V *Oliva* at Piney Point, Md., on June 16, 1970.

Forwarded approved with these additional comments:

1. There was delay in reporting the incident to the Coast Guard. The reported speed with which company personnel reacted to contain the oil does not absolve it from this responsibility. Moreover, had the local Coast Guard been notified promptly, station personnel would have been readily available to assist in containment.

2. There appeared to be reluctance by company employees to advise on the amount of oil spillage and a tendency to minimize the amount. It was the considered estimate of observers that not 200 gallons but at least 400 gallons were lost.

3. The cleanup operation necessarily extended over a long period. This was not due to the slowness of Steuart Petroleum Co. but to the topographical and weather conditions, as indicated in the basic report.

4. The incident occurred at a time when wind and weather were adverse. The spill of oil therefore had maximum effect over a more extended area than normally experienced for the quantity involved.

5. Representatives of the Maryland Department of Water Resources, Federal Water Quality Administration, and Coast Guard met with company officials to discuss the problem of spillage and what steps the company is taking or might consider to minimize this occurrence. Items included:

(*a*) Expanded use of flexible steel hose.

(*b*) Fixed and/or movable boom.

(*c*) Continuous communications between ship and terminal during transfer operations.

6. Group Commander Baltimore is preparing an operating bill which will be hand delivered by the officer in charge, Piney Point Coast Guard Station upon ship's arrival at the terminal. This will be discussed with responsible ship's officers of that vessel. The bill will include:

(*a*) Federal and State laws relative to pollution.
(*b*) Required and desired safety procedures during transfer.
(*c*) Security of ship's internal arrangement against discharge of oil/waste.
(*d*) Emergency procedure in the event of a spill.

T. L. SEAMAN,
Lieutenant Commander, U.S. Coast Guard,
Executive Officer, Group Baltimore.

16 June 70
(DATE)

I. (STATEMENT) Jerry F. Cutchember OF MY OWN

FREE WILL, GIVE THE STATEMENT BELOW. I HAVE BEEN WARNED THAT ANYTHING CONTAINED IN THIS STATEMENT MAY BE USED IN ANY PROCEEDINGS IN COURT AGAINST THE VESSEL, COMPANY, OR MYSELF

I was on Pier watch Tanker Olivia Approx. 2200 Hose comenced to squeal and shower me with oil. I called Mate on ship - Told him to shut Down - climbed Ladder & closed shore valve in Approx 2-3 minutes - Called plant & reported.

WITNESS TO SIGNATURE (PRINT)

8711 Eaglebrook Ct
ADDRESS

360 4141
PHONE

Jerry F. Cutchember
NAME (PRINT)

Eng. Helper
POSITION

Lenard Town Lock 5
ADDRESS

475 8251
PHONE

16 June 70
(DATE)

STATEMENT

I. William R Sack OF MY OWN FREE WILL, GIVE THE STATMENT BELOW. I HAVE BEEN WARNED THAT AYTHING CONTAINED IN THIS STATMENT MAY BE USED IN ANY PROCEEDINGS IN COURT AGAINST THE VESSEL, COMPANY, OR MYSELF

I arrived on Pier + saw that all possible work was being done to contain + clean up Spill. Hoses were suspended correctly + under no strain.

I notified Coast Guard - Inspector Mr. Silverman at home - Called in all hands for clean-up.

Warren DeFrozier
WITNESS TO SIGNATURE (PRINT)

Rt-2 Box 17 Lewisburg Ohio
ADDRESS

475-8441
PHONE

William R Sack
NAME (PRINT)

S-P-T.
POSITION

5711 Eagle Branch Rd.
ADDRESS

360 4141
PHONE

6-16-70
(DATE)

STATEMENT

I. Warren Dolozich OF MY OWN FREE WILL, GIVE THE STATEMENT BELOW. I HAVE BEEN WARNED THAT ANYTHING CONTAINED IN THIS STATMENT MAY BE USED IN ANY PROCEEDINGS IN COURT AGAINST THE VESSEL, COMPANY, OR MYSELF

At approx 2210 6-15-70 I was notified at home that a hose Connected to the tanker Olivia had burst at approx 2200. On arriving at the Pier we started putting out oil boom trying to Contain as much oil as possible. Brought Skimmer boat into operation. Brought in help to start cleaning up dock with absorbent to lower fire Hazard.

Warren Dolozich
ADDRESS TO SIGNATURE (PRINT)

8711 Eagle Creek Ct.
ADDRESS

360 4141
PHONE

Warren Dolozich
NAME (PRINT)

Chief Engineer
POSITION

Stewart Petroleum Co Piney Point
ADDRESS

994 1200
PHONE

CHRONOLOGICAL RECORD OF EVENTS PERTAINING TO OIL SPILL, PINEY POINT, MD., AT STEUART PETROLEUM CO. ON JUNE 16, 1970 (M/V "OLIVA")

160005Q—Notified by Mr. William Saul (superintendent) of oil spill.
160015Q—Dispatched two personnel from station to investigate and get samples.
160045Q—OinC arrived end of Steuart's pier to conduct further investigation and rendezvous with Mr. Saul and company foreman, Warren Delozier; found oil company had oil boom in place and MOPCAT in use; estimated 200 gallons spilled (conservative due to darkness).
160500Q—Completed preliminary investigation, directed watchstander to hold reveille on BM3 Aspinwall at sunrise to observe what actions were being taken by petroleum company.
160545Q—BM3 Aspinwall found petroleum company was conducting cleanup as before with MOPCAT and oil boom.
160830Q—Received call from local citizen, complained of oil on beach.
160930Q—Dispatched station vehicle and two personnel to investigate.
161300Q—OinC departed to observe oil coming ashore at Tall Timbers.
161600Q—OinC returned to station, determined that largest amount of spillage had washed ashore at Tall Timbers.
161700Q—OinC departed with Corps of Engineers representative Mr. Robinson to direct him to area of oil spills and talk to local citizens.
161800Q—OinC returned.
171000Q—OlinC departed via station vehicle to determine progress of cleanup and talk to local citizens.
171145Q—OinC returned.
171300Q—OinC departed with Mr. Edwards, Corps of Engineers representative to scene to determine extent of beach affected.
171430Q—OinC returned.
181000Q—OlinC departed via station vehicle to check area.
181145Q—OinC returned.
181230Q—OinC departed via station vehicle with Sergeant Mattingly, Maryland Marine Police to survey area and talk to local citizens.
181430Q—OinC returned.
181800Q—OinC departed station via station vehicle to survey progress.
182030Q—OinC returned.

FOLLOWING INFORMATION ADDED CONCERNING CLEANUP EFFORTS BY STEUART

1. June 18 and 19—37 men, two front-end loaders, two dump trucks, and five small boats utilized for clean-up purposes.
2. June 16 and 17—17 men, various pieces of shore equipment utilized.
3. Three flights sent up to maintain oil surveillance.
4. Reported to this unit that approximately 1,000 man-hours had been used.

JOINT STATEMENT OF EN2 FRANK S. STEWART, JR., 371 344, U.S. COAST GUARD AND BM2 THOMAS ASPINWALL, 377 265, U.S. COAST GUARD

At 0900Q 16 June 1970 received a call by phone from Mr. Cockrell stating he had an accumulation of oil in the water and on his beach in the Tall Timbers area. It was passed to Mr. Cockrell that we had been working with Steuart Petroleum Co. on the spill since they notified us that they had ruptured a pipe line between the M/V *Oliva* and Steuart's prior. It was explained to Mr. Cockrell that the cleanup was already in progress and that boats, personnel and a plane were to be dispatched to survey the extent of the spill damage as soon as possible. Mr. Cockrell insisted that we come to his home in Tall Timbers and get a sample to be compared with the oil spilled at Steuart's. 0915Q June 16, 1970 EN2 Steward and BM2 Aspinwall departed Station Piney Point enroute Tall Timbers to get sample from Mr. Cockrell's beach.

0930Q En2 Stewart took oil sample from beach at Mr. Cockrell's residence, while at Mr. Cockrell's it was explained to him that Steuart Petroleum Co. and we at Station Piney Point would be making surveys of the spill damage and clean-up progress until it was cleaned up and that Steuart Co. was already in the process of starting clean-up and that the Petroleum Co. had stated they would clean-up all oil spill damage to the satisfaction of the residence (sic).

EN2 FRANK STEWART.
BM3 THOMAS ASPINWALL
(now Bm2).

STATEMENT OF EN2 PAUL L. BRAUNER, JR., 364 744, U.S. COAST GUARD, JUNE 19, 1970

On June 16, 1970 at 005 was notified of a oil spill at the end of Stewart's (sic) pier. CS3 Barnes and myself proceeded to the end of the pier. When we arrived they had already put the oil boom's out at both ends of the T-pier, also the Mopcat was tied up to the up river side. We then proceeded to gather oil samples from the water. We then observed that the oil boom on the upriver side was not completely all the way across, between the ship and a oil barge tied up parallel to it. Oil was escaping through these openings. We notified one of the workmen and he stretched it the rest of the way across. We also observed that quite a bit of oil covered the pier but not much was in the water. At 0105 while we were taking oil samples, workmen at the pier started spraying a chemical on the equipment to clean it. This chemical was also getting in the water by dripping and by spray caused by the wind. Upon contact with the water it turned a milky white in color.

We notified the workmen and they quit using it immediately. Mr. Delozier told us that they were told that they could use it. Also Mr. Saul told us the same thing. At 0115 Mr. Saul instructed me that he was taking full responsibility for the use of it, giving the reason that the oil on the pier and equipment posed a great fire hazard. After returning to the station to secure another sample bottle we took a sample of the chemical. Also around 0115 I instructed CS3 Barnes to take a oil sample from the tank. And I talked with the watchman that was on duty Mr. Jerry Cutchumber and really got no more info that there was a oil spill. Also at this time the Mopcat started to clean up the oil from the water.

PAUL J. BRAUNER, Jr.

[Official message]

U.S. COAST GUARD,
June 19, 1970.

From CCGDFIVE.
To COMDT COGARD.
BT.
Unclas.
Sitrep summary oil pollution, Piney Point, Md.

1. Situation:
   (*a*) At 170405Z Coast Guard Station, Piney Point, notified by Mr. Bill Soul, superintendent of Steuart Petroleum Co. of oil spill on their pier at Piney Point, Md.
   (*b*) Notified Maryland Department of Water Resource, Army Engineers and FWQA.
   (*c*) Corps of Engineers, Baltimore, determined cause of spill to be failure of flexible transfer hose occurring during offloading of MV *Oliva*. Pumping was reportedly secured within 3 minutes after rupture. Spill estimated at 500–1,000 gallons of No. 6 bunker oil.
   (*d*) Weather partly cloudy, visibility 5 miles, temperature 68 degrees, wind southwest 10 knots, seas southwest 1 foot.
2. Action taken:
   (*a*) Coast Guard personnel on scene to investigate at 0415Z.
   (*b*) At 0445Z OINC Piney Point reported that Steuart Petroleum Co. had rigged oil vanes, and were using mop cat to assist in clean-up. Hemco No. 2 being used in spill cleanup on pier and equipment.
   (*c*) At 0600Z petroleum company employees provided 25 bags of absorbent material for cleanup assist.
   (*d*) Steuart Petroleum launched A/C at daylight to assist in locating extent of overboard oil and rented two boats to isolated spills with oil vanes. Mop cat use intended for cleanup but shallow water precluded except for approximately eight barrels of oil recovered offshore.
   (*e*) Approximately 5 miles of beach now affected. Cleanup operations continue in progress. Steuart Petroleum has hired high school boys to assist. Expect several days duration on cleanup.
   (*f*) Group commander reports efforts of Steuart Petroleum prompt and as effective as could be expected. Coast Guard presonnel have maintained contact with situation and report no criticism from FWQA or engineers.
3. Future plans:
   (*a*) Captain Levine now enroute to scene for personal assessment of situation.

(*b*) District representative in departing ports Virginia via helicopter to assist in survey of situation.

(*c*) Continue to monitor cleanup efforts with a group officer on scene next day or so.

E. H. BURT, Jr.,
Captain, U.S. Coast Guard,
Chief, Operations Division.

FI DE BA
P 161238Z June 1970.
Fm COMCOGARD GRU, Baltimore.
To CCGDFIVE.
BT
Unclas
Sitrep 1 oil pollution, Piney Point.

1. Situation:
   (*a*) 0005Q Coast Guard Station, Piney Point, notified by Mr. Bill Saul, superintendent of Steuart Petroleum Co., of oil spill on their pier, Piney Point, Md.
   (*b*) Amount of spillage unknown, 8-inch pipeline had ruptured with approximately 6-inch crack in bend of hose, spill was of No. 6 bunker oil. When pipe ruptured, the oil came out in a fine spray and due to darkness unable to determine amount of spillage.
   (*c*) WX partly cloudy, visibility 5 miles, temperature 68 degrees, winds southwest 10 knots, seas southwest 1 foot.
2. Action taken:
   (*a*) 0015Q 2 personnel from station departed to investigate.
   (*b*) 0045Q OINC arrived end of Steuart pier, found that petroleum company had rigged oil vanes, and had mop cat on scene to assist in cleanup. Petroleum company had employees using Hemco No. 2 cleaning up spill and equipment.
   (*c*) 0200Q Petroleum company employees brought in 25 bags of absorbent material to assist in cleaning up pier and equipment.
   (*d*) Advised by superintendent of company that plane would be launched during daylight hours to spot any oil slicks that may have occurred. Also two boats had been rented to isolate spills with oil vanes and cleanup would be conducted with mop cat.
   (*e*) Spill had occurred while offloading MV *Oliva*.
   (*f*) Spill occurred due to equipment failure, first mate of MV *Oliva* stated that equipment had been shut down within 3 minutes after rupture occurred.
   (*g*) Notified Maryland Department Water Resources, Corps of Engineers, and FWQA.
3. Future plans:
   (*a*) Investigate beach areas to determine extent of spill. Insure cleanup by Steuart.

FI DE BA
P 17025Z June 1970.
Fm COMCOGARD GRU, Baltimore.
To CCGDFIVE.
BT
Unclas.
Sitrep 2, oil pollution, Piney Point.

1. Situation:
   (*a*) As before.
   (*b*) Estimate 200 gallons lost.
   (*c*) Heaviest concentration at 38°09′38″ N., 76°32′04″ W. Mop cat unable to operate in this area due to shallow water.
2. Action taken:
   (*a*) Plane and boats employed by Steuart Petroleum report slick extends from Piney Point Creek to Tall Timbers along shoreline but not into creeks.
   (*b*) 2000Q Cleanup operations secured until 170700Q June 1970.
   (*c*) Mr. Warren DeLozier, foreman, unable to estimate amount recovered. Also that operations would continue for next 2 or 3 days.

3. Future plans:
   (*a*) Cleanup operations with heavy shore equipment and approximately 20 employees to commence when slick comes ashore.
   (*b*) Mop cat to continue cleanup operations.
   (*c*) Station Piney Point to continue on scene coordination.
4. Case pends.

FI DE BA
P 180135Z June 1970
Fm COMCOGARD GRU, Baltimore
To CCGDFIVE
BT
Unclas
Sitrep 3, oil pollution, Piney Point.

1. Situation:
   (*a*) Tide distributed oil along shore approximately 1 mile long. McKay Beach and Lane Beach affected.
2. Action taken:
   (*a*) Steuart continuing cleanup with 17 men, and mop cat where able to operate. Continuing air surveillance.
   (*b*) Approximately 150 feet of beach area and about 2 miles loose oil in water cleaned up.
3. Future action:
   (*a*) Cleanup to continue for next 2 or 3 days.

FI DE BA
P 190300Z June 1970
Fm COMCOGARD GRU, Baltimore
To CCGDFIVE
BT
Unclas
Sitrep 4, oil pollution, Piney Point.
Your 190159Z June 1970.

1. Situation as before.
2. Action taken:
   (*a*) Steuart Petroleum partially cleaned 500 feet of beach.
   (*b*) Steuart has hired high school boys. Total personnel 30.
3. Future plans:
   (*a*) Steuart to continue cleanup operations.
   (*b*) Comply reference A, June 19, 1970.
4. Case pends.

FI DE BA
P 200100Z June 1970
Fm COMCOGARD GRU, Baltimore
To CCGDFIVE
BT
Unclas
Sitrep 5, oil pollution, Piney Point.

1. Situation:
   (*a*) As before.
   (*b*) Area affected consists primarily of small private residences with about 50 feet each of very narrow beach area. Most divided by wood breakwaters. Arrangement does not lend itself to massive removal. Moreover most properties do not permit bringing heavy equipment directly to beach. Spacing between residences and septic tanks drain fields are limiting factors. Sand removal necessarily done by loading onto boats on beach, carrying to nearby area accessible for heavy equipment to permit off loading.
2. Action taken:
   (*a*) Steuart continuing cleanup of beach areas by removing oil soaked sand, and cleaning fixed structures such as ramps.
   (*b*) Steuart using five teams of eight men each and five boats and miscellaneous heavy equipment.
   (*c*) Steuart removing dirtied private boats to its facilities for cleaning and return to owners.

(*d*) District group officers inspected area and operations. Group officers spot checked complainants to insure reasonably prompt level of response being made by Steuart.

(*e*) GRUCOM interviewed by Washintgon Post and Evening Star and Baltimore Sun.

3. Future plans:

(*a*) Steuart to continue cleanup operations of beach and other private property.

(*b*) Group pollution control officer to be on scene to answer queries and monitor operations.

4. Case pends.

FI DE BA
P 201930Z June 1970
Fm COMCOGARD GRU, Baltimore
To CCGDFIVE
BT
Unclas
Sitrep 6, oil pollution, Piney Point.

1. Situation:

(*a*) Pollution control officer on scene to determine progress of oil cleanup.

2. Action taken:

(*a*) Steuart oil has 60 workers including local Boy Scout groups working on cleanup, sand being loaded in boats for removal.

(*b*) Local residents contacted concerning cleanup; no problems at this time; work progressing as rapidly as possible.

(*c*) Residents personally contacted expressed pleasure in the efforts and cooperation of OIC Coast Guard Station, Piney Point, residents were pleased with the personal contacts with the Coast Guard.

(*d*) Not aware of any wildlife kills.

3. Future action:

(*a*) Steuart Petroleum Co. to continue cleanup through weekend and next week until completion.

FI DE BA
P 220118Z June 1970
Fm COMCOGARD GRU, Baltimore
To CCGDFIVE
BT
Unclas
Sitrep 7, oil pollution, Piney Point.

1. Situation:

(*a*) As before.

2. Action taken:

(*a*) Steuart employed same personnel and equipment.

(*b*) Secured cleanup approximately 1400Q due to local thunderstorms.

3. Future action:

(*a*) Steuart to continue cleanup 0800Q daily during week.

FI DE BA
P 222005Z June 1970
Fm COMCOGARD GRU, Baltimore
To CCGDFIVE
BT
Unclas
Sitrep 8, oil pollution, Piney Point.

1. Situation as before.

2. Action taken:

(*a*) Station Piney Point conducted daily check of area. Percentage of cleanup completed undetermined because recovery crew working in various areas.

(*b*) Steuart states they are using same number of crew and equipment and will work till 1900 this date.

3. Future plans:

(*a*) Petroleum company to continue daily cleanup.

4. Case pends.

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CG-3639 (Rev. 7-68)

REPORTS CONTROL SYMBOL OLE-2101

WATER POLLUTION (Check applicable violation(s))

- ☐ OIL POLLUTION ACT OF 1961 (Discharge of oil by vessels within prohibited zones of the high seas.)
- ☐ OIL POLLUTION ACT OF 1924 (Discharge of oil by vessels into navigable waters of the United States.)
- ☒ THE REFUSE ACT OF 1899 (Discharge of refuse by vessel or shore facility into any navigable waters of the United States.)

REPORTING UNIT	CG DISTRICT	DATE OF VIOLATION
U.S. Coast Guard Group Baltimore	5	11 July 1970

SECTION I - VESSEL DATA

1. NAME OF VESSEL	2. OFFICIAL NUMBER	3. NATIONALITY
Barge "Auntie Mame"	None	U.S.

4. TYPE OF VESSEL	5. GROSS TONS	6. INTERNATIONAL CALL
☐ DRY CARGO ☐ TANKER ☒ TANK BARGE ☐ OTHER (Specify)	2928	NONE

7. OWNERS (Name and address)	8. LOCAL AGENT (Name and address)
Steuart Transportation Co. Piney Point, Maryland	NONE

9. MASTER Bargeman		10. CHIEF ENGINEER	
a. NAME AND ADDRESS (If available)	b. LICENSE NO.	a. NAME AND ADDRESS (If available)	b. LICENSE NO.
James Leach	N/A	NONE	

SECTION II - OIL RECORD BOOK DATA

1. REQUESTED RECORD BOOK FROM	2.
☐ MASTER ☐ CHIEF ENGINEER N/A	☐ PROPERLY MAINTAINED ☐ IMPROPERLY MAINTAINED ☐ COULD NOT BE PRODUCED

SECTION III - SHORE FACILITY DATA

1. NAME AND ADDRESS OF COMPANY	2. TYPE OF FACILITY
Steuart Petroleum Company Piney Point, Md.	Oil Storage Facility
	3. TYPE OF REFUSE Asphalt

SECTION IV - POLLUTION DATA

1. PLACE OF POLLUTION (Local name or geographical coordinates)	2. TIME	3. ☒ EQUIPMENT FAILURE ☐ PERSONNEL FAILURE
Loading Pier at Piney Point	Approx 1000Q 11 July 1970	

4. OPERATING PERSONNEL INVOLVED	5. DUTY	6. MARINERS LICENSE NUMBER (If any)	7. SIGNED STATEMENT ATTACHED
Kenneth Coleman	Tankerman	N/A	NO
Gerald Ansell	Tankerman	N/A	NO

8. EMERGENCY MEASURES TAKEN TO REDUCE FIRE HAZARD	9. POLLUTANT
None necessary	Asphalt

SECTION V - POLLUTION SAMPLES (Include this information on label of sample)

1. SOURCES	2. TIME	3. DATES
A. Not necessary to case	A.	A.
B.	B.	B.

4. NAME OF PERSON(S) TAKING SAMPLES	5. WITNESS(ES) TO TAKING SAMPLES

PERSON REPORTING POLLUTION	WITNESS	SIGNED STATEMENT ATTACHED
Mr. Warren Delozier Foreman--Steuart Petroleum Co.		☒ YES ☐ NO

INVESTIGATING OFFICER (Typed name)	SIGNATURE (Investigating Officer)
C.F. Scammon Jr.	C.F. Scammon Jr.

FIRST ENDORSEMENT

Forearded approved

DATE	SIGNATURE (Unit Commanding Officer)
1 August 1970	L.E. Lunning, Capt. USCG

SECOND ENDORSEMENT

DATE	SIGNATURE (District Commander)

STEUART PETROLEUM ASPHALT SPILL, JULY 11, 1970

FINDINGS OF FACT

At approximately 1015Q, July 11, 1970, Coast Guard Station Piney Point was notified by Mr. Warren Delozier of an asphalt spill at the loading pier at Steuart Petroleum Co., Piney Point, Md.

Initial investigation revealed that spillage had been caused by a ruptured 2-inch hose aboard the barge *Auntie Mame*. It was believed at that time that the asphalt had been contained by the deck coaming and that none had escaped overboard.

At approximately 1830Q Mr. William A. Vought of Piney Point reported some asphalt on his beach. Coast Guard personnel investigated and found small quantities between Oakwood Lodge and St. George's Island Bridge. Steuart Petroleum advised they would clean this up.

On July 12, 1970, Mr. Edwards of the Corps of Engineers investigated and reported finding approximately 2 gallons of scattered asphalt along the beach. This was removed by Steuart.

The Maryland Department of Water Resources and the FWQA were notified of the spill.

C. F. SCAMMON, Jr.

7-12-70
(DATE)

STATEMENT

I. Warren DeLozier OF MY OWN FREE WILL, GIVE THE STATMENT BELOW. I HAVE BEEN WARNED THAT ANYTHING CONTAINED IN THIS STATMENT MAY BE USED IN ANY PROCEEDINGS IN COURT AGAINST THE VESSEL, COMPANY, OR MYSELF

I was notified at appx 1015 of a possible asphalt spill from Barge Ante Marie. while transfering product through "3" hose Buried aft Pin appx 1030. A light spatter of asphalt on deck no visuale sign of any asphalt on the water near barge. Appeard at this time all of the asphalt at staged on deck.

Later was notified Bay Coast Guard that splatches of asphalt were showing up on Piney Point Beach.

William C. Brizendine
WITNESS TO SIGNATURE (PRINT)

ADDRESS

PHONE

WARREN DeLOZIER
NAME (PRINT)

FOREMAN
POSITION

ADDRESS

994-1200
PHONE

7/11/70

1016 Q notified by Mr. Warren Delorick of possible asphalt spill end of Stewarts pier, Piney pt.

1020 Q Station personnel departed to investigate, (Boat Boyarlun + EN2 Stewart)

1023 Q arrived end of petroleum Co. Pier, found no asphalt in water, a 2 inch rubber hose had ruptured and created a spray around over the barge "Austin Maine" ←→

1045 Q Station personnel returned

1830 Q rec'd Call from mr. William A. Vought Piney pt that he had asphalt on his beach

1840 Q 2 station Vehicles departed to investigate (Boat Boyarlun and Bm2 Aspinwall)

1850 Q found small quantities of asphalt between OAKwood lodge + St georges Is. Bridge

1900 Q Notified Mr. Delozier and he stated that he would get a Crew and Clean beach.

7/12/70

0815 Q Dive + mr. Edwards (C.G.F.E) departed to Walk beaches, found approx ~~2~~ gal asphalt scattered

0850 Q returned station

0900 Q Dive departed to insure that beach was being Cleaned

~~0900 Q~~ 1 0 mr. Delozier and 6 employees Cleaning

beach, loading With boat. estimated Time of Completion
1200 Q
0945 Q returned station
1000Q Oine departed to check on progress
1100Q Oine returned.
1300Q Oine made check of beach, found that all asphalt appears to have been picked up with the exception of a few small [redacted] pieces.

[From the Potomac Newsletter, vol. II, No. 12, Dec. 30, 1968]

The Oyster-Producing Potential of the Potomac Estuary

INTRODUCTION

The oyster manager of today, both on the Potomac and on Chesapeake Bay, is caught between two unfavorable comparisons. On the one hand, recent oyster production figures are compared with the many-times-higher figures of the previous century. On the other, recent production is compared with that being achieved in other parts of the world under different techniques of management. In Japan, for example, some yields are several thousands of times higher per acre than are average yields on Potomac or Chesapeake oyster bars. These comparisons suggest an underutilization of resources, and raise the basic question: What is the productive potential of the Potomac estuary?

* * *

Recent months have seen a series of resources controversies on the lower Potomac—over proposals and actions which threaten pollution of the water or destruction of estuarine marsh and bottom. The Federal Water Pollution Control Administration reported in November that pollution of the Chesapeake Bay and its tributaries now causes an annual commercial fish and shellfish loss of $3 million (dockside value) and that more than 50,000 acres of Chesapeake area wetland have been lost to drainage, land fill, and other construction since the mid-1950's.

Efforts to develop the lower Potomac are sure to continue. Yet, the existing river clearly has some economic value of its own—and, under intensified management, might become an enormous economic resource. Planners will likely find it difficult to determine the optimum mix of uses.

In 1966, the lower Potomac—entirely excluding tributaries, which are highly productive—provided a fish and shellfish harvest valued dockside at nearly $3.5 million, with oysters accounting for about 60 percent of the total. We got to wondering what the real potential of the river might be, and asked an expert on the matter to provide an answer in terms of our famous oyster. This Newsletter is his essay; opinions expressed are not necessarily those of the Center.

This question can be approached only by dealing with three sets of conditions which limit oyster production. There is first a biological limit. For any given management scheme the primary question is: Will it be biologically possible? Within this biological limit, there is an economic limit. The question here applied to a management scheme is: Will it be profitable? Finally, there is a limit imposed by the cultural environment within which possible management schemes are considered. The question raised by this limit is: Will it be acceptable? Only when all three limiting factors are considered can a resource management possibility be evaluated.

None of these limits is static. If a new oyster disease developed, the biological limit might decrease; if a vigorous new genetic strain of oyster evolved, it might increase. New technology or a change in the price of labor would affect the economic limit. At the cultural level, a host of changes might affect the limit of the acceptable, including changes in the attitudes of managers, watermen, legislators, and the general public. Since this last limit is determined by people, another question is raised: Is the limit of the acceptable the best that can be done, or can changes be brought about that will make that which is acceptable closer to that which is desirable? Each of these dynamic limits, and the questions they imply, will be discussed in turn.

THE BIOLOGICAL LIMIT

The oyster, like any other species in nature, will reach a population level at any given time and place that is the result of a complex set of circumstances involving the interrelationships between the organisms themselves, and a variety of environmental factors. For the oyster, the latter include water temperature and salinity, food supply, predators, character of the bottom, and competitors for food and space. Because these factors are constantly changing, the number of oysters in any given area will fluctuate over time.

Stages of oyster management

Contemporary primitive management.—If man is introduced into a natural oyster-producing system as a harvester, he simply becomes another predator. If he is interested in harvesting oysters over time, he must regulate his take so that the natural productivity of the system will not be progressively diminished. This, in essence, means limiting annual take to the number that would otherwise be destroyed by other causes of mortality. This take is known to fish and wildlife biologists as harvestable surplus; its achievement over time, often regarded as the objective of modern management, is known as sustained yield management. Yet, however sophisticated the scientific determination of this surplus, and however modernized the enforcement techniques by which it is achieved, the industry itself is essentially primitive. The naturally occurring crop is gathered just as it was by neolithic man. Only slight improvements in harvesting gear mark a change.

Contemporary advanced management.—The current form of public oyster management in the Potomac and Chesapeake Bay is an advance over sustained yield. In it, man intervenes in the resource system to improve upon the naturally occurring yield. This involves two aspects of the biology of the oyster. First, in its early stage, the oyster is a free-swimming organism. Only after a couple of weeks does it settle down to join mature oysters in a sedentary existence. This free-swimming, or larval, oyster requires a hard clean surface upon which to settle and attach itself. It conveniently prefers oyster shells, although many other materials will do. Second, for a variety of reasons, many of which are little understood, some areas are especially suited for the occurrence of larval attachment, known as spatfall. Based on these two biological aspects, contemporary managers employ two management practices—oyster shells are deposited on

oyster bars to replace those removed in the harvest of live oysters, thus precluding a gradual decline in the amount of available surface or cultch; oyster shells from areas of heavy spatfall are gathered and transferred to other oyster bars much the same as nursery trees are transferred to their final growing sites, making possible yields greater than those produced by a natural system.

Oyster farming.—Even though contemporary practices improve upon sustained yield management, much more can be done to increase the physical yield of oysters from natural waters. Food and fertilizers can be added, predators controlled, salinity regulated, heat added; the bottom can be plowed, cultivated, and raked. In short, a variety of environmental changes favoring oysters can be produced, closely paralleling the treatments a modern farmer applies to his land.

Important as these changes might be, the most dramatic change in productivity would come about if the oyster itself were not confined to growth on the bottom. The food and oxygen that supports oyster life is abundantly distributed throughout the water volume. In most cases, a bottom-dwelling oyster community does not make anywhere near full use of the resources available. Man, then, can intervene by providing growing surface vertically as well as horizontally. In Japanese estuaries, for example, oyster shells are closely spaced on ropes, which are suspended from rafts. The rafts can be positioned in areas of heavy spatfall, then moved to areas of maximum growth potential. At appropriate times, the ropes can be hauled in to weed, thin, measure, and ultimately harvest the oysters. As a further boon to production, some of the natural enemies of the oyster are confined to the bottom, and therefore cannot attack their prey. Using these techniques, the maximum biological limit for a natural water body, set by the quantities of water, oxygen, and available food, could be approached.

Oyster factories.—Finally, oysters could be grown under completely controlled conditions, independent of a natural water body. There is no biological reason why oysters could not be grown in a factory in Nebraska. While this takes one beyond a consideration of the productive potential of the Potomac, it deserves brief mention as a possible future development in the industry.

SETTING BIOLOGICAL LIMITS FOR POTOMAC

Putting real numbers on the biological limits of each of these stages of management would be extremely difficult. Only a few general observations can be made here. Under sustained yield management, it seems reasonable to assume that the maximum productive potential of the estuary would be something less than the historical highs of around 1.6 million bushels achieved in the last century. This follows from the observation that the estuary could not and did not maintain this level of yield, and was gradually depleted to lows of less than 50,000 bushels in the early 1930's. Since many of the natural bars have been effectively destroyed by exploitation, dredging, and siltation, the present natural sustainable productivity would likely be less than one-tenth the historical high. (Of the 60 square miles of recorded 19th century oyster bar, only six are listed as currently productive.)

Under present management practices, involving seed and shell planting as well as regulation, the biological limits are much higher. These limits are set by the supply of cultch and seed oysters, and by the amount of bottom otherwise suited for oyster growth. Ancestral oyster shell deposits are abundant in the Potomac and in the bay. These are now being mined for cultch. Other materials, such as glass, could also be used. As oyster production increases under this stage of management, seed production should also increase. Also, seed oysters can be imported from other areas. There is no biological reason, therefore, why a gradual buildup to new highs could not be achieved.

Production estimates for the variety of oyster farming treatments listed above could be determined only after actually putting these methods into practice. However, a rough idea of the magnitude of the potential can be given by referring to Japanese raft culture production figures. In Hiroshima Bay, annual production of over 20 metric tons per acre has been reported. At this level of production, the historical high for the Potomac could be matched in less than one-half square mile of area. The entire 1967–68 production in Maryland waters, where there are over 500 square miles classified as productive oyster bottom, could be matched in less than a square mile.

It should be emphasized that this kind of comparison has many pitfalls. There is no assurance that the Hiroshima biological conditions are matched or approached in the Potomac, although it is the untested opinion of some biologists that they are. Certainly not all natural oyster water would be suitable for raft

culture; on the other hand, because raft culture is not dependent on the nature of the bottom, large areas currently nonproductive might be suitable. Short of substantial experimental and practical evidence about all that can be said with confidence is this: the Potomac estuary has a large volume of water offering suitable conditions for oysters. The available food and oxygen supply is far beyond that which could be used up by oysters on natural bars. With intensive management, therefore, biological maximums could likely be greatly increased.

ECONOMIC LIMITS

The discussion above has been confined to the biological limits of production. Since the production of oysters is undertaken for profit, and since there are always costs involved in production, economic limits must also be considered. These limits are set at those points, under various management schemes, where it is no longer profitable to produce oysters.

Economic limits under present management

The oysters of the Potomac are a public property resource. Managed under a compact between Maryland and Virginia, they are in effect the common property of the residents of those States. Although publicly owned and managed, oysters are harvested and processed by private parties. Economic limits must therefore be posted for both the private and the public sector.

The private economic view.—The private operator is interested in a fair return for the time and money he puts into the production of oysters. His return is based on his catch times the market value per unit. His costs are based on the time and equipment necessary to make that catch. If his catch per unit of time or the market price declines, he might choose to leave the industry. If price or supply increases, he will have more incentive to stay on. At the same time, however, others will be attracted to the water by the prospect of high returns. Thus, in good years there will be more competition and greater pressure put on the resource itself.

The freedom to enter and leave the industry results in two inevitable characteristics of the public property oyster fishery. It is first of all an economically inefficient industry. It is second an industry in which it is virtually impossible for the waterman to make a profit beyond a modest wage for his efforts. Although the economic reasoning behind these characteristics is rather involved, a general idea of their causes can be described. Unlike the farmer, whom in many other ways he resembles, the oyster fisherman does not have exclusive rights to his potential crop. If he does not harvest oysters on a given bed, someone else will. Competition for the available supply will therefore be intense. In order to prevent depletion of the resource, some public controls are necessary. These include length of season, a size limit, and a restriction on the type of gear permitted. The first reduces efficiency because equipment must lie idle for part of the year, and harvest might not coincide with periods of highest demand or the best weather. The second reduces efficiency because much time is spent returning undersized oysters to the bottom, and because under certain market conditions smaller oysters might bring a better price. It is in the restriction of gear, however, that inefficiency is most dramatic. Oystermen in the Potomac are restricted to the use of a harvesting method hundreds, if not thousands, of years old. Power dredges could operate at many times the efficiency of hand tongs, the only allowable method. Thus, the unit cost of harvest could be substantially lower than it is. Were dredges permitted, however, the season would have to be shortened or a limit on the number of dredges applied in order to control the amount of annual take. A shorter season would result in a longer period of idle time for more expensive equipment. A system of limited entry, while economically desirable, would favor those who were permitted to dredge at the expense of those who were not.

Not only is the industry inefficient, but the individual operator stands little chance of making profits in the long run. If the supply of oysters is good, his competition will increase and the price will decrease. Since all beds are open to everyone, an individual cannot wait for the right price or condition of oyster to harvest from a particular bed. He is always involved in a race with other oystermen. This race forces him to fish harder for less catch than he would if he had exclusive rights to a bed. He therefore increases his average costs of harvest, and these higher costs eat up his profits.

Although the industry in inefficient and profits are dissipated through competition for a public resource, there are probably no economic limits faced by present management practices. Oysters will probably continue to be demanded at prices that are high enough to support an inefficient industry and still provide a living wage for the waterman. It is conceivable, though, that watermen, attracted by other forms of employment, might gradually leave oystering in sufficient numbers so that not all of the available supply of oysters would be harvested. In this event, either various harvesting restrictions would have to be eased or there would be an unharvested surplus of oysters.

The public economic view.—The public's position in oyster management produces a different economic viewpoint. Presumably, the costs to the public of any Government program should be exceeded by the public benefits. Further, since public funds are always limited, there will be a tendency to expend funds on those projects that have the largest ratios of benefits to costs. However, while costs are often directly measurable, benefits of public programs are often not. Management of an oyster resource involves costs of enforcement, shell planting, and seed planting. Many kinds of benefits are possibly yielded by the program, all more or less difficult to measure. There is first the net contribution of the industry to the economy of the region and the States. Since the industry is inevitably inefficient, however, greater gains could be achieved if the same amount of capital and labor were invested in some other economic activity. There is also the benefit of supplying employment in areas where opportunities and employment skills are limited. Further, there is a benefit assumed in the maintenance of an industry which is rich in tradition, color, and personal virtue. In short, the possible social benefits of a public oyster program are many and difficult to pin down. Public expenditure is not likely to be limited by precise economic analysis, but rather by a politically determined decision of whether the diffuse benefits are worth the costs.

Economic limits of oyster farming

Because of the inherent economic inefficiency of the public oyster fishery, some private property rights would have to be available in order to attract the capital, innovation, and management skill necessary to employ intense management practices such as raft culture. Assuming that property rights were available, there would still be a question of whether intense management practices would be profitable under the U.S. economy. Raft culture as practiced in Japan requires intensive labor inputs; U.S. labor costs using Japanese techniques would be high. In all cases, the maximum economic productivity of any section of the Potomac would be less than the maximum biological productivity. This is because the costs of producing the last units of oysters would increase the biological limits were approached. Eventually, a point would be reached where the cost of producing this last unit of oyster would exceed the value of that same unit. Beyond that point, further investment in production would be a losing proposition. The level of production at which this would occur is not known, and could be determined only after some of the important biological questions are answered. All that can be said with certainty is that the maximum production figure of the economist—or the entrepreneur—would be lower than that of the biologist. Because of the high cost of labor in this country, it would likely be a great deal lower.

SOCIAL LIMITS TO PRODUCTION

We have asked what is biologically possible and what is economically profitable in Potomac oyster production. It is now necessary to ask what level of production is politically and socially acceptable. There are two especially significant factors which impose limits on the Potomac oyster fisher—the interstate problem between Maryland and Virginia, and the considerable resistance to a shift from public to private property rights. Each is a complex issue.

The interstate problem

Competition between Virginia and Maryland watermen for Potomac oysters has been intense for well over a century. Full-scale shooting wars and frequent skirmishes have colored Potomac history even into this decade. Only since the 1958 establishment and gradual acceptance of the interstate Potomac River Fisheries Commission has some measure of orderly management been achieved. But this order is unstable, and could disappear quickly in heated controversy among the watermen and legislators of the two States. Even now, wide-scale

violations of Commission regulations occur and are difficult to suppress. The Commission, having no police force of its own, relies on the enforcement agencies of the two States. Each State, understandably, concentrates its enforcement effort in its own waters, where the benefits of enforcement will be highest. For the same reason, each State allocates relatively small general tax moneys toward the management and improvement of the Potomac fishery. The annual outlay to the Commission is $50,000 per State. By comparison, Maryland has recently been putting over $1.5 million per year directly into its oyster repletion program. The Potomac fishery is therefore the poor cousin of the oyster industry in each of the two riparian States. In sum, public decisionmaking for oyster management, complicated as it is within each State, is made considerably more so on the Potomac because of interstate considerations.

Public versus private property rights

As mentioned previously, substantial growth of the Potomac fishery would probably depend on the granting of some private property rights in order to attract capital and innovation. Resistance to such grants would be strong. The tradition of public ownership of fish and wildlife is long standing; it stems directly from early English law. In both Maryland and Virginia, there is a large and politically effective population of watermen that hangs to this tradition with special tenacity. It is constituted for the most part of individual operators who would have neither the capital, the technical competence, nor the inclination to modernize their techniques. Since a shift to private property rights would bring about more efficient operation, costs of production would be reduced, which in a competitive market would lower price. Returns to the public fisherman, whose costs would remain constant, would decrease. The traditional oysterman would therefore be gradually forced out of operation. He would occupy a position parallel to that of the small farmer, who is disappearing in the face of competition from large, technically efficient farms.

Even though, by going to a private property resource, total economic yields of the oyster industry would almost surely increase and the cost of oysters to the consumer would decrease, it is still a moot question whether the result would be of net benefit to society. Economic yields are only one of the criteria by which society judges public policy. There are values represented by the traditional oystermen which are still highly prized in our culture, including thrift, hard work, self-reliance, and personal fortitude. Because of the substantial numbers of Negroes involved in oystering, there might be minority group considerations. Recent nationwide social problems attributed in part to the rapid shift from a rural to an urban culture give one pause when considering the extensive social dislocation in tidewater areas that might occur with a shift to private property oyster rights. Finally, there are substantial returns to the watermen themselves, who cling to their work despite modest wages and considerable personal risk; they are, in effect, receiving psychic income that might be largely absent from a modern, technologized industry. These psychic rewards do not get recorded in any economic analysis of the industry, but they are real and meaningful.

Changing the social limits

Critics of public oyster management often speak rather blandly of the need for education and change of attitude to bring about improved management of the estuary. But some of the barriers to this improved management are fundamental to our Democratic political system, and involve conflicts over values and interests that are emotionally and historically deep seated. The political, social, and emotional environment needs far more careful study than it has received to date. Short of better understanding and consequent orderly change of this environment, sociopolitical factors can be expected to continue to be the controlling limits to future expansion of the Potomac oyster fishery. Biological and economic potential notwithstanding, the Potomac will yield only what is permitted through a complex and often frustrating decisionmaking process.

MANUAL FOR THE PREVENTION OF WATER POLLUTION DURING MARINE OIL TERMINAL TRANSFER OPERATIONS

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FOREWORD

Pollution of navigable waters by oil usually is the result of an accident or of failure to follow good practices. These causes can be minimized only through the constant education of those responsible for handling petroleum, and it is hoped that this manual will be useful in that effort. The text, based on information and procedures supplied by oil companies who operate the major tanker and barge terminals in this country, is offered for careful study to all those involved in marine transfer operations.

Nothing contained herein should be construed as superseding the statutory or regulatory requirements of any governmental body. Rather, it is intended that this manual should reflect and supplement such requirements. It is concerned solely with the prevention of water pollution by oil and the hazards associated with such pollution at marine terminals. Control of other hazards involved in handling petroleum and the matter of *sea* pollution are subjects of extensive regulation and legislation and, therefore, are not discussed herein.

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MANUAL FOR THE PREVENTION OF WATER POLLUTION DURING MARINE OIL TERMINAL TRANSFER OPERATIONS

SECTION I—IMPORTANCE OF POLLUTION PREVENTION

When discussing pollution of water by petroleum and its products, it is necessary to differentiate between those oils which are persistent, and will therefore not dissipate quickly, and those which present only a short-term problem. Internationally, the persistent oils are recognized as crude oil, fuel oil, heavy diesel oil, and lubricating oil. These oils are such that they will remain on the water surface for an extended period of time and can be carried considerable distances by prevailing currents and winds. Since they are less susceptible to evaporation they also will remain longer when deposited on shore. Gasoline, kerosine, and light distillates are nonpersistent and will therefore dissipate quite rapidly through evaporation.

Although these oils present a slight degree of hazard when floating on water (see Sect. VII—"When a Spill Occurs") the principal reason for eliminating pollution is to prevent permanent or temporary loss of community water supplies which in turn affects wildlife, recreation facilities, and property value.

SECTION II—GOVERNMENT LEGISLATION AND REGULATIONS

Many government bodies legislate and regulate against oil pollution, including federal, state, city and municipal bodies, and subbodies thereof, in addition to interstate groups. No attempt will be made to cite these prohibitions, but the current requirements of the majority of such bodies have been reviewed during the preparation of this manual. It is sufficient to say that THOSE WHO CAUSE POLLUTION OF THE WATERS OF THE UNITED STATES ARE SUBJECT TO EXTENSIVE FINES AND PENALTIES UNDER NUMEROUS LAWS AND REGULATIONS.

Those who are responsible for terminal and tank vessel operations (including both ships and barges) must comply with two federal statutes and the regulations promulgated under them. These statutes are set forth in Appendix A to indicate that all facilities involved in terminal transfer operations are subject to penalties for contributing to oil pollution of navigable waters and tributaries thereto. Operations on board tank vessels are subject to absolute authority and control of the US Coast Guard. These regulations, set forth in *Rules and Regulations for Tank Vessels, CG-123*, govern all operations and in many instances speak specifically of pollution. Additionally, in enforcing pollution laws on behalf of the Corps of Engineers, Coast Guard authority extends to shoreside installations, which are also subject to requirements of numerous local jurisdictions.

Existing laws and regulations are adequate to discourage intentional pollution. This manual, therefore, is devoted to a discussion of the principles and procedures involved in preventing accidental spillage during tank vessel–shore transfer operations.

SECTION III—COOPERATION BETWEEN VESSEL AND SHORE PERSONNEL

Before discussing procedures applicable individually to vessels and terminals, it is appropriate to review operations which involve cooperative action. NO MATTER HOW EFFICIENTLY THE VESSEL AND TERMINAL ARE RUN BY THEIR RESPECTIVE CREWS, THERE MUST BE COOPERATION OR POLLUTION MAY RESULT!!

The most effective mechanism for guaranteeing an incident-free transfer is a full discussion prior to commencement of operations between the men who will supervise the terminal and vessel procedures, respectively. The importance of such discussions cannot be overemphasized especially when foreign vessels, manned by personnel having a limited English vocabulary, are involved. Only through discussion and cooperation can there be a

complete understanding of the obligations and responsibilities on the part of the vessel and shore personnel.

Matters which are usually agreed upon during this conference are discussed in the following paragraphs.

Cargo Sequence

Only by a mutual understanding of the sequence of loading and discharging the various products can the operation proceed logically and without interruption. Although the sequence is generally based on factors other than pollution, a smooth operation is one of the best guarantees against spills.

Cargo Handling Rates

There must be agreement on the rates at which the vessel or terminal will supply cargo so that the necessary tankage and crew will be available. Initial loading operations should commence at reduced rates, either by pumping or gravity, in order that those in charge may assure themselves that valves, lines, and tanks are properly lined up and that no leakage is occurring. Only after this is determined should the transfer be increased to the normal rate. As the operation nears completion, reduced rates usually are again required. Other operations, such as "topping off" certain tanks, removing or adding pumps to the line, and changing the lineup, will also influence the rate of transfer. In this connection, *there must be agreement on the amount of standby time* to be given when the vessel or terminal desires to start, stop, or change the rate of flow of the cargo.

Signals and Communications

Because changes in the product being handled, variation in pumping rates, shutdowns, and startups are involved, appropriate signals and means for transmitting them must be established. Hand signals and voice instructions are usually used; telephones, walkie talkie or hand radio, bull horns, and lights are also utilized.

No matter what means of communication are used, certain criteria must be met, remembering that the situations which bring about the need for relaying information are those which can, or have, caused an emergency. At all times the communication system must be readily available, dependable, and capable of instantaneous use. Also, the actual phrases, signals, or signs which may be used must be so well thought out and precisely defined that no misinterpretation is possible.

It is suggested that the manifolds be marked so that lines and valves can be easily identified. Some companies affix appropriate permanent or temporary signs to the lines identifying the products being handled. Some also color code hose ends (Fig. 1).

Declaration of Inspection

The pretransfer conference is a convenient time for the vessel and terminal representatives to make sure that the "Declaration of Inspection" required by the US Coast Guard is in order. A typical "Declaration of Inspection" form is shown in Appendix B, which is extracted from *Rules and Regulations for Tank Vessels, CG-123*.

Emergency Procedures

Realizing that spillage may occur in spite of all precautions, the procedures to be followed in such event must be agreed upon. Included are the procedures for shutting down transfer operations, eliminating potential sources of vapor ignition, and cleanup. It is important that any spillage which presents a hazard be reported to the proper authorities, so that they may take any action necessary, e.g.,

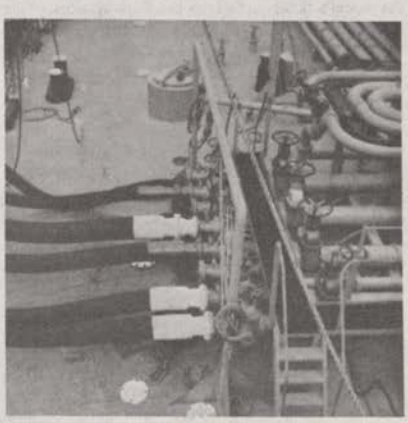


FIG. 1—Hose Ends Color Coded.

having fire-fighting equipment available. The requirements for such reporting will vary geographically, thus, the crew at each terminal must be familiar with the regulations in its particular area. In some cases the harbor authority will be involved; in others, the game warden, US Army Corps of Engineers, Fish and Wildlife Commission, water supply authorities, fire department or police department; in all cases, the US Coast Guard. It must be remembered that, while these groups are charged with enforcing existing laws and regulations they are, more importantly, able to provide assistance which may not otherwise be available.

A thorough discussion, as outlined in the preceding paragraph should preclude the majority of problems which might normally arise during transfer operations. However, it will not eliminate all occurrences which might lead to an emergency situation. It is therefore mutually advantageous for the men in charge to notify each other if a condition contrary to good practice is noticed. If the condition continues after such notification, shutting down the transfer operation may be warranted. AN EMERGENCY SITUATION JEOPARDIZES ALL PARTIES INVOLVED!!

With an understanding as to the areas where cooperative effort is necessary, it is now appropriate to consider pollution abatement procedures peculiar to the tank vessel and terminal individually. It must be realized, however, that some matters such as making up connections apply on the vessel and dock alike. Also, because of their importance and the overlap between vessel and dock operations, the use and care of hose is discussed in detail in Sect. VI.

SECTION IV—TANK VESSEL OPERATION

The procedures of this section are for the most part derived from "Subpart 35.35—Cargo Handling" of the US Coast Guard's *Rules and Regulations for Tank Vessels, CG-123*. The overriding consideration in all cases is the requirement that cargo handling be in charge of a licensed officer or certified tanker man, who by virtue of his training, experience, and abilities will be in a position to meet any situation which may arise and will have full knowledge of the vessel's tanks and cargo handling systems. This man will usually be a member of the crew of the ship, barge, or tug; in some instances, he may be provided by the shore staff.

Crew Complement

The necessity for having a sufficient number of men on duty who are adequately trained in cargo handling operations is so obvious as to only require highlighting here.

Securing to Dock

At the initial meeting of the vessel and dock one of the most important pollution abatement procedures commences. The vessel must be properly tied up with the respective cargo manifolds in alignment, AND MUST BE KEPT THAT WAY!! Any cargo connections between the vessel and dock, be they hoses or mechanical arms, have very specific limitations as to horizontal and vertical movement. If these limits are exceeded, a rupture and an emergency situation will result.

A sufficient number of mooring lines of adequate size and with proper leads must be used in tying up the vessel. In order to determine *sufficient number, adequate size* and *proper lead*, the dockside conditions at the terminal under consideration must be evaluated. Surge of the vessel, both parallel and perpendicular to the dock will be influenced by the proximity of traffic in the channel, the channel and dock configuration, the state of the tide, and the vessel's draft. Consideration must also be given to existing and anticipated weather conditions.

Once the vessel is securely moored, attention must be devoted to the mooring lines so that neither slack nor excess tension is developed in the lines. Slack will permit the vessel to surge out of place, and in checking this surge the lines may part. Excess tension may bring about the same result. The important factors to remember are that the dock ends of the lines remain stationary but the vessel rises and falls, depending upon whether it is being loaded or discharged, and upon the state of the tide. Lines should always be run to bitts and kevels through proper chocks and/or fairleads. They must be secured with a sufficient number of turns properly laid up. Lines should never be left on capstans or winch heads unattended.

Plugging of Scuppers

In order to contain on board any cargo which may be accidentally spilled, all scuppers must be plugged during the transfer operation (Fig. 2). Only in the case of vessels using water for deck cooling may this operation be omitted. If, as in the case of heavy rain, it is necessary to remove plugs to drain the deck area, they should be replaced immediately in the event of a spill.

Making Up Joints

When hoses or other connecting devices are put on board the vessel, the end will normally be blanked off. When removing the blank, care must be taken to avoid spilling cargo which may have been left from previous operations. The hose end should be spotted over a drip pan before removing the blank. The same precautions apply in removing the blanks from the vessel's cargo manifold (Fig. 3).

Suitable gasket material must be used in all connections to insure against leakage and in no case should less than three bolts be used in bolted flanged couplings.

In aligning and bolting couplings, care must be used to make certain that flanges, joints, and the hose itself are not subjected to cracking or weakening by application of excessive pressure, strain, or stress (see Sect. VI—"Use and Care of Hose").

If a permanent manifold spill collector trough is not provided, drip pans or buckets should be placed under all cargo and bunker connections.



FIG. 2—All Scuppers Must Be Plugged.

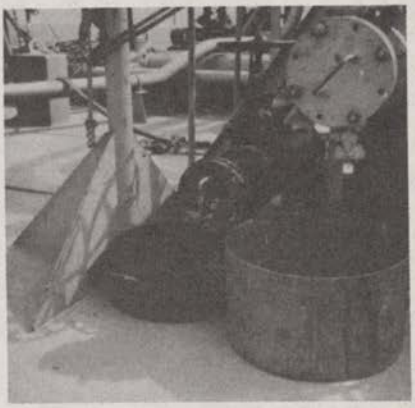


FIG. 3—Drip Pans at Manifold

Cargo System Lineup

Prior to starting the ship's pumps or notifying the dock crew to begin cargo transfer operations, the senior deck officer on duty must assure himself that the entire cargo system is lined up properly. All main and stripping lines, pumps, valves, crossovers, bypasses, drops, and header vent valves which are involved in the contemplated lineup should be checked from the outboard deck manifold valve through the system to the first cargo tank valve. Cargo manifold and stern discharge valves which are not to be used should receive special attention. It is just as important to make certain that all valves controlling flow to or from tanks not involved in initial transfer operations are closed as it is to see that they are open in the first tanks to be loaded or discharged. There have been cases where ships' tanks have overflowed *while discharging* because a valve in a main, stripping, or drop line on the discharge side of the pumps, was cracked open in a full tank.

To insure that cargo is not inadvertently dis-

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charged into the surrounding water, sea valves must be closed and lashed or sealed to indicate that they should never be open during cargo handling. Some vessels are, however, appropriately equipped to handle cargo and ballast simultaneously by utilizing an independent ballast system.

Under no circumstances should sea valves be secured by locks, inasmuch as emergency conditions may require immediate use of these valves.

All transfer operations should commence at a reduced rate so that the lineup; water around the vessel; and tightness of couplings, glands, strainer covers, and other appurtenances subject to leakage may be checked. Only after conditions are determined to be satisfactory should the cargo rate be increased to the normal flow with a constant check being made on pressure in the system. The inspections as discussed herein should also be carried out regularly during the entire transfer operation.

Topping-Off Tanks

From the oil pollution standpoint, pressing the tanks up to the proper ullage and securing the valves is a most critical operation. An adequate crew working under experienced supervision is vital and, if necessary, the operation should be carried out at a reduced loading rate. When approaching the topping-off stage, flow to the tank involved should be regulated so that full attention can be given to securing one tank at a time (Fig. 4). The multitude of cargo system lineups precludes any standard procedure, but it is well to highlight the following factors:

1. The closing off of one tank increases the rate of flow to other open tanks on the same line.

2. As the vessel goes "by the stern" the rate of flow into after tanks which are open increases.

3. The rate of flow into any tank which is nearly full can quickly be reduced by opening the valve to an empty tank on the same line. This procedure, in conjunction with closing the valve on the full tank, permits precise control of the rate of loading individual tanks.

4. The man in charge of topping-off (see Fig. 5), tanks must give the operation his undivided attention, which precludes his carrying out other duties simultaneously, e.g., reading vessel's draft.

5. When closing a valve, it should be seated hard, then opened slightly to wash away any scale which may be under the gate, and then closed hard.



FIG. 4—Approaching Topping-Off Stage.

6. The liquid level in topped-off tanks (see Fig. 6), should be checked frequently to make certain that the level is not changing.

7. When loading, terminal personnel should stand by to shut down when the last set of tanks for each grade of product is topped-off.



FIG. 5—Undivided Attention Required for the Topping-Off Operation.



FIG. 6—Liquid Level in Topped-Off Tanks Should Be Checked Frequently.

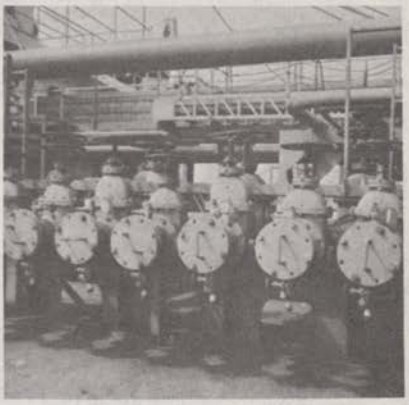


FIG. 7—Cargo Manifold Lines Blanked Off.

8. If a valve is closed on a cargo line under full pump pressure, shock and hose rupture may result.

Water Around Vessel

At regular intervals during cargo transfer and ballasting operations the water around the vessel should be checked to make certain that there is no oil leakage. Particular attention should be paid to the area around sea valves and other overboard discharge valves.

Breaking Cargo Couplings

After completion of cargo transfer, the connections between the vessel and dock should be appropriately vented, blown, or sucked out to permit the remaining cargo to drain. This procedure will vary between vessels and terminals. Even though the lines have been drained, care must be exercised when opening couplings. For example, drip pans should be in place, and the bottom of the coupling should be loosened first. After the connection is broken, the end of the hose should be blanked off before it is moved. The cargo manifold lines as shown in Fig. 7, should also be blanked off.

Ballast Handling

Generally, the same practices apply to ballasting operations as to cargo handling and these will not be reiterated. Of these, the system lineup and topping-off processes are most directly related.

No more ballast than is necessary for safe navigation should be carried into port. Clean ballast which is to be discharged into the harbor should be carried in tanks and handled through lines which have previously been purged of cargo and should be so discharged that the quality of the water can be continuously monitored. Dirty ballast *should never* be pumped into harbors, but rather into ballast facilities at the terminal or into slop barges. The same applies to slop oil collected as a result of tank cleaning.

To prevent cargo which may have been trapped in the lines from escaping overboard, it is important to:

1. Start the pumps before opening sea valves to take on ballast.
2. Close sea valves before stopping the pumps upon completion of ballasting.

A detailed discussion of ballast handling and terminal equipment is presented in Appendix C, which is a reproduction of a section of Chapter 7, "Volume on Liquid Wastes." [This volume, which is a part of the *API Manual on Disposal of Refinery Wastes,* is scheduled for publication in 1965.]

Bunkering and Fueling

The process of taking on ship's fuel presents as great a potential for pollution as does cargo transfer.

In fact, the majority of spills from ships which have been investigated by the US Coast Guard have resulted from bunkering operations. The man in charge of this operation must be as familiar with the operation and precautions to be followed as the man responsible for handling cargo.

The fact that relatively slower loading rates prevail tends to present a false sense of security which leads to infrequent checks on progress. Additionally, the configuration of bunker and fuel tanks and piping seems to add to the problem as evidenced by the fact that the usual reason given for a bunker spill is, "There was an air bubble in the system and the ullage didn't read right."

Pumping of Bilges

In no case should the vessel's bilges be pumped overboard in port.

Final Authority

The points which have been discussed in the preceding paragraphs highlight good practices. In an emergency situation, nothing that has been said herein should be construed as preventing the senior officer present from pursuing the most effective action in his judgment for rectifying the conditions causing the emergency.

SECTION V—TERMINAL OPERATIONS

Many of the procedures and precautions which apply on board ship also apply to terminal operations. Rather than repeat these the reader is referred to Sect. IV—"Tank Vessel Operations"; see, especially, the discussion "Making Up Joints" through "Ballast Handling."

In addition, subjects which are inherent to terminal operation and which deserve careful consideration are discussed in the following paragraphs.

Men on Duty

The need for having the shoreside operations supervised and conducted by adequately trained men at all times cannot be overemphasized.

Ballast Disposal Facilities

If the terminal is equipped with facilities for receipt of slop oil and ballast from vessels, the entire system and lineup should be checked before permitting the vessel to discharge. When the operation is in process, the system should again be periodically checked, with particular attention to any outfalls to the harbor or channel.

Oil Drainage Collection Equipment

When drip pans are utilized to collect drainage from hoses and manifolds, care must be exercised to make certain that they do not leak or spill oil into the water when dumped into other containers for disposal.

Piped-in systems, (see Fig. 8), whereby waste oil is carried to a collection sump or separator should be checked for proper operation prior to breaking any connection at the manifold.

Accumulated slop oil should be appropriately disposed of so that the container does not overflow in the event of rain.

Lighting

Dock facilities should be adequately lighted.

Draining Hoses

When the dock is so designed that loaded vessels are lower than the dock manifold, residual cargo in the hoses may be drained into the vessel by venting the line at the risers.



FIG. 8—Piped-In System.

Leak Detection

Whether handled by gravity or pumping, oil cargoes being transferred are under pressure in the lines and if leaks develop, a considerable quantity may be discharged directly or indirectly into the water if the leak is not immediately detected.

Proper maintenance and testing of all oil handling lines and equipment will minimize the potential for ruptures, however, this does not obviate the need for making certain that no leakage is taking place during the actual transfer operation.

Inasmuch as the situation within each terminal is different, no overall recommendations can be stipulated. However, in principle, each terminal should consider its own oil handling system very carefully to make certain that procedures and equipment are being used which will assure that leaks from lines, valves, and tanks will be detected in the shortest time possible.

SECTION VI—USE AND CARE OF HOSE

The greatest pollution potential is presented by the weakest link in the transfer system. This link is usually the connection between the dock and vessel. Although proprietary mechanical loading arms are gaining wider application, the bulk of cargo still moves through hoses. For these reasons it appears appropriate to dedicate considerable discussion to the use, handling, and care of hoses, which must be made of materials compatible with the liquids to be handled.

Handling

The following suggestions were assembled from procedures followed by various terminal operators and generally are applicable to both vessels and terminals:

1. Make certain that the gear to be used in handling hoses is properly rigged, of adequate strength, and in good working order.
2. Never leave topping lifts or runners on winch heads.
3. Do not drag the hose over docks or decks. Carry it on dollies or rollers or move it by derrick, using all precautions as outlined herein.
4. Do not roll flanged hose more than one revolution unless precautions are taken to prevent damage to the body of the hose due to twisting.
5. Whenever possible support hose every 10 ft with slings and/or saddles.
6. Never lift the hose by the middle with the ends hanging down.
7. Limit the curvature to 1 ft of diameter for each inch of hose size; i.e., 8 in. ID hose should not be bent to less than 8 ft ID. If manufacturer's recommendations are available, they should be followed.
8. Do not support a hose with a single rope sling. Use belt slings, saddles, or bridles which may be made of wood, rope, or old hose.
9. Avoid sharp bends at nipples and at manifold connections. Damaging bends can frequently be avoided by installing a double swivel at the manifold.
10. Make up the hose line with considerable slack and with the curvature evenly distributed over the entire length. Allow for change in tide and the draft of the ship as it is loaded or unloaded.
11. Do not permit the hose to touch the dock or ship. If possible, keep the hose in the air, otherwise put dollies or pads under the hose to prevent chafing on dock or on edge of ship due to pump vibration or to the motion of the ship.
12. Do not permit the hose to contact or be near any hot surfaces such as steam pipes.
13. As the ship or barge changes elevation, adjust the supports to keep the curvature evenly distributed; this will prevent crimping in the hose.
14. Do not permit the hose to get into a position where it could be pinched between the vessel and the dock.
15. Extreme care should be used when disconnecting the hose at the end of operations. Do not permit the hose to fall to dock or deck.
16. Should any leakage of the hose develop, or should the hose bulge or seep, transfer operations should be shut down at once.
17. Never use wet gaskets for making up connections during freezing weather. A frozen gasket will frequently blow out when warm air or cargo passes through the line.

Inspection

It is best to detect defects in cargo hose before an accident occurs. Hoses should be inspected fre-

quently, with particular attention to the following indications of weaknesses:

1. Sweating or pinhole leakage.
2. Leakage at nipples not completely stopped by clamping.
3. Hard circumferential bulges.
4. Bulges having liquid underneath.
5. Severe fraying of interior.
6. Breakage.
7. Collapse, or excessive displacement of interior helix of rough bore hose.
8. Deep exterior gashes or abrasions materially damaging wire reinforcement.
9. Evidence of severe damage to internal strength as revealed by unusual behavior during test.

Testing

In some cases the only way of determining the serviceability of hoses suspected of having weaknesses is by testing them. The procedures for doing so, and the test intervals followed, if a periodic testing program has been adopted, vary according to the type of hose, its usage, and length of service. These factors should be considered in order to avoid any unnecessary testing of hoses which could lead to failures that would not otherwise have occurred.

Criteria used for the evaluation of hose under test include the following—depending upon service:

1. Obvious leaks, blisters, cracks, or pinches.
2. Elongation or immediate set.
3. Resistance to collapse under vacuum.
4. Weaknesses at the joint between the coupling and hose body.
5. Failures in the hose couplings.

TO AVOID FAILURES, THE BEST POLICY IS TO TREAT HOSE FOR WHAT IT IS . . . THE WEAKEST LINK.

SECTION VII—WHEN A SPILL OCCURS

No one on the vessel or dock wants a spill, but *despite* their best efforts, oil occasionally gets on the water. A *word of caution* . . . when a spill occurs, those concerned with cleaning it up must carefully analyze many factors, including local laws, before choosing a course of action. Therefore, the following discussion applies generally but not in every specific case.

Notification

The first step is to eliminate the source of the spill and then report the situation to cognizant authorities, both at the terminal and within the community. Pollution may jeopardize public water supply intakes, therefore, appropriate action must be taken. Emergency equipment may also be dispatched as a result of such notification.

As was previously stated, reporting requirements vary geographically. In some cases the harbor authority will be involved; in others, the game warden, US Army Corps of Engineers, Fish and Wildlife Commission, water supply authorities, fire department or police department; in all cases, the US Coast Guard. It must be remembered that while these groups are charged with enforcing existing laws and regulations they are, more importantly, able to provide assistance which may not otherwise be available.

Initial Steps

Because of the nature of the products being handled, sources of vapor ignition are usually eliminated by regulatory requirements in areas subject to gas accumulation on the vessel and dock. However, since spilled product and vapor may migrate from this area, it is important that terminal personnel be familiar with surrounding properties and operations in order that proper steps to eliminate any external sources of ignition may be taken immediately.

After the initial emergency steps have been taken, the cleanup process must be determined. The responsibility for cleaning up is subject to many variables which depend upon the immediate situation. In some cases, the matter is covered by local ordinances or contract terms. In others, moral obligations and public relations come into play. In any case, a spill is an emergency and positive steps must be taken cooperatively and as expeditiously as possible.

Containment

The first matter to consider is whether it is necessary or desirable to contain the oil. Light products,

which present the greater fire hazard, fortunately disperse quite rapidly. With tidal, wind, and channel factors considered, it may be desirable to allow dispersal to take place under controlled conditions. In such cases, elimination of sources of ignition, traffic control, and standby emergency equipment are necessary. Careful consideration must be given to the potential hazards which may be presented, both to the terminal and vessel, by containing these products around the ship and under the adjoining docks.

On the other hand, containment is usually desirable in spills of heavy, persistent oils. The simplest method is the use of booms, which float on the water partially submerged so as to form a barrier. There are several types of patented devices, some towable and others of permanent nature. Towable booms of plastic or similar construction are stored either on or adjacent to the dock and towed into position when required. Some are one-piece inflatable devices which are unreeled and then put under several pounds air pressure. Another device is formed by sections being joined together and held accordion fashion abreast the dock until needed. Generally, a keel arrangement is fitted to partially submerged inflatable booms. The permanent type is normally ballasted to the bottom and raised by air inflation, if required. Another type ejects air bubbles from submerged permanent piping. Inflated surplus fire hose has been used quite successfully as have railroad ties, telephone poles, or timbers lashed together. The latter, however, are somewhat difficult to make up and tow.

Removal

Once the oil has been contained it must be removed. The methods for doing so range from the use of makeshift to highly specialized equipment. Vacuum equipment designed to skim or draw off the oil may be carried on specially designed trucks which operate on the dock, or on barges which have the advantage of being able to go to the scene of the spill. A typical truck may have a capacity of 2,000 gal. and use a 3-in. suction hose. Some terminals have assembled permanent dockside skimming equipment which discharges into the separator system or slop oil system.

A simpler method which has been used successfully consists of throwing straw onto the surface of the contained oil. The oil is absorbed by the straw, which is then disposed of. This procedure is usually of value for limited quantities of the heavier oils.

Oil which has been deposited on the shore is usually turned under or picked up with front-end loaders and trucked out. In several cases, shoreline deposits have been burned off but this procedure must be very carefully evaluated, particularly if oil remains on the water.

Sand and sawdust are good absorbents and can be of considerable value in cleaning up spills.

Use of Chemicals

For cleanup purposes chemicals have been formulated which emulsify or coagulate oil. The use of chemicals can be an expensive procedure and subject to criticism. Many groups believe that the emulsified oil may have a deleterious effect on shellfish and other marine life. For this reason, it is well to check with local officials if the use of chemicals is contemplated. In addition, it has been pointed out that intentional deposit of chemicals on navigable waters may constitute a violation of antipollution statutes.

Cleaning Oil-Coated Equipment

Heavy oils may be removed from oil-coated surfaces by the use of heavy duty detergents (degreasers). These work best if applied and allowed to remain undisturbed for several minutes while emulsification takes place. The surface is then washed off with a pressure water stream or brush. In the case of light-colored, smooth surfaces, such as boat hulls, it may be necessary to follow up with a household detergent containing trisodium phosphate in order to remove all discoloration resulting from the oil. Where the discoloration is minor, a kerosine wash followed by a household detergent is effective.

SECTION VIII—CONCLUSIONS

Oil spills are a source of public scorn, expense, legal actions, and disruption of operations. It is, therefore, highly desirable that all possible precautions be taken to avoid spills. In summary: MARINE TERMINAL OIL TRANSFER OPERATIONS MUST BE CONDUCTED COOPERATIVELY BY EXPERIENCED PERSONNEL, WORKING WITH GOOD EQUIPMENT, AND IN ACCORDANCE WITH PROVEN PRACTICES, WHILE DEVOTING THEIR FULL ATTENTION TO THE OPERATIONS.

APPENDIX A

FEDERAL OIL POLLUTION ABATEMENT STATUTES

THE REFUSE ACT OF 1899 *

(Approved June 7, 1924)

§ 407. Deposit of refuse in navigable waters generally

It shall not be lawful to throw, discharge, or deposit, or cause, suffer, or procure to be thrown, discharged, or deposited either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever other than that flowing from streets and sewers and passing therefrom in a liquid state, into any navigable water of the United States, or into any tributary of any navigable water from which the same shall float or be washed into such navigable water; and it shall not be lawful to deposit, or cause, suffer, or procure to be deposited material of any kind in any place on the bank of any navigable water or on the bank of any tributary of any navigable water, where the same shall be liable to be washed into such navigable water, either by ordinary or high tides, or by storms or floods, or otherwise, whereby navigation shall or may be impeded or obstructed: *Provided*, That nothing herein contained shall extend to, apply to, or prohibit the operations in connection with the improvement of navigable waters or construction of public works, considered necessary and proper by the United States officers supervising such improvement or public work: *And provided further*, That the Secretary of the Army, whenever in the judgment of the Chief of Engineers anchorage and navigation will not be injured thereby, may permit the deposit of any material above mentioned in navigable waters, within limits to be defined and under conditions to be prescribed by him, provided application is made to him prior to depositing such material; and whenever any permit is so granted the conditions thereof shall be strictly complied with, and any violation thereof shall be unlawful.

* Extracted from "Title 33—Navigation and Navigable Waters," Chap. 9. *United States Code Annotated*, 90 and 117. Edward Thompson Co., Brooklyn, N.Y. (1957).

§ 411. Penalty for wrongful deposit of refuse; use of or injury to harbor improvements, and obstruction of navigable waters generally

Every person and every corporation that shall violate, or that shall knowingly aid, abet, authorize, or instigate a violation of the provisions of sections 407, 408, and 409 of this title shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding $2,500 nor less than $500, or by imprisonment (in the case of a natural person) for not less than thirty days nor more than one year, or by both such fine and imprisonment, in the discretion of the court, one-half of said fine to be paid to the person or persons giving information which shall lead to conviction.

OIL POLLUTION ACT OF 1924

OIL POLLUTION OF COASTAL WATERS †

§ 431. Short title

Sections 431-437 of this title may be cited as the "Oil Pollution Act, 1924."

§ 432. Definitions

When used in sections 431-437 of this title, unless the context otherwise requires—

(a) The term "oil" means oil of any kind or in any form, including fuel oil, oil sludge, and oil refuse;

(b) The term "person" means an individual, partnership, corporation, or association; any owner, master, officer or employee of a vessel; and any officer, agent, or employee of the United States;

(c) The term "coastal navigable waters of the United States" means all portions of the sea within the territorial jurisdiction of the United States, and all inland waters navigable in fact in which the tide ebbs and flows;

† *Ibid.*, 137-138, 140-142.

(d) The term "Secretary" means the Secretary of the Army.

§ 433. Prohibition against discharge of oil generally

Except in case of emergency imperiling life or property, or unavoidable accident, collision, or stranding, and except as otherwise permitted by regulations prescribed by the Secretary as in sections 434-437 of this title authorized, it shall be unlawful for any person to discharge, or suffer, or permit the discharge of oil by any method, means, or manner into or upon the coastal navigable waters of the United States from any vessel using oil as fuel for the generation of propulsion power, or any vessel carrying or having oil thereon in excess of that necessary for its lubricating requirements and such as may be required under the laws of the United States and the rules and regulations prescribed thereunder. The Secretary is authorized and empowered to prescribe regulations permitting the discharge of oil from vessels in such quantities, under such conditions, and at such times and places as in his opinion will not be deleterious to health or sea food, or a menace to navigation, or dangerous to persons or property engaged in commerce on such waters, and for the loading, handling, and unloading of oil.

§ 434. Penalties for violations; liability of vessel

Any person who violates section 433 of this title, or any regulation prescribed in pursuance thereof, is guilty of a misdemeanor, and upon conviction shall be punished by a fine not exceeding $2,500 nor less than $500, or by imprisonment not exceeding one year nor less than thirty days, or by both such fine and imprisonment, for each offense. And any vessel (other than a vessel owned and operated by the United States) from which oil is discharged in violation of section 433 of this title, or any regulation prescribed in pursuance thereof, shall be liable for the pecuniary penalty specified in this section, and clearance of such vessel from a port of the United States may be withheld until the penalty is paid, and said penalty shall constitute a lien on such vessel which may be recovered in proceedings by libel in rem in the district court of the United States for any district within which the vessel may be.

§ 435. Revocation or suspension of license of officers of offending vessels

The Coast Guard may, subject to the provisions of section 239 of Title 46, suspend or revoke a license issued to the master or other licensed officer of any vessel found violating the provisions of section 433 of this title.

§ 436. Personnel for enforcement of provisions; arrest of offenders and procedures

In the administration of sections 431-437 of this title, the Secretary may make use of the organization, equipment, and agencies, including engineering, clerical, and other personnel, employed under his direction in the improvement of rivers and harbors, and in the enforcement of laws for the preservation and protection of navigable waters. And for the better enforcement of the provisions of the said sections, the officers and agents of the United States in charge of river and harbor improvements, and the assistant engineers and inspectors employed under them by authority of the Secretary, and officers of the Customs and Coast Guard of the United States, shall have power and authority and it shall be their duty to swear out process and to arrest and take into custody, with or without process, any person who may violate any of said provisions: *Provided,* That no person shall be arrested without process for a violation not committed in the presence of some one of the aforesaid officials: And provided further, That whenever any arrest is made under the provisions of the said sections the person so arrested shall be brought forthwith before a commissioner, judge, or court of the United States for examination of the offenses alleged against him; and such commissioner, judge, or court shall proceed in respect thereto as authorized by law in cases of crimes against the United States.

§ 437. Other statutes for preservation and protection of navigable waters unaffected

Sections 431-436 of this title shall be in addition to the laws existing prior to June 7, 1924, for the preservation and protection of navigable waters and shall not be construed as repealing, modifying, or in any manner affecting the provisions of those laws.

NOTE: This act of 1924 was reaffirmed by Section 16 of the Oil Pollution Act of 1961 (Public Law 87-167).

APPENDIX B

DECLARATION OF INSPECTION

35.35-30 "Declaration of Inspection" for tank ships—T/ALL. After completing the inspection required by Section 35.35-20 and prior to giving his approval to start the cargo transfer operation, the master or senior deck officer on duty shall fill in the following Declaration of Inspection in duplicate. The original of the Declaration of Inspection shall be kept aboard for the information of authorized persons. The duplicate, where required, shall be handed to the terminal superintendent or his representative, who shall on demand be given the opportunity to satisfy himself that the condition of the vessel is as stated in the Declaration of Inspection.

DECLARATION OF INPECTION PRIOR TO BULK CARGO TRANSFER

Date .....

S..... Port of .....

I, ..., being the master or senior deck officer in charge of the transfer of bulk inflammable and combustible cargo about to be undertaken, do certify that I have personally inspected this vessel with reference to the following requirements set forth in Section 35.35-20 and that opposite each of them I have indicated that the regulations have been complied with.

(1) Are warnings displayed as required?

(2) Is there any repair work in way of cargo spaces being carried on for which permission has not been given?

(3) Have cargo connections been properly made and are cargo valves properly set?

(4) Have all cargo connections for loading Grades A, B, and C cargoes been made to vessel's pipelines?

(5) Are there any fires or open flames present on the deck or in any compartment which is located on, facing, open and adjacent to the main deck of the vessel on which the cargo connections have been made?

(6) Has the shore terminal or other tank vessel concerned reported itself in readiness for transfer of cargo?

(7) Are sea valves connected to the cargo system closed?

(8) If Grades A, B, and C cargoes are to be loaded and boiler fires are lighted, has an inspection been made to determine that they may be operated with reasonable safety?

(9) If Grades A, B, and C cargoes are to be loaded and galley fires are lighted, has an inspection been made to determine that they may be operated with reasonable safety?

(10) If Grades A, B, and C cargoes are to be loaded, has an inspection been made to determine whether smoking is to be permitted?

(11) If smoking is to be permitted, have spaces been designated for this purpose?

APPENDIX C

BALLAST WATER DISPOSAL *

Many refineries located on waterways, where tankers and barges are loaded and unloaded, are confronted with ballast water problems. Controls set forth in USAE and USCG regulations, the Oil Pollution Acts of 1924 and 1961, the act of 1899,† and the laws of various states prohibit the discharge of oil-bearing water from vessels into harbors, coastal waters, or inland waterways of the United States. These laws carry penalties for violations.

Ship tank cleaning is frequently accomplished at sea where it is common practice to discharge the ballast water.‡ However, in a majority of cases some ballast water must be retained to avoid navigational and docking difficulties. When ballast water is brought to the refinery, or when an inspection of the ships' tanks shows them to be unfit for loading, or when changes are made in the products to be loaded after the ships reach the wharf, it becomes necessary for the refinery to handle the ballast water or tank-cleaning waste water.

Characteristics of Ballast Water and Tank-Cleaning Emulsion

Ballast water may be fresh water or salt water, or a mixture of the two. Salt water is usually clean with respect to suspended solids, whereas fresh water of the surface category, such as that obtained from the Mississippi River, may contain large amounts of silt. This will deposit in the tanks of the vessel. In addition to the silt, ballast water may contain finely divided rust and precipitated chemicals used in tank cleaning. The oil contained in ballast water will range from gasoline to heavy cracked fuel oils.

Ballast water discharged from gasoline or light distillate oil tanks will contain little oil until almost all the water has been pumped out. On the other hand, ballast from a tank which contained heavy fuel oil may have oil dispersed throughout the entire volume. This is also true of the emulsion from tank cleaning.

Recommended Disposal Facilities

The installations discussed herein are representative of those which are required to provide varying degrees of treatment, ranging from the simplest to the most complex. In any case, the degree of treatment which must be provided depends upon the character of the waste water to be handled and the pollution-control regulations in effect. These factors merit careful consideration in the selection of the facilities for a particular installation.

Direct disposal of ship ballast water via the refinery waste water separator is not recommended unless the separator system has sufficient excess capacity. Normally, the high drawoff rates necessary to avoid loss of ship time require a separate system.

Facilities for handling ballast water should be designed to produce a satisfactory stream for final disposal and to minimize the loss of ship time. This applies particularly to sizing of tankage and lines. Intermediate pumping should be avoided as this increases emulsification, which results in more difficult treating problems.

The rate and volume of ballast water discharged from vessels will vary widely. Equipment sizing and selection of treatment procedure should be based on a study of present and future plans pertaining to the size and number of tankers and barges to be loaded. In this connection, the character of the ballast water to be handled also must be considered. Ballast water tankage on shore should have sufficient capacity to receive the total discharge and to provide the necessary settling time. Multiple tanks are preferred to a single tank as this permits flexibility—one tank can be working while the other is in the settling period.

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* Extracted from *API Manual on Disposal of Refinery Wastes;* see volume on "Liquid Wastes," Chapter 7. [This volume is scheduled for publication in 1965.]

† An Act Making Appropriations for the Construction, Repair and Preservation of Certain Public Works on Rivers and Harbors and for Other Purposes, Mar. 3 (1899).

‡ The 1954 International Convention for the Prevention of Pollution of the Seas by Oil prohibits the discharge of ballast water containing more than 100 ppm in restricted coastal areas.

Ballast water tanks should be located as close to the piers as is practical. Short delivery lines not only permit faster discharge rates and reduce the emulsification tendency, but also decrease the cost of the installation. Tanks should be installed so that the settled water can be discharged by gravity to the natural body of water.

Storage Tanks

The minimum degree of treatment applied to ballast water involves settling only. This can be carried out in the ballast water tanks which are provided. Such tanks should be equipped with an oil-skimming device. A steam coil for heating the tank contents and an air coil to provide gentle agitation also may be desirable. If a simple chemical treatment is effective, provision for injecting treating agents may be included.

The storage tanks should be equipped with sampling connections at intervals of approximately 2 ft throughout the height of the tank. All sample lines should be discharged into a pan which drains into an oil sewer.

Skimming devices can vary, depending upon the preference of the user. The commonly employed type consists of an ordinary swing pipe with a funnel or skimming pan attached to its free end. In use, this skimmer is raised or lowered by a manually operated winch.

Following the settling period, as much of the separated oil as possible should be skimmed before releasing the settled water from the tank. Ordinarily the skimmed oil is combined with slop recovered from the refinery separator.

Prior to discharge from the tank, the settled water should be tested for oil content to determine whether the water is suitable for entry into natural waters. During discharge the appearance of the water should be checked. Release of settled water should be stopped before the emulsion or oil-water interface is reached. A safe depth of settled water should be left in the tank when withdrawal is stopped. In some cases, a flow breaker may be installed in the discharge line so that flow will cease when the water level in the tank falls to a predetermined level. One such device consists of an inverted U-bend inside the tank, equipped with a siphon breaker extending through the roof of the tank, and connected to the drawoff line. Another type of automatic-flow breaker consists of a vertical standpipe located outside the tank and connected to the tank drawoff nozzle at the bottom. The standpipe, which is equal in height to the ballast water tank is open at the top. Drawoff connections with valves, manifolded into a common header, are provided at one or more levels in the standpipe. When the level in the ballast water tank falls to a point opposite the open drawoff valve, flow automatically ceases. These two types of automatic flow breakers are illustrated in Fig. 9.

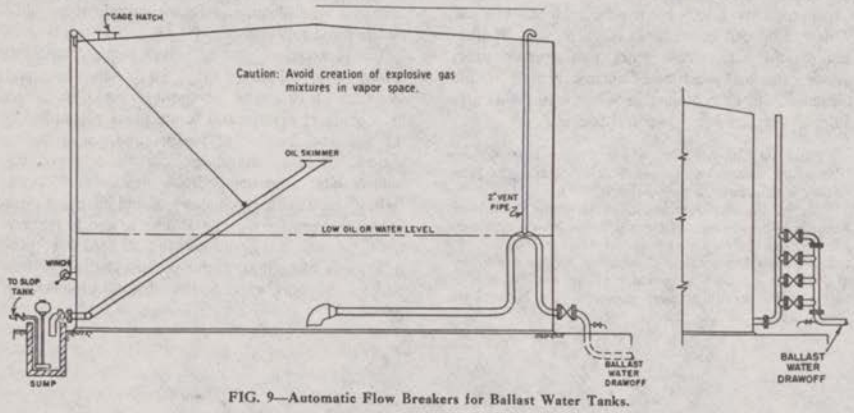


FIG. 9—Automatic Flow Breakers for Ballast Water Tanks.

Discharge of settled water from the tank usually is accomplished by gravity and is desirable to avoid costly pump installation. The discharge line should be of sufficient size to permit emptying the tank at a fairly fast rate so that it can be readied on short notice for an incoming tanker. This type of installation provides the minimum degree of treatment. A suggested arrangement of the facilities is shown in Fig. 10.

CAUTION: If a steam coil or any other means of heating the tank contents is used in a cone-roof tank, there is grave danger of creating explosive mixtures in the tank vapor space. Suitable provisions should be made to prevent this hazard. A floating-roof tank, an inert gas system to maintain nonexplosive mixtures, or a natural gas system to maintain rich gas mixtures have been used.

Storage Tanks Plus Gravity Separator

This discussion is an extension of the preceding example. In addition to the storage tanks previously indicated, a gravity-type-oil-water separator, designed in accordance with the procedure outlined in Chapter 5, is included. This type of installation is illustrated in Fig. 11.

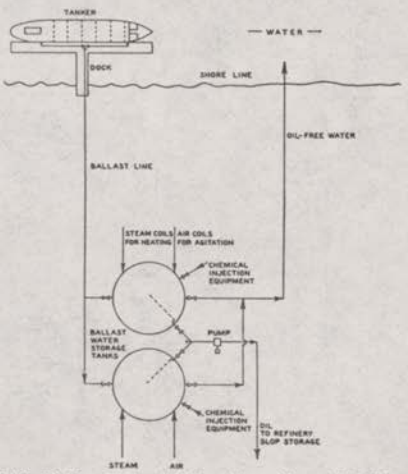


FIG. 10—Example A of Ballast Water Disposal Facilities.

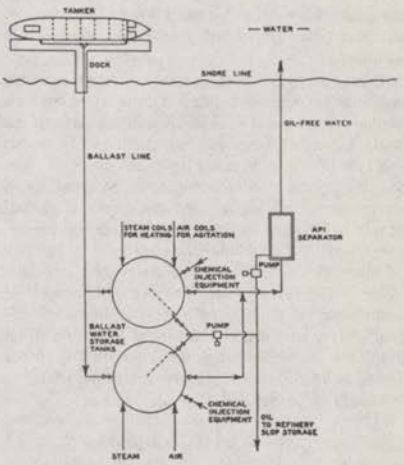


FIG. 11—Example B of Ballast Water Disposal Facilities.

Proper operation of the facilities described requires very close control to prevent contamination of surface waters. The addition of a separator will lower the oil content of the waste water withdrawn from the storage tanks and also serve as a trap for oil which might escape from the tanks. With this arrangement, those responsible for ballast water disposal are not required to devote continuous attention to the operation to prevent the release of objectionable amounts of oil. The inclusion of a separator also may reduce the settling time required in the storage tanks and, hence, effect a reduction in the size or number of tanks required, depending upon the frequency of ballast water unloading operations and the characteristics of the ballast water being handled.

Storage Tanks, Separator, and Emulsion-Breaking Equipment

In the preceding examples, the emulsion phase present in ballast water is treated in the storage tanks or recovered as a separate phase and sent to proper facilities elsewhere for treatment. In this case, separate facilities are included in the ballast water handling installation for treating the emulsion phase recovered from the storage tanks. Procedures for

emulsion breaking and description of the required equipment are presented under "Treating Waste Emulsions."

It may appear that special emulsion-breaking equipment is unnecessary and that the entire contents of the storage tanks may be discharged through the separator and the other units which follow. However, this is not feasible; in many instances, emulsion from the storage tanks will accumulate in the separator to an uncontrollable degree and interrupt the normal operation of the separator. Fig. 12 shows the arrangement of the facilities included in this example. In operation, settled water is discharged from the ballast water tanks to the separator. Withdrawal of water from the tank is continued until emulsion appears. The emulsion is discharged to the emulsion treating unit. Separated water is returned from the emulsion treating unit to the separator inlet while the separated oil is sent to slop oil tankage.

Storage Tanks, Separator, Filter, Emulsion-Breaking Equipment, and Flocculation

This type of disposal can take the form of filtration, chemical flocculation, and air flotation, either singly or in combination. These methods of treatment are the same as those described for separator effluents. In some cases, it is advantageous to follow flocculation or flotation with filtration so as to remove suspended floc particles from the water before discharge to the natural body of water. The arrangement of these facilities is shown in Fig. 13.

In operation, water is discharged from the ballast water tank to the separator until an emulsion layer is encountered. The emulsion is directed to the emulsion treating unit. The settled water from this unit is returned to the separator and separated oil is sent to slop oil tankage. Dispersed or suspended oil passes with the water through the separator and on to the final clarification equipment where it is removed.

Floating Separators

Patented devices in the form of rafts or barges are in limited use of for disposal of ballast water and cargo tank cleaning waters. These devices are available on a lease or royalty basis.

Floating gravity-type separators which may be moved alongside a ship are used for disposal purposes. The ballast water is pumped into the separa-

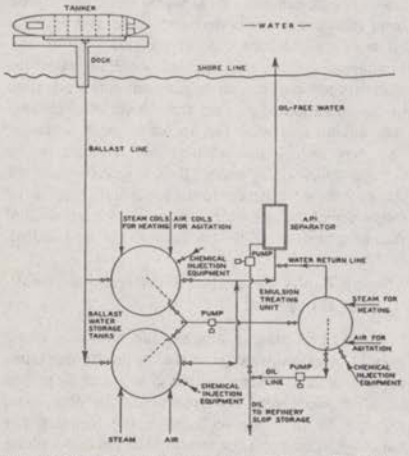


FIG. 12—Example C of Ballast Water Disposal Facilities.

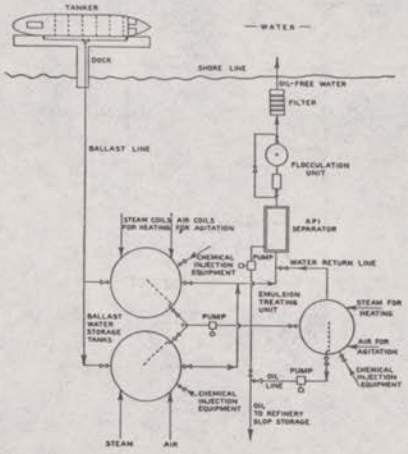


FIG. 13—Example D of Ballast Water Disposal Facilities.

tors continuously where the oil separates from the water which, in turn, is displaced through the open bottom of the barge into the natural water. Although mobility is an advantage, floating separators generally are incapable of the thorough, and often necessary, treatment which can be accomplished by the shore installations previously discussed. They provide no way to check on the quality of the separated water and no means of detecting or retaining any emulsions present.

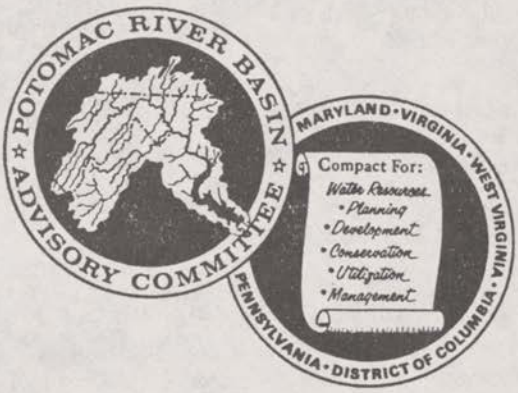
Appendix 4.—Legal Materials

A. Proposed Potomac River Basin Compact, April 1970, published by the Potomac River Basin Advisory Committee.

B. 1968 Laws of Maryland, chapter 493—pages 924–926—An act to add new section 54A to article 78 of the Annotated Code of Maryland (1965 Replacement Volume), title "Public Service Commission," subtitle "Gas and Electric Companies," to follow immediately after section 54 thereof, to provide that electric companies must make application to the Commission for a certificate of public convenience and necessity before exercising the right of eminent domain or commencing construction of an electric transmission line and providing for the standards to be considered by the Commission before issuing the certificate and to make application to the Commission for a certificate of public convenience and necessity before beginning the construction of a generating facility. Approved May 7, 1968.

C. 1970 Laws of Maryland, chapter 243—pages 775–785—An act to repeal sections 23 through 29, inclusive, of article 96A of the Annotated Code of Maryland (1964 Replacement Volume and 1969 Cumulative Supplement), title "Water Resources," subtitle "Pollution Abatement" and to enact new sections 23, 24, 25, 26, 27, 28, 28A, 28B, 29, 29A, 29B, 29C and 29D to stand in the place of the sections repealed, generally revising the Pollution Abatement Subtitle of the Water Resources Law of this State and relating generally to the powers, duties, functions and procedures of the Department of Water Resources Law of this State and relating generally to the powers, duties, functions, and procedures of the Department of Water Resources and the Department of Natural Resources regarding water quality, the control, prevention, and abatement of water pollution, the preservation and protection of natural resources and the enforcement of water quality and pollution abatement laws. Approved April 22, 1970.

POTOMAC RIVER BASIN COMPACT



THE POTOMAC RIVER BASIN ADVISORY COMMITTEE

APRIL, 1970

(379)

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Potomac River Basin Compact



April, 1970

Published by

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Preface

The Compact presented in this booklet includes some substantial changes from the Advisory Committee's Compact proposal of October 1968 (yellow book). With the exception of one provision (see Sec. 3.01a), this booklet contains the Compact as enacted into law by Virginia—the first Potomac state to give its approval to the agreement. In order to reach this stage of enactment, tremendous cooperation was extended by legislative leaders not only in Virginia, but in the other Potomac states as well. Prior to this state and interstate legislative study and revision, the Compact as presented in the yellow book had already been revised from the 1967 preliminary version to include constructive suggestions from public and private sectors of the Potomac Basin. Thus, this Compact represents the original draft with a number of revisions which have been made upon the advice of citizens, organizations, businesses, public agencies, legislators and legislative bodies. The Advisory Committee believes the Compact's acceptance in the form presented herein by the remaining signatories is most appropriate.

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Preamble

Whereas, the Potomac River Basin has experienced many years of drought which severely damaged the productivity of agriculture and drastically reduced the flow of the river which threatened the water supplies throughout the basin and particularly in the Washington metropolitan area at the time of greatest demand; and

Whereas, the flow of the Potomac River and its tributaries is subject to dramatic fluctuation and variation, so much so that melting snows and spring rains have produced costly and damaging floods even in years of minimal summer flows; and

Whereas, the population of the Potomac River Basin and the industrial and commercial development therein have greatly expanded during the last decade, and are continuing to expand, increasing the demands for water supply and the potential for loss through floods; and

Whereas, federal, state and local agencies and organizations have made numerous surveys and reports concerning the water and related resources of the Potomac River Basin which revealed the urgent need for measures to assure an adequate water supply and flood protection, to reduce sedimentation and otherwise improve the quality of the waters, to provide water related recreational facilities, to enhance the preservation and propagation of fish and wildlife, and to promote related forestry, agriculture, soil conservation and watershed projects; and

Whereas, the President of the United States asked the Secretary of the Interior to work with the affected states and local governments, the District of Columbia, and interested federal agencies to prepare a program for his consideration which would include provisions for cleaning up the river, protecting its natural beauty and providing adequate recreational facilities, to which end the Secretary established the Federal Interdepartmental Task Force on the Potomac; and

Whereas, the Governors of the States of Maryland, Pennsylvania, Virginia and West Virginia and the Commissioners of the District of Columbia established the Potomac River Basin Advisory Committee composed of their representatives; and

Whereas, it has become apparent to all parties that, although many state and federal agencies have an interest in or responsibility for one or more aspects of the water resources of the Potomac River Basin, none has the legal authority to provide the broad, continuous guidance for development and management on a regional basis necessary for the most effective utilization of these resources; and

Whereas, the wisest and most efficient uses of the available resources of the Potomac River and its tributaries may be determined only through the continuing process of fully coordinated and comprehensive planning which is responsive to all of the interests and jurisdictions of the basin; and

Whereas, the effectuation of plans so conceived for the conservation, utilization, development and management of these water resources for

maximum public and private benefit may best be realized under the guidance of a single basin agency; and

Whereas, the Potomac River Basin Advisory Committee prepared a draft of an interstate-federal compact calling for the creation of a basin agency to discharge the joint responsibilities of the United States, the states in the Potomac River Basin and the District of Columbia with respect to the conservation, utilization, development and management of the water and related resources of the Potomac River Basin, which draft has been reviewed by the agencies of the governments involved and by the public and has been revised in the light of comments therefrom;

Now, therefore, the parties signatory hereto do mutually agree and covenant with each other as follows:

ARTICLE 1
SHORT TITLE, DEFINITIONS, PURPOSES AND LIMITATIONS

§ 1.01. Short Title.—This compact shall be known and may be cited as the Potomac River Basin Compact.

§ 1.02. Definitions.—For the purpose of this compact and of any supplemental or concurring legislation enacted pursuant or in relation hereto, except as may be otherwise required by the context:

(a) *Basin* shall mean the area of drainage into the Potomac River and its tributaries and branches, unto its confluence with the Chesapeake Bay at an established line marking Chesapeake Bay waters between the mean low water mark at Point Lookout, Maryland, and Smith's Point, Virginia, as the latter shall be defined from time to time by boundary compact between Maryland and Virginia;

(b) *Commission* shall mean the Potomac River Basin Commission created and constituted by this compact, and *commissioner* shall mean a member of the Commission;

(c) *Diversion* shall mean the transfer of water into or out of the basin;

(d) *Facility* shall mean any real or personal property, within or without the basin, and improvements thereof or thereon, and any and all rights-of-way, water, water rights, plants, structures, machinery and equipment acquired, constructed, operated or maintained for the use of water resources or related land uses including, without limiting the generality of the foregoing, any and all things and appurtenances necessary, useful or convenient for the collection, storage, withdrawal, diversion, release, treatment, transmission, sale or exchange of water; or for navigation thereon; or for the development and use of hydroelectric energy and power; or for public recreational facilities; or for the propagation of fish and wildlife; or to conserve and protect the water resources of the basin or any existing or future water supply source, or to facilitate any other uses of them;

(e) *Federal Government* shall mean the government of the United States of America and any appropriate department, agency, commission, bureau, division, branch, or other unit thereof, as the case may be, but shall not include the District of Columbia;

(f) *Governor* shall include the commissioner of the District of Columbia, or his successor as chief executive of the District of Columbia;

(g) *Governmental Agencies* shall mean the governments of the United States and the signatory states, their political subdivisions, and every department, agency, commission, bureau, division, branch and other unit or instrumentality thereof;

(h) *Person* shall mean an individual, partnership, corporation, joint stock company, firm, society, association or other unincorporated organization, receiver, trustee, and any officer, agent or employee of any of the foregoing acting in his capacity as such, but shall not include governmental agencies or their officers and employees;

(i) *Project* shall mean any work, service or activity which is separately planned, financed, or identified by the Commission, or any separate facility, or any addition thereto, undertaken or to be undertaken within a specified area, for the conservation, utilization, development or management of water resources and which can be considered as a separate entity for purposes of evaluation;

(j) *State* shall include the District of Columbia;

(k) *Signatories* shall mean the States, District of Columbia and the United States which have signed this compact and are parties hereto;

(l) *Water Resources* shall include all waters within the basin;

(m) *Withdrawal* shall mean any appropriation of water including, but not limited to, a taking or removal of water from any source within the basin regardless of its use or destination;

(n) *Words* importing the singular include and apply to several persons, parties, or things; words importing the plural include the singular;

(o) *Writing* shall include printing, typewriting, and every other method and manner in which visual symbols may be permanently produced or reproduced.

§ 1.03. Findings.—The legislative bodies of the respective signatories hereby find and declare:

(a) The water resources of the basin are affected with local, state, regional and national interests and their planning, conservation, utilization, development and management, under appropriate arrangements for intergovernmental cooperation, are public purposes of the respective signatories.

(b) The water resources of the basin are subject to the sovereign rights and responsibilities of the signatories, and the coordinated, cooperative or joint exercise of such rights and responsibilities is in the common interests of the people of the signatories.

(c) The water resources of the basin are functionally interrelated, and the uses of these resources are interdependent. A single governmental agency is therefore essential for effective economical direction, supervision and coordination of efforts and programs of federal, state and local governments, of other public bodies and of private enterprise, as they may relate to water resources.

(d) The satisfaction of present and future demand requires increasing economies and efficiencies in the use of water resources, and these

can be brought about only by comprehensive planning, programming and management under the direction of a single governmental agency.

§ 1.04. Purposes.—The purposes of the signatories in enacting this compact are:

(a) To help meet the essential requirements of the present and future population of the basin; to promote intergovernmental cooperation; to assure and protect desirable developments within the basin; to encourage cooperative and coordinated water resources planning and action by the signatories and their agencies; and to establish a joint agency of the signatories to provide for the planning, conservation, utilization, development and management of the water resources of the basin.

(b) To preserve and utilize the functions, powers and duties of existing offices and agencies of government to the greatest extent consistent with the other purposes of this compact.

§ 1.05. Powers of the United States.—(a) Nothing contained in this compact shall impair, affect, or extend the constitutional authority of the United States.

(b) The signatories hereby recognize the power and right of the Congress at any time by any statute expressly enacted for that purpose to revise the terms and conditions of its consent, withdraw the United States as a party, or revise the terms and conditions under which the United States may remain a party to this compact.

(c) Nothing contained in this compact shall restrict the executive powers of the President in the event of a national emergency.

§ 1.06. Duration of Compact.—(a) The duration of this compact shall be for an initial period of one hundred (100) years from its effective date, and it shall be continued for additional periods of one hundred (100) years unless, not less than seven (7) years nor more than twelve (12) years prior to the termination of the initial period or any succeeding period, one or more of the signatory states, by authority of an act of its legislature, notifies the Commission of intention to terminate the compact at the end of the then current one hundred (100) year period.

(b) In the event that this compact should be terminated by operation of paragraph (a) or paragraph (c) hereof, the Commission shall be dissolved, its assets and liabilities transferred, and its corporate affairs wound up in accordance with unanimous agreement of the signatories or, failing unanimous agreement, in such manner as may be provided by act of the Congress.

(c) If at a time subsequent to the initial effective date of the compact, the United States has withdrawn or substantially modified its participation as permitted by § 1.05 (b), the states may terminate the compact in accordance with the following procedures and requirements:

1. Not less than seven (7) years nor more than twelve (12) years after the United States acts pursuant to § 1.05 (b), the states may enact statutes repealing the compact. Such repealing statutes shall take effect when they have been enacted by at least four of the States.

2. If the action of the United States is in the nature of a modification of the terms of its participation rather than a withdrawal, the considera-

tion of repeal of the compact by the state legislatures shall be preceded by a report of the members of the Commission from the states finding that the modifications of the terms of participation by the United States is substantial, setting forth the effects which the state members of the Commission believe the modification will have or has had, and recommending either that the compact should be continued or that it should be terminated.

3. Any termination pursuant to this Section shall include adequate provision for the assumption of any outstanding obligations of the Commission.

ARTICLE 2
COMMISSION—ORGANIZATION AND TERRITORIAL JURISDICTION

§ 2.01. Commission Created.—The Potomac River Basin Commission is hereby created as a body politic and corporate, with succession for the duration of this compact, as an agency and instrumentality of each of the respective signatories, with all powers and duties herein set forth.

§ 2.02. Commission Membership.—The members of the Commission shall be the governor of each signatory state, or his designee or appointee to serve at his pleasure, and one member to be appointed by the President of the United States to serve at the pleasure of the President. A governor who intends to act as the member from his state at a meeting shall give notice of his intention to the other governors.

§ 2.03. Alternates.—Each governor of a signatory state and the President of the United States shall appoint or designate an alternate for the commissioner from his jurisdiction who shall serve at his pleasure unless the law of the signatory otherwise provides for the appointment and tenure of such alternate. Each alternate shall have authority to attend all meetings of the Commission and in the absence of the commissioner for whom appointed shall act in his place and stead and be deemed a commissioner for the purposes of this compact.

§ 2.04. Compensation.—Commissioners and alternates shall serve without compensation from the Commission but may be reimbursed by it for necessary expenses incurred in and incident to the performance of their duties. Nothing herein contained shall be construed to prohibit any commissioner or alternate from receiving such compensation, reimbursement, or other remuneration as the signatory he represents may provide.

§ 2.05. Voting Powers.—Each commissioner shall be entitled to one vote on all matters which may come before the Commission. Except as hereinafter provided, no action of the Commission may be taken unless four of the six members vote in favor thereof.

§ 2.06. Advisors.—The Commission shall provide by its rules for the designation by each commissioner in his discretion of advisors to serve without compensation from the Commission, who may attend meetings of the Commission and its committees.

§ 2.07. Organization, Internal Procedures and Delegation of Powers. —The commissioners shall serve as the governing body of the Commission

and, except as hereinafter provided, shall exercise and discharge all powers, functions and responsibilities of the Commission conferred by this compact. The commissioners shall provide for the organization and internal procedures of the Commission, and to this end shall adopt suitable bylaws. The commissioners shall annually elect a chairman and vice-chairman. The Commission may maintain one or more offices for the transaction of its business and shall hold an annual meeting within the basin. The commissioners may, without regard to the civil service or other laws of any signatory relative to public officers and employees, create and abolish offices, employments and positions as they deem necessary for the purposes of the Commission, fix and provide for the duties, conditions of employment, qualifications, appointment, removal, term, tenure, compensation, pension and retirement rights, and other rights and benefits, of the Commission's officers and employees, and shall appoint the principal officers of the Commission and allocate among them administrative functions, powers and duties. The commissioners may delegate to the officers and employees of the Commission such powers, functions and responsibilities under this compact as they deem suitable, except that they may not delegate the power to adopt a comprehensive water resources plan, amenities plan, or any part or revision thereof, the annual water resources programs or the annual capital and current expense budgets, or the power to adopt regulations. The Commission shall determine which of its officers and employees shall give bond or other security for the faithful performance of their duties and the amount or amounts thereof, and may pay the premiums therefor.

§ 2.08. Territorial Jurisdiction of the Commission.—The Commission shall have, exercise and discharge its functions, powers and duties within the limits of the basin except that it may, in its discretion, act outside the basin whenever such action may be necessary or appropriate to effectuate its powers or duties within the basin. Any exercise by the Commission of its powers outside the basin which affects persons or property outside the basin but within a signatory state shall be only with the consent of the commissioner from such state.

ARTICLE 3
POWERS AND DUTIES OF THE COMMISSION

§ 3.01. Policy.—(a) The Commission shall adopt and promote coordinated policies for water resources conservation, use and management in the basin, and shall adopt a comprehensive water resources plan to effectuate such policies. It shall encourage the planning, development and financing of water resources projects according to such policies and plan, and shall exercise such powers vested in it as it deems necessary or desirable to carry out such plan.*

* As enacted by Virginia in 1970, the Compact contains, at this point, the following provision: "The powers, duties and jurisdiction of the Commission shall not extend to underground or subterranean waters." The Advisory Committee believes this provision would be unduly restrictive upon the Commission and recommends, as an alternative which would accomplish the same stated purpose, the clause which was added to Sec.

(b) In administering the provisions of this compact, the Commission shall consider the needs of the basin for industrial and agricultural development and for gainful employment and maintenance of a high quality environment.

(c) Insofar as other offices and agencies of government possess functions, powers and duties relating to water resources the Commission shall utilize such offices and agencies to the greatest extent consistent with the purposes of this compact; provided, that whenever the Commission finds that any such office or agency fails, refuses or is unable to take action, the Commission after hearing upon due notice given, shall itself perform such functions or take such actions by exercise of the powers conferred by this compact until the Commission subsequently finds that an office or agency of the signatory will take or continue the necessary action.

(d) Planning and regulatory powers of the Commission, and the exercise thereof, are limited, and shall affect planning and zoning by state, regional, or local governments and agencies only to the extent that state, regional or local planning and zoning substantially conflict with the Commission's planning and regulation of water resources and other public values, as provided in this compact. The provisions with reference to planning, zoning and other public values, however, shall be subject to the limitations set forth in § 9.06 paragraphs (c) and (d).

§ 3.02. Comprehensive Water Resources Plan.—The Commission shall develop and adopt, and from time to time review and revise, a comprehensive water resources plan for the immediate and long-range development, conservation, utilization and management of the water resources of the basin, and may adopt such plan or any revision thereof in such part or parts as it may deem appropriate. The plan may include, but need not be limited to, determinations of immediate and long-range needs and objectives, water quality standards, and any public or private projects and facilities which are required, in the judgment of the Commission, for the optimum development, conservation, utilization and management of the water resources of the basin.

In developing, reviewing and revising the comprehensive water resources plan, or parts thereof, the Commission shall give consideration to relevant portions of federal, state, regional and local plans, whether prepared by signatories or their agencies, by local or regional planning commissions, by local governmental units or organizations thereof, by soil and water conservation districts, by regional resource use associations, or by other governmental agencies or organizations. Such consideration shall be required only with respect to such plans as are presented to the Commission in the manner the Commission may provide.

§ 3.03. Water Resources Program.—Within two (2) years after the election of its first chairman, and annually thereafter the Commission shall formulate and adopt a water resources program based upon the

3.05(i) in the Bill approved by the Maryland House of Delegates (but which never reached a vote in the Senate) reading as follows: "except that the Commission shall not restrict or prohibit withdrawals from any well supplying water for use in not more than five (5) households;". Accordingly, this latter provision is included herein in Sec. 3.05(i) and the Virginia amendment which was made at this point is omitted.

comprehensive water resources plan or such part or parts thereof as may have been adopted, which shall include a systematic presentation of the quality and quantity of water resources needs of the basin during such reasonably foreseeable period as the Commission may determine, and of all existing and proposed public and private projects and facilities required to satisfy such needs, together with a separate statement of the projects proposed to be undertaken by the Commission and by persons and governmental agencies during such period. If the Commission determines that it should contribute to the payment of the cost of any project proposed to be undertaken by any person or governmental agency, it shall identify such project and the total amount of the Commission's proposed contribution.

§ 3.04. Budgets.—The Commission shall annually adopt a capital budget and a current expense budget, as provided in Article 14.

§ 3.05. General Powers.—The Commission may:

(a) Adopt and use a corporate seal, enter into contracts, and in its own name sue, and except as otherwise provided in this compact, be sued;

(b) Collect, compile, analyze, interpret, coordinate, tabulate, summarize, and distribute technical and other data relative to, and conduct studies, sponsor research and prepare reports on, water resources and existing or potential water resources problems of the basin;

(c) Prepare, publish and disseminate information and reports in relation to the water resources of the basin, and on the views, policies and recommendations of the Commission in relation thereto;

(d) Establish standards to guide the construction, operation and management of projects and facilities to the extent that such projects and facilities affect the water resources of the basin;

(e) Subject to any limitations and restrictions provided elsewhere in this compact, plan, design, acquire, construct, reconstruct, complete, own, improve, extend, develop, operate, maintain, and regulate any and all projects, facilities, properties, activities and services, determined by the Commission to be necessary, appropriate or useful for the purposes of this compact;

(f) Negotiate for such loans, grants, services, or other aids as may be available from public or private sources to finance or assist in effectuating any of the purposes of this compact; and receive and accept the same upon such terms and conditions, and subject to such provisions for repayment, as may be required by federal or state law or by the Commission or as the Commission may deem acceptable;

(g) Regulate and control diversions and allocate, and change the allocations of, the waters of the basin to and among the states signatory to this compact and impose related conditions, obligations and release requirements. Except as otherwise provided in subsection (h) of this § 3.05, appropriation or use of water pursuant to action of the Commission hereunder shall not constitute a prior appropriation of any waters of the basin, nor shall any action of the Commission hereunder confer any superiority of right in respect to the appropriation or use of water or be deemed to constitute a permanent apportionment of the waters of the basin among the parties hereto;

(h) Enter into agreements with respect to water supply, which agreements shall be subordinate to the authority of the Commission under Article 11 and shall not extend beyond the life of this compact;

(i) Restrict or prohibit authorized withdrawals and diversions of surface and ground waters in accordance with Article 11, except that the Commission shall not restrict or prohibit withdrawals from any well supplying water for use in not more than five (5) households;

(j) Institute an action or actions in its own name to compel compliance with any and all of the provisions of this compact or any of the rules and regulations of the Commission adopted pursuant thereto;

(k) Acquire, hold, administer, maintain and dispose of real and personal property and any interest therein as it may deem necessary or appropriate for carrying out its functions under this compact; and every acquisition shall be deemed to be for a public use insofar as such determination is constitutionally permissible. Acquisition may be by eminent domain, which power is hereby conferred upon the Commission, but subject to the limitations and restrictions provided elsewhere in this compact;

(l) Sell or dispose of any of its products or services and make charges in connection with the use of any of its facilities, without regulation or control by any other governmental agency of any signatory;

(m) Conduct such investigations and inspections as it may deem appropriate to carry out its functions under this compact;

(n) Adopt, amend and repeal such rules and regulations, and prescribe the effective dates therefor, as it may deem necessary or desirable for the effectuation and enforcement of the compact or to carry out its responsibilities under the compact. Such rules and regulations, except those relating solely to the internal management of the Commission, shall be adopted, amended and repealed only after notice and public hearing, but shall not become effective in any signatory prior to filing therein as prescribed in § 15.01(c);

(o) Exercise such other powers as are granted by this compact, and take such actions as are necessary or appropriate to carry out powers granted by this compact.

§ 3.06. Interbasin Agreements.—Notwithstanding the jurisdictional limitations of § 2.08, whenever the Commission deems it to be advisable it may enter into interbasin agreements with other river basin or other governmental agencies not inconsistent with any of the purposes of this compact.

§ 3.07. Coordination and Cooperation.—The Commission shall promote and aid the coordination of the activities and programs of persons and governmental agencies concerned with water resources administration in the basin. To this end, but without limitation thereto, the Commission may:

(a) Advise, consult, contract, financially assist, or otherwise cooperate with any and all such agencies and persons;

(b) Employ any other governmental agency in the design, construction, operation and maintenance of facilities, and the installation and management of river control systems, or for any other purpose;

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(c) Develop and adopt plans or specifications for particular water resources projects and facilities which, so far as is consistent with the comprehensive water resources plan, incorporate any separate plans of other persons and governmental agencies operating in the basin;

(d) Serve as a sponsoring or reviewing agency under any legislation heretofore or hereafter enacted by the signatories to provide financial or other assistance for the planning, conservation, utilization, development or management of water resources.

§ 3.08. Review and Approval of Projects of Others.—(a) Except as hereinafter excluded or exempted, none of the following projects affecting the water resources of the basin shall be undertaken by any person or governmental agency prior to submission of the project proposal to, and its approval by, the Commission as hereinafter provided:

(1) Projects on or crossing the boundary between any two or more signatory states;

(2) Projects involving the diversion of water;

(3) Projects which have been included by the Commission as a part of the comprehensive water resources plan or which, alone or in conjunction with other projects, the Commission deems would have a substantial effect upon such plan;

(4) Projects completely within the boundaries of any signatory state which are of a class determined by Commission regulations as having a substantial effect on water resources within another signatory state;

(5) Projects for the modification or alteration of facilities whose initial construction required, or would have required, Commission approval pursuant to this section.

(b) The Commission may by regulation determine the classes of such projects for which Commission approval is not required, the types of such projects for which proposals must be submitted directly to the Commission for review, and the types for which proposals may be submitted to the Commission through the appropriate offices or agencies of a signatory. The Commission after consultation with the appropriate offices or agencies of the signatories, shall establish the procedure of submission, timely review and consideration of projects.

(c) The Commission shall approve a project unless it determines that the project, alone or in conjunction with other projects, is not in the public interest in the conservation, development, utilization or management of the water resources of the basin as provided for in this compact, or is in substantial conflict with the comprehensive water resources plan. In either case it may require modification thereof and approve as modified, or may disapprove the project. If the Commission does not act on a project pursuant to this section within ninety (90) days of its submission, the project shall be deemed to have been approved, except that if the Commission requests modifications in the project as submitted, a reasonable time shall be allowed for the making of such modifications and for resubmission to the Commission. Nothing in this section shall be construed to prevent the Commission and the applicant from extending the ninety (90) day period provided herein by mutual written consent.

(d) Proposals for federal projects which come within one or more of the classes enumerated in subsection (a) of this § 3.08 and which require Congressional authorization shall be submitted to the Commission for review and recommendation for a period of not less than ninety (90) days; and the recommendations and views of the Commission thereon shall be included in any report thereon submitted by the sponsoring federal agency to the Congress.

§ 3.09. Effect on the Chesapeake Bay.—With respect to any action taken by it under this compact, the Commission shall consider the actual or potential effect of such action upon the receiving waters of the Chesapeake Bay.

§ 3.10. Advisory Committees.—The Commission may constitute, and prescribe the functions of, such number of advisory committees consisting of such number of members who shall serve for such periods of time as it may determine, which committees may be comprised of representatives of the public and of federal, state, county and municipal governments, organizations of local governments, intergovernmental agencies, water resources agencies, water-using industries, water-interest groups, labor, agriculture and other interests, and may be basin-wide, regional or local, as the Commission may determine.

§ 3.11. Proposing Amendments.—The commissioners may from time to time recommend to the legislatures of the signatories amendments to the compact and shall, not less often than once every ten (10) years during the duration of this compact, report to such legislatures their views concerning the desirability of amending this compact.

ARTICLE 4
WATER SUPPLY

§ 4.01. Development, Storage and Release of Waters.—The Commission may acquire, construct, operate and maintain projects and facilities and such related structures, appurtenances and equipment as it deems appropriate, for the development, storage and release of water and for the regulation of flows and supplies of surface and ground waters of the basin, for domestic, municipal, agricultural and industrial water supply, the protection of public health, water quality control, economic development, improvement of fisheries and wildlife, recreation, flood control and flood damage reduction, prevention of undue salinity, and for other purposes relating to the control and use of the water resources of the basin.

§ 4.02. Unauthorized Diminution of Augmented Flows Prohibited.—No person or governmental agency shall diminish any augmented flow during any period in which releases from storage are being made under the direction of the Commission, except where diversion or withdrawal is authorized by this compact or by the Commission.

§ 4.03. Additional Powers.—In connection with any project authorized by this article, the Commission shall have power to provide storage, treatment, pumping, and transmission facilities, but nothing herein shall be construed to authorize the Commission to engage in the retail business of distributing water.

ARTICLE 5
WATER QUALITY MANAGEMENT AND CONTROL

§ 5.01. Intent and Policy.—(a) The legislative intent in enacting this article is to give specific emphasis to the primary responsibility of the signatory states for water quality management and control.

(b) In order to conserve, protect, and improve the quality of the waters of the basin, it shall be the policy of the Commission to encourage and coordinate the efforts of the signatories to prevent, reduce, control, and eliminate pollution so as to achieve and maintain water quality consistent with the uses established in the comprehensive water resources plan.

§ 5.02. Standards for Controlling Water Quality.—(a) The Commission may recommend to the signatories their establishment, modification, or amendment of standards of quality for any waters of the basin.

(b) The Commission may, after public hearing, adopt and from time to time change, criteria of water quality for each classification of water use established in the comprehensive water resources plan, standards of water quality applicable to particular waters of the basin, standards for preventing, controlling and abating pollution, and definitions of *pollution* and identification of *pollutants*.

Upon the effective date of this compact, the criteria and standards in force in the signatory states shall be deemed to have been adopted by the Commission and shall be the criteria and standards of the Commission until changed as set forth in the preceding sentence, provided, that until the Commission gives notice that it is prepared to exercise the functions vested in it by the preceding sentence any changes made by a signatory state in its criteria or standards shall be effective as amended criteria or standards of the Commission.

§ 5.03. Scope.—Criteria for water quality and the various standards referred to in this article may relate, but shall not be limited, to bacterial, viral, chemical, radio-active, organic, thermal, gaseous, liquid, solids or soils pollution or enrichment of the waters of the basin from treated or untreated domestic and industrial wastes, or from aerial contaminants or agricultural, construction and navigational activities, or from the exploitation of natural resources or the deposit of solid wastes, refuse or materials of any kind in or near the waters, or from the failure to prevent or control the discharge, or entry by other means, of oils, chemicals or other materials which might adversely affect the quality or the uses of the waters of the basin as set by the various standards and plans referred to herein.

§ 5.04. Cooperative Administration and Enforcement.—(a) The Commission shall encourage cooperative and uniform implementation and enforcement programs and policies by the water quality control agencies of the signatories to achieve compliance with the water quality standards adopted by the Commission.

(b) Every officer and agency of each signatory having enforcement responsibilities with respect to water resources shall enforce the Commission's standards and its rules and regulations relative thereto.

(c) The Commission as complainant may enforce against any polluter

its own standards to control future pollution and abate existing pollution in any waters of the basin.

§ 5.05. Projects and Facilities.—The Commission may acquire, construct, operate, and maintain projects and facilities and such related structures, appurtenances and equipment as it may deem appropriate for the management and control of the quality of any waters in the basin.

§ 5.06. Pollution Damage.—(a) Any person or governmental agency responsible for any change in, or for the entry of any pollutant into, any waters of the basin to such extent or in such quantities, alone or in combination with changes or pollutants from other sources, as to cause or contribute to the degradation of the quality of any waters of the basin below the standards of water quality adopted therefor by the Commission shall be civilly liable for any damage suffered by the Commission or by any other governmental agency by reason of such degradation, whether such damage be in the nature of actual damage sustained through loss of fish and wildlife or injury to property, or reasonable cost of necessary remedial measures undertaken by the Commission or other governmental agency for the amelioration of the effects of the change or the pollutants, or to prevent the change or the entry of such pollutants into the waters.

(b) The Commission may ascertain the extent of any such damage suffered by it and make claim upon each person or governmental agency responsible therefor. Upon the request of any other governmental agency which has suffered any such damage the Commission may, in collaboration with such agency, ascertain the extent of such damage and make claim on behalf of the agency upon each person or governmental agency responsible therefor. In the event the damages so ascertained and claimed by the Commission are not paid by the person or governmental agency responsible, the Commission may institute an action to recover the same.

(c) Except in case of emergency remedial measures, there shall be no civil liability pursuant to this section for the cost of remedial measures unless such measures have been ordered or approved by the Commission after hearing following notice to those persons and governmental agencies from whom damages are to be claimed.

(d) Subject to its deduction of all costs and expenses incurred in connection therewith, the Commission shall pay promptly to each governmental agency so entitled all monies collected by the Commission pursuant to this section on behalf of such governmental agency as the loss or damage sustained or the cost of remedial measures undertaken by such governmental agency in counteracting or preventing such change or in mitigating the effects of such change, or in handling, treating, removing, or preventing the entry of, such pollutants, or of otherwise rendering any such pollutants suitable for introduction into, or retention in, the waters of the basin.

(e) The provisions of this section shall not supersede any other provision in this compact or contained in any other law, but shall be in addition thereto.

ARTICLE 6
FLOOD PROTECTION

§ 6.01. Flood Control Authority.—(a) In addition to authority granted elsewhere in this compact, the Commission may plan, design, con-

struct, operate and maintain projects and facilities it deems necessary or desirable for flood damage reduction, or may recommend to any governmental agency that it undertake flood damage reduction activities.

(b) Except as otherwise provided by the Commission, all plans, programs and operating procedures, and all changes therein, of every person or governmental agency, relating to existing or future projects, facilities or structures within a flood plan and which in the judgment of the Commission may have any effect upon, or be affected by, floods or flooding shall, prior to any implementation or effectuation thereof, be submitted to the Commission for review and comment, and no action may be taken with respect to the implementation or effectuation of any such plans, programs, operating procedures or changes therein until the Commission has had an opportunity to comment thereon. The provisions of this subsection are not in lieu of, but are in addition to, any provisions or requirements contained elsewhere in this compact.

(c) As part of the comprehensive water resources plan the Commission shall delineate flood plains and classify them in terms of the frequency of flooding in such manner as the Commission shall determine.

ARTICLE 7
WATERSHED MANAGEMENT

§ 7.01. Management Practices.—In discharging its functions and duties under § 3.01 the Commission shall promote sound practices of watershed management throughout the basin, including, but not limited to, soil conservation, the control of surface runoff and prevention of erosion, the improvement of the quality and yield of water, land reclamation and sound land and forest management, and the maintenance and improvement of fish and wildlife habitat. To this end the Commission may acquire, provide, sponsor, maintain and operate projects and facilities necessary or suitable therefor, and so far as practicable sponsor, aid and promote the basic policies of the soil and water conservation districts of the basin. Any Commission project or facility for the maintenance or improvement of a fish or wildlife habitat or involving the introduction of species new to such habitat shall be subject to approval of the applicable fish or wildlife management agency of the signatory state in which the same is located.

§ 7.02. Watershed Defined.—As used in this article *watershed* shall mean a region or area of drainage into a particular watercourse or body of water, and includes the basin as well as an area of drainage into a minor tributary and a combination of such areas draining into a larger tributary.

ARTICLE 8
RECREATION

§ 8.01. Planning.—(a) The Commission may include water resources related public recreational projects and facilities in its comprehensive water resources plan and in its amenities plan.

(b) The Commission shall cooperate with the appropriate persons and governmental agencies in planning and effectuating coordinated programs

for the construction, operation, maintenance and administration of water resources related public recreational projects, facilities and activities.

§ 8.02. Cooperation.—(a) The Commission shall encourage activities of persons and governmental agencies having water resources related recreational interests and assist in the coordination thereof.

(b) The Commission may provide technical assistance and make recommendations to persons and governmental agencies for the development, operation, maintenance and administration of water resources related recreational programs, projects, facilities and activities.

§ 8.03. Construction, Operation, Maintenance and Administration.—The Commission, alone or in cooperation with one or more persons or governmental agencies, may construct, operate, maintain and administer water resources related public recreational projects and facilities and may contribute to the costs of construction, operation, maintenance and administration thereof undertaken by others than the Commission. The Commission may, by lease or any other form of contract or agreement, undertake to operate, maintain or administer any water resources related public recreational project or facility and with respect thereto may exercise any power, not inconsistent with such lease, contract or agreement, which it might exercise with respect to any project or facility owned by it. In the operation, maintenance and administration of any water resources related public recreational project or facility, whether or not owned by it, the Commission may act through public or private lessees or concessionaires.

§ 8.04. Uniformity of Fishing and Boating Laws on Certain Waters.—Whenever two or more signatory states have a common boundary in or contiguous to any body of water or portion thereof within the basin, unless prohibited by the law of such signatory state, the Commission, board, or other agency from each such signatory state, having jurisdiction over the regulation of fishing, or boating, or health and safety aspects of recreational activities, in or upon such waters, may agree upon, and by rules or regulations provide for, uniform enforcement relating to the aforesaid activities with respect to any such waters mutually designated or agreed upon. Infractions of laws, and rules and regulations on such bodies of water shall be prosecuted in the appropriate court within the territorial jurisdiction where the offense occurred. If the offense occurs on or so near the boundary between two signatory states that it cannot be readily determined in which state the offense occurred, it shall be presumed that such offense occurred within the jurisdiction of the court where the enforcement action was instituted by the enforcement officer.

§ 8.05. Restrictions on Commission Construction and Operation.—In order to assure utilization of the functions, powers and responsibilities of existing state agencies, the Commission shall not engage in the operation of any recreational facilities, nor construct any project or facility solely for recreational purposes, unless the commissioner from the signatory state in which the project or facility is located has approved the same.

§ 8.06. Definition.—For purposes of this article *public recreational project or facility* shall mean a recreational project or facility open to the general public either free or on a fee basis.

ARTICLE 9
OTHER PUBLIC VALUES

§ 9.01. Purpose and Findings.—Comprehensive planning is essential to assure orderly development, safeguard the intrinsic natural values of the Potomac Basin and preserve the beauty and environmental amenities of the region. This need is greatest in those localities most subject to the pressures of urbanization, expanding population and industrial development. Accordingly the legislative bodies of the respective signatories declare that, in addition to water resources management, the purposes of this compact are to preserve and promote the aesthetic and other values inherent in the historic, scenic and environmental amenities of the Potomac River Basin for the enjoyment and enrichment of future generations and relate such values to the economic health of the basin and the promotion of the orderly development of the basin.

§ 9.02. Compatibility of Water Resources Related Projects.—The signatories agree that in the consideration, authorization, construction, maintenance and operation of their water resources related projects in the basin, they will consider the compatibility of such projects with the values hereinabove stated.

§ 9.03. Planning Coordination.—The Commission may recommend standards and act as a coordinator for planning, zoning, and other action which will promote balanced development and may act as an agency for the intergovernmental coordination and effectuation of local, regional, state and interstate planning.

§ 9.04. Amenities Plan and River Zones.—Complementary to the comprehensive water resources plan provided for by § 3.02, the Commission shall develop and adopt, and from time to time review and revise an amenities plan and programs for the development and preservation of the aesthetic, scenic and historic values along the Potomac and its tributaries, and may adopt such plan or any revision thereof in such part or parts as it may deem appropriate.

In developing, reviewing and revising the amenities plan, or parts thereof, the Commission shall give consideration to agricultural, industrial, commercial and residential values.

In developing, reviewing and revising the amenities plan, or parts thereof, the Commission shall give consideration to relevant portions of federal, state, regional and local plans, whether prepared by signatories or their agencies, by local or regional planning commissions, by local governmental units or organizations thereof, by soil and water conservation districts, by regional resource use associations, or by other governmental agencies or organizations. Such consideration shall be required only with respect to such plans as are presented to the Commission in the manner the Commission may provide.

The plan shall include public and private areas, waters, land, land uses, structures, projects and facilities which are necessary, in the judgement of the Commission for the balanced development, conservation, utilization and preservation of such values. Any such plan shall also provide for:

(a) river zones and their accessibility;

(b) instituting land use plans and controls within river zones;

(c) acquiring or otherwise preserving existing and potential parks and parkways, scenic areas, open spaces, recreation areas, historic areas, trail corridors, wetlands or natural areas within river zones.

A *river zone*, as used in this article, means such portion of the Potomac River or a tributary, including the islands, and an area along the shores, of such length and extending inland such distance, as the Commission may determine, but no river zone may extend inland more than one mile except with the concurrence of the governing body of the locality in which such zone is located.

The Commission may, from time to time after public hearing which whenever practicable shall be in the general vicinity of the river zone involved, establish, modify or abolish so many river zones of such sizes as it may determine to be necessary for the protection of fish and wildlife habitat, and aesthetic, scenic and historic values; provided, that no river zone or portion thereof may be established within any signatory state without prior consultation with county and other concerned local public bodies and the affirmative vote of the commissioner from such signatory.

The Commission may establish river zones on the Potomac River including its North Branch, but may not establish river zones on any tributary or portion thereof unless the same has been designated for the establishment of river zones pursuant to the laws of the signatory state within which such tributary or portion thereof is situate.

§ 9.05. Amenities Plan Effectuation—Acquisition and Administration.—(a) In effectuating the amenities plan or portions thereof adopted pursuant to § 9.04, the Commission may acquire the fee or any lesser interest, development right, easement, covenant, contractual or other right in real or personal property, through purchase, gift, grant, bequest, devise, lease, condemnation, transfer from any governmental agency, exchange or otherwise; provided, however, that the Commission's power to acquire such fees or lesser interests in such lands or other property by condemnation for scenic, open space or historic purposes may not be exercised when and so long as the signatory or signatories or political subdivisions wherein such lands or other property are situate shall have in force, applicable to such lands or other property, laws or regulations which the Commission deems adequate protection for preserving such lands or other property, or such protection is provided by other means deemed adequate by the Commission. The Commission may administer or provide for administration by an appropriate person or governmental agency of any land or other property acquired pursuant to this section.

(b) If acquisition of property or a right or interest therein pursuant to subsection (a) hereof is by any means, the acquisition shall be only with the concurrence of the Commission member from the state in which the property is situated and with the consent of the local government within whose territory the property is situated. For the purposes of this subsection, "local government" means the county or the District of Columbia, except that if the county does not have jurisdiction to condemn land

or regulate land use in the area where the property is situated, it means a city, town, village or other unit of general local government having such power.

§ 9.06. Land Use Plans and Controls—River Zone Protection.—(a) In effectuating the plan or portions thereof adopted pursuant to § 9.04, the Commission shall assist local agencies in developing coordinated comprehensive land use plans for the preservation, reservation, enhancement, and orderly development of the scenic, historic, recreational, open space and natural resources of the river zones and propose state and local land use controls for their effectuation. The Commission may accept state and local comprehensive land use plans, and state and local zoning and other land use controls which effectuate such accepted plans.

(b) Except pursuant to the provisions of state or local zoning or other land use controls which have been accepted by the Commission, land within any river zone established by the Commission may not be used for any purpose other than that for which it was actually and lawfully being used when the river zone was established or the amenities plan or portion thereof relating thereto was adopted by the Commission pursuant to § 9.04, whichever shall be later; provided, that until such state or local zoning or other land use controls have been accepted by the Commission, the Commission may authorize changes from existing uses of land if it finds that such changed uses will be compatible with its amenities plan adopted pursuant to § 9.04. The Commission shall not accept any zoning or other land use controls unless they provide that, insofar as the Commission may prescribe, any change in, or special exceptions or variances thereafter made or authorized relating to the use to which any land may be put, shall not become effective with respect to land within a river zone until accepted by the Commission as compatible with its amenities plan. The Commission shall by regulation provide for the effectuation of the provision of this subsection (b).

(c) Whenever any jurisdiction has enacted and is enforcing zoning or other land use control laws, ordinances or regulations, subsections (a) and (b) hereof shall not apply, and the power of the Commission shall be limited to the making of recommendations for the implementation of its amenities plan.

(d) The Commission shall not exercise any of the authority conferred by subsections (b) and (c) hereof prior to January 1, 1980.

§ 9.07. Recommendations for Land Preservation.—The Commission may from time to time designate park, recreation, scenic and historic areas and the boundaries thereof within the basin and recommend to agencies of the signatories and to local governmental units programs for the preservation and enhancement of such areas. With respect to such areas the Commission may also recommend minimum standards of regulation of land and water use and such other protective measures as the Commission may deem desirable, and may prepare and recommend to the signatories and to local governmental units model laws, ordinances and regulations which would assist, promote, develop and protect those areas.

ARTICLE 10
HYDROELECTRIC POWER

§ 10.01. General.—In the exercise of its general powers as described in § 3.05, it is not intended that the Commission shall engage in the construction and operation of hydroelectric generating or transmission facilities as a primary undertaking. However, hydroelectric generating components and appurtenances may be installed in any project of the Commission either by the Commission, or by others under such terms and conditions as may be agreed upon with the Commission, whenever the Commission deems their inclusion either desirable or necessary in view of the prevailing or anticipated economic, operational or regional circumstances. Such facilities may be operated by the Commission or may be operated by others under its authority and direction.

§ 10.02. Development.—Nothing in the preceding section shall be construed to bar the development and operation of facilities for the generation of hydroelectric power and energy from the waters of the basin by others than the Commission, subject to all other provisions of this compact.

§ 10.03. Transmission.—The Commission may provide means for the transmission of hydroelectric power and energy produced by a Commission facility, where such means are not otherwise available upon reasonable terms, for the purpose of wholesale marketing of power. Nothing herein shall be construed to authorize the Commission to engage in the business of direct sale to retail customers, or to limit the jurisdiction of any other agency, lawfully empowered, to prescribe or approve the location and structural characteristics of transmission lines and their appurtenances.

ARTICLE 11
WATER SHORTAGES AND EMERGENCIES

§ 11.01. Areas of Potential Water Shortage.—The Commission shall conduct continuing studies of the relationship of demand to available supply of water, and whenever it determines that the demands upon supply in any part or parts of the basin have developed or threaten to develop to such a degree as to create a potential water shortage or impair or conflict with the requirements or effectuation of the comprehensive water resources plan it shall delineate each area involved as an *area of potential water shortage*. Thereupon it shall be the duty of the Commission to publicize each such delineation and to reexamine the comprehensive water resources plan in the light thereof.

§ 11.02. Protected Areas.—Whenever, after public hearing, the Commission finds that control of water withdrawal, diversion or use is required in an area of potential water shortage, which has been delineated under § 11.01, it may designate such area as a *protected area*.

§ 11.03. Emergency Areas.—Whenever the Commission finds that a drought or other condition has caused or may cause an actual and immediate shortage of the available supply of water within the basin, or within any part thereof, it may delineate the area of such shortage and designate the area delineated as an *emergency area*, which delineation

and designation shall not extend beyond thirty (30) days except to the extent that, after public hearing, such delineation and designation are confirmed by the Commission.

§ 11.04. Protected Area and Emergency Area Controls.—Upon the designation of a *protected* or *emergency* area by the Commission, and until such designation is changed or terminated, no person or governmental agency shall divert, withdraw or use water from the sources supplying such protected or emergency area for any purpose in excess of such quantities, at such times, and from such sources as the Commission may prescribe by regulation or authorize by special permit; except that the foregoing shall not apply within a protected area to a diversion, withdrawal or use of water authorized, prior to the adoption of this compact and not thereafter revoked, changed, or abandoned, under the law of any signatory.

§ 11.05. Standards.—Regulations shall be adopted, and permits shall be granted, modified or denied, as the case may be, to avoid such depletion of the surface and ground waters in a protected or in an emergency area as will adversely affect the comprehensive water resources plan or the just and equitable interests and rights of other lawful users of the same source, giving due regard to the need to balance and reconcile alternative and conflicting uses in the event of an actual or threatened shortage of water.

§ 11.06. Termination.—From time to time the Commission shall review its actions taken pursuant to § 11.01. If conditions then so warrant, the Commission may alter the areas so delineated, and after public hearing may then enlarge or diminish areas designated under § 11.02 as *protected areas*. After the conditions requiring control no longer exist, the Commission shall terminate the designation of any such area as a *protected area*.

The Commission shall review at least monthly any action taken pursuant to § 11.03, and when it determines that the drought or the condition which caused or could have caused an actual and immediate shortage of available water no longer prevails, the Commission shall terminate the designation of the area as an *emergency area*.

§ 11.07. Maintenance of Records.—Each signatory shall provide for the maintenance and preservation of such records of authorized diversions and withdrawals, and the quantities thereof, as the Commission shall prescribe. Such records, and related reports, shall be furnished to the Commission at its request.

§ 11.08. Existing Authorizations.—Permits authorized or issued and every other authorization to store, use, withdraw or divert water under the laws of any of the signatories in every emergency area, shall be suspended to the extent of any conflict with the control and regulation exercised by the Commission, pursuant to this article.

ARTICLE 12
INTERGOVERNMENTAL RELATIONS

§ 12.01. Federal, State and Local Projects.—For the purposes of avoiding conflicts of jurisdiction and of giving full effect to the Commis-

sion as a regional agency of the signatories, the following rules shall apply to all governmental agencies:

(a) The planning and design of all projects and facilities related to powers of the Commission under this compact shall be undertaken in consultation with the Commission;

(b) No expenditure or commitment shall be made for or on account of the construction, acquisition or operation of any project or facility nor shall it be deemed authorized, unless it shall have first been included by the Commission in its comprehensive water resources plan or amenities plan, or has been otherwise approved by the Commission;

(c) All plans shall be made, and if need be modified, so as to conform with the Commission's comprehensive water resources plan and, to the extent required for compliance with § 9.06 (b), with the Commission's amenities plan, or such parts or revisions thereof as have been adopted by the Commission;

(d) All projects and facilities shall be constructed, operated and managed in a manner which does not substantially conflict with the Commission's comprehensive water resources plan and, to the extent required for compliance with § 9.06 (b), with the Commission's amenities plan or, with any applicable standard, rule or regulation adopted by the Commission.

§ 12.02. Cooperative Services.—Every governmental agency is authorized to provide technical and administrative services to the Commission upon request, within the limits of available appropriations, and to cooperate generally with the Commission for the purposes of this compact. The costs of any such services may be reimbursable.

§ 12.03. Agreements with Other Governmental Agencies.—In order to enable the Commission to cooperate most effectively with other agencies of the signatories and to utilize to the fullest extent other offices and agencies of government for the purposes of this compact, the Commission, with the approval of the commissioner from the affected signatory, is authorized to enter into agreements with federal, state and local agencies relating to the purposes of this compact for the exercise of the duties and functions of the Commission.

§ 12.04. Local Governmental Cooperation.—Subject to the constitutions and laws of the signatories, governmental agencies and organizations of local governments of one or more signatories are authorized to contract with the Commission, each other and persons to acquire, construct, operate, manage, finance, and pay the costs of, any project or facility and to make any plans, necessary or convenient in the opinion of the Commission to carry out the Commission's comprehensive water resources plan or its amenities plan, or for the acquisition, development and operation of park, recreation, scenic and historic areas, or for the collection and disposal of solid wastes, or to control, abate and prevent air pollution.

§ 12.05. Potomac River Fisheries Commission.—Nothing in this compact shall be construed to diminish or supersede the powers and functions of the Potomac River Fisheries Commission as provided by the

Potomac River Compact of 1958 (Chapter 28, Acts of Virginia Assembly, Special Session 1959; 1959 Laws of Maryland, Chapter 269; PL 85-783, 76 Stat. 797) and revisions thereof. The Commission shall consult and cooperate with the Potomac River Fisheries Commission with respect to the conservation and improvement of the fishery resources of the tidewater portion of the Potomac River under the jurisdiction of the Fisheries Commission, and shall consider all recommendations received from the Fisheries Commission in connection with any comprehensive plan of the Commission for the basin and its approval of projects pursuant to its powers in Article 3 hereof.

ARTICLE 13
BOND FINANCING

§ 13.01. Borrowing Power.—The Commission may borrow money for any of the purposes of this compact and may issue its negotiable bonds and other evidences of indebtedness in respect thereto.

All such bonds and evidences of indebtedness shall be payable solely out of the properties and revenues of the Commission. The bonds and other obligations of the Commission, except as may be otherwise provided in the indenture under which they were issued, shall be direct and general obligations of the Commission, and the full faith and credit of the Commission are hereby pledged for the prompt payment of the debt service thereon and for the fulfillment of all other undertakings of the Commission assumed by it to or for the benefits of the holders thereof.

§ 13.02. Funds and Expenses.—The purposes of this compact shall include, without limitation, all costs of any project or facility or any part thereof, including interest during a period of construction and a reasonable time thereafter and any incidental expenses (legal, engineering, fiscal, financial, consultant, and other expenses) connected with issuing and disposing of the bonds; all amounts required for the creation of an operating fund, construction fund, reserve fund, sinking fund, or other special fund; all other expenses connected with the planning, design, acquisition, construction, completion, improvement, or reconstruction of any facility or any part thereof; and reimbursement of advances by the Commission or by others for such purposes and for working capital.

§ 13.03. Credit Excluded; Officers, State and Municipal.—The Commission shall have no power to pledge the credit of any signatory or other governmental agency, or to impose any obligation for payment of the bonds upon any signatory or other governmental agency, but may pledge the contracts of any signatory or other governmental agency; provided, however, that nothing herein shall preclude any signatory or other governmental agency from underwriting the bonds or other obligations of the Commission in whole or in part as to principal and interest. Neither the commissioners nor any person executing the bonds shall be liable personally on the bonds of the Commission or be subject to any personal liability or accountability by reason of the issuance thereof.

§ 13.04. Funding and Refunding.—Whenever the Commission deems it expedient, it may fund and refund its bonds and other obligations, whether or not such bonds and obligations have matured. It may

provide for the issuance, sale or exchange of refunding bonds for the purpose of redeeming or retiring any bonds (including payment of any premium, duplicate interest, or cash adjustment required in connection therewith) issued by the Commission or issued by any other issuing body, the proceeds of the sale of which have been applied to any facility acquired by the Commission or which are payable out of the revenues of any facility acquired by the Commission. Bonds may be issued partly to refund bonds and other obligations then outstanding, and partly for any other purpose of the Commission. All provisions of this compact applicable to the issuance of bonds are applicable to refunding bonds and to the issuance, sale, or exchange thereof.

§ 13.05. Bonds: Authorization Generally.—Bonds and other indebtedness of the Commission shall be authorized by resolution of the Commission. The validity of the authorization and issuance of any bonds by the Commission shall not be dependent upon or affected in any way by: (a) the disposition of bond proceeds by the Commission or by contract, commitment or action taken with respect to such proceeds; or (b) the failure to complete any part of the project for which bonds are authorized to be issued. The Commission may issue bonds in one or more series and may provide for one or more consolidated bond issues, in such terms and provisions as the Commission may deem necessary. The bonds may be secured by a pledge of all or any part of the property, revenues and franchises under its control. Bonds may be issued by the Commission in such amount, with such maturities and in such denominations and form or forms, whether coupon or registered, as to principal alone or as to both principal and interest, as may be determined by the Commission. The Commission may provide for redemption of bonds prior to maturity on such notice and at such time or times and with such redemption provisions, including premiums, as the Commission may determine.

§ 13.06. Bonds, Resolutions and Indentures Generally.—The Commission may determine and enter into indentures providing for the principal amount, date or dates, maturities, interest rate, denominations, form, registration, transfer, interchange, and other provisions of the bonds and coupons and the terms and conditions upon which the same shall be executed, issued, secured, sold, paid, redeemed, funded and refunded. The resolution of the Commission authorizing any bond or any indenture so authorized under which the bonds are issued may include all such covenants and other provisions not inconsistent with the provisions of this compact, other than any restriction on the regulatory powers vested in the Commission by this compact, as the Commission may deem necessary or desirable for the issue, payment, security, protection, or marketing of the bonds, including without limitation covenants and other provisions as to the rates or amounts of fees, rents, and other charges to be charged or made for use of the facilities; the use, pledge, custody, securing application, and disposition of such revenues, of the proceeds of the bonds, and of any other monies or contracts of the Commission; the operation, maintenance, repair, and reconstruction of the facilities and the amounts which may be expended therefor; the sale, lease, or other disposition of the facilities; the insuring of the facilities

and of the revenues derived therefrom; the construction or other acquisition of other facilities; the issuance of additional bonds or other indebtedness; the rights of the bondholders and of any trustee for the bondholders upon default by the Commission or otherwise; and the modification of the provisions of the indenture and of the bonds. Reference on the face of the bonds to such resolution or indenture by its date of adoption or the apparent date on the face thereof is sufficient to incorporate all of the provisions thereof and of this compact into the body of the bonds and their appurtenant coupons. Each taker and subsequent holder of the bonds or coupons, whether the coupons are attached to or detached from the bonds, has recourse to all of the provisions of the indenture and of this compact and is bound thereby.

§ 13.07. Maximum Maturity.—No bond or its term shall mature in more than fifty (50) years from its own date, and in the event any authorized issue is divided into two or more series or divisions, the maximum maturity date herein authorized shall be calculated from the date on the face of each bond separately, irrespective of the fact that different dates may be prescribed for the bonds of each separate series or division of any authorized issue.

§ 13.08. Tax Exemption.—All bonds and all other evidences of debt issued by the Commission under the provisions of this compact and the interest thereon shall at all times be free and exempt from all taxation by or under authority of any of the signatories, except for transfer, inheritance, and estate taxes.

§ 13.09. Place of Payment.—The Commission may provide for the payment of the principal and interest of bonds at any place or places within or without the signatory states, and in any specified lawful coin or currency of the United States of America.

§ 13.10. Execution.—The Commission may provide for the execution and authentication of bonds by the manual, lithographed, or printed facsimile signature of the officers of the Commission, and by additional authentication by a trustee or fiscal agent appointed by the Commission; provided, however, that one of such signatures shall be manual. If any of the officers whose signatures or counter-signatures appear upon the bonds or coupons ceases to be an officer before the delivery of the bonds or coupons, his signature or counter-signature is nevertheless valid and of the same force and effect as if the officer had remained in office until the delivery of the bonds and coupons.

§ 13.11. Holding Own Bonds.—The Commission shall have power, out of any funds available therefor, to purchase its bonds and may hold, cancel, or resell such bonds.

§ 13.12. Sale.—The Commission may fix terms and conditions for the sale or other disposition of any authorized issue of bonds. The Commission may sell bonds at less than their par or face value. All bonds issued and sold pursuant to this compact may be sold in such manner, either at public or private sale, as the Commission shall determine. In the event the Commission desires to issue its bonds in exchange for an existing facility or portion thereof, or in exchange for bonds secured by the revenues of an existing facility, it may exchange such bonds for the

existing facility or portion thereof or for the bonds so secured, with or without an additional amount of cash.

§ 13.13. Negotiability.—All bonds issued under the provisions of this compact are negotiable instruments.

§ 13.14. Bonds Eligible for Investment and Deposit.—Bonds issued under the provisions of this compact are hereby made securities in which all public officers and governmental agencies of the signatories and all banks, trust companies, savings and loan associations, investment companies and others carrying on a banking business, all insurance companies and insurance associations and others carrying on an insurance business, all administrators, executors, guardians, trustees and other fiduciaries, and all other persons may legally and properly invest funds, including capital in their control or belonging to them. Such bonds are hereby made securities which may properly and legally be deposited with and received by an officer of any governmental agency for any purpose for which the deposit of bonds or other obligations of such signatory is now or may hereafter be authorized by law.

§ 13.15. Validation Proceedings.—Prior to the issuance of any bonds, the Commission may institute a special proceeding to determine the legality of proceedings to issue the bonds and their validity under the laws of any of the signatories. Such proceedings shall be instituted and prosecuted in rem, and the final judgment rendered therein shall be conclusive against all persons whomsoever and against each of the signatories.

§ 13.16. Recording.—No indenture need be recorded or filed in any public office, other than the office of the Commission. The pledge of revenues provided in any indenture shall take effect forthwith as provided therein and irrespective of the date of receipt of such revenues by the Commission or the indenture trustee. Such pledge shall be effective as provided in the indenture without physical delivery of the revenues to the Commission or to the indenture trustee.

§ 13.17. Pledged Revenues.—Bond redemption and interest payments shall, to the extent provided in the resolution or indenture, constitute a first, direct and exclusive charge and lien on all such rates, rents, tolls, fees, and charges and other revenues and any accrued interest thereon received from the use and operation of the facility, and on any sinking or other funds created therefrom. All such rates, rents, tolls, fees, charges and other revenues, together with any accrued interest thereon, shall constitute a trust fund for the security and payment of such bonds, and except as and to the extent provided in the indenture with respect to the payment therefrom of expenses for other purposes including administration, operation, maintenance, improvements, or extensions of the facilities or other purposes, shall not be used or pledged for any other purpose so long as such bonds, or any of them, are outstanding and unpaid.

§ 13.18. Remedies.—The holder of any bond may for the equal benefit and protection of all holders of bonds similarly situated: (a) by mandamus or other appropriate proceedings require and compel the performance of any of the duties imposed upon the Commission or assumed by it, its officers, agents or employees under the provisions of any indenture, in connection with the acquisition, construction, operation, main-

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tenance, repair, reconstruction, or insurance of the facilities, or in connection with the collection, deposit, investment, application and disbursement of the rates, rents, tolls, fees, charges, and other revenues derived from the operation and use of the facilities, or in connection with the deposit, investment and disbursement of the proceeds received from the sale of bonds; or (b) by action or suit in a court of competent jurisdiction of any signatory require the Commission to account as if it were the trustee of an express trust, or enjoin any acts or things which may be unlawful or in violation of the rights of the holders of the bonds. The enumeration of such rights and remedies, however, does not exclude the exercise or prosecution of any other rights or remedies available to the holders of bonds.

§ 13.19. Sales and Guarantees by Signatories and Other Governmental Agencies.—The Commission may deliver to any signatory or other governmental agency the bonds of the Commission which may be sold on behalf of the Commission with or without the guarantee of such signatory or other governmental agency subject to, and in accordance with, the constitution and laws governing such signatory or other governmental agency. Any signatory or other governmental agency owning bonds of the Commission may sell such bonds with or without the guarantee of such signatory or other governmental agency subject to, and in accordance with, the constitution and laws governing such signatory or other governmental agency.

ARTICLE 14
BUDGETS, FINANCING AND PROPERTY

§ 14.01. Annual Capital and Current Expense Budgets.—(a) *Capital Budget.* The Commission shall annually adopt a capital budget including all capital projects it proposes to undertake or continue, or toward payment of the cost of which it proposes to contribute, during the budget period containing a statement of the estimated cost of each project, the method of financing thereof and, when applicable, the amounts of current annual shares of the cost which any person or governmental agency has contracted to pay. The portions of the capital budget not balanced by shares of the costs undertaken by any person or governmental agency shall be financed in such manner as the entire Commission, by unanimous vote, shall determine.

(b) *Current Expense Budget.* The Commission shall annually adopt a current expense budget for each fiscal year. Such budget shall include the Commission's estimated expenses for administration, operation, maintenance and repairs, including a separate statement thereof for each project together with its cost allocations. The total of such expenses shall be balanced by the Commission's estimated revenues from all sources, including the cost allocations which any person or governmental agency has contracted to pay in connection with any project, and an equitable apportionment, by unanimous vote of the entire Commission, among the signatories of the remaining revenues required. Following the adoption of the annual current expense budget by the Commission, the executive director of the Commission shall:

(1) Certify to the respective signatories, and submit to persons and other governmental agencies statements of, the amounts due from them in accordance with existing cost sharing established for each project; and

(2) Transmit certified copies of such budget to the principal budget officers of the respective signatories at such time and in such manner as may be required under their respective budgetary procedures.

(c) *Payments of Budget Apportionments.* The respective signatories covenant and agree to include the amounts allocated and apportioned for the support of the current expense budget of the Commission in their respective budgets next to be adopted, subject to such review as may be required by their respective budgetary procedures. Such amounts shall be due and payable to the Commission in not more than four (4) installments which shall be not less often than quarterly during its fiscal year.

(d) *Payment of Cost Shares.* Every statement rendered to a person or governmental agency other than a signatory, for his or its annual share in the costs of any project shall be payable in full within thirty (30) days of the date of receipt of the statement unless the Commission shall otherwise provide.

(e) *Interim Financing.* Pending remittances by the signatories, and payments by persons and other governmental agencies, the Commission may borrow from its working capital or other sources to finance its current expense budget.

§ 14.02. Project Costs and Evaluation Standards.—The Commission may:

(a) Establish standards and procedures for the evaluation, determination of benefits, and allocation of costs of projects affecting the water resources of the basin;

(b) Develop equitable cost sharing and reimbursement formulas for the signatories;

(c) Develop procedures for the allocation of project costs among purposes included in multiple-purpose programs;

(d) Develop contracts and arrangements for sharing financial responsibility among and with persons and governmental agencies and for the supervision of their performance;

(e) Establish and supervise a system of accounts for reimbursable purposes and direct the payments and charges to be made from and to such accounts;

(f) Determine the bases and apportion the amounts of reimbursable revenues to be paid persons and governmental agencies;

and may from time to time modify or amend any of the foregoing.

§ 14.03. Cost Sharing.—(a) The signatories will provide such capital funds required for projects of the Commission as may be authorized by their respective laws in accordance with a cost-sharing plan prepared pursuant to § 14.02 of this compact; but nothing in this section shall be deemed to impose any mandatory obligation on any signatory other than such obligations as may be assumed by a signatory in connection with a specific project or facility.

(b) Whenever the Commission finds that a person or governmental agency has undertaken or will undertake a project which will benefit any

other person or governmental agency, the Commission may develop a cost-sharing formula and contract to receive agreed shares of the cost of such project from those to be benefitted and to pay the same in the manner agreed upon. Every governmental agency is hereby authorized to contract with, and make payments to, the Commission pursuant to this subsection. Without regard to benefit received, the Commission may contribute to the payment of the cost of any such project, but the Commission may contract to pay such contribution only in such amount as may have been included in an annual capital budget adopted by the Commission.

§ 14.04. Project Cost Assessments.—In accordance with provisions of applicable state laws, the Commission may defray all or part of the costs of its water management and flow regulation projects, or such projects of others to the extent of the Commission's financial obligation therefor, by making on an equitable basis special assessments upon properties specially benefitted thereby, or upon persons and governmental agencies specially benefitted thereby. Any such assessment shall be imposed and collected in accordance with the procedure prescribed by law for local improvement assessments and shall be subject to judicial review in any court of competent jurisdiction in the signatory state where such assessment was made.

§ 14.05. Governmental Appropriations, Loans and Grants.—Every governmental agency may make to the Commission, and the Commission may receive and accept, loans, grants, appropriations, advances and payments of reimbursable or nonreimbursable funds or property in any form for the capital or operating purposes of the Commission, and payments for benefits received or to be received from the operation of any project or facility; but, except to such extent as may be provided in § 14.04, nothing in this compact shall be deemed to impose upon any local governmental unit or agency any mandatory obligation to provide any capital funds to the Commission other than funds which such local governmental unit or agency may agree or contract to pay.

§ 14.06. Acquisition of Property from Signatories.—The respective officers, agencies, departments, commissions or bodies of each signatory having jurisdiction and control over real and personal property owned by such signatory are authorized and empowered, upon the Commission's request and in accordance with the legal requirements of the signatory, to transfer and convey to the Commission any such property or any interest therein, including lands lying under water, as may be necessary or convenient to the effectuation of the authorized purposes of the Commission.

§ 14.07. Acquisition of Property from Political Subdivisions.—Each political subdivision and other public body of each of the signatories is authorized and empowered, notwithstanding any contrary provision of law, to grant and convey to the Commission, upon the Commission's request, any real or personal property or any interest therein owned by such political subdivision or other public body, including lands lying under water and lands already devoted to public use, which may be necessary or convenient to the effectuation of the authorized purposes of this Commission.

§ 14.08. Rights-of-Way.—Permission is hereby granted to the Com-

mission to locate, construct and maintain any aqueducts, lines, pipes, conduits and auxiliary facilities authorized to be acquired, constructed, owned, operated or maintained by the Commission in, over, under or across any streets and highways now or hereafter owned, opened or dedicated to or for public use, subject to such reasonable conditions as the agency having jurisdiction over such street or highway may require.

§ 14.09. Power to Acquire Property by Condemnation.—(a) The power of eminent domain granted by § 3.05 (k) includes, but is not limited to, the power to condemn for the purposes of this compact any property already devoted to a public use, other than property of a signatory. Any condemnation of any property or franchises owned or used by a governmental or private agency or entity for public utility purposes and being utilized in providing a public service shall be subject to the consent of such board, commission, or other body of a signatory as may have regulatory jurisdiction over the utility or service, unless the affected facility is to be relocated or unless such acquisition will not affect the operation of the utility or service; provided, that in the event of relocation the cost thereof shall be paid in accordance with the law of the state in which the facility is located but any such cost payable by the Commission shall not in any event exceed the expenditure required to serve the public convenience and necessity.

(b) Except as limited by § 9.05, whenever any signatory or political subdivision of a signatory or public utility owns any land or any easement, right-of-way or other interest in land which is devoted to a public use, and which the Commission deems necessary to acquire, the Commission may acquire by gift, purchase, or by exercise of the power of eminent domain other land or easement, right-of-way or interest in land and convey the same to such signatory, political subdivision or public utility for use by it in exchange for the land, easement, right-of-way, or other interest in land theretofore owned by it but needed by the Commission for purposes of this compact.

(c) Proceedings for condemnation by the Commission shall be instituted and conducted in the name of the Commission as petitioner without naming the individuals who may be such commissioners. The power of condemnation shall be exercised in accordance with the provisions of the state condemnation law in force in the signatory state in which the property is located. If there is no applicable state condemnation law, the power of condemnation shall be exercised in accordance with the provisions of federal condemnation law.

(d) The purchase price or amount awarded as compensation in any condemnation proceeding shall be paid by the Commission, and none of the signatories shall be liable for the payment thereof.

(e) In addition to the exercise of the power of eminent domain by the Commission as hereinabove provided, the appropriate officials, agencies, and political subdivisions lying within the basin, of each signatory, having the power of eminent domain are hereby authorized, whenever requested by the Commission, to acquire by purchase, condemnation, or any other means, such land or other property as may be requested by the Commission, and upon acquisition shall convey or transfer said land or

other property to the Commission. Unless otherwise agreed upon between the parties, the Commission shall reimburse the signatory, its agency or political subdivision for the cost of property and such acquisition costs as may be incurred.

§ 14.10. Tax Exemption and Payment in Lieu of Taxes.—The Commission, its property, functions, and activities shall be exempt from taxation by or under the authority of any governmental agencies. Nevertheless, it is the intention of this compact that, so far as possible, local taxing authorities shall not be adversely affected by the Commission's acquisition of taxable property, and in lieu of property taxes the Commission shall, as to specific projects, make payments to local taxing authorities in annual amounts which shall equal the annual average of the taxes lawfully assessed upon the property for five (5) years next preceding the tax year of its acquisition by the Commission. The nature and amount of such payments shall be reviewed by the Commission from time to time not more often than once in two (2) years, upon reasonable notice and opportunity to be heard to the affected taxing authority, and the payments may be terminated or continued in such reasonable amounts as the Commission may determine to be necessary or desirable after taking into account the hardships incurred and the benefits received by the taxing authority which are attributable to the project.

§ 14.11. Riparian and Other Vested Rights.—Nothing in this compact shall be construed to authorize a taking without just compensation of any riparian or other vested right as the same may then be recognized by applicable law.

ARTICLE 15
GENERAL PROVISIONS

§ 15.01. Commission Meetings, Minutes, Copies of Documents and Fees Therefor.—(a) *Meetings.* The Commission may meet in public or executive sessions as it may determine, but all official actions of the Commission shall be taken in public session.

(b) *Minutes.* The minutes of the Commission shall be a public record open to inspection at its offices during regular business hours. It shall not be necessary to physically incorporate in the minutes any maps, drawings or other pictorial matters nor the full text of regulations, plans, budget, programs or other documents relating to actions taken by the Commission; but every such pictorial matter and every full text or other document shall be incorporated by reference in said minutes, shall be preserved in the office with the minutes, and shall be deemed a part of said minutes.

(c) *Filing With Signatories.* One copy of the comprehensive water resources plan, the amenities plan or each part or revision thereof, and of every regulation, standard or rule adopted by the Commission other than those dealing solely with the internal management of the Commission, shall be filed with the chief executive or with such other officer of each signatory as the chief executive thereof may determine by a written notice filed with the Commission.

(d) *Availability of Copies.* The Commission shall supply, upon request accompanied by any fee prescribed by the Commission, a copy of

any document or pictorial or other matter which is deemed a part of the Commission's minutes. The Commission shall provide for the dissemination throughout the basin of copies of its comprehensive plans and of parts and revisions thereof, and for their availability to the public.

(e) *Fee For Documents.* The Commission may require payment of a reasonable fee or price for copies of any documents or data supplied by the Commission. Such fee shall not exceed the costs of printing or reproduction and distribution unless the Commission shall determine that other costs, specified by it, shall be included in the fee.

(f) *Communications.* Wherever in this compact provisions are made for communications from the Commission to governmental agencies, such communications shall be addressed to the principal executive or administrative officer thereof, as the case may be.

§ 15.02. Contracting and Purchasing.—(a) Every contract in excess of ten thousand dollars ($10,000.00) for the construction, reconstruction or improvement of any facility and every contract in excess of five thousand dollars ($5,000.00) for the purchase of services, supplies, equipment and materials shall be advertised and let upon sealed bids to the lowest responsible bidder. Notice requesting such bids shall be published at least ten (10) days before bids are to be received, in a manner reasonably likely to attract prospective bidders. The notice shall state the place where bidders may examine the specifications and other contract documents, and the time and place when bids will be opened.

(b) Each bidder on a contract for construction, reconstruction or improvement of a facility shall accompany his bid with a corporate surety bond, or a certified check payable to the Commission, for a reasonable sum to be fixed by the Commission, as a guarantee that, if the contract is awarded to him, he will enter into a contract with the Commission in accordance with the terms of his bid.

(c) In its discretion the Commission may accept or reject any or all bids and may readvertise, but nothing in this compact shall prohibit the Commission from negotiating a lower price with the lowest responsible bidder. If all bids are rejected, the Commission may procure the work, services, supplies, equipment or materials in such manner as the Commission, pursuant to rules or regulations theretofore adopted by it, may determine; provided, that it may not pay more than the amount bid by the lowest responsible bidder whose bid was rejected.

(d) Prior to entering into any contract in excess of five thousand dollars ($5,000.00) the contractor shall provide a bond with corporate surety, payable to the Commission in such form and penal sum as the Commission may determine, conditioned upon the faithful performance of the contract in strict conformity with its terms, and the Commission may require such bonds for contracts of five thousand dollars ($5,000.00) or less.

(e) The Commission shall adopt rules and regulations to provide for contracting and purchasing when sealed bids, notice and publication are not required by this section and may adopt such additional rules and regulations as it deems appropriate to effectuate this section.

(f) The Commission may suspend and waive the provisions of this section requiring competitive bids whenever:

(1) the purchase is to be made from or the contract is to be made with a signatory or other governmental agency or pursuant to any open end, general schedule or requirements purchase contract of any of them;

(2) the public exigency requires the immediate delivery of the articles or performance of the work or service;

(3) only one source of supply is available;

(4) standardization of equipment or interchangeability of parts is in the public interest; or

(5) services are to be provided of a specialized or professional nature.

(g) Whenever requested by the Commission, open end, general schedule and requirements purchase contracts of the signatories, their agencies, and their political subdivisions within the basin, shall provide that the Commission may purchase thereunder; and the signatories hereby authorize their respective central purchasing agencies to make purchases for the Commission when so requested by the Commission.

§ 15.03. Insurance.—The Commission may purchase, and pay the premiums for, insurance against loss of or damage to any of its properties and against loss of revenue from any cause whatsoever. Such insurance coverage shall be in such form and amount as the Commission may determine, subject to the requirements of any agreement or indenture arising out of the issuance of bonds by the Commission. The Commission shall obtain insurance against liability for injury to persons and damage to property in such amounts as the Commission shall determine.

§ 15.04. Employees' Benefits.—The Commission shall have authority to elect to be covered by the provisions of any law of any signatory relating to employee benefits, in order that its employees may be eligible for such benefits, and upon such election the Commission shall be deemed an *employer* within the meaning of such laws of each signatory, and the Commission shall have authority to elect to be removed from any such coverage; provided, that such election shall relate only to those laws under which benefits may be paid to employees of nongovernmental employers, and that all provisions of such laws relating to nongovernmental employers shall apply to the Commission. The Commission is authorized to agree with any agency of any signatory which administers a retirement system for all, or any class of, employees of such signatory, whereby all or any classes of officers and employees of the Commission may be included within such retirement system, and every agency of each signatory which administers a retirement system is authorized to so agree with the Commission; provided, that any such agreement may provide that the Commission or its officers and employees to be included in such retirement system, or both, shall contribute to said system such amounts as will defray on an actuarially sound basis all benefits payable to officers and employees of the Commission, but excluding the costs of operation.

§ 15.05. Prohibited Activities.—(a) No commissioner, officer or employee shall:

(1) Be a contractor or subcontractor with the Commission or its agents, or have a material financial interest, direct or indirect, in any

contract, subcontract, or job of work, or materials, or the profits or contract price thereof, or any services to be furnished or performed for the Commission for pay under any contract or subcontract, unless pursuant to an award or contract let after competitive bidding; provided, however, the foregoing shall not apply to the purchase from or sale to the Commission of any real property if the purchase or sale and the terms thereof are approved in advance by unanimous vote of the entire Commission, nor shall the foregoing apply to any transaction where the amount or value does not exceed a maximum to be fixed from time to time by the Commission by regulation.

(2) Solicit or accept money or other thing of value in addition to the compensation, expenses or other remuneration paid him by the Commission or pursuant to § 2.04 of this compact for services performed within the scope of his official duties.

(3) Offer or accept money or any other thing of value for or in consideration of obtaining an appointment, promotion or privilege in his employment with the Commission.

(b) The Commission may, by regulation, specify particular interest or classes of interest which shall not be deemed direct or indirect material financial interests within the meaning of this section.

(c) Whenever a violation or apparent violation of this section becomes known to any commissioner, officer or employee, he shall forthwith bring the matter to the attention of the Commission. Any contract or agreement which the Commission finds was made in violation of this section shall be either ratified or declared void. In such latter event the consideration to be paid or transferred by the Commission under such agreement shall not be paid or transferred by the Commission, or, if paid or transferred, may be recovered, with interest, by the Commission.

§ 15.06. Annual Independent Audit.—(a) As soon as practicable after the close of the fiscal year, an audit shall be made of the financial accounts of the Commission. The audit shall be made by one or more certified public accountants selected by the Commission, who have no personal interest, direct or indirect, in the financial affairs of the Commission or of any of its officers or employees. The report of audit shall be prepared in accordance with accepted accounting practices and shall be filed with the chairman and such other officers as the Commission shall direct. Copies of the report shall be distributed to each commissioner and shall be made available for public distribution.

(b) Without regard to the close of the fiscal year, each signatory shall be entitled to examine and audit all of the books, documents, records, files, accounts and property of the Commission, and shall be afforded full facilities for verifying transactions with the balances or securities held by depositaries, fiscal agents, and custodians.

§ 15.07. Reports.—The Commission shall make an annual report to the signatories on its programs, operations, and finances. Copies shall be furnished to water resources agencies of the signatories and shall be made available to the public, upon request, at the Commission's offices.

§ 15.08. Notice.—(a) Unless otherwise specified in this compact, whenever notice is required by any section in this compact, such notice

shall be given by publication once a week for two successive weeks in a newspaper having general circulation in the area, or portion or portions, of the basin to be affected by the proposed action of the Commission. If the purpose of such notice is to give notice of a proposed public hearing, the notice shall identify the subject or subjects to be considered and specify the time, not less than twenty-one (21) days after first publication, and place of hearing at which interested persons may appear and present their views. In addition to newspaper publication, notice of the proposed action of the Commission, or of public hearing, shall be posted in a conspicuous place at the offices of the Commission. Whenever the matter in question is the adoption, amendment or revision of the comprehensive water resources plan or the amenities plan, there shall be at least one public hearing in the affected area or as near thereto as may be feasible.

(b) The Commission may mail a copy of the notice to each person and governmental agency which the Commission believes may be affected by the proposed action of the Commission or by the action it may take after such public hearing, and may also mail a copy of the notice to any other person or governmental agency who shall request such notice. The Commission may provide for other means of giving notice to the end that all persons and governmental agencies having an interest in the subject may reasonably be apprised thereof. Any failure of the Commission to give notice as provided in this paragraph (b) shall not affect the validity of any action taken by the Commission.

(c) The notice need not contain the entire text, plan, or detail of the proposed action of the Commission or of the subject matter of the hearing, but shall reasonably identify the same and state the place at which the same may be examined. Whenever copies of such text, plans, or details may be provided by the Commission, the notice shall so state and shall give the post office address to which requests for such data may be sent and the price, if any, charged by the Commission therefor.

§ 15.09. Hearings.—(a) The Commission shall, after notice and at such place or places as it may determine, conduct at least one public hearing prior to the adoption of the comprehensive plan, of any major part or revision thereof, of water resources programs, and of annual capital and current expense budgets, and in all other cases wherein this compact requires a public hearing; and the Commission may conduct hearings, which need not be public hearings, with respect to any other action or activity of the Commission. Whenever the Commission proposes to act with respect to the revision, or the adoption or revision of a part, of the comprehensive water resources plan or amenities plan which it deems to be minor in nature, it shall give notice that it proposes to act without public hearing, in which event any person or governmental agency claiming to have an interest in the subject matter of such proposed action shall be entitled to submit data or views to the Commission prior to its action according to such rules as the Commission may adopt or to petition for a public hearing which petition shall be granted upon a showing of legitimate interest; and the Commission may provide for a public hearing.

(b) Commission hearings may be conducted by such commissioner, officer or employee as the Commission may direct.

(c) The Commission shall adopt rules and regulations governing hearings, including rules of practice and procedure and circumstances in which hearings shall be afforded, and may prescribe the form and content of pleadings and other documents that may be filed with the Commission.

(d) The Commission may hold joint hearings with any federal, state or local public body empowered to hold hearings. Any such hearing may be either pursuant to a request of the Commission or of the other public body therefor. Any such hearing may be held either pursuant to the rules and procedures of the Commission or of the other public body; provided, that in no event shall interested parties and the general public be afforded less actual notice and opportunity to be heard than required by the provisions of the compact and the rules and procedures governing hearings of the Commission. Notices of joint hearings shall state that the hearings are to be joint and shall identify the other public body or bodies participating therein.

§ 15.10. Oaths and Subpoenas.—(a) *Oaths.* Any commissioner, and counsel and hearing examiner authorized by the Commission, may administer oaths and affirmations, examine witnesses and receive evidence at any hearing by the Commission. Any willful false swearing or affirming before the Commission or any authorized employee of the Commission as to any material fact shall be deemed perjury under the laws of the United States.

(b) *Subpoenas.* Any commissioner, and counsel and hearing examiner authorized by the Commission, may issue subpoenas in the name of the Commission to compel witnesses to appear and testify and/or to produce books, records, papers, documents or other tangible forms of evidence, relating to any matter within the authority of the Commission.

In any proceeding before it the Commission may issue such subpoenas upon the timely request of any party; provided, however, that the party so requesting the subpoena shall pay all expenses of service together with all fees and travel expenses to which the witness may be entitled and, prior to issuance of the subpoena, shall deposit with the Commission an amount estimated by the Commission to be sufficient to cover such costs. Subpoenas may be served at any place within any signatory state by a United States marshal, by any officer of a signatory authorized to serve process of a court, or by any employee of the Commission designated for such purpose, and the person serving the subpoena shall make proof of service thereof promptly to the Commission, but failure to make proof of service does not affect the validity of the service. Each witness so subpoenaed shall be entitled to the same fees as are paid witnesses before a United States Court, but such fees need not be tendered in advance of his appearing and testifying and/or producing books, records, papers, documents or other tangible forms of evidence. If any witness shall neglect or refuse to obey such subpoena, or shall refuse to be sworn or to testify, the Commission may report that fact to the United States District Court for the district within which the witness was required to appear or to testify, and the court may order such person to comply with such subpoena or to testify and may enforce its orders in

any manner provided by law for the enforcement of subpoenas and orders of said court.

§ 15.11. Judicial Review of Commission Orders and Actions.—(a) Upon the petition of any person or governmental agency aggrieved, any final order, decision or action of the Commission made or taken after hearing, or with respect to which a hearing is required, any final decision of the Commission approving or refusing to approve a project pursuant to § 3.08, and any other order, decision or action which this compact provides shall be subject to judicial review, may be reviewed in any court of competent jurisdiction. The petition for review shall be filed in the court within the time limited by this compact or, if not so limited, by law of the signatory, or as may be fixed by rule of the court. Upon the filing of the petition the Clerk of Court or comparable official shall forthwith, by mail, serve a copy thereof upon the Commission which shall thereupon file in the court a certified list of the materials comprising the record of the proceedings and hold for the court all such materials and transmit the original or certified copies of the same or any part thereof to the court, when and as required by it, at any time prior to the final determination of the review.

(b) The filing of a petition for review shall not operate as a stay of the operation of such order or decision unless so ordered by the Commission or by the court for good cause shown. For good cause shown, and upon such conditions as may be required and to the extent necessary to prevent irreparable injury, the court may take appropriate and necessary action to preserve the status quo or rights of any of the parties, or others, pending conclusion of the review proceedings.

(c) The court shall hear and decide the review on the record of proceedings before the Commission, and may affirm the decision of the Commission or remand the case for further proceedings; or it may reverse or modify the decision if substantial rights of the petitioner have been prejudiced because the findings, conclusions or decisions, are (1) in violation of constitutional or statutory provisions, or (2) in excess of the authority of the Commission, or (3) made upon unlawful procedure, or (4) affected by other error of law, or (5) unsupported by substantial evidence on the record considered as a whole, or (6) arbitrary, capricious, or an abuse of discretion. The court may appoint a special master to take evidence and make recommendations to the court with respect to any question raised in a petition for review if the court is of the opinion that the question cannot be adequately determined from the record of the proceedings before the Commission and that the interest of justice so requires.

(d) Judicial review of any final action taken by any governmental agency in the exercise of powers, duties or authorities of the Commission under the provisions of § 12.03 shall be pursuant to the laws and procedures of such signatory relating to judicial review of the actions of such governmental agency. If no provision for judicial review exists within the signatory then recourse may be had in the United States District courts within the signatory involved, in accordance with subsections (a), (b) and (c) of this § 15.11.

§ 15.12. Enforcement by the Commission.—The Commission may enforce or require compliance with any provision of this compact, or any rule, regulation, decision or order of the Commission made pursuant thereto, or restrain any violation of any such provision, rule, regulation, decision or order, by injunction or any other appropriate action brought in the name of the Commission in a court of equity or of general jurisdiction, as the case may be, in any of the signatories, and jurisdiction thereof is hereby conferred.

§ 15.13. Penal Sanctions.—(a) Any person violating any provision of this compact or regulation of the Commission, other than one of a procedural nature or relating solely to the internal management of the Commission, shall be guilty of a petty offense and, upon conviction, shall be punished by a fine not exceeding five hundred dollars ($500.00) for each offense, unless a greater penalty is specifically provided elsewhere in this compact. Each day during which a violation occurs shall be deemed a separate and additional violation. Prosecutions for violations of any provision of this compact or of any regulation of the Commission shall be in any court having jurisdiction to try misdemeanor cases in the signatory state in which the violation is committed. Any violation of any provision of this compact or of any regulation of the Commission shall be deemed an offense against the signatory state in which the offense is committed. All law enforcement officers, and other persons possessing the power to arrest under the laws of a signatory, are authorized and directed to enforce the regulations of the Commission. Any fine imposed for violations shall be collected as fines are collected in the signatory state within which the offense was committed. Unless otherwise required by the law of the signatory, all fines collected shall be paid to the Commission by the officer whose duty it is to collect such fines.

(b) Notwithstanding any criminal liability, any person violating any provision of this compact or any regulation of the Commission, shall be civilly liable to the Commission for any actual damage sustained by the Commission by reason of such violation.

(c) The penal sanctions herein provided shall not be applicable to any failure or refusal to pay any charge or assessment imposed by the Commission.

§ 15.14. Tort Liability.—The Commission shall be liable for the negligence or warranty of its officers, agents, and employees only to the extent of the limits of the insurance coverage required by § 15.03, and to that extent the defense of governmental immunity shall not be a bar to action or recovery.

§ 15.15. Transfer of Employees and Property; Abolition of Interstate Commission on the Potomac River Basin; Repeal of Potomac River Sanitation Compact; and Payment of Certain Expenses.—(a) Effective upon the election of the first chairman of the Potomac River Commission created by Article 2 of this compact, all money, property and other assets of the Interstate Commission on the Potomac River Basin created by the Potomac River Sanitation Compact (approved by Congress, July 11, 1940) are hereby transferred to, and all of its liabilities are hereby imposed upon, the said Potomac River Basin Commission, and all

employees of said Interstate Commission are hereby transferred at their then current salaries to said Potomac River Basin Commission subject to the authority vested in it by said Article 2; and all programs and activities of said Interstate Commission then in effect shall thereupon be programs and activities of the Potomac River Basin Commission until changed or terminated by it. Effective six months after the election of the first chairman of the Potomac River Basin Commission, the Interstate Commission on the Potomac River Basin shall thereupon be abolished and the Potomac River Sanitation Compact repealed. During said six-month period the Interstate Commission shall have a final examination and audit made of its accounts and shall make a final report of its operations and transactions.

(b) From the money transferred by subsection (a) of this § 15.15 the Potomac River Basin Commission shall pay the expense of the audit and report required by subsection (a) and the actual expenses incurred by any commissioner or officer of the Interstate Commission incident to his performance of any function in connection with the transfer of assets, liabilities and personnel to the Potomac River Commission or the winding up of the affairs of said Interstate Commission, or which may be requested of him by said Potomac River Basin Commission.

(c) Except as provided in subsection (b) of this § 15.15, the money transferred by subsection (a) of this § 15.15 shall be used only for payment of the salaries and related expenses of employees transferred to, and for the discharge of liabilities imposed upon, the Commission by subsection (a) until other funds are available to the Commission for payment of salaries.

§ 15.16. Jurisdiction of Signatories Reserved.—Nothing in this compact shall be construed to restrict, relinquish or be in derogation of, any power or authority constitutionally possessed by any signatory within its jurisdiction, and every such power and authority shall continue to exist and be exercised except as specifically limited by this compact and except to the extent that the exercise of a power by a signatory conflicts with an exercise by the Commission of a power vested in it. Nothing contained in this compact, however, shall be construed as granting to the Commission the power to regulate the taking of fish and wildlife.

§ 15.17. Complementary Legislation by Signatories.—Each of the signatories agrees that it will enact such additional legislation as may be required to enable its officers and governmental agencies to accomplish effectively the purposes of this compact.

§ 15.18. Amendments and Supplements.—Amendments and supplements to this compact may be adopted by legislative action of any of the signatories concurred in by all of the others.

§ 15.19. Construction.—The enactment of this compact by the Congress of the United States shall not be construed as indicating an intent on the part of the Congress to occupy the field in which any part of this compact operates to the exclusion of individual state laws on the same subject matter. It is the intent of the Congress and of the legislatures of the other signatories that no provision of this compact shall be construed as invalidating any provision of law of any signatory unless such pro-

vision is inconsistent with any of the purposes of this compact or of any provision thereof; and that nothing in this compact shall be construed to modify or qualify the authority of any signatory to enact or enforce legislation or regulations relating to any subject matter of this compact which are within its jurisdiction and not inconsistent with any purpose or provision of this compact.

§ 15.20. Severability.—If any word, phrase, clause, sentence or provision of this compact or the application thereof to any person or circumstance is held invalid, the remainder of the compact and the application of the word, phrase, clause, sentence or provision to other persons not similarly situated or to other circumstances shall not be affected thereby.

§ 15.21. Effective Date; Execution.—This compact shall become binding and effective thirty (30) days after its enactment by the legislatures of Maryland, Pennsylvania, Virginia and West Virginia, and by the Congress on behalf of the United States and the District of Columbia. The compact shall be signed and sealed in seven (7) identical original copies by the respective chief executives of the signatories. One such copy shall be filed with the Secretary of State of the signatories or in accordance with the laws of the signatory in which the filing is made, and one copy shall be filed and retained in the archives of the Commission upon its organization.

CHAPTER 493

(Senate Bill 22)

~~AN ACT to repeal and re-enact, with amendments, Section 24(b) of Article 78 of the Annotated Code of Maryland (1965 Replacement Volume), title "Public Service Commission Law," subtitle "Public Service Companies," subheading "Prohibitions," providing that a public service company without the prior authorization of the Public Service Commission shall not acquire any property or any property interest by means of condemnation or eminent domain proceedings.~~

AN ACT TO ADD NEW SECTION 54A TO ARTICLE 78 OF THE ANNOTATED CODE OF MARYLAND (1965 REPLACEMENT VOLUME), TITLE "PUBLIC SERVICE COMMISSION," SUBTITLE "GAS AND ELECTRIC COMPANIES," TO FOLLOW IMMEDIATELY AFTER SECTION 54 THEREOF, TO PROVIDE THAT ELECTRIC COMPANIES MUST MAKE APPLICATION TO THE COMMISSION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY BEFORE EXERCISING THE RIGHT OF EMINENT DOMAIN OR COMMENCING CONSTRUCTION OF AN ELECTRIC TRANSMISSION LINE AND PROVIDING FOR THE STANDARDS TO BE CONSIDERED BY THE COMMISSION BEFORE ISSUING THE CERTIFICATE AND TO MAKE APPLICATION TO THE COMMISSION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY BEFORE BEGINNING THE CONSTRUCTION OF A GENERATING FACILITY.

~~Section 1. *Be it enacted by the General Assembly of Maryland,* That Section 24(b) of Article 78 of the Annotated Code of Maryland~~

~~(1965 Replacement Volume), title "Public Service Commission Law," subtitle "Public Service Companies," subheading "Prohibitions," be and it is hereby repealed and re-enacted, with amendments, to read as follows:~~

SECTION 1. BE IT ENACTED BY THE GENERAL ASSEMBLY OF MARYLAND, THAT NEW SECTION 54A BE AND IT IS HEREBY ADDED TO ARTICLE 78 OF THE ANNOTATED CODE OF MARYLAND (1965 REPLACEMENT VOLUME), TITLE "PUBLIC SERVICE COMMISSION," SUBTITLE "GAS AND ELECTRIC COMPANIES," TO FOLLOW IMMEDIATELY AFTER SECTION 54 THEREOF, AND TO READ AS FOLLOWS:

~~24.~~

~~(b) Hereafter, no public service company shall, without the prior authorization of the Commission:~~

~~(1) Assign, lease or transfer any franchise or right thereunder or enter into any agreement or contract materially affecting such franchise or right;~~

~~(2) Purchase, acquire, take or hold any part of the capital stock of any other public service company organized or existing under or by virtue of the laws of this State;~~

~~(3) Abandon or discontinue in whole or in part the exercise of any franchise or right;~~

~~(4) Assume or guarantee any obligation or liability in any capacity or by any means in respect of stocks, bonds, securities, notes or other evidence of indebtedness of any person, payable in whole or in part more than twelve months after the date thereof. This subparagraph shall apply only to corporations organized or existing or hereafter incorporated under or by virtue of the laws of this State.~~

~~(5) Issue stocks, bonds, securities, notes, or any other evidence of indebtedness payable in whole or in part more than twelve months after date of issuance. Such stocks, etc., shall be issued in accordance with Sections 65 and 66 of this article. This subparagraph shall apply only to corporations organized or existing or hereafter incorporated under or by virtue of the laws of this State.~~

~~*(6) Acquire any property or any property interest by means of condemnation or eminent domain proceedings.*~~

54A.

NO ELECTRIC COMPANY MAY ~~EXERCISE THE RIGHT OF EMINENT DOMAIN FOR THE PURPOSE OF CONSTRUCTING~~ BEGIN THE CONSTRUCTION IN MARYLAND OF A GENERATING STATION OR ANY OVERHEAD TRANSMISSION LINE ~~CARRYING A VOLTAGE IN EXCESS OF 65,000 VOLTS, OR BEGIN ANY CONSTRUCTION THEREOF,~~ DESIGNED TO CARRY A VOLTAGE IN EXCESS OF 69,000 VOLTS, OR EXERCISE THE RIGHT OF EMINENT DOMAIN IN CONNECTION THEREWITH, WITHOUT HAVING FIRST OBTAINED FROM THE COMMISSION A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CON-

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~~STRUCTION OF THE STATION OR LINE. THE COMMISSION SHALL TAKE FINAL ACTION ON EACH APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY BY ORDER AFTER CONSULTATION WITH THE LOCAL GOVERNING BODIES OF THE AREAS AFFECTED AND GIVING FULL WEIGHT TO THE RECOMMENDATIONS OF SUCH BODIES FOLLOWING A JOINT PUBLIC HEARING OF THE GOVERNING BODY AND THE PUBLIC SERVICE COMMISSION IN THE LOCALITY AFFECTED, AND IT SHALL ALSO GIVE DUE CONSIDERATION, AMONG OTHER FACTORS, TO THE NEED TO MEET PRESENT AND FUTURE DEMANDS FOR SERVICE, EFFECT ON SYSTEM STABILITY, ECONOMICS, ESTHETICS AND, WHEN APPLICABLE, THE EFFECT ON AIR AND WATER POLLUTION.~~ THE COMMISSION SHALL HOLD A PUBLIC HEARING ON EACH APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY IN ~~EACH AREA AFFECTED, TOGETHER WITH THE LOCAL GOVERNING BODY OF EACH AREA AFFECTED, UNLESS~~ THE AREA IN WHICH ANY PORTION OF THE CONSTRUCTION OF A GENERATING STATION OR AN OVERHEAD TRANSMISSION LINE DESIGNED TO CARRY A VOLTAGE IN EXCESS OF 69,000 VOLTS IS PROPOSED TO BE LOCATED, TOGETHER WITH THE LOCAL GOVERNING BODIES OF EACH SUCH AREA, UNLESS ANY SUCH GOVERNING BODY WISHES NOT TO PARTICIPATE IN THE HEARING. THE COMMISSION SHALL TAKE FINAL ACTION ONLY AFTER DUE CONSIDERATION OF THE RECOMMENDATIONS OF SUCH GOVERNING BODIES, THE NEED TO MEET PRESENT AND FUTURE DEMANDS FOR SERVICE, EFFECT ON SYSTEM STABILITY AND RELIABILITY, ECONOMICS, ESTHETICS, HISTORIC SITES, AND, WHEN APPLICABLE, THE EFFECT ON AIR AND WATER POLLUTION. THE SAID PUBLIC HEARING SHALL BE ADVERTISED IN A NEWSPAPER OF GENERAL CIRCULATION IN THE AREA AFFECTED ONCE IN EACH OF THE TWO SUCCESSIVE WEEKS IMMEDIATELY PRIOR TO THE HEARING.

SEC. 2. *And be it further enacted,* That this Act shall take effect July 1, 1968.

Approved May 7, 1968.

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Regular Session

Chapter 243, Laws 1970

House Bill No. 882

AN ACT to repeal Sections 23 through 29, inclusive, of Article 96A of the Annotated Code of Maryland (1964 Replacement Volume and 1969 Cumulative Supplement), title "Water Resources," subtitle "Pollution Abatement" and to enact new Sections 23, 24, 25, 26, 27, 28, 28A, 28B, 29, 29A, 29B, 29C and 29D to stand in the place of the sections repealed, generally revising the Pollution Abatement Subtitle of the Water Resources Law of this State and relating generally to the powers, duties, functions and procedures of the Department of Water Resources and the Department of Natural Resources regarding water quality, the control, prevention and abatement of water pollution, the preservation and protection of natural resources and the enforcement of water quality and pollution abatement laws.

SECTION 1. *Be it enacted by the General Assembly of Maryland*, That Sections 23 through 29, inclusive, of Article 96A of the Annotated Code of Maryland (1964 Replacement Volume and 1969 Cumulative Supplement), title "Water Resources," subtitle "Pollution Abatement," be and they are hereby replaced and that new Sections 23, 24, 25, 26, 27, 28, 28A, 28B, 29, 29A, 29B, 29C and 29D be and they are hereby enacted in lieu thereof to stand in the place of the Sections so repealed and to read as follows:

EXPLANATION: *Italics indicate new matter added to existing law.*
[Brackets] indicate matter stricken from existing law.
CAPITALS indicate amendments to bill.
~~Strike out~~ indicates matter stricken out of bill.

28.

Whereas the quality of the waters of this State is vital to the public and private interests of its citizens; and

Whereas pollution constitutes a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish and aquatic life, and impairs domestic, agricultural, industrial, recreational and other legitimate beneficial uses of water; and

Whereas the problem of water pollution in this State is closely related to the problem of water pollution in adjoining States; and

Whereas it is hereby declared to be the public policy of this State to improve, conserve and manage the quality of the waters of the State and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; to provide that no waste be discharged into any waters of the State without first receiving the necessary treatment or other corrective action to protect the legitimate beneficial uses of such waters; to provide for the prevention, abatement and control of new or existing water pollution; and to co-operate with the agencies of other States and the Federal Government in carrying out these objectives; now, therefore

It is the intention of the General Assembly in the enactment of this subtitle to ~~insure that discharges of potentially harmful substances to the waters of the State never exceed the limits imposed by a real determination of necessity~~ IMPROVE, CONSERVE AND MANAGE THE QUALITY OF THE WATERS OF THE STATE.

24.

For the purposes of this Subtitle, the following words and phrases shall have the following meanings:

(a) "Pollution" means such contamination or other alteration of the physical, chemical or biological properties, of any waters of the State, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge or deposit of any organic matter, harmful organisms; liquid, gaseous, solid, radioactive, or other substance into any waters of the State as will ~~or is likely to create a nuisance or~~ render such waters harmful detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

(b) "Wastes" means industrial wastes and all other liquid, gaseous, solid or other substances which ~~may~~ WILL *pollute ~~or tend to pollute~~ any waters of this State.*

(c) "Treatment works" means any plant or other works, used for the purpose of treating, stabilizing or holding wastes.

(d) "Disposal system" means a system for disposing of wastes, either by surface or underground methods, and includes treatment works, disposal wells and other systems.

(e) "Waters of the State" means both surface and underground waters within the boundaries of the State or subject to its jurisdic-

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tion, including that portion of the Atlantic Ocean within the boundaries of the State, the Chesapeake Bay and its tributaries, the flood plain of free-flowing waters on the basis of a fifty (50) year flood frequency, and all ponds, lakes, rivers, streams, public ditches, tax ditches, and public drainage systems within the State, other than those designed and used for the purpose of collection, conveyance, or disposal of sanitary sewage.

(l) "Person" means the State or any agency or institution thereof, any municipality, political subdivision, public or private corporation, individual, partnership, association, or other entity, and includes any officer or governing or managing body of any municipality, political subdivision, or public or private corporation.

25.

The Department shall have and may exercise the following powers and duties:

(a) To exercise general supervision over the administration and enforcement of this Subtitle and all rules, regulations and orders promulgated pursuant thereto;

(b) To develop comprehensive programs for the prevention, control and abatement of pollution of the waters of the State;

(c) To advise, consult, and co-operate with other agencies of the State, the Federal Government, other States and interstate agencies, and with affected groups, political subdivisions, and industries in furtherance of the purposes of this Subtitle;

(d) To accept and administer loans and grants from the Federal Government and from other sources, public or private, for carrying out any of its functions;

(e) To encourage, participate in, finance, or conduct studies, investigations, research and demonstrations relating to water pollution and the causes, prevention, control, and abatement thereof;

(f) To collect and disseminate information relating to water pollution and the prevention, control, and abatement thereof;

(g) To adopt, modify, repeal and promulgate water quality standards for the waters of the State, and effluent standards for waters discharged into the waters of the State;

(h) To adopt, modify, repeal, and promulgate, after due notice and hearing, and to enforce rules and regulations implementing or effectuating its powers and duties;

(i) To issue, modify, or revoke orders (1) prohibiting discharges of wastes into the waters of the State; (2) requiring the construction, modification, extension or alteration of new or existing disposal systems or treatment works or parts thereof or the adoption of other reasonable remedial measures to prevent, control or abate pollution or undesirable changes in the quality of the waters of the State;

(j) To hold hearings, to issue notices of hearing and subpoenas requiring the attendance of witnesses and the production of evidence, to administer oaths, and to take such testimony as it deems neces-

sary, and any of these powers may be exercised by the Director or by a hearing officer designated in writing by the Director;

(k) To require the prior submission of plans, specifications, and other data relative to, and to inspect the construction of, disposal systems or treatment works or any part thereof in connection with the issuance of permits or approvals as are required by this Subtitle;

~~(l)~~ *(l) To issue, continue in effect, revoke, modify, or deny, under such conditions as it may prescribe, permits for the discharge of waters or wastewaters into the waters of the State, and for the installation, modification, or operation of disposal systems or any parts thereof;*

(m) To require proper maintenance and operation of disposal systems;

(n) To exercise all incidental powers necessary to carry out the purposes of this Subtitle.

26.

(a) It shall be unlawful for any person: (1) to cause pollution of any waters of the State or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any waters of the State; or (2) to discharge any wastes into any waters of the State which would violate effluent standards or reduce the quality of such waters below the water quality standards established therefor by the Department. Any such action is hereby declared to be a public nuisance.

(b) Subject to the provisions of Section 29(c) of this Subtitle, it shall be unlawful for any person to carry on any of the following activities unless he holds a current permit therefor from the the Department for the disposal of all wastes or waters which are or may be discharged thereby into the waters of the State: (1) the discharge of any waters or wastewaters into the waters of the State in violation of regulations promulgated by the Department; (2) the construction, installation, modification, extension, alteration or operation of any disposal system or part thereof; (3) the increase in volume, TEMPERATURE *or strength of any wastes in excess of the permissive discharges specified under any existing permit; (4) the construction, installation, or operation of any industrial, commercial, or other establishment or any extension or modification thereof or addition thereto, the operation of which would cause an increase in the discharge of wastes into the waters of the State or otherwise alter the physical, chemical, or biological properties of any waters of the State in any manner not already lawfully authorized; (5) the construction or use of any new outlet for the discharge of any wastes into the waters of the State.*

The Department may require the submission of such plans, specifications, and other information as it deems necessary to carry out the provisions of this Subtitle or to carry out the rules and regulations adopted pursuant to the provisions of this Subtitle.

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27.

(a) The Department may set water quality and effluent standards to be applicable to the waters of this State or portions thereof. The standards shall be such as to protect the public health, safety and welfare and the present and future use of such waters for public water supply, the propagation of fish and other aquatic life and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses. Such standards may be amended from time to time by the Department.

(b) Prior to establishing, amending, or repealing water quality or effluent standards the Department shall, after due notice, conduct public hearings thereon. Notice of public hearings shall specify the waters for which standards are sought to be adopted, amended, or repealed and the time, date, and place of the hearing.

28.

~~(a) Whenever the Department has reason to believe that a violation of any provision of this Subtitle or of any regulation or order of the Department has occurred, it shall cause a written complaint to be served upon the alleged violator or violators. The complaint shall specify the provision of law, regulation or order alleged to be violated, the facts alleged to constitute a violation thereof, and may order that necessary corrective action be taken within the time prescribed in such order. Said order contained in the complaint shall become final on the date specified therein unless the person or persons named therein request in writing a hearing before the Department no later than ten (10) days after the date such order is served. If a hearing before the Department is requested as hereinbefore specified, the Department shall hold said hearing no later than thirty (30) days from the date it receives said request. The Department shall render its decision accompanied by an appropriate order within ten (10) days from the date of the hearing. Said decision and order shall be final and must be complied with in accordance with the time as specified therein. Any person aggrieved by the aforementioned decision or order shall not have the right to appeal said decision to the board of review of the Department of Natural Resources as provided in Article 41, Section 237 of this code. However, any person aggrieved by a decision of the Department shall have the right to have said decision reviewed in accordance with the provisions of the Administrative Procedures Act and the Maryland Rules of Procedure.~~

~~An appeal under the provisions of the Maryland Administrative Procedures Act shall not operate as a stay of the order issued by the Department. Any request to a court for a stay of the Department's order pending judicial review shall be applied for and acted upon as prescribed in the Maryland Rules of Procedure. However, no court shall issue such a stay unless the court shall find both that the person appealing said order is likely to prevail in such appeal and upon as prescribed in the Maryland Rules of Procedure. However, damage to the person appealing said order.~~

~~(b) The Department, prior to the aforementioned hearing, may require that the alleged violator file a written report regarding the alleged violation.~~

(A) WHENEVER THE DEPARTMENT HAS REASON TO BELIEVE THAT A VIOLATION OF ANY PROVISION OF THIS SUBTITLE OR OF ANY REGULATION OF THE DEPARTMENT HAS OCCURRED, IT SHALL CAUSE A WRITTEN COMPLAINT TO BE SERVED UPON THE ALLEGED VIOLATOR OR VIOLATORS. THE COMPLAINT SHALL SPECIFY THE PROVISION OF LAW OR REGULATION ALLEGED TO BE VIOLATED, AND THE FACTS ALLEGED TO CONSTITUTE A VIOLATION THEREOF.

SUBSEQUENT TO OR CONCURRENT WITH SERVICE OF THE COMPLAINT AS PROVIDED IN SUBSECTION (C) OF THIS SECTION, THE DEPARTMENT MAY EXERCISE ONE OF THE FOLLOWING OPTIONS:

(1) THE DEPARTMENT MAY ISSUE AN ORDER REQUIRING THAT NECESSARY CORRECTIVE ACTION BE TAKEN WITHIN THE TIME PRESCRIBED IN SUCH ORDER. ANY PERSON OR PERSONS NAMED IN THE ORDER MAY REQUEST IN WRITING A HEARING BEFORE THE DEPARTMENT NO LATER THAN TEN (10) DAYS AFTER THE DATE SUCH ORDER IS SERVED, IN WHICH CASE A HEARING SHALL BE SCHEDULED WITHIN TEN (10) DAYS FROM RECEIPT OF SUCH REQUEST AND A DECISION SHALL BE RENDERED WITHIN TEN (10) DAYS FROM THE DATE OF THE HEARING.

(2) THE DEPARTMENT MAY REQUIRE THAT THE ALLEGED VIOLATOR FILE A WRITTEN REPORT REGARDING THE ALLEGED VIOLATION.

(3) THE DEPARTMENT MAY REQUIRE THAT THE ALLEGED VIOLATOR APPEAR BEFORE THE DEPARTMENT AT A TIME AND PLACE SPECIFIED BY THE DEPARTMENT AND ANSWER THE CHARGES OUTLINED IN THE COMPLAINT.

(4) THE DEPARTMENT MAY REQUIRE THAT THE ALLEGED VIOLATOR FILE A WRITTEN REPORT REGARDING THE ALLEGED VIOLATION AND APPEAR BEFORE THE DEPARTMENT AT A TIME AND PLACE SPECIFIED BY THE DEPARTMENT AND ANSWER THE CHARGES OUTLINED IN THE COMPLAINT.

IF THE DEPARTMENT EXERCISES THE OPTION PROVIDED BY PARAGRAPH (2) OF THIS SUBSECTION, THE
41a ALLEGED VIOLATOR OR VIOLATORS MAY REQUEST IN WRITING A HEARING BEFORE THE DEPARTMENT NO LATER THAN TEN (10) DAYS AFTER THE DATE THAT NOTICE OF THE REQUIREMENT OF THE WRITTEN REPORT IS SERVED. THE APPEARANCE OF THE ALLEGED VIOLATOR OR VIOLATORS BEFORE THE DEPARTMENT UNDER THE OPTIONS PROVIDED BY PARAGRAPH (3) OR (4) OF THIS SUBSECTION SHALL BE AN ADMINISTRATIVE HEARING, AND THE PARTIES IN ALL HEARINGS CONDUCTED UNDER THIS SUBSECTION SHALL HAVE THE RIGHTS OF PARTIES IN CONTESTED CASES PROVIDED IN SECTIONS 251 AND 252 OF ARTICLE 41 OF THIS CODE.

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IF THE DEPARTMENT EXERCISES THE OPTION PROVIDED BY PARAGRAPHS (2), (3), OR (4) OF THIS SUBSECTION, THE DEPARTMENT SHALL NOT ISSUE AN ORDER REQUIRING CORRECTIVE ACTION TO BE TAKEN AS A RESULT OF THE ALLEGED VIOLATION BEFORE THE EXPIRATION OF THE TIME SET FOR THE FILING OF ANY REPORT AND THE HOLDING OF ANY HEARING REQUIRED PURSUANT TO THIS SUBSECTION. THEREAFTER, THE DEPARTMENT MAY ISSUE AN ORDER REQUIRING THAT NECESSARY CORRECTIVE ACTION BE TAKEN WITHIN SUCH TIME AS PRESCRIBED IN SUCH ORDER, AND NO PERSON SHALL BE ENTITLED TO A HEARING BEFORE THE DEPARTMENT AS A RESULT OF SUCH ORDER.

NOTICE OF A HEARING OR OF A REQUIREMENT THAT A WRITTEN REPORT BE FILED SHALL BE SERVED ON THE ALLEGED VIOLATOR IN ACCORDANCE WITH THE PROVISIONS OF SUBSECTION (C) OF THIS SECTION NOT LESS THAN TEN (10) DAYS BEFORE THE TIME SET FOR THE HEARING OR FOR THE FILING OF A REPORT.

ALL ORDERS ISSUED BY THE DEPARTMENT PURSUANT TO THE PROVISIONS OF THIS SECTION SHALL BE SERVED ON THE PERSON OR PERSONS AFFECTED THEREBY IN ACCORDANCE WITH THE PROVISIONS OF SUBSECTION (C) OF THIS SECTION, AND UPON SERVICE SHALL BECOME IMMEDIATELY EFFECTIVE ACCORDING TO THEIR TERMS.

(B) PERSONS AGGRIEVED BY AN ORDER ISSUED HEREUNDER SHALL NOT HAVE THE RIGHT TO APPEAL TO THE BOARD OF REVIEW OF THE DEPARTMENT OF NATURAL RESOURCES AS PROVIDED IN SECTION 237 OF ARTICLE 41 OF THIS CODE, BUT MAY OBTAIN IMMEDIATE JUDICIAL REVIEW PURSUANT TO THE PROVISIONS OF SECTIONS 255 AND 256 OF ARTICLE 41 OF THIS CODE AND THE MARYLAND RULES OF PROCEDURE.

(c) Except as otherwise expressly provided, any notice, order, or other instrument issued by or under authority of the Department may be served on any person affected thereby personally or by publication, and proof of such service may be made in like manner as in case of service of process in a civil action, such proof to be filed in the office of the Department; or such service may be made by mailing a copy of the notice, order, or other instrument by Certified or Registered mail, directed to the person affected at his last known post-office address as shown by the files or records of the Department, and proof thereof may be made by the sworn statement or affidavit of the person who did the mailing, filed in the office of the Department.

(d) A verbatim record of the proceedings of hearings may be taken when deemed necessary or advisable by the Department. Witnesses who are ~~subpoened~~ SUBPOENAED *shall receive the same fees and mileage as in civil actions. In case of refusal to obey a notice of hearing or subpoena issued under this section, any Circuit Court shall have jurisdiction upon application of the Department, to issue an or-*

der requiring such person to appear and testify or produce evidence as the case may require and any failure to obey such order of the court may be punished by such court as contempt.

28A.

(a) Any person who shall violate any of the provisions of, or who fails to perform any duty imposed by, this Subtitle or regulation issued hereunder or who violates any order of the Department made pursuant to this Subtitle shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished by fine of not more than ten thousand dollars ($10,000.00) or by imprisonment not to exceed one (1) year, or both, and in addition thereto may be enjoined from continuing such violation. Each day upon which such violation occurs shall constitute a separate offense.

(b) It shall be the duty of the Attorney General on the request of the Department to prosecute such criminal cases or to bring an action for an injunction against any person violating the provisions of this Subtitle, or violating any valid order of the Department. In any action for an injunction brought pursuant to this section, any finding of the Department after hearing shall be prima facie evidence of the fact or facts found therein.

(c) Upon a showing by the Attorney General in behalf of the Department that any person is violating or is about to violate the provisions of this Subtitle or is violating or is about to violate any valid order of the Department, an injunction shall be granted without the necessity of showing a lack of adequate remedy at law.

(D) IN ANY CASE WHERE A VIOLATION OF ANY PROVISION OF THIS SUBTITLE HAS OCCURRED AND THE EXISTENCE OF SUCH VIOLATION HAS BEEN FINALLY DETERMINED, THE DEPARTMENT SHALL PROMPTLY ISSUE AN ORDER REQUIRING THE CORRECTION OF EACH VIOLATION FOUND TO HAVE OCCURRED, AND THE DEPARTMENT SHALL SECURE COMPLIANCE WITH THE PROVISIONS OF SUCH ORDER WITHIN ONE (1) YEAR FROM THE DATE OF SERVICE THEREOF ON THE VIOLATOR. IF THE VIOLATION HAS NOT BEEN CORRECTED AND A PLAN FOR COMPLIANCE SUBMITTED BY THE VIOLATOR HAS NOT BEEN APPROVED BY THE DEPARTMENT WITHIN THE AFOREMENTIONED ONE-YEAR PERIOD, THE VIOLATION SHALL BE REFERRED TO THE ATTORNEY GENERAL IMMEDIATELY AFTER THE EXPIRATION OF THE ONE-YEAR PERIOD, WHO SHALL THEREUPON, AND IN ADDITION TO ANY OTHER ACTIONS WHICH HE MAY HAVE TAKEN OR WHICH HE MAY ELECT TO TAKE AGAINST THE VIOLATOR, TAKE APPROPRIATE LEGAL ACTION TO REQUIRE CORRECTION OF THE VIOLATION. NOTHING IN THIS SUBSECTION SHALL BE CONSTRUED TO PREVENT THE ATTORNEY GENERAL OR THE DEPARTMENT FROM TAKING ACTION AGAINST THE VIOLATOR BEFORE THE EXPIRATION OF THE AFOREMENTIONED ONE-YEAR PERIOD. ANY COURT HAVING JURISDICTION OF AN ACTION FOR AN INJUNCTION BROUGHT UNDER THE PROVISIONS OF THIS SUBTITLE SHALL HAVE THE DISCRETION, BASED UPON THE PARTICULAR FACTS OF EACH CASE, TO EXTEND THE TIME PERIOD AL-

LOWED FOR THE CORRECTION OF A VIOLATION FOR ONE OR MORE ADDITIONAL ONE-YEAR PERIODS.

28R.

This Subtitle shall not be construed as repealing any law of the State relating to the pollution of waters thereof or any conservation laws, but shall be held and construed as auxiliary and supplementary thereto, except to the extent that the same are in direct conflict herewith. It is the purpose of this Act to provide additional and cumulative remedies to prevent, abate, and control the pollution of the waters of the State. Nothing herein contained shall be construed to abridge or alter rights of action or remedies in equity or under existing common law or statutory law, criminal or civil, nor shall any provision of this Subtitle, or any act done by virtue thereof, be construed as estopping the State, or any person, as riparian owners or otherwise in the exercise of their rights in equity or under the common law or statutory law to suppress nuisances or to abate pollution.

29.

(a) Except in case of emergency imperiling life or property, or unavoidable accident, collision, or stranding, it shall be unlawful for any person to discharge or permit the discharge of oil in any manner into or upon the waters within the jurisdiction of the State of Maryland from any vessel, ship or ~~coat~~ BOAT of any kind.

The term "oil" shall mean any of a large class of unctuous substances of vegetable, animal or mineral origin, which are liquid or at least easily liquefiable on warming and soluble in ether but not in water.

(b) Any person who violates subsection (a) of this section is guilty of a misdemeanor, and upon conviction shall be punished by a fine or by imprisonment or by both fine and imprisonment, for each offense as provided in Section 28A of this Article. And any vessel from which oil is discharged in violation of subsection (a), shall be liable for the pecuniary penalty as specified in this section, and clearance of such vessel from a port of the State may be withheld until the peralty is paid, and said penalty shall constitute a lien on such vessel.

(c) In the administration of this section the Department may make use of the organization, equipment, and agencies, including engineering, clerical, and other personnel, employed in the improvement and preservation of waters and natural resources of the State of Maryland in the enforcement of laws for the preservation and protection of the waters and natural resources of the State of Maryland. And for the better enforcement of the provisions of this section, all persons authorized by law of this State to make arrests shall have the power and it shall be their duty to swear out process and to arrest and take into custody, with or without process, any person who may violate any of said provisions; provided, that no person shall be arrested without process for a violation not committed in the presence of some one of the aforesaid officials; and provided further, that whenever any arrest is made under the provisions of the said section the person so arrested shall be brought forthwith before a magistrate, judge, or court of the State for ex-

amination of the offenses alleged against him; and such magistrate, judge, or court shall proceed in respect thereto as authorized by law in cases of crimes against the State of Maryland.

(d) Whenever any person, or ship is accused of violating the provisions of this section, it shall be the duty of the arresting officer to notify the Department forthwith in writing, for the purpose of permitting it to take any steps in the proceeding that it may deem advisable. The provisions of this subsection are intended to be directory only.

(e) This section shall be in addition to the laws existing prior to June 1, 1949, for the preservation and protection of waters of the Chesapeake Bay and its tributaries and shall not be construed as repealing, modifying, or in any manner affecting the provisions of those laws.

29A.

The responsibility of developing a program, including training, which would enable the State to respond to an emergency oil spillage in Maryland waters is that of the Maryland Port Authority in the Baltimore Harbor area and of the Department of Natural Resources in other waters of the State. These agencies shall coordinate the efforts of the various State and local agencies aiding in the operation and request the aid of the appropriate Federal agencies if necessary.

29B.

The Maryland Port Authority and the Department of Natural Resources shall charge and collect a compensatory fee from the person responsible for the oil spillage. This fee shall cover the cost of labor, equipment operation, and materials necessary to eliminate the residue of oil spillage and shall be retained by the agency charging the fee.

29C.

Nothing in this subtitle shall be construed to alter, change, modify or restrict the jurisdiction of the State Department of Health and Mental Hygiene as set forth in this Code.

29D.

(a) Whenever there occurs in the waters of the State any condition indicative of damage to aquatic resources, including, but not limited to, mortality of fish and other aquatic life, it shall be the duty of the Department of Natural Resources to investigate the occurrence, to determine the nature and extent of the occurrence, and to endeavor to establish the cause and source of the occurrence. The Department of Natural Resources shall act on these findings, as hereinafter provided, to require the repair of any damage done and the restoration of water resources to a degree necessary to protect the best interests of the people of the State.

(b) The Department of Natural Resources, if it believes the institution of suit to be advisable, shall turn over to the Attorney

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General all pertinent information and data. The Attorney General thereupon shall file suit against the person or persons causing the condition complained of, who shall be jointly and severally liable for the reasonable cost of rehabilitation and restoration of the resources damaged and the cost of eliminating the condition causing the damage.

SEC. 2. *And be it further enacted,* That if any provision of this Act or the application thereof to any person or circumstance is held invalid for any reason, the invalidity shall not affect the other provisions or any other application of this Act which can be given effect without the invalid provisions or application, and to this end all the provisions of this Act are declared to be severable.

SEC. 3. *And be it further enacted,* That this Act shall take effect July 1, 1970.

Approved, April 22, 1970