

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Legal Compilation

Statutes and Legislative History

Executive Orders

Regulations

Guidelines and Reports



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JANUARY 1973

WILLIAM D. RUCKELSHAUS
Administrator

FOREWORD

It has been said that America is like a gigantic boiler in that once the fire is lighted, there are no limits to the power it can generate. Environmentally, the fire has been lit.

With a mandate from the President and an aroused public concerning the environment, we are experiencing a new American Revolution, a revolution in our way of life. The era which began with the industrial revolution is over and things will never be quite the same again. We are moving slowly, perhaps even grudgingly at times, but inexorably into an age when social, spiritual and aesthetic values will be prized more than production and consumption. We have reached a point where we must balance civilization and nature through our technology.

The U.S. Environmental Protection Agency, formed by Reorganization Plan No. 3 of 1970, was a major commitment to this new ethic. It exists and acts in the public's name to ensure that due regard is given to the environmental consequences of actions by public and private institutions.

In a large measure, this is a regulatory role, one that encompasses basic, applied, and effects research; setting and enforcing standards; monitoring; and making delicate risks—benefit decisions aimed at creating the kind of world the public desires.

The Agency was not created to harass industry or to act as a shield behind which man could wreak havoc on nature. The greatest disservice the Environmental Protection Agency could do to American industry is to be a poor regulator. The environment would suffer, public trust would diminish and instead of free enterprise, environmental anarchy would result.

It was once sufficient that the regulatory process produce wise and well-founded courses of action. The public, largely indifferent to regulatory activities, accepted agency actions as being for the "public convenience and necessity." Credibility gaps and cynicism make it essential not only that today's decisions be wise and well-founded but that the public know this to be true. Certitude, not faith, is *de rigueur*.

In order to participate intelligently in regulatory proceedings, the citizen should have access to the information available to the agency. EPA's policy is to make the fullest possible disclosure of information,

without unjustifiable expense or delay, to any interested party. With this in mind, the EPA Compilation of Legal Authority was produced not only for internal operations of EPA, but as a service to the public, as we strive together to lead the way, through the law, to preserving the earth as a place both habitable by and hospitable to man.

WILLIAM D. RUCKELSHAUS,
Administrator
U.S. Environmental Protection Agency

PREFACE

Reorganization Plan No. 3 of 1970 transferred 15 governmental units with their functions and legal authority to create the U.S. Environmental Protection Agency. Since only the major laws were cited in the Plan, the Administrator, William D. Ruckelshaus, requested that a compilation of EPA legal authority be researched and published.

The publication has the primary function of providing a working document for the Agency itself. Secondly, it will serve as a research tool for the public.

A permanent office in the Office of Legislation has been established to keep the publication updated by supplements.

It is the hope of EPA that this set will assist in the awesome task of developing a better environment.

LANE WARD, J.D.,
Assistant Director for Field Operations
Office of Legislation
U.S. Environmental Protection Agency.

ACKNOWLEDGMENT

The idea of producing a compilation of the legal authority of EPA was conceived and commissioned by William D. Ruckelshaus, Administrator of EPA. The production of this compilation involved the cooperation and effort of numerous sources, both within and outside the Agency. The departmental libraries at Justice and Interior were used extensively; therefore we express our appreciation to Marvin P. Hogan, Librarian, Department of Justice; Arley E. Long, Land & Natural Resources Division Librarian, Department of Justice; Frederick E. Murray, Assistant Director, Library Services, Department of the Interior.

For exceptional assistance and cooperation, my gratitude to: Gary Baise, formerly Assistant to the Administrator, currently, Director, Office of Legislation, who first began with me on this project; A. James Barnes, Assistant to the Administrator; K. Kirke Harper, Jr., Special Assistant for Executive Communications; John Dezzutti, Administrative Assistant, Office of Executive Communications; Roland O. Sorensen, Chief, Printing Management Branch, and Jacqueline Gouge and Thomas Green, Printing Management Staff; Ruth Simpkins, Janis Collier, Wm. Lee Rawls, James G. Chandler, Jeffrey D. Light, Randy Mott, Thomas H. Rawls, and John D. Whittaker, Peter J. McKenna, Linda L. Payne, John M. Himmelberg, and Dana W. Smith, a beautiful staff who gave unlimited effort; and to many others, behind the scenes who rendered varied assistance.

LANE WARD, J.D.,
Assistant Director for Field Operations
Office of Legislation
U.S. Environmental Protection Agency.

INSTRUCTIONS

The goal of this text is to create a useful compilation of the legal authority under which the U.S. Environmental Protection Agency operates. These documents are for the general use of personnel of the EPA in assisting them in attaining the purposes set out by the President in creating the Agency. This work is not intended and should not be used for legal citations or any use other than as reference of a general nature. The author disclaims all responsibility for liabilities growing out of the use of these materials contrary to their intended purpose. Moreover, it should be noted that portions of the Congressional Record from the 92nd Congress were extracted from the "unofficial" daily version and are subject to subsequent modification.

EPA Legal Compilation consists of the Statutes with their legislative history, Executive Orders, Regulations, Guidelines and Reports. To facilitate the usefulness of this composite, the Legal Compilation is divided into the eight following chapters:

- | | |
|----------------|------------------|
| A. General | E. Pesticides |
| B. Air | F. Radiation |
| C. Water | G. Noise |
| D. Solid Waste | H. International |

WATER

The chapter labeled "Water" and color coded blue contains the legal authority of the Agency as it applies to water pollution abatement. It is well to note that any law which is applicable to more than one chapter of the compilation will appear in each of the chapters; however, its legislative history will be cross referenced into the "General" chapter where it is printed in full.

SUBCHAPTERS:

Statutes and Legislative History

For convenience, the Statutes are listed throughout the Compilation by a one-point system, i.e., 1.1, 1.2, 1.3, etc., and Legislative History begins wherever a letter follows the one-point system.

Thusly, any 1.1a, 1.1b, 1.2a, etc., denotes the public laws comprising the 1.1, 1.2 statute. Each public law is followed by its legislative history. The legislative history in each case consists of the House Report, Senate Report, Conference Report (where applicable), the Congressional Record beginning with the time the bill was reported from committee.

Example: 1.4 Amortization of Pollution Control Facilities, as amended, 26 U.S.C. §169 (1969).

1.4a Amortization of Pollution Control Facilities, December 30, 1969, P.L. 91-172, §704, 83 Stat. 667.

- (1) House Committee on Ways and Means, H.R. REP. No. 91-413 (Part I), 91st Cong., 1st Sess. (1969).
- (2) House Committee on Ways and Means, H.R. REP. No. 91-413 (Part II), 91st Cong., 1st Sess. (1969).
- (3) Senate Committee on Finance, S. REP. No. 91-552, 91st Cong., 1st Sess. (1969).
- (4) Committee of Conference, H.R. REP. No. 91-782, 91st Cong., 1st Sess. (1969).
- (5) Congressional Record, Vol. 115 (1969):
 - (a) Aug. 7: Debated and passed House, pp. 22746, 22774-22775;
 - (b) Nov. 24, Dec. 5, 8, 9: Debated and passed Senate, pp. 35486, 37321-37322, 37631-37633, 37884-37888;
 - (c) Dec. 22: Senate agrees to conference report, p. 40718;*
 - (d) Dec. 22: House debates and agrees to conference report, pp. 40820, 40900.

This example not only demonstrates the pattern followed for legislative history, but indicates the procedure where only one section of a public law appears. You will note that the Congressional Record cited pages are only those pages dealing with the discussion and/or action taken pertinent to the section of law applicable to EPA. In the event there is no discussion of the pertinent section, only action or passage, then the asterisk (*) is used to so indicate, and no text is reprinted in the Compilation. In regard to the situation where only one section of a public law is applicable, then only the parts of the report dealing with same are printed in the Compilation.

Secondary Statutes

Many statutes make reference to other laws and rather than have this manual serve only for major statutes, these secondary statutes have been included where practical. These secondary statutes are indicated in the table of contents to each chapter by a bracketed cite to the particular section of the major act which made the reference.

Citations

The United States Code, being the official citation, is used throughout the Statute section of the compilation. In four Statutes, a parallel table to the Statutes at Large is provided for your convenience.

TABLE OF STATUTORY SOURCE

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1.1	River and Harbor Act of 1899, 33 U.S.C. §§403, 407, 411 (1899).	E.O. 11574 sets out EPA's function under this Act.
1.2	Federal Water Pollution Control Act, as amended, 33 U.S.C. §1151 <i>et seq.</i> (1970).	Transferred to EPA in Reorg. Plan No. 3 of 1970.
1.3	Pollution of the Sea by Oil, as amended, 33 U.S.C. §1001 <i>et seq.</i> (1966).	Implements the Convention of
1.4	Advances of Public Moneys, Prohibition Against, as revised, 31 U.S.C. §529 (1946).	Referred to in the Federal Water Pollution Control Act at §1155(g) (3) (A).
1.5	Public Contracts, Advertisements for Proposals for Purchases and Contracts for Supplies or Services for Government Departments; App Application to Government Sales and Contracts to Sell and to Government Corporations, as amended, 41 U.S.C. §5 (1958).	Referred to in Federal Water Pollution Control Act in §1155(g) (3) (A).
1.6	Courts of Appeals, Certiorari; Appeal; Certified Questions, as amended, 28 U.S.C. §1254 (1948).	Referred to in the Federal Water Pollution Control Act at §1157(g) (2).
1.7	Davis-Bacon Act, as amended, 40 U.S.C. §276a-275a-5 (1964).	Referred to in the Federal Water Pollution Control Act at §1158(g).
1.8	Per Diem, Travel and Transportation Expenses; Experts and Consultants; Individuals Serving Without Pay, as amended, 5 U.S.C. §5703 (1966).	Referred to in the Federal Water Pollution Control Act at §1159(a) (2) (B), 1160(c) (4), (i).
1.9	1909 Boundary Waters Treaty Between Canada and the United States, and the Water Utilization Treaty of 1944 Between Mexico and the United States, 36 Stat. 2448 (1909), 59 Stat. 1219 (1944).	Referred to in the Federal Water Pollution Control Act at §1160(d) (2).

STATUTES	SOURCE
1.10 Disclosure of Confidential Information Generally, as amended, 18 U.S.C. §1905 (1948).	Referred to in the Federal Water Pollution Control Act at §§1160(f) (2), (k), (1), 1163(g) (3).
1.11 Convention on the Territorial Sea and the Contiguous Zone, Article XXIV, 5 U.S.T. 1612, 1613 (1958).	Referred to in the Federal Water Pollution Control Act at §1161(a) (9).
1.12 International Convention for the Prevention of Pollution of the Sea by Oil, 1954, Article IV, as amended, 17 U.S.T. 1528 (1954).	Referred to in the Federal Water Pollution Control Act at §1161(b) (2) (A).
1.13 Granting Clearances, as amended, 46 U.S.C. §91 (1951).	Referred to in the Federal Water Pollution Control Act at §1161(b) (5).
1.14 Outer Continental Shelf Lands Act, as amended, 43 U.S.C. §1331 <i>et seq.</i> (1953).	Referred to in the Federal Water Pollution Control Act at §1161(i) (2).
1.15 Administrative Procedure Act, as amended, 5 U.S.C. §§551-559, 701-705 (1968).	Referred to in the Federal Water Pollution Control Act at §§1162(b), 1163(e).
1.16 Higher Education General Provision, Definitions, as amended, 20 U.S.C. §1141 (1970).	Referred to in the Federal Water Pollution Control Act at §1169(1) (B).
1.17 National Environmental Policy Act of 1969, 42 U.S.C. §4321 <i>et seq.</i> (1970).	Direct reference in the Reorg. Plan No. 3 of 1970.
1.18 Public Health Service Act, as amended, 42 U.S.C. §§241, 243, 246 (1970).	Directly cited in Reorg. Plan No. 3 of 1970.
1.19 The Water Resource Planning Act, as amended, 42 U.S.C. §1962 <i>et seq.</i> (1970).	E.O. 11613.
1.20 Appalachian Regional Development Act of 1965, as amended, 40 App. U.S.C. §§212, 214 (1971).	All functions of the Secretary of the Interior and the Department of the Interior administrative to the Federal Water Quality Administration, all functions which were transferred to the Secretary of the Interior by Reorg. Plan No. 2 of 1966, and all functions vested in the Secretary of the Interior of the Department of the Interior by the Federal Water Pollution Control Act were transferred to the Administrator of the Environmental Protection Agency by Reorg. Plan No. 3 of 1970.
1.21 The Disaster Relief Act, 42 U.S.C. §4401 <i>et seq.</i> (1970).	Direct reference made to the Water Quality Administration at the Department of the Interior by E.O. 11490, §§703(3), 1102(1), 1103(2), etc., this administration being transferred to EPA through Reorg. Plan No. 3 of 1970.
1.22 Department of Transportation Act, 49 U.S.C. §1653(f) (1968).	The Federal Water Pollution Control Act in section 1153 regarding the preservation of fish and wildlife.

STATUTES	SOURCE
1.23 Federal Aid Highway Act, as amended, 23 U.S.C. §109(h) (1970).	The Act at §109(h) requires the Secretary of Transportation to consult with the appropriate agency dealing with water pollution, in this case, the Administrator of EPA, before promulgating guidelines for any proposed project on any federal aid system.
1.24 Amortization of Pollution Control Facilities, as amended, 26 U.S.C. §169(d) (1) (B), (3) (1969).	The section cited in the Act refers directly to the Federal Water Pollution Control Act and the Federal certifying authority requirement filing to the Secretary of the Interior in the case of water pollution, both functions being transferred through Reorg. Plan
1.25 Airport and Airway Development Act, 49 U.S.C. §§1712(f), 1716(c) (4), (e) (1970).	Direct reference made to water pollution and the appropriate agency to deal with same in the Act.
1.26 Interest on Certain Government Obligations, as amended, 26 U.S.C. §103 (1969).	The sections of the Act provide a tax relief on industrial development bonds for sewage or solid waste disposal facility and water pollution control facilities, at the section cited.
1.27 Fish and Wildlife Coordination Act, as amended, 16 U.S.C. §§661-666c (1965).	E.O. 11574, Administration of Refuse Act Permit Program.

Executive Orders

The Executive Orders are listed by a two-point system (2.1, 2.2, etc.). Executive Orders found in General are ones applying to more than one area of the pollution chapters.

Regulations

The Regulations are noted by a three-point system (3.1, 3.2, etc.). Included in the Regulations are those not only promulgated by the Environmental Protection Agency, but those under which the Agency has direct contact.

Guidelines and Reports

This subchapter is noted by a four-point system (4.1, 4.2, etc.). In this subchapter is found the statutorily required reports of EPA, published guidelines of EPA, selected reports other than EPA's and inter-departmental agreements of note.

UPDATING:

Periodically, a supplement will be sent to the interagency distribution and made available through the U.S. Government Printing Office in order to provide an accurate working set of EPA Legal Compilation.

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1.27f(1) HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES**H.R. REP. No. 2183, 85th Cong., 2d Sess. (1958)****TO AMEND THE COORDINATION ACT**

JULY 16, 1958.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BONNER, from the Committee on Merchant Marine and Fisheries, submitted the following

R E P O R T

[To accompany H.R. 13138]

The Committee on Merchant Marine and Fisheries, to whom was referred the bill (H.R. 13138) to amend the act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource developments, and for other purposes, having considered the same, report favorably thereon with amendments and recommend that the bill do pass.

The amendments are as follows:

On page 1, line 3 and 4, after the word "That", delete the words "this Act may be cited as the 'Wildlife Coordination Act'." and insert in lieu thereof the following: "the Act of March 10, 1934, as amended, and as further amended by this Act, may be cited as the 'Fish and Wildlife Coordination Act'."

On page 5, line 7, after the words "on the date of enactment of the", insert the words "Fish and".

On page 5, line 13, after the words "of the", insert the words "Fish and".

On page 7, line 18, delete the word "consevation" and insert in lieu thereof the word "conservation".

On page 8, line 1, after the words "before or after the date of enactment of the", insert the words "Fish and".

On page 8, line 4, after the words "the date of enactment of the", insert the words "Fish and".

On page 12, line 15, after the word "Sec.", delete "2." and insert in lieu thereof "3."

On page 13, after line 24, add the following new section:

SEC. 4. There is authorized to be appropriated and expended such funds as may be necessary to carry out the purposes of this Act.

[p. 1]

The purpose of the bill is to grant authority to construction agencies like the Bureau of Reclamation and the Corps of Engineers to cooperate with Fish and Wildlife Service in planning and constructing, as a part of Federal water-development projects, facilities necessary to protect fish and wildlife values. Construction of projects of the nature of Grand Coulee Dam and Bonneville Dam require considerable study and, in some cases, slight modification, to insure against the loss of a valuable fish or wildlife resource, in that case, the salmon.

At present, there is no requirement that Fish and Wildlife Service be consulted, with the result that at times the failure to secure information as to future projects has had an adverse effect on fish and wildlife values.

Studies conducted by the Service of the effect of a project on fish and wildlife values require time. Measures necessary to minimize the impact of such a project may entail changes in the overall plans. In the past, suggestions for such changes may have been made too late to permit of alternation with resultant adverse effects on fish and wildlife. Under this bill, Fish and Wildlife Service must be consulted and its plan, whether accepted or rejected by the constructing agency, must be submitted to the Congress for its consideration as a part of the authorizing legislation for each project.

To assure further protection to fish and wildlife, the bill amends the Watershed Protection and Flood Prevention Act administered under the Department of Agriculture. While leaving full control of the so-called small watershed program with that Department and the sponsoring organizations, the bill would extend the principle of coordination to it so that work under the program will include measures necessary to protect fish and wildlife values.

The governors of all 48 States have endorsed the objectives of the bill, and conservation organizations heard by the committee were unanimous in support. In addition, the Department of the Interior unqualifiedly supports the bill and the Department of Defense and the Department of Agriculture have stated that they have no objection to its enactment.

The committee unanimously recommends its enactment.

While no estimate of cost is possible, since the studies and plans will necessarily depend on the nature and location of individual future projects, the opinion was expressed by a witness for the Department

of the Interior that the cost would be little above the amount presently being spent on the studies which have been made on water-development projects, but that the cost of such studies would be charged under the bill to Department of the Interior appropriations.

The bill was amended to authorize reference to it as the Fish and Wildlife Coordination Act to more accurately reflect its purposes and to authorize appropriations necessary to effectuate its purposes.

Departmental reports on H.R. 12371, which is on the same subject, follow.

DEPARTMENT OF AGRICULTURE,
Washington, D.C., June 26, 1958.

Hon. HERBERT C. BONNER,
Chairman, Committee on Merchant Marine and Fisheries,
House of Representatives.

DEAR CONGRESSMAN BONNER: This is in reply to your letter of May 9, 1958, requesting a report by this Department on H.R. 12371, a [p. 2]

bill to amend the act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource developments, and for other purposes.

The bill would amend the Coordination Act administered by the Department of the Interior and the Watershed Protection and Flood Prevention Act administered by the Department of Agriculture to further promote the conservation of wildlife, fish, and game resources.

The provisions of the bill, with some minor differences in wording and the omission of a section 3, to which we do not object, are the same as the provisions of the text recommended by the Secretary of the Interior on April 1, 1958, to the Committee on Merchant Marine and Fisheries as a substitute for H.R. 8631, and concurred in by this Department in its report dated May 2, 1958, to that committee in which it also outlined its strong objections to H.R. 8631 as introduced

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

TRUE D. MORSE,
Acting Secretary.

DEPARTMENT OF THE ARMY,
Washington, D.C., June 26, 1958.

Hon. HERBERT C. BONNER,
Chairman, Committee on Merchant Marine and Fisheries,
House of Representatives.

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Department of the Army with respect to H.R. 12371,

85th Congress, a bill to amend the act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource developments, and for other purposes.

The Department of the Army by letter dated May 13, 1958, commented upon a previous bill with respect to the amendment of the act of Congress approved March 10, 1934, as amended by the act approved August 14, 1946, pertaining to the conservation of wildlife. Those comments indicated that this Department had no objection to the amendments proposed in H.R. 8631 if modified to make the bill consistent with certain proposals which were embodied in a substitute draft bill submitted with the letter of May 13, 1958. H.R. 12371 contains the specific modifications suggested in the letter from this Department, and accompanying substitute proposals. Accordingly the Department of the Army has no objection to the enactment of H.R. 12371.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

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CHANGES IN EXISTING LAW

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as introduced, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in *italic*, existing law in which no change is proposed is shown in *roman*):

SECTIONS 1 THROUGH 4, INCLUSIVE, OF AN ACT TO PROMOTE THE CONSERVATION OF WILD LIFE, FISH, AND GAME, AND FOR OTHER PURPOSES

(48 Stat. 401; 16 U.S.C., secs. 661 to 664, inclusive)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, [That in order to promote effectual planning, development, maintenance, and coordination of wildlife conservation and rehabilitation in the United States, its Territories and possessions, the Secretary of the Interior, through the Fish and Wildlife Service, is authorized (a) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in

controlling losses of the same from disease or other causes, in minimizing damages from overabundant species, in providing public shooting areas, and in carrying out other measures necessary to effectuate the purposes of this Act; and (b) to make surveys and investigations of the wildlife of the public domain, including lands and waters or interests therein acquired or controlled by any agency of the United States.

[SEC. 2. Whenever the waters of any stream or other body of water are authorized to be impounded, diverted, or otherwise controlled for any purpose whatever by any department or agency of the United States, or by any public or private agency under Federal permit, such department or agency first shall consult with the Fish and Wildlife Service and the head of the agency exercising administration over the wildlife resources of the State wherein the impoundment, diversion, or other control facility is to be constructed with a view to preventing loss of and damage to wildlife resources, and the reports and recommendations of the Secretary of the Interior and of the head of the agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the Fish and Wildlife Service and by the said head of the agency exercising administration over the wildlife resources of the State, for the purpose of determining the possible damage to wildlife resources and of the means and measures that should be adopted to prevent loss of and damage to wildlife resources, shall be made an integral part of any report submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects.

[The cost of planning for and the construction or installation and maintenance of any such means and measures shall be included in and shall constitute an integral part of the costs of such projects: *Provided*, That, in the case of projects after August 14, 1946, authorized to be constructed, operated, and maintained in accordance with the Federal reclamation laws (Act of June 17, 1902, 32 Stat. 388,

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and Acts amendatory thereof or supplementary thereto), the Secretary of the Interior shall, in addition to allocations to be made under section 9 of the Reclamation Project Act of 1939 (53 Stat. 1187), make findings on the part of the estimated cost of the project which can properly be allocated to the preservation and propagation of fish and wildlife, and costs allocated pursuant to such findings shall not be reimbursable. In the case of construction by a Federal agency, that agency is authorized to transfer, out of appropriations or other funds made available for surveying, engineering, or construction to the Fish and Wildlife Service, such funds as may be necessary to con-

duct the investigations required by this section to be made by it.

[SEC. 3. Whenever the waters of any stream or other body of water are impounded, diverted, or otherwise controlled for any purpose whatever by any department or agency of the United States, adequate provision consistent with the primary purposes of such impoundment, diversion, or other control shall be made for the use thereof, together with any areas of land, or interest therein, acquired or administered in connection therewith, for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon. In accordance with general plans, covering the use of such waters and other interests for these purposes, approved jointly by the head of the department or agency exercising primary administration thereof, the Secretary of the Interior, and the head of the agency exercising administration over the wildlife resources of the State wherein the waters and areas lie, such waters and other interests shall be made available without cost for administration (a) by such State agency, if the management thereof for the conservation of wildlife relates to other than migratory birds; (b) by the Secretary of the Interior, if the waters and other interests have particular value in carrying out the national migratory bird management program.]

[SEC. 4. Such areas as are made available to the Secretary of the Interior for the purposes of this Act under sections 1 and 3, or by any other law, proclamation, or Executive order, shall be administered directly or under cooperative agreements entered into pursuant to the provisions of section 1 by the Secretary of the Interior under such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, as may be adopted by him in accordance with general plans approved jointly by the Secretary of the Interior and the head of the department or agency exercising primary administration of such areas: Provided, That such rules and regulations shall not be inconsistent with the laws for the protection of fish and game of the States in which such area is situated.]

For the purpose of recognizing the vital contribution of our wildlife resources to the Nation, the increasing public interest and significance thereof due to expansion of our national economy and other factors, and to provide that wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation for the purposes of this Act in the United States, its Territories and possessions, the Secretary of the Interior is authorized (1) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the develop-

ment, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in controlling

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losses of the same from disease or other causes, in minimizing damages from overabundant species, in providing public shooting and fishing areas, including easements across public lands for access thereto, and in carrying out other measures necessary to effectuate the purposes of this Act; (2) to make surveys and investigations of the wildlife of the public domain, including lands and waters or interests therein acquired or controlled by any agency of the United States; and (3) to accept donations of land and contributions of funds in furtherance of the purposes of this Act.

Sec. 2. (a) Except as hereafter stated in subsection (h) of this section, whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State wherein the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of wildlife resources by preventing loss of and damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development.

(b) In furtherance of such purposes, the reports and recommendations of the Secretary of the Interior on the wildlife aspects of such projects, and any report of the head of the State agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the United States Fish and Wildlife Service and such State agency for the purpose of determining the possible damage to wildlife resources and for the purpose of determining means and measures that should be adopted to prevent the loss of or damage to such wildlife resources, as well as to provide concurrently for the development and improvement of such resources, shall be made an integral part of any report prepared or submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects when such reports are presented to the Congress or to any agency or person having the authority or the power, by administrative action, or otherwise, (1) to authorize the construction of water-resource development projects

or (2) to approve a report on the modification or supplementation of plans for previously authorized projects, to which this Act applies. Recommendations of the Secretary of the Interior shall be as specific as is practicable with respect to features recommended for wildlife conservation and development, lands to be utilized or acquired for such purposes, the results expected, and shall describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages. The reporting officers in project reports of the Federal agencies shall give full consideration to the report and recommendations of the Secretary of the Interior and to any report of the State agency, on the wildlife aspects of such projects and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits.

(c) Federal agencies authorized to construct or operate water-control projects are hereby authorized to modify or add to the structures and operations of such projects, the construction of which has not been substantially completed on the date of enactment of the Wildlife Coordination Act,

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and to acquire lands in accordance with section 3 of this Act, in order to accommodate the means and measures for such conservation of wildlife resources as an integral part of such projects: Provided, That for projects authorized by a specific Act of Congress before the date of enactment of the Wildlife Coordination Act (1) such modification or land acquisition shall be compatible with the purposes for which the project was authorized; (2) the cost of such modifications or land acquisition, as means and measures to prevent loss of and damage to wildlife resources to the extent justifiable, shall be an integral part of the cost of such projects; and (3) the cost of such modifications or land acquisition for the development or improvement of wildlife resources may be included in the extent justifiable, and an appropriate share of the cost of any project may be allocated for this purpose with a finding as to the part of such allocated cost, if any, to be reimbursed by non-Federal interests.

(d) The cost of planning for and the construction or installation and maintenance of such means and measures adopted to carry out the conservation purposes of this section shall constitute an integral part of the cost of such projects: Provided, That such cost attributable to the development and improvement of wildlife shall not extend beyond those necessary for (1) land acquisition, (2) modification of the project, and (3) modification of project operations; but shall not include the operation of wildlife facilities nor the construction of such

facilities beyond those herein described: And provided further, That, in the case of projects authorized to be constructed, operated, and maintained in accordance with the Federal reclamation laws (Act of June 17, 1902, 32 Stat. 388, and Acts amendatory thereof or supplementary thereto), the Secretary of the Interior, in addition to allocations made under section 9 of the Reclamation Project Act of 1939 (53 Stat. 1187), shall make findings on the part of the estimated cost of the project which can properly be allocated to means and measures to prevent loss of and damage to wildlife resources, which costs shall not be reimbursable, and an appropriate share of the project costs may be allocated to development and improvement of wildlife resources, with a finding as to the part of such allocated costs, if any, to be reimbursed by non-Federal fish and wildlife agencies or interests.

(e) In the case of construction by a Federal agency, that agency is authorized to transfer to the United States Fish and Wildlife Service, out of appropriations or other funds made available for investigations, engineering, or construction, such funds as may be necessary to conduct all or part of the investigations required to carry out the purposes of this section.

(f) In addition to other requirements, there shall be included in any report submitted to Congress supporting a recommendation for authorization of any new project for the control or use of water as described herein (including any new division of such project or new supplemental works of such project) an estimation of the wildlife benefits or losses to be derived therefrom including benefits to be derived from measures recommended specifically for the development and improvement of wildlife resources, the cost of providing wildlife benefits (including the cost of additional facilities to be installed or lands to be acquired specifically for that particular phase of wildlife conservation relating to the development and improvement of wildlife), the part of the cost of joint-use facilities allocated to wildlife, and the part of such costs, if any, to be reimbursed by non-Federal interests.

(g) The provisions of this section shall be applicable with respect to any project for the control or use of water as prescribed herein, or any unit

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of such project authorized before or after the date of enactment of the Wildlife Coordination Act for planning or construction, but shall not be applicable to any project or unit thereof authorized before the date of enactment of the Wildlife Coordination Act if the construction of the particular project or unit thereof has been substantially completed. A project or unit thereof shall be considered to

be substantially completed when sixty percent or more of the estimated construction cost has been obligated for expenditure.

(h) The provisions of this Act shall not be applicable to those projects for the impoundment of water where the maximum surface area of such impoundments is less than ten acres, nor to activities for or in connection with programs primarily for land management and use carried out by Federal agencies with respect to Federal lands under their jurisdiction.

Sec. 3 (a) Subject to the exceptions prescribed in section 2 (h) of this Act, whenever the waters of any stream or other body of water are impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, adequate provision, consistent with the primary purposes of such impoundment, diversion, or other control, shall be made for the use thereof, together with any areas of land, water, or interests therein, acquired or administered by a Federal agency in connection therewith, for the conservation, maintenance, and management of wildlife resources thereof, and its habitat thereon, including the development and improvement of such wildlife resources pursuant to the provisions of section 2 of this Act.

(b) The use of such waters, land, or interests therein for wildlife conservation purposes shall be in accordance with general plans approved jointly (1) by the head of the particular department or agency exercising primary administration in each instance, (2) by the Secretary of the Interior, and (3) by the head of the agency exercising the administration of the wildlife resources of the particular State wherein the waters and areas lie. Such waters and other interests shall be made available, without cost for administration, by such State agency, if the management of the properties relate to the conservation of wildlife other than migratory birds, or by the Secretary of the Interior, for administration in such manner as he may deem advisable, where the particular properties have value in carrying out the national migratory bird management program: Provided, That nothing in this section shall be construed as affecting the authority of the Secretary of Agriculture to cooperate with the States or in making lands available to the States with respect to the management of wildlife and wildlife habitat on lands administered by him.

(c) When consistent with the purposes of this Act and the reports and findings of the Secretary of the Interior prepared in accordance with section 2, land, waters, and interests therein may be acquired by Federal construction agencies for the wildlife conservation and development purposes of this Act in connection with a project as reasonably needed to preserve and assure for the public benefit the wildlife

potentials of the particular project area: *Provided, That before properties are acquired for this purpose, the probable extent of such acquisition shall be set forth, along with other data necessary for project authorization, in a report submitted to the Congress, or in the case of a project previously authorized, no such properties shall be acquired unless specifically authorized by Congress, if specific authority for such acquisition is recommended by the construction agency.*

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(d) *Properties acquired for the purposes of this section shall continue to be used for such purposes, and shall not become the subject of exchange or other transactions if such exchange or other transaction would defeat the initial purpose of their acquisition;*

(e) *Federal lands acquired or withdrawn for Federal water-resource purposes and made available to the States or to the Secretary of the Interior for wildlife management purposes, shall be made available for such purposes in accordance with this Act, notwithstanding other provisions of law.*

(f) *Any lands acquired pursuant to this section by any Federal agency within the exterior boundaries of a national forest shall, upon acquisition, be added to and become national forest lands, and shall be administered as a part of the forest within which they are situated, subject to all laws applicable to lands acquired under the provisions of the Act of March 1, 1911 (36 Stat. 961), unless such lands are acquired to carry out the National Migratory Bird Management Program.*

Sec. 4. Such areas as are made available to the Secretary of the Interior for the purposes of this Act, pursuant to sections 1 and 3 or pursuant to any other authorization, shall be administered by him directly or in accordance with cooperative agreements entered into pursuant to the provisions of the first section of this Act and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, as may be adopted by the Secretary in accordance with general plans approved jointly by the Secretary of the Interior and the head of the department or agency exercising primary administration of such areas: Provided, That such rules and regulations shall not be inconsistent with the laws for the protection of fish and game of the States in which such area is situated (16 U.S.C., sec. 664): Provided further, That lands having value to the National Migratory Bird Management Program may, pursuant to general plans, be made available without cost directly to the State agency having control over wildlife resources, if it is jointly determined by the Secretary of the Interior and such State agency that this would be in the public

interest: And provided further, That the Secretary of the Interior shall have the right to assume the management and administration of such lands in behalf of the National Migratory Bird Management Program if the Secretary finds that the State agency has withdrawn from or otherwise relinquished such management and administration.

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**1.27f (2) SENATE COMMITTEE ON INTERSTATE AND
FOREIGN COMMERCE**

S. REP. No. 1981, 85th Cong., 2d Sess. (1958)

AMENDING THE COORDINATION ACT

JULY 28, 1958.—Ordered to be printed

Mr. MAGNUSON, from the Committee on Interstate and Foreign Commerce, submitted the following

R E P O R T

[To accompany H.R. 13138]

The Committee on Interstate and Foreign Commerce, to whom was referred the bill (H.R. 13138) to amend the act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource developments, and for other purposes, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

PURPOSE OF THE BILL

This amendment to the Coordination Act would grant authority to the agencies of Government engaged in construction to consult with the Fish and Wildlife Service before and during the building of Federal water development projects.

The Fish and Wildlife Service would make known to these construction agencies, such as the Corps of Engineers and the Bureau of Reclamation, the project necessary to protect fish and wildlife. Considerable study would be required in some cases, with suggested changes in construction plans to the great advantage to our wildlife resource. Under the bill suggestions regarding changes could be made previous to the commencement of construction. Such plans, or

recommendations, whether accepted or rejected by the construction agency, would be submitted to the Congress at the time authorization legislation for the project was under consideration.

The bill would amend the Watershed Protection and Flood Prevention Act which is administered by the Department of Agriculture. It is designed to provide for greater consideration of fish and wildlife conservation in the Federal water-resource development program. Enactment of the bill would not retard that program but should help significantly in permitting Federal water development to serve the interests of a much larger share of our population.

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The Secretary of Agriculture would be required to notify the Department of the Interior on any construction plans which concern the conservation and development of wildlife resources. The Secretary of Agriculture would give full consideration to any plans submitted to him by the Fish and Wildlife Service.

The Congress recognized the need for greater emphasis on fish and wildlife conservation through the enactment of the Fish and Wildlife Act of August 8, 1956 (70 Stat. 1119). This act specifically pointed to the need to maintain and increase these resources through proper development and management. The Congress also directed the Secretary of the Interior to take such steps as may be required for the betterment of fish and wildlife resources, and to make such recommendations for additional legislation as deemed necessary.

H.R. 13138 in the form reported by your committee is based on the recommendations of the Secretary of the Interior contained in a letter to the Committee dated April 1, 1958. That letter stated, in part:

* * * we have discussed this proposed legislation with other interested departments, including particularly, the Department of Agriculture and the Department of the Army. The bill as transmitted herewith has their concurrence.

The bill enjoys exceptionally enthusiastic and widespread support. Every one of the 48 State governors, or their authorized representatives, had expressed general endorsement of an earlier version of this bill, according to the Secretary of the Interior. Every major national conservation organization supports it. The bill has the wholehearted endorsement of the commercial fishing industry. As noted above, the Secretary of the Interior sponsored the bill and states that the administration, including all of the other affected Federal departments, supports the bill. The committee has received a very large number of written endorsements from all parts of the country.

COSTS

The Department of the Interior is of the opinion that the cost of this bill will be little above the amounts now being spent on studies of water development projects.

GENERAL DISCUSSION

The fish and wildlife resources of the Nation are tremendously important, not only to the physical and spiritual well-being of our people, but to our national economy as well. A survey made by an independent sampling organization in 1955 found that 1 out of every 3 of all the households in this Nation contains at least 1 person who hunts, fishes, or both. These people spent in that year some \$3 billion in pursuit of their sports. One in every 5 persons, 12 years of age or over—a total of 25 million in this age group—hunts or fishes, or both. In addition to the business these activities generate to provide profits and wages in the sporting goods, recreation and related industries, these 25 million people gained much in physical and spiritual health.

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Not all of the recreational benefits from fish and wildlife accrue to those who hunt and fish. It has been estimated, for example, that 66 million people find recreation and release from tension in wildlife photography, bird watching, and other forms of nature study based on fish and wildlife resources.

Commercial fisheries are of major importance to our Nation. This industry provides employment, both direct and indirect, for about half a million workers. The commercial fisheries industry supplies somewhat more than 5 billion pounds of fish to our markets each year, nearly 3 billion pounds of which are used for human food, providing proteins and vitamins of great value in the national diet.

The remainder, as well as most of the waste from filleting, canning, and otherwise preparing food fish for market, is used in the production of supplements to animal feeds and as special-purpose materials in industry and the arts.

Fishmeals, when incorporated in poultry diets, enable the farmer to bring his birds to market weight in a period of 8 weeks, resulting in a significant saving in feed and a significant improvement in poultry quality. Fish solubles, another product derived from the fish wastes, are an acknowledged superior source of vitamins, minerals, and unknown growth factors and are universally used in feeds prepared for use by the poultry and swine-raising industries.

The commercial fish catch, when processed into human food and industrial products, is valued at well over a billion dollars annually at the retail level.

Some of the more desirable and most valuable commercial fishes such as salmon, striped bass, menhaden, shrimp, and other shellfish, are affected by water-use projects. The anadromous fishes, which include the salmon, striped bass, and shad, must migrate to locations in streams to perform their spawning act. After the eggs have hatched, the resulting young fish must make their way downstream to the ocean to achieve their growth. This two-way migration is particularly vulnerable to interference by dams. In some instances, shellfish may also be affected by dams, as these dams may alter the salinity of the water in river estuaries. Finally, the nursery and feeding grounds of valuable crustaceans, such as shrimp, as well as the young of valuable marine fishes, may be affected by dredging, filling, and diking operations often carried out to improve navigation and provide new industrial or residential land.

It is particularly important that adequate provision be made for fish and wildlife conservation in the water resource program, in view of the very great increases in demand for water in the Nation's expanding population and economy.

Since 1950, water demands for use by humans have increased by 35 to 40 percent. This is roughly three times the increase in population, even though the population itself is increasing very rapidly. Fish and wildlife species, like other living things, need land and water. Adequate provision must be made for the conservation and preservation of fish and wildlife in our water program if we are to continue to have them as part of our economy and way of life. H.R. 13138, as reported, is intended to provide more adequately for the conservation and preservation of fish and wildlife without unduly restricting needed development of our water resources to meet man's various requirements. Despite the considerable accomplishments under the

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1946 Coordination Act, the results have fallen far short of the results anticipated by the conservationists who sponsored the 1946 law. The limitations and deficiencies of that act will not permit the Fish and Wildlife Service and the State fish and game departments to accomplish the objectives of fish and wildlife conservation and river basin development that are clearly essential if we are to preserve our fish and wildlife resources on a scale demanded by the people of the Nation.

Principally the 1946 act does not provide clear, general authority for the Federal agencies who construct water-resource projects to incorporate in project construction and operation plans the needed measures for fish and wildlife conservation. The act is mainly concerned with compensatory measures to mitigate the loss of or damage to fish and wildlife resources; it contains no clear authority

to permit the planning of installations of appropriate means and measures to take advantage of opportunities provided by water projects for enhancement or improvement for fish and wildlife resources.

Existing law is of questionable application to many authorized projects, a very serious shortcoming. The Corps of Engineers, for example, has a backlog of 650 active authorized projects with an estimated cost of about \$6 billion on which construction has not yet started. Many of these cover vast areas, containing some of the most important fish and wildlife resources of the Nation. The Bureau of Reclamation has about 150 projects or units at an estimated cost of \$3.7 billion in this category. Most of these projects have never been investigated from the standpoint of their effects on fish and wildlife resources. Many of them were authorized 15 or 20 years ago or more. It would make good sense to have the policies and procedures of the Coordination Act applicable to them in order that the wishes of the Congress in enacting the 1946 statute and the proposed amendments can be observed.

The bill provides for the inclusion of fish and wildlife conservation features in these authorized projects so long as they are "compatible with the purposes for which the project was authorized." It is understood that some benefits from authorized project purposes may have to be diminished in some slight degree in order to obtain benefits from fish and wildlife conservation measures adopted to compensate for losses to these resources or to enhance and develop fish and wildlife.

The legislation would provide that conservation measures for the prevention of losses to fish and wildlife should be included "to the extent justifiable" in authorized projects. It is the understanding of your committee, however, that these measures would not have to be justified under the usual benefit-cost type of analysis. They would not produce "benefits." These measures would be for reducing or compensating for losses.

Similarly, it is the understanding of your committee that the "estimation of wildlife * * * losses" provided for in the bill would not require a dollar evaluation.

Existing law has questionable application to projects of the Corps of Engineers for the dredging of bays and estuaries for navigation and filling purposes. More seriously, existing law has no application whatsoever to the dredging and filling of bays and estuaries by private interests or other non-Federal entities in navigable waters

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under permit from the Corps of Engineers. This is a particularly serious deficiency from the standpoint of commercial fishing interests.

The dredging of these bays and estuaries along the coastlines to aid navigation and also to provide land fills for real estate and similar developments, both by Federal agencies, or other agencies under permit from the Corps of Engineers, has increased tremendously in the last 5 years. Obviously, dredging activity of this sort has a profound disturbing effect on aquatic life, including shrimp and other species of tremendous significance to the commercial fishing industry. The bays, estuaries, and related marsh areas are highly important as spawning and nursery grounds for many commercial species of fish and shellfish.

Also existing law contains no reference to the authority of the water-project construction agencies to acquire land around water-use projects for fish and wildlife conservation purposes. In very many cases, the availability of lands to the Fish and Wildlife Service or the State fish and game departments for these purposes is the key to adequate and satisfactory project measures to compensate for losses and to provide for the enhancement and improvement of fish and wildlife. The conservation agencies are restricted and hampered by this lack of authority, particularly where the land acquisition necessary for flood control and other so-called primary purposes of projects results in little or no land being available for conservation purposes.

The amendments proposed by this bill would remedy these deficiencies and have several other important advantages. The amendments would provide that wildlife conservation shall receive equal consideration with other features in the planning of Federal water resource development programs. This would have the effect of putting fish and wildlife on the basis of equality with flood control, irrigation, navigation, and hydroelectric power in our water resource programs, which is highly desirable and proper, and represents an objective long sought by conservationists of the Nation.

The amendments would also provide the Department of the Interior with authority to accept lands and funds for fish and wildlife conservation purposes given by individuals and other non-Federal entities. They would grant authority for the withdrawal of public lands to provide areas for fishing purposes and access to areas to be utilized by the public for both hunting and fishing. (The present act contains authority for withdrawal of public lands to provide areas for hunting purposes.) Much public land has been withdrawn for hunting purposes and large areas have been made available to State fish and game departments for administration and management.

Finally, the amendments to existing law would simplify procedures, for the assumption of management by the States of project lands found to be of particular value to the national migratory bird program. Under other existing law, the Department of the Interior has

jurisdiction of this program, but frequently it is found to be in the public interest for the States to take over the management of certain lands particularly valuable for migratory birds. Today these lands must be assigned by the project construction agency first to the Fish and Wildlife Service, who in turn, assigns them to State fish and game departments. The bill would permit the assignment directly to the States, while safeguarding the Federal interest in migratory birds.

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The legislation would be a permissive law so far as it concerns relationship between water project construction agencies and fish and wildlife conservation agencies. The latter would not be given any veto power over any part of the water resource development program.

The legislation would establish in law the provisions of a memorandum of understanding, dated May 12, 1955, entered into by the Fish and Wildlife Service and the Soil Conservation Service of the Department of Agriculture. It would provide for study of projects in the small watershed program by the Fish and Wildlife Service on a fully cooperative basis, leaving full control of the program with local groups, the Secretary of Agriculture, and the Congress, as at present. These studies could be made to determine desirable means of enhancing fish and wildlife resources in these small watershed projects as well as the mitigation of damages.

Unquestionably, the bill, if enacted, would result in the Congress having better information on the effects of water projects on fish and wildlife resources while considering project-authorizing legislation. It will then, of course, be for the Congress to decide what conservation measures should be incorporated in any project.

The Congress, moreover, would retain full control, through its consideration of project-authorizing legislation, and the review of supplemental reports, in the case of projects already authorized, of any costs incurred for fish and wildlife conservation purposes.

AGENCY COMMENT

Departmental reports on S. 3725, the Senate version of H. R. 13138, follow:

DEPARTMENT OF AGRICULTURE,
Washington, D.C., June 9, 1958.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate.

DEAR SENATOR MAGNUSON: This is in reply to your request of April 30, 1958, for the comments of this Department on S. 3725, a bill to amend the Coordination and Watershed Protection and Flood Prevention Acts, to promote the conservation of wildlife, fish, and

game, and for other purposes.

The bill would amend the Coordination Act administered by the Department of the Interior and the Watershed Protection and Flood Prevention Act administered by the Department of Agriculture to further promote the conservation of wildlife, fish, and game resources.

The provisions of this bill are identical, except for two added subsections, to the provisions of the text recommended by the Secretary of the Interior on April 1, 1958, to the Committee on Interstate and Foreign Commerce as a substitute for S. 2496 and concurred in by this Department in its report dated April 30, 1958, to that committee in which it also outlined its strong objections to S. 2496 as introduced. The 2 added subsections consist of a further proposed identical amendment to each of the 2 acts to be amended by the bill which would require that any acquisition, withdrawal, administration, or transfer of water, water resources, or water rights necessary to carry out the provisions of those acts shall be accomplished in accordance with the water laws of the State or States in which such action is taken. This [p. 6]

Department feels that the proposed added subsection 12(b) to the Watershed Protection and Flood Prevention Act beginning on page 13, line 23 of the bill does not appear to be necessary in view of the existing provisions in section 4 (4) of that act, which provides that local organizations shall acquire or provide assurance that landowners or water uses have acquired needed water rights, pursuant to State law.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

TRUE D. MORSE, *Acting Secretary.*

FEDERAL POWER COMMISSION,
Washington, June 26, 1958.

S. 3725, 85th Congress, 2d session, to amend the Coordination and Watershed Protection * * * Act * * *.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate, Washington, D.C.

DEAR MR. CHAIRMAN: In response to your request of April 30, 1958, there are enclosed copies of the report of the Federal Power Commission on the subject bill.

Sincerely yours,

JEROME K. KUYKENDALL,
Chairman.

Enclosure No. 104472.

FEDERAL POWER COMMISSION REPORT ON S. 3725, 85th CONGRESS, A
BILL TO AMEND THE COORDINATION AND WATERSHED PROTECTION
AND FLOOD PREVENTION ACTS, TO PROMOTE THE CONSERVATION OF
WILDLIFE, FISH, AND GAME, AND FOR OTHER PURPOSES

The amendments to the Wildlife Resources Coordination and Watershed Protection and Flood Prevention Acts (16 U. S. C. 661, 1001) proposed by this bill appear to be designed to secure more effective cooperation between State and Federal agencies and between Federal agencies themselves in planning for the preservation, improvement, and use of fish and wildlife resources in connection with water resource projects to be constructed by or under authority of the United States or with Federal financial or technical assistance. The amendments would also place an affirmative responsibility upon Federal agencies, not only to prevent loss or damage to wildlife resources as presently contemplated by the Coordination Act, but to integrate wildlife conservation programs for the enhancement of wildlife with other water resource development programs whether carried out by Federal or non-Federal agencies.

There is much to be gained by an affirmative approach to wildlife protection and preservation. In the issuance of licenses under the Federal Power Act for water-power development by non-Federal agencies, the Federal Power Commission regards the Wildlife Resources Coordination Act as calling not only for protection but also for the enhancement of fish and wildlife resources whenever such enhancement can be reasonably achieved. It appears, therefore, that

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the amendments carried by the bill would merely apply the same principle to Federal programs as is now applied to non-Federal developments under the Federal Power Act.

In this connection subsection 1 (c) of the bill would authorize the Secretary of the Interior "to accept donations of land and contributions of funds in furtherance of the purposes of this act." In issuing licenses the Commission has required in appropriate cases that licensees make funds available to the Secretary to conduct studies to determine measures and facilities required to conserve and enhance fish and wildlife resources. In addition, the Commission has required licensees to acquire or provide funds for acquiring lands for wildlife management programs. If any doubt exists as to the authority of the Secretary of the Interior to accept such donations and contributions, it appears desirable to expressly grant such authority as proposed by the bill.

We understand that the Secretary of the Interior in his report on this bill urges that Congress consider separately from this bill the matter of compliance with State laws covered by the two subsections appearing on page 11, lines 7 through 11, and on page 13, line 23, through line 2 on page 14, because of their controversial nature.¹ The matter of compliance with State water laws is presently before the Congress in other bills directly dealing with that subject. While we do not construe these two subsections as superseding any of the licensing provisions of the Federal Power Act, we also believe that the question of compliance with State laws might better be considered separately from S. 3725. Consequently, we recommend that the two subsections be deleted from the bill.

With the amendment recommended above the Commission is in favor of this bill.

FEDERAL POWER COMMISSION,
BY JEROME K. KUYKENDALL, *Chairman*.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, May 16, 1958.

HON. WARREN G. MAGNUSON,
*Chairman, Committee on Interstate and Foreign Commerce,
United States Senate.*

DEAR MR. CHAIRMAN: Further reference is made to your letter dated April 30, 1958, acknowledged May 2, requesting our comments on S. 3725, 85th Congress, 2nd session.

S. 3725 would amend the Coordination Act of 1934, as amended (16 U. S. C. 661-667), and the Watershed Protection and Flood Prevention Act, as amended (16 U. S. C. 1001-1007), to provide for the integration of fish and wildlife conservation programs with water-resource development projects in which a Federal interest exists.

We find nothing in this bill which is objectionable from an accounting and auditing viewpoint. However, we have no information, other than that contained in the remarks of the sponsor upon introduction of the bill, with respect to the necessity for, or advisability of, legislation of this nature. We therefore make no recommendation with respect to its enactment.

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¹These lines were deleted by amendments.

Your attention is invited to the reference to "section o" in line 17, page 11, which apparently should read "section 3 (b)."

Sincerely yours,

JOSEPH CAMPBELL,
Comptroller General of the United States.

GENERAL SERVICES ADMINISTRATION,
Washington, D.C., July 9, 1958.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate, Washington, D.C.

DEAR MR. CHAIRMAN: Your letter of April 30 requested the views of the General Services Administration on S. 3725, 85th Congress, a bill to amend the Coordination and Watershed Protection and Flood Prevention Acts, to promote the conservation of wildlife, fish, and game, and for other purposes.

Inasmuch as the subject matter of this measure does not concern the operations and functions of GSA, we do not believe an expression of our views would be appropriate.

Enactment of this measure will not affect the budgetary requirements of GSA.

The Bureau of the Budget has advised that there is no objection to the submission of this report to your committee.

Sincerely yours,

FRANKLIN FLOETE, *Administrator.*

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., June 11, 1958.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate, Washington, D.C.

DEAR SENATOR MAGNUSON: We invite your attention to S. 3725, a bill to amend the Coordination and Watershed Protection and Flood Prevention Acts, to promote the conservation of wildlife, fish, and game, and for other purposes. In this connection, we refer also to S. 2496, a bill to amend the act entitled "AN ACT To promote the conservation of wildlife, fish, and game, and for other purposes," approved March 10, 1934, as amended, known as the Coordination Act. On April 1, we transmitted to you our report on S. 2496. Our report was accompanied by suggested revisions of that bill.

S. 3725, which has been introduced following our report on S. 2496, contains the suggested amendments that we transmitted to you with

our report. However, it includes also two new subsections, on page 11, lines 7 through 11, and on page 13, line 23 through line 2, page 14, dealing with the matter of compliance with State water laws along the lines of S. 863, 85th Congress. This Department in the past has recommended the enactment of legislation similar to S. 863, and we so reported to the chairman, Committee on Interior and Insular Affairs, United States Senate, by our letter of March 20, 1956, on S. 863 of the

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84th Congress. We recognize, however, that there is considerable difference of opinion concerning such legislation. We recommend, therefore, that the controversy over S. 863 and similar bills not be injected into the consideration of the proposed legislation to amend the Fish and Wildlife Coordination Act. Accordingly, we urge that the Congress consider S. 863 separately. If enacted, that legislation would, of course, have the general application that its terms prescribe.

For the foregoing reasons, we recommend that S. 3725 be enacted in the form transmitted with our report on S. 2496. We recommend that S. 3725 be amended as follows:

(1) On page 11, strike out lines 7 through 11.

(2) On page 13, beginning with line 23, strike out the text through line 2 on page 14.

The Bureau of the Budget has advised us that there is no objection to the submission of this report to your committee.

Sincerely yours,

ROSS LEFFLER,
Assistant Secretary of the Interior.

DEPARTMENT OF THE ARMY,
Washington, D.C., April 29, 1958.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Interstate and Foreign Commerce,
United States Senate.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for the views of the Department of Defense with respect to S. 2496, 85th Congress, a bill to amend the act entitled "AN ACT To promote the conservation of wildlife, fish, and game, and for other purposes," approved March 10, 1934, as amended, known as the Coordination Act." The Secretary of Defense has assigned to the Department of the Army the responsibility for the preparation of a report.

The Department of the Army has considered the above-mentioned bill, the purpose of which, stated generally, is to amend sections 1-3

of the act of Congress approved March 10, 1934, as amended by the act approved August 14, 1946 (16 U. S. C. 661-663), pertaining to the conservation of wildlife.

The primary interest of this Department in the proposed amendments pertains to the civil works water resource development program. The Department is in complete agreement with the objective of promoting effective coordination of wildlife conservation with resource development programs and equal consideration of wildlife conservation in planning and carrying out such programs. All purposes must be considered in any comprehensive and coordinated development if the maximum sustained benefits are to be obtained for each public dollar invested in the development of our natural resources. This will involve the active participation of all responsible State and Federal agencies in the planning, development and maintenance of water resources programs. Experience shows that each interest cannot be given everything it wants. There usually must be adjustments in balancing the degree to which the various purposes can be served considering the overall needs in the areas benefited. Full

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consideration can be given to all conservation matters only with the active help of all responsible agencies concerned on a cooperative basis.

There is a strong implication in the modifications proposed in S. 2496, however, that wildlife conservation shall be given more than equal treatment. The costs of means and measures to prevent loss of and damage to wildlife, and to provide for the development and improvement of wildlife, do not have to be justified by the results expected. The bill implies that provisions for wildlife shall be included irrespective of other project considerations.

This Department is agreeable to the inclusion, in the project work to be performed and budgeted by it, of facilities and modifications for wildlife which are attached to or form an integral part of other project features. It is considered essential to the proper operation of the project that such facilities should be operated by the agency responsible for operation and maintenance of the project. However, it is considered that facilities and improvements which can be undertaken separately for wildlife conservation should be undertaken as a part of wildlife conservation programs by the agencies responsible for those programs.

The bill, S. 2496, in its present form, is inconsistent as to cost sharing. It provides that for projects under reclamation law all costs allocated to conservation of wildlife, including those for prevention of

loss or damage, shall be nonreimbursable. On the other hand, for other Federal projects costs of measures for prevention of loss would be joint or integral project costs chargeable to other project functions such as hydro-power or flood control), and for costs allocated to improvement of the resource the bill would require a finding of the amount which should be reimbursed by non-Federal interests. It is believed to be essential that whatever cost sharing procedure the Congress adopts as a matter of policy for wildlife conservation be uniformly applicable to programs of all Federal agencies.

S. 2496 would give broad authority for acquisition of lands for prevention of damage to wildlife resources and for improvement of such resources, in accordance with recommendations of the Fish and Wildlife Service and subject to approval by the Secretary of the Interior. No specific action by the Congress thereon would be required nor would affected States necessarily have an opportunity to comment on the appropriateness of such acquisition. It is considered essential to the accomplishment of such acquisition that before properties are acquired for this purpose, the extent of such acquisition be described as accurately as practicable and be set forth, along with other data necessary for project authorization, in a report submitted to the Congress, and that no such properties be acquired unless specifically authorized by the Congress, if specific authority for such acquisition is recommended by the construction agency.

Modification of the basic legislation of this matter has been the subject of extensive coordination among the Departments of the Interior, Army and Agriculture and the Bureau of the Budget as it relates to the various Federal programs that would be affected. As a result of these endeavors, the Department of the Interior has proposed certain modifications of the law on which substantial agreement has been reached among the agencies. A copy of those proposals is inclosed. If the amendments proposed in S. 2496 were modified to make the bill consistent with the inclosed proposals, the [p. 11]

Department of the Army would interpose no objection to its enactment.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

CHANGES IN EXISTING LAW

In compliance with subsection 4 of rule XXIX of the Standing Rules of the Senate, changes in existing law made by the bill are

shown as follows (existing law proposed to be omitted is enclosed in brackets; new matter is printed in italic; existing law in which no change is proposed is shown in roman):

SECTIONS 1 THROUGH 4, INCLUSIVE, OF AN ACT TO PROMOTE THE
CONSERVATION OF WILDLIFE, FISH, AND GAME, AND FOR OTHER
PURPOSES

(48 Stat. 401; 16 U. S. C., secs. 661 to 664, inclusive)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, [That in order to promote effectual planning, development, maintenance, and coordination of wildlife conservation and rehabilitation in the United States, its Territories and possessions, the Secretary of the Interior, through the Fish and Wildlife Service, is authorized (a) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in controlling losses of the same from disease or other causes, in minimizing damages from overabundant species, in providing public shooting areas, and in carrying out other measures necessary to effectuate the purpose of this Act; and (b) to make surveys and investigations of the wildlife of the public domain, including lands and waters or interests therein acquired or controlled by any agency of the United States.

[SEC. 2. Whenever the waters of any stream or other body of water are authorized to be impounded, diverted, or otherwise controlled for any purpose whatever by any department or agency of the United States, or by any public or private agency under Federal permit, such department or agency first shall consult with the Fish and Wildlife Service and the head of the agency exercising administration over the wildlife resources of the State wherein the impoundment, diversion, or other control facility is to be constructed with a view to preventing loss of and damage to wildlife resources, and the reports and recommendations of the Secretary of the Interior and of the head of the agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the Fish and Wildlife Service and by the said head of the agency exercising administration over the wildlife resources of the State, for the purpose of determining the possible damage to wildlife resources and of the means and measures that should be adopted to prevent loss of and damage to wildlife resources, shall be made an integral part of any

report submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects.

[The cost of planning for and the construction or installation and maintenance of any such means and measures shall be included in and shall constitute an integral part of the costs of such projects: *Provided*, That, in the case of projects after August 14, 1946, authorized to be constructed, operated, and maintained in accordance with the Federal reclamation laws (Act of June 17, 1902, 32 Stat. 388, and Acts amendatory thereof or supplementary thereto), the Secretary of the Interior shall, in addition to allocations to be made under section 9 of the Reclamation Project Act of 1939 (53 Stat. 1187), make findings on the part of the estimated cost of the project which can properly be allocated to the preservation and propagation of fish and wildlife, and costs allocated pursuant to such findings shall not be reimbursable. In the case of construction by a Federal agency, that agency is authorized to transfer, out of appropriations or other funds made available for surveying, engineering, or construction to the Fish and Wildlife Service, such funds as may be necessary to conduct the investigations required by this section to be made by it.

[SEC. 3. Whenever the waters of any stream or other body of water are impounded, diverted, or otherwise controlled for any purpose whatever by any department or agency of the United States, adequate provision consistent with the primary purposes of such impoundment, diversion, or other control shall be made for the use thereof, together with any areas of land, or interest therein, acquired or administered in connection therewith, for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon. In accordance with general plans, covering the use of such waters and other interests for these purposes, approved jointly by the head of the department or agency exercising primary administration thereof, the Secretary of the Interior, and the head of the agency exercising administration over the wildlife resources of the State wherein the waters and areas lie, such waters and other interests shall be made available without cost for administration (a) by such State agency, if the management thereof for the conservation of wildlife relates to other than migratory birds; (b) by the Secretary of the Interior, if the waters and other interests have particular value in carrying out the national migratory bird management program.

[SEC. 4. Such areas as are made available to the Secretary of the Interior for the purposes of this Act under sections 1 and 3, or by any other law, proclamation, or Executive order, shall be administered directly or under cooperative agreements entered into pursuant to the provisions of section 1 by the Secretary of the Interior under such rules and regulations for the conservation, maintenance, and manage-

ment of wildlife, resources thereof, and its habitat thereon, as may be adopted by him in accordance with general plans approved jointly by the Secretary of the Interior and the head of the department or agency exercising primary administration of such areas: *Provided*, That such rules and regulations shall not be inconsistent with the laws for the protection of fish and game of the States in which such area is situated.]

For the purpose of recognizing the vital contribution of our wildlife resources to the Nation, the increasing public interest and significance thereof due to expansion of our national economy and other factors, and

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to provide that wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation for the purposes of this Act in the United States, its Territories and possessions, the Secretary of the Interior is authorized (1) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in controlling losses of the same from disease or other causes, in minimizing damages from overabundant species, in providing public shooting and fishing areas, including easements across public lands for access thereto, and in carrying out other measures necessary to effectuate the purposes of this Act; (2) to make surveys and investigations of the wildlife of the public domain, including lands and waters or interests therein acquired or controlled by any agency of the United States; and (3) to accept donations of land and contributions of funds in furtherance of the purposes of this Act.

Sec. 2 (a) Except as hereafter stated in subsection (h) of this section, whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State wherein the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of

wildlife resources by preventing loss of and damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development.

(b) In furtherance of such purposes, the reports and recommendations of the Secretary of the Interior on the wildlife aspects of such projects, and any report of the head of the State agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the United States Fish and Wildlife Service and such State agency for the purpose of determining the possible damage to wildlife resources and for the purposes of determining means and measures that should be adopted to prevent the loss of or damage to such wildlife resources, as well as to provide concurrently for the development and improvement of such resources, shall be made an integral part of any report prepared or submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects when such reports are presented to the Congress or to any agency or person having the authority or the power, by administrative action, or otherwise,

(1) to authorize the construction of water-resource development projects or (2) to approve a report on the modification or supplementation of plans for previously authorized projects, to which this Act applies. Recommendations of the Secretary of the Interior shall be as specific as is practicable with respect to features recommended for wildlife conservation and development, lands to be utilized or acquired for such purposes, the results expected, and shall describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages. The re-

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porting officers in project reports of the Federal agencies shall give full consideration to the report and recommendations of the Secretary of the Interior and to any report of the State agency on the wildlife aspects of such projects, and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits.

(c) Federal agencies authorized to construct or operate water-control projects are hereby authorized to modify or add to the structures and operations of such projects, the construction of which has not been substantially completed on the date of enactment of the Fish and Wildlife Coordination Act, and to acquire lands in accordance with section 3 of this Act, in order to accommodate the means and measures for such conservation of wildlife resources as an integral part of such projects: Provided, That for projects authorized

for a specific Act of Congress before the date of enactment of the Fish and Wildlife Coordination Act (1) such modification or land acquisition shall be compatible with the purposes for which the project was authorized; (2) the cost of such modifications or land acquisition, as means and measures to prevent loss of and damage to wildlife resources to the extent justifiable, shall be an integral part of the cost of such projects; and (3) the cost of such modifications or land acquisition for the development or improvement of wildlife resources may be included to the extent justifiable, and an appropriate share of the cost of any project may be allocated for this purpose with a finding as to the part of such allocated cost, if any, to be reimbursed by non-Federal interests.

(d) The cost of planning for and the construction or installation and maintenance of such means and measures adopted to carry out the conservation purposes of this section shall constitute an integral part of the cost of such projects: Provided, That such cost attributable to the development and improvement of wildlife shall not extend beyond those necessary for (1) land acquisition, (2) modification of the project, and (3) modification of project operations; but shall not include the operation of wildlife facilities nor the construction of such facilities beyond those herein described: And provided further, That, in the case of projects authorized to be constructed, operated, and maintained in accordance with the Federal reclamation laws (Act of June 17, 1902; 32 Stat. 388, and Acts amendatory thereof or supplementary thereto), the Secretary of the Interior, in addition to allocations made under section 9 of the Reclamation Project Act of 1939 (53 Stat. 1187), shall make findings on the part of the estimated cost of the project which can properly be allocated to means and measures to prevent loss of and damage to wildlife resources, which costs shall not be reimbursable, and an appropriate share of the project costs may be allocated to development and improvement of wildlife resources, with a finding as to the part of such allocated costs, if any, to be reimbursed by non-Federal fish and wildlife agencies or interests.

(e) In the case of construction by a Federal agency, that agency is authorized to transfer to the United States Fish and Wildlife Service, out of appropriations or other funds made available for investigations, engineering, or construction, such funds as may be necessary to conduct all or part of the investigations required to carry out the purposes of this section.

(f) In addition to other requirements, there shall be included in any report submitted to Congress supporting a recommendation for authorization of any new project for the control or use of water as described herein

(including any new division of such project or new supplemental works on such project) an estimation of the wildlife benefits or losses to be derived therefrom including benefits to be derived from measures recommended specifically for the development and improvement of wildlife resources, the cost of providing wildlife benefits (including the cost of additional facilities to be installed or lands to be acquired specifically for that particular phase of wildlife conservation relating to the development and improvement of wildlife), the part of the cost of joint-use facilities allocated to wildlife, and the part of such costs, if any, to be reimbursed by non-Federal interests.

(g) The provisions of this section shall be applicable with respect to any project for the control or use of water as prescribed herein, or any unit of such project authorized before or after the date of enactment of the Fish and Wildlife Coordination Act for planning or construction, but shall not be applicable to any project or unit thereof authorized before the date of enactment of the Fish and Wildlife Coordination Act if the construction of the particular project or unit thereof has been substantially completed. A project or unit thereof shall be considered to be substantially completed when sixty percent or more of the estimated construction cost has been obligated for expenditure.

(h) The provisions of this Act shall not be applicable to those projects for the impoundment of water where the maximum surface area of such impoundments is less than ten acres, nor to activities for or in connection with programs primarily for land management and use carried out by Federal agencies with respect to Federal lands under their jurisdiction.

Sec. 3 (a) Subject to the exceptions prescribed in section 2 (h) of this Act, whenever the waters of any stream or other body of water are impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, adequate provision, consistent with the primary purposes of such impoundment, diversion, or other control, shall be made for the use thereof, together with any areas of land, water, or interests therein, acquired or administered by a Federal agency in connection therewith, for the conservation, maintenance, and management of wildlife resources thereof, and its habitat thereon, including the development and improvement of such wildlife resources pursuant to the provisions of section 2 of this Act.

(b) The use of such waters, land, or interests therein for wildlife conservation purposes shall be in accordance with general plans approved jointly (1) by the head of the particular department or

agency exercising primary administration in each instance, (2) by the Secretary of the Interior, and (3) by the head of the agency exercising the administration of the wildlife resources of the particular State wherein the waters and areas lie. Such waters and other interests shall be made available, without cost for administration, by such State agency, if the management of the properties relate to the conservation of wildlife other than migratory birds, or by the Secretary of the Interior, for administration in such manner as he may deem advisable, where the particular properties have value in carrying out the national migratory bird management program: Provided, That nothing in this section shall be construed as affecting the authority of the Secretary of Agriculture to cooperate with the States or in making lands available to the States with respect to the management of wildlife and wildlife habitat on lands administered by him.

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(c) When consistent with the purposes of this Act and the reports and findings of the Secretary of the Interior prepared in accordance with section 2, land, waters, and interests therein may be acquired by Federal construction agencies for the wildlife conservation and development purposes of this Act in connection with a project as reasonably needed to preserve and assure for the public benefit the wildlife potentials of the particular project area: Provided, That before properties are acquired for this purpose, the probable extent of such acquisition shall be set forth, along with other data necessary for project authorization, in a report submitted to the Congress, or in the case of a project previously authorized, no such properties shall be acquired unless specifically authorized by Congress, if specific authority for such acquisition is recommended by the construction agency.

(d) Properties acquired for the purposes of this section shall continue to be used for such purposes, and shall not become the subject of exchange or other transactions if such exchange or other transaction would defeat the initial purpose of their acquisition.

(e) Federal lands acquired or withdrawn for Federal water-resource purposes and made available to the States or to the Secretary of the Interior for wildlife management purposes, shall be made available for such purposes in accordance with this Act, notwithstanding other provisions of law.

(f) Any lands acquired pursuant to this section by any Federal agency within the exterior boundaries of a national forest shall, upon acquisition, be added to and become national forest lands, and shall be administered as a part of the forest within which they are situated, subject to all laws applicable to lands acquired under the provisions

of the Act of March 1, 1911 (36 Stat. 961), unless such lands are acquired to carry out the National Migratory Bird Management Program.

Sec. 4. Such areas as are made available to the Secretary of the Interior for the purposes of this Act, pursuant to sections 1 and 3 or pursuant to any other authorization, shall be administered by him directly or in accordance with cooperative agreements entered into pursuant to the provisions of the first section of this Act and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, as may be adopted by the Secretary in accordance with general plans approved jointly by the Secretary of the Interior and the head of the department or agency exercising primary administration of such areas: Provided, That such rules and regulations shall not be inconsistent with the laws for the protection of fish and game of the States in which such area is situated (16 U.S.C., sec. 664): Provided further, That lands having value to the National Migratory Bird Management Program may, pursuant to general plans, be made available without cost directly to the State agency having control over wildlife resources, if it is jointly determined by the Secretary of the Interior and such State agency that this would be in the public interest: And provided further, That the Secretary of the Interior shall have the right to assume the management and administration of such lands in behalf of the National Migratory Bird Management Program if the Secretary finds that the State agency has withdrawn from or otherwise relinquished such management and administration.

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1.27f(3) CONGRESSIONAL RECORD, VOL. 104 (1958)

1.27f(3)(a) July 21: Passed House, pp. 1440-1442

[No Relevant Discussion on Pertinent Section]

1.27f(3)(b) July 31: Passed Senate, p. 15713

[No Relevant Discussion on Pertinent Section]

1.27g FEDERAL WATER PROJECT RECREATION ACT

July 9, 1965, P.L. 89-72, §6(b), 79 Stat. 216

SEC. 6.

* * * * *

(b) The first proviso of subsection 2(d) of the Act of August 12,

1958 (72 Stat. 563; 16 U.S.C. 662 (d)), is amended to read as follows: "Provided, That such cost attributable to the development and improvement of wildlife shall not extend beyond that necessary for (1) land acquisition, (2) facilities as specifically recommended in water resource project reports, (3) modification of the project, and (4) modification of project operations, but shall not include the operation of wildlife facilities." The second proviso of subsection 2 (d) of said Act is hereby repealed.

* * * * *

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1.27g(1) SENATE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

S. REP. No. 149, 89th Cong., 1st Sess. (1965)

FEDERAL WATER PROJECT RECREATION ACT

APRIL 7, 1965.—Ordered to be printed

Mr. JACKSON, from the Committee on Interior and Insular Affairs,
submitted the following

REPORT

[To accompany S. 1229]

The Committee on Interior and Insular Affairs, to whom was referred the bill (S. 1229) to provide uniform policies with respect to recreation and fish and wildlife benefits and cost of Federal multiple-purpose water resource projects, and to provide the Secretary of the Interior with authority for recreation development of projects under his control, having considered the same, report favorably thereon with amendments and recommend that the bill, as amended, do pass.

BACKGROUND OF MEASURE

The Congress, the Bureau of the Budget, the Department of the Army, and the Department of the Interior have for some time been giving formal study to the subject of uniform cost allocations on water resource projects.

At the request of the Bureau of the Budget, Senator Jackson

introduced S. 1229 dealing with recreation and fish and wildlife policies in reclamation projects.

PURPOSE OF MEASURE

The principal purpose of S. 1229, as reported, is to establish prospective standard guidelines on the allocation of and the reimbursability of recreation and fish and wildlife costs on Federal multiple-purpose water-resource projects.

The bill also gives the Secretary of the Interior certain limited authority for recreation development on existing projects under his control.

The committee wishes to encourage, through its action on S. 1229, non-Federal development and operation of recreation and fish and wildlife enhancement features of Federal water resources projects except where such features meet the criteria for Federal administration.

[p. 1]

The committee finds the cost-sharing provisions proposed by the Bureau of the Budget to be reasonable. The committee recognizes that in a few instances, unusual circumstances may compel the Federal water resource agencies to recommend to the Congress exceptions to the general cost-sharing and reimbursement policy enunciated in this bill.

These cost-sharing provisions contemplate the Federal Government bearing all joint project costs allocated to recreation and fish and wildlife enhancement. The Federal Government, under the bill, could also bear up to one-half of the separable project costs allocated to these functions. The States, or local public bodies thereof, would reimburse the Federal Government for the remaining separable costs.

Joint costs, for example, include the cost of a dam to the extent it is common to all project purposes. Illustrations of separable costs are the costs of picnic tables, boat-launching ramps, lands, roads, or such project modifications as increasing the height of a dam or providing a subimpoundment specifically for recreation or fish and wildlife enhancement.

States, or local public bodies thereof, may pay or repay their share of the separable costs either through (1) payment in cost or by provision of lands or facilities needed for the project or through (2) repayment, within 50 years and with interest, from entrance and user fees collected at the projects by these entities.

The committee, not only in its examination of the more novel functions of Federal water projects such as recreation, but also in its review of such traditional project functions as power and irrigation,

believes that the Congress can better meet its responsibilities by requiring the specific approval by law or by direction of one of its Interior and Insular Affairs Committees before any major Department of the Interior water-project feasibility investigation may be undertaken.

The committee believes that the active participation of these committees in the Department of the Interior's project investigations process will substantially strengthen the Department's water-resource program and be to the mutual benefit of both that agency and the Congress.

[p. 2]

COMMITTEE AMENDMENTS

* * * * * * *

SEC. 6.

(b) Nothing in this Act shall be construed as amending the first proviso of subsection 2(d) of the Act of August 12, 1958 (72 Stat. 563; 16 U.S.C. 662 (d)), and the second proviso of subsection 2(d) of that Act is hereby repealed.

* * * * * * *

[p. 8]

Subsection 6(b) confirms the limitations of the first proviso of subsection 2(d) of the Fish and Wildlife Coordination Act (72 Stat. 563; 16 U.S.C. 622(d)) with respect to measures for the enhancement of fish and wildlife properly includeable in a Federal water resource project; it repeals the second proviso of that subsection of the Fish and Wildlife Coordination Act, which applies to projects constructed under reclamation law. The effect of the repeal of the second proviso is twofold: First, it will result in the costs of mitigation of project-occasioned damage to fish and wildlife being distributed among all project purposes the same as any other project cost; and, second, it will terminate the reimbursement policy for costs allocated to fish and wildlife enhancement now set out in the Fish and Wildlife Coordination Act so that the reimbursement policy established by this bill may take effect.

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1.27g(2) HOUSE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

H.R. REP. No. 254, 89th Cong., 1st Sess. (1965)

FEDERAL WATER PROJECT RECREATION ACT

APRIL 27, 1965.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. ASPINALL, from the Committee on Interior and Insular Affairs, submitted the following

REPORT

[To accompany H.R. 5269]

The Committee on Interior and Insular Affairs, to whom was referred the bill (H.R. 5269) to provide uniform policies with respect to recreation and fish and wildlife benefits and costs of Federal multiple-purpose water resource projects, and to provide the Secretary of the Interior with authority for recreation development of projects under his control, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment is as follows:

Strike out all after the enacting clause and insert the following language:

* * * * *

[p. 1]

SEC. 6.

* * * * *

(b) The first proviso of subsection 2(d) of the Act of August 21, 1958 (72 Stat. 563; 16 U.S.C. 662 (d)) is amended to read as follows: "*Provided*, That such cost attributable to the development and improvement of wildlife shall not extend beyond that necessary for (1) land acquisition, (2) facilities as specifically recommended in water resource project reports, (3) modification of the project, and (4) modification of project operations, but shall not include the operation of wildlife facilities." The second proviso of subsection 2(d) of said Act is hereby repealed.

[p. 3]

Subsection 6(b) amends the first proviso of subsection 2(d) of the

Fish and Wildlife Coordination Act (72 Stat. 563; 16 U.S.C. 622(d)) to make it clear that facilities recommended in project reports for fish and wildlife enhancement may be provided in accordance with the terms of this legislation and it repeals the second proviso of that subsection of the Fish and Wildlife Coordination Act, which applies to projects constructed under reclamation law. The effect of the repeal of the second proviso is twofold: first, it will result in the costs of mitigation of project-occasioned damage to fish and wildlife being distributed among all project purposes the same as other project costs; and, second, it will terminate the reimbursement policy for costs allocated to fish and wildlife enhancement now set out in the Fish and Wildlife Coordination Act so that the reimbursement policy established by this bill may take effect.

[p. 15]

SEC. 6.

* * * * *

(b) Nothing in this Act shall be construed as amending the first proviso of subsection 2 (d) of the Act of August 12, 1958 (72 Stat. 563; 16 U.S.C. 662(d)), and the second proviso of subsection 2 (d) of that Act is hereby repealed.

[p. 21]

1.27g(3) COMMITTEE OF CONFERENCE

H.R. REP. No. 538, 89th Cong., 1st Sess. (1965)

UNIFORM POLICIES ON MULTIPLE-PURPOSE WATER RESOURCE PROJECTS

JUNE 22, 1965.—Ordered to be printed

Mr. ASPINALL, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany S. 1229]

R E P O R T

The committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 1229) to pro-

vide uniform policies with respect to recreation and fish and wildlife benefits and costs of Federal multiple-purpose water resource projects, and for other purposes, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the Senate recede from its disagreement to the amendment of the House and agree to the same with an amendment as follows:

In lieu of the matter inserted by the House amendment insert the following:

* * * * *

[p. 1]

SEC. 6.

* * * * *

(b) *The first proviso of subsection 2 (d) of the Act of August 12, 1958 (72 Stat. 563; 16 U.S.C. 662 (d)), is amended to read as follows: "Provided, That such cost attributable to the development and improvement of wildlife shall not extend beyond that necessary for (1) land acquisition, (2) facilities as specifically recommended in water resource project reports, (3) modification of the project, and (4) modification of project operations, but shall not include the operation of wildlife facilities." The second proviso of subsection 2 (d) of said Act is hereby repealed.*

[p. 4]

1.27g(4) CONGRESSIONAL RECORD, VOL. 111 (1965)

1.27g(4)(a) April 13: Amended and passed Senate, p. 7891

[No Relevant Discussion on Pertinent Section]

1.27g(4)(b) May 18: Amended and passed House, p. 10881

Mr. ROGERS of Texas.

* * * * *

Subsection 6(b) amends the Fish and Wildlife Coordination Act in certain

respects to make it consistent with this legislation.

* * * * *

[p. 10881]

1.27g(4)(c) June 23: House agrees to conference report, p. 14464

[No Relevant Discussion on Pertinent Section]

1.27g(4)(d) June 25: Senate agrees to conference report, p. 14814

[No Relevant Discussion on Pertinent Section]

**1.28 PUBLIC WORKS AND ECONOMIC DEVELOPMENT
ACT OF 1965**

42 U.S.C. §3136 (1965)

**§3136. Sewer and other waste disposal facilities; certification by
Secretary of the Interior regarding adequate treatment
prior to discharge into streams**

No financial assistance, through grants, loans, guarantees, or otherwise, shall be made under this chapter to be used directly or indirectly for sewer or other waste disposal facilities unless the Secretary of the Interior certifies to the Secretary that any waste material carried by such facilities will be adequately treated before it is discharged into any public waterway so as to meet applicable Federal, State, interstate, or local water quality standards.

Pub.L. 89-136, Title I, §106, Aug. 26, 1965, 79 Stat. 554; 1966 Reorg. Plan No. 2, §1 (h) (3), eff. May 10, 1966, 31 F.R. 6857, 80 Stat. 1608.

Transfer of Functions. The functions of the Secretary of the Interior under this section which had been transferred to the Secretary of the Interior from the Secretary of Health, Education, and Welfare by Reorg. Plan No. 2 of 1966 were transferred to the Administrator of the Environmental Protection Agency by Reorg. Plan No. 3 of 1970, §2(a) (1), eff. Dec. 2, 1970, 35 F.R. 15623.

**1.28a PUBLIC WORKS AND ECONOMIC DEVELOPMENT
ACT OF 1965**

August 26, 1965, P.L. 89-136, §106, 79 Stat. 554

FINANCIAL ASSISTANCE FOR SEWER FACILITIES

SEC. 106. No financial assistance, through grants, loans, guarantees, or otherwise, shall be made under this Act to be used directly or indirectly for sewer or other waste disposal facilities unless the Secretary of Health, Education, and Welfare certifies to the Secretary that any waste material carried by such facilities will be adequately treated before it is discharged into any public waterway so as to meet applicable Federal, State, interstate, or local water quality standards.

[p. 554]

1.28a(1) SENATE COMMITTEE ON PUBLIC WORKS

S. REP. No. 193, 89th Cong., 1st Sess. (1965)

PUBLIC WORKS AND ECONOMIC DEVELOPMENT ACT
OF 1965

MAY 14, 1965.—Ordered to be printedFiled under authority of the order of the Senate of May 14, 1965

Mr. McNAMARA, from the Committee on Public Works, submitted
the following

REPORT

[To accompany S. 1648]

The Committee on Public Works to whom was referred the bill (S. 1648) to provide grants for public works and development facilities, other financial assistance, and the planning and coordination needed to alleviate conditions of substantial and persistent unemployment and underemployment in economically distressed areas and regions, and for other purposes, having considered the same report favorably thereon with amendments and recommend that the bill as amended do pass.

* * * * *

[p. 1]

1.28a(2) HOUSE COMMITTEE ON PUBLIC WORKS**H.R. REP. No. 539, 89th Cong., 1st Sess. (1965)****PUBLIC WORKS AND ECONOMIC DEVELOPMENT ACT
OF 1965**

JUNE 22, 1965.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BLATNIK, from the Committee on Public Works,
submitted the following

R E P O R T

[To accompany S. 1648]

The Committee on Public Works, to whom was referred the bill (S. 1648) to provide grants for public works and development facilities, other financial assistance and the planning and coordination needed to alleviate conditions of substantial and persistent unemployment and underemployment in economically distressed areas and regions, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment is as follows:

The amendment strikes out all of the Senate bill and inserts in lieu thereof a substitute which appears in the reported bill in italic type.

[p. 1]

1.28a(3) CONGRESSIONAL RECORD, VOL. 111 (1965)**1.28a(3)(a) June 1: Debated, amended and passed Senate, p. 12183**

[No Relevant Discussion on Pertinent Section]

1.28a(3)(b) Aug. 12: Debated, amended, and passed House, pp. 20250–20251

[No Relevant Discussion on Pertinent Section]

1.28a(3)(c) Aug. 16: Senate concurs in House amendments, p. 20571

[No Relevant Discussion on Pertinent Section]

1.28b REORGANIZATION PLAN NO. 2 OF 1966

80 Stat. 1608

Prepared by the President and transmitted to the Senate and the House of Representatives in Congress assembled, February 28, 1966, pursuant to the provisions of the Reorganization Act of 1949, 63 Stat. 203, as amended.

WATER POLLUTION CONTROL

SECTION 1. *Transfers of functions and agencies.* (a) Except as otherwise provided in this section, all functions of the Secretary of Health, Education, and Welfare and of the Department of Health, Education, and Welfare under the Federal Water Pollution Control Act, as amended, hereinafter referred to as the Act (33 U.S.C. 466 et seq.), including all functions of other officers, or of employees or agencies, of that Department under the Act, are hereby transferred to the Secretary of the Interior.

(b) The Federal Water Pollution Control Administration is hereby transferred to the Department of the Interior.

(c) (1) The Water Pollution Control Advisory Board, together with its functions, is hereby transferred to the Department of the Interior.

(2) The functions of the Secretary of Health, Education, and Welfare (including those of his designee) under section 9 of the Act shall be deemed to be hereby transferred to the Secretary of the Interior.

(3) The Secretary of Health, Education, and Welfare shall be an additional member of the said Board as provided for by section 9 of the Act and as modified by this reorganization plan.

(d) (1) The Hearing Boards provided for in sections 10(c) (4) and 10(f) of the Act, including any Boards so provided for which may be in existence on the effective date of this reorganization plan, together with their respective functions, are hereby transferred to the Department of the Interior.

(2) The functions of the Secretary of Health, Education, and Welfare under the said sections 10(c) (4) and 10(f) shall be deemed to be hereby transferred to the Secretary of the Interior.

(3) The Secretary of the Interior shall give the Secretary of Health, Education, and Welfare opportunity to select a member of each Hearing Board appointed pursuant to sections 10(c) (4) and 10(f) of the Act as modified by this reorganization plan.

(e) There are excepted from the transfers effected by subsection (a) of this section (1) the functions of the Secretary of Health, Education, and Welfare and the Assistant Secretary of Health, Education, and Welfare under clause (2) of the second sentence of 1(b) of the

Act, and (2) so much of the functions of the Secretary of Health, Education, and Welfare under section 3(b) (2) of the Act as relates to public health aspects.

(f) The functions of the Surgeon General under section 2(k) of the Water Quality Act of 1965 (79 Stat. 905) are transferred to the Secretary of Health, Education, and Welfare. Within 90 days after this reorganization plan becomes effective, the Secretary of the Interior and the Secretary of Health, Education, and Welfare shall present to the President for his approval an interdepartmental agreement providing in detail for the implementation of the consultations provided for by said section 2(k). Such interdepartmental agreement may be modified from time to time by the two Secretaries with the approval of the President.

[p. 1608]

(g) The functions of the Secretary of Health, Education, and Welfare under sections 2(b), (c), and (g) of the Water Quality Act of 1965 are hereby transferred to the Secretary of the Interior: *Provided*, That the Secretary of the Interior may exercise the authority to provide further periods for the transfer to classified positions in the Federal Water Pollution Control Administration of commissioned officers of the Public Health Service under said section 2(b) only with the concurrence of the Secretary of Health, Education, and Welfare.

(h) The functions of the Secretary of Health, Education, and Welfare under the following provisions of law are hereby transferred to the Secretary of the Interior:

(1) Section 702(a) of the Housing and Urban Development Act of 1965 (79 Stat. 490).

(2) Section 212 of the Appalachian Regional Development Act of 1965 (79 Stat. 16).

(3) Section 106 of the Public Works and Economic Development Act of 1965 (79 Stat. 554).

SEC. 2. Assistant Secretary of the Interior. There shall be in the Department of the Interior one additional Assistant Secretary of the Interior, who shall be appointed by the President, by and with the advice and consent of the Senate, who shall, except as the Secretary of the Interior may direct otherwise, assist the Secretary in the discharge of the functions transferred to him hereunder, who shall perform such other duties as the Secretary shall from time to time prescribe, and who shall receive compensation at the rate now or hereafter prescribed by law for Assistant Secretaries of the Interior.

SEC. 3. Performance of transferred functions. The provisions of sections 2 and 5 of Reorganization Plan No. 3 of 1950 (64 Stat. 1262) shall be applicable to the functions transferred hereunder to the

Secretary of the Interior to the same extent as they are applicable to the functions transferred to the Secretary thereunder.

SEC. 4. *Incidental provisions.* (a) So much of the personnel, property, records, and unexpended balances of appropriations, allocations, and other funds, employed, used, held, available, or to be made available in connection with the functions transferred to the Secretary of the Interior or the Department of the Interior by this reorganization plan as the Director of the Bureau of the Budget shall determine shall be transferred to the Department of the Interior at such time or times as the Director shall direct.

(b) Such further measures and dispositions as the Director of the Bureau of the Budget shall deem to be necessary in order to effectuate the transfers referred to in subsection (a) of this section shall be carried out in such manner as he shall direct and by such agencies as he shall designate.

(c) This reorganization plan shall not impair the transfer rights and benefits of commissioned officers of the Public Health Service provided by section 2 of the Water Quality Act of 1965.

SEC. 5. *Abolition of office.* (a) There is hereby abolished that office of Assistant Secretary of Health, Education, and Welfare the incumbent of which is on date of the transmittal of this reorganization plan to the Congress the Assistant Secretary of Health, Education, and Welfare designated by the Secretary of Health, Education, and Welfare under the provisions of section 1 (b) of the Act.

[p. 1609]

(b) The Secretary of Health, Education, and Welfare shall make such provisions as he shall deem to be necessary respecting the winding up of any outstanding affairs of the Assistant Secretary whose office is abolished by subsection (a) of this section.

[p. 1610]

1.28b(1) MESSAGE FROM THE PRESIDENT OF THE UNITED STATES

H.R. DOC. No. 388, 89th Cong., 2d Sess. (1966)

LETTER OF TRANSMITTAL

To the Congress of the United States:

I transmit herewith Reorganization Plan No. 2 of 1966, prepared in accordance with the provisions of the Reorganization Act of 1949, as amended, and providing for reorganization of certain water pollution control functions.

Thirty-five years ago Justice Oliver Wendell Holmes said: "A river is more than an amenity, it is a treasure."

Only recently has the truth of this observation entered the public conscience. For we now recognize that the Nation's rivers, far from being treasured, have been carelessly neglected for too long.

Today we face a harsh reality. Our waters are burdened with blight. We know that every river system in America suffers from some degree of pollution. This menace is growing more serious with every passing day.

We have just begun to take the steps to clean and restore our waters.

The task is immense. The journey will be long.

If our new programs are to succeed we must combine our efforts—Federal, State, local, and private—in new and creative partnerships.

The attack against water pollution should be unified and coordinated.

It should be carried forward as an integral part of comprehensive planning for the development of river basins.

But, most importantly, the Government's management structure must be strengthened and reshaped to meet the challenges that lie ahead.

In my February 23 message on the quality of our environment I stated:

* * * we must reorganize the Federal effort. In the past, the Federal anti-pollution effort has been organizationally separate from water conservation and use programs.

One agency should assume leadership in our clean water effort.

That agency should be the Department of the Interior.

The Department of the Interior, for many years, has been concerned with the comprehensive management and development of the Nation's water resources.

It plans, constructs, and operates multiple-purpose water and related land resources projects.

It carries on research and development on the removal of minerals from water.

It administers the Water Resources Research Act.

The Secretary of the Interior also serves as Chairman of the Water Resources Council responsible for coordinating river basin planning. Under the Clean Rivers Restoration Act of 1966 and other legislation

[p. III]

which I have recently proposed, the Secretary will become the focal point for Federal efforts in this area.

It is wise management to place under his control the related resources and authority now in the Department of Health, Education, and Welfare.

The reorganization plan maintains a proper and effective role for the Department of Health, Education, and Welfare with respect to the health aspects of pollution. At the same time it places in the Department of the Interior all of the necessary tools to move forward and drive to clean America's waters.

The reorganization plan herewith transmitted will transfer to the Secretary of the Interior the functions of the Department of Health, Education, and Welfare under the Federal Water Pollution Control Act except for responsibilities relating to public health for which the Department of Health, Education, and Welfare has special competence. That Department will retain responsibility under section 3(b) of the act for advising on public health questions involved in determinations by Federal agencies of the need for and value of the inclusion of storage for water quality control in Federal reservoirs. The Federal Water Pollution Control Administration would be transferred to the Department of the Interior.

The Secretary of the Interior in administering the act will also be required to consult with the Secretary of Health, Education, and Welfare on public health aspects relating to water pollution. This consultative responsibility is now vested in the Surgeon General by section 2(k) of the Water Quality Act of 1965. The plan transfers that responsibility to the Secretary of Health, Education, and Welfare.

The Water Pollution Control Advisory Board and the hearing boards provided for in the act would be transferred to the Department of the Interior, together with their respective functions. The reorganization plan also makes the Secretary of Health, Education, and Welfare a member of the Advisory Board and gives him the opportunity to select a member of each hearing board.

The reorganization plan would in no way impair the rights and benefits of commissioned officers of the Public Health Service who may transfer to the Water Pollution Control Administration.

The reorganization to be accomplished by the plan transmitted herewith will enable the Federal Government to organize for action against pollution on a river basin basis under the unified leadership of the Secretary of the Interior.

After investigation, I have found and hereby declare that each reorganization included in the accompanying reorganization plan is necessary to accomplish one or more of the purposes set forth in section 2(a) of the Reorganization Act of 1949, as amended. I have also found and hereby declare that it is necessary to include in the accompanying reorganization plan, by reason of the reorganizations made thereby, provision for the membership of the Secretary of Health, Education, and Welfare on the Water Pollution Control Advisory Board and for the appointment and compensation of an additional

Assistant Secretary of the Interior. The rate of compensation fixed for that officer is that which I have found to prevail in respect of comparable officers in the executive branch of the Government.

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The reorganizations provided for in the reorganization plan transmitted herewith will produce significant long-range savings and economies by reason of the efficiencies in organization and in the elimination of duplication of effort it will bring about. It is, however, impracticable to specify or itemize at this time the reductions of expenditures which it is probable will be brought about by the taking effect of the reorganizations included in the reorganization plan.

I recommend that the Congress allow the accompanying plan to become effective.

LYNDON B. JOHNSON.

THE WHITE HOUSE, *February 28, 1966.*

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1.29 RIVER AND HARBOR ACT OF 1910

33 U.S.C. §421 (1910)

33 §421. Deposit of refuse, etc., in Lake Michigan near Chicago

It shall not be lawful to throw, discharge, dump, or deposit, or cause, suffer, or procure, to be thrown, discharged, dumped, or deposited, 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 Lake Michigan, at any point opposite or in front of the county of Cook, in the State of Illinois, or the county of Lake in the State of Indiana, within eight miles from the shore of said lake, unless said material shall be placed inside of a breakwater so arranged as not to permit the escape of such refuse material into the body of the lake and cause contamination thereof; and no officer of the Government shall dump or cause or authorize to be dumped any material contrary to the provisions of this section: *Provided, however,* That the provisions of this section shall not apply to work in connection with the construction, repair, and protection of breakwaters and other structures built in aid of navigation, or for the purpose of obtaining water supply. Any person violating any provision of this section shall be guilty of a misdemeanor, and on conviction thereof shall be fined for each offense not exceeding \$1,000.

June 23, 1910, c. 359, 36 Stat. 593.

1.29a RIVER AND HARBOR ACT OF 1910**June 23, 1910, P.L. 61-245, 36 Stat. 593**

CHAP. 359.—An Act To prevent the dumping of refuse material in Lake Michigan at or near Chicago.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall not be lawful to throw, discharge, dump, or deposit, or cause, suffer, or procure, to be thrown, discharged, dumped, or deposited, 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 Lake Michigan, at any point opposite or in front of the county of Cook, in the State of Illinois, or the county of Lake in the State of Indiana, within eight miles from the shore of said lake, unless said material shall be placed inside of a breakwater so arranged as not to permit the escape of such refuse material into the body of the lake and cause contamination thereof; and no officer of the Government shall dump or cause or authorize to be dumped any material contrary to the provisions of this Act: *Provided, however,* That the provisions of this Act shall not apply to work in connection with the construction, repair, and protection of breakwaters and other structures built in aid of navigation, or for the purpose of obtaining water supply. Any person violating any provision of this Act shall be guilty of a misdemeanor, and on conviction thereof shall be fined for each offense not exceeding one thousand dollars.

Approved, June 23, 1910.

**1.29a(1) HOUSE COMMITTEE ON INTERSTATE AND
FOREIGN COMMERCE****H. R. REP. No. 1120, 61st Cong., 2d Sess. (1910)****TO PREVENT DUMPING OF REFUSE MATERIAL INTO LAKE
MICHIGAN**

APRIL 26, 1910.—Referred to the House Calendar and ordered to be printed.

Mr. STEVENS, from the Committee on Interstate and Foreign Commerce, submitted the following

R E P O R T :

[To accompany H. R. 18700.]

The Committee on Interstate and Foreign Commerce, to which was referred the bill (H.R. 18700) to prevent the dumping of refuse material in Lake Michigan at or near Chicago, having considered the same, beg leave to report the bill back with a recommendation that it be amended by inserting after the word "act," where it first occurs in line 1, page 2, the following:

Provided, however, That the provisions of this act shall not apply to work in connection with the construction, repair, and protection of breakwaters and other structures built in aid of navigation, or for the purpose of obtaining water supply.

As thus amended the committee recommend that the bill do pass.

The statement is made by the health authorities of the city of Chicago that at the present time about 2,000,000 cubic yards of material are dumped each year in Lake Michigan contiguous to Chicago, Hammond, Whiting, and East Chicago. A part of this is dredging done under contract between the United States, through the engineer office of the War Department, and dredging contractors. A part of it is done under contracts of various sorts between various people. Some of it is removed from water courses, placed on boats, and dumped in the lake. Most of it is removed from the land to boats and dumped into the lake for reasons of cheapness of disposition. A part of it represents trade waste so unpleasant that land disposition is objected to.

This material is dumped in areas in the lake established by the War Department engineer office. The two areas so designated are 1,000 feet offshore, opposite Fourteenth to Thirty-ninth streets, in

12 feet of water, and offshore near the mouth of the Calumet River.

The authority for the establishment of such dumps is set forth in the law as interpreted by Attorney-General Griggs under date of December 4, 1899. These locations were made some years ago and

[p. 1]

were determined upon after various conferences between the authorities representing the city of Chicago and the engineer office of the War Department.

The consideration responsible for the selection of these grounds on the part of the engineer office was economy of disposition. The consideration responsible for the acquiescence of the city of Chicago was that the sewers of the city were at that time emptying into Lake Michigan at various points along the shore from Evanston to Indiana Harbor; that therefore all of the water close inshore was polluted at that time, and that to further pollute that which was already polluted was better than to pollute waters which were free from pollution.

These dumping grounds having been established by the United States Government, and control of them being vested in the Government, they are made use of by other parties who deposit material in bulk in excess of that deposited by the Government, and much more offensive. In fact, there is no present proper control by which material of any character could be excluded from such dumping grounds.

In the last three years conditions have changed. No Chicago sewage now goes into Lake Michigan within miles of the Fourteenth to Thirty-ninth streets dumping ground in any direction. The shallow shore waters off the city are not materially polluted, as the character of the banks does not lead to the discharge of storm water into the lake.

We have, then, the south side dumping polluting waters which are relatively free from pollution. Many analyses demonstrate the truth of this statement. The Calumet dumping is done sometimes within 1,000 feet of the Hammond intake. When the wind is from the west most of this pollution is swept directly to the intakes of Hammond, East Chicago, and Whiting. When it is from the east it is swept directly to the Sixty-eighth street intake. Abundant analyses prove the truth of these statements.

The municipalities of northern Indiana located on Lake Michigan are planning to take care of their sewage. Their typhoid death rate is very high. They are meeting with some opposition from people who oppose the necessary expenditures, because it will be rendered futile by the dumping allowed by the Government. If this dumping ground is so placed as to be safe for the people of northern Indiana

then they will be willing to proceed with the necessary improvements. At least this is the judgment of those most in touch with the people of these towns.

This dumping zone is partly off the shore of Illinois and partly off the shore of Indiana. The water is 12 to 15 feet deep. At least once a month there is wind enough to stir the water to the entire depth and to scatter whatever may be lying loose on the bed of the lake. The deposited material is carried in part to the water intakes of Illinois and in part to the water intakes of Indiana.

The health authorities made their request to the engineer office of the War Department that these dumping grounds be changed to points 8 miles in the lake or else behind breakwaters. Their plea was that the water 8 miles out was more than 65 feet deep and that this is the greatest depth to which the waters of the lake are ever stirred; that therefore the dumped material would speedily sink to a

[p. 2]

depth where it would not be disseminated into the waters from which drinking water is taken; and that, lying beyond these depths, the organic part of it would be destroyed by fish, oxygen, and by those saprophytic bacteria tenacious of life at a temperature at which typhoid and the diarrhea organisms but feebly exist. Where the other alternative was used, the breakwater would serve to protect the general water area far better than it is at present protected.

On the presentation of their petition to General Marshall, Chief of Engineers, they were told that he sympathized with them in their desire to protect the lives and health of those under their care, but that the obligations of his office demanded that he pay attention to the economy of disposal. He suggested that they would have two remedies: The first, an appeal to Congress; the second, an appeal to the administrative discretion of the Secretary of War.

Section 13 of the rivers and harbors act of March 3, 1899, provided as follows:

That 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, ap-

ply 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 War, 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.

Section 4 of the rivers and harbors act of March 3, 1905, provided as follows:

That the Secretary of War is hereby authorized and empowered to prescribe regulations to govern the transportation and dumping into any navigable water or waters adjacent thereto of dredgings, earth, garbage, and other refuse materials of every kind or description, whenever in his judgment such regulations are required in the interest of navigation.

Under these provisions of law dumping is permitted in Lake Michigan in front of Chicago, within 1,000 feet of the shore line south of Sixteenth street, and also just outside of the harbor at South Chicago.

There are now no sewers emptying into the lake at Chicago, except those which empty into the Calumet River. That river now flows into the lake, but the War Department has declined to issue a permit to the local authorities to reverse the flow of the river, and the right of the local authorities to reverse the flow of the Calumet River, without obtaining a permit from the General Government, is now in litigation in the federal court.

There are several small sewers emptying into Lake Michigan from cities in Indiana, which cities are now studying the subject of the proper disposal of sewage. Chicago and other cities along the lake

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in the vicinity of Chicago depend upon Lake Michigan for their water supply. The local authorities at Chicago have expended upward of \$60,000,000 for the purpose of maintaining a pure-water supply in Lake Michigan and are now offering to spend further sums for the purpose of reversing the flow of the Calumet River, in order to prevent the sewage of that stream going into the lake. Where the refuse material, consisting often of rotten and decomposed matter, is dumped into the lake near the shore, it is washed up from the bottom with every storm and is spread in the water until at present it may and does reach the water tunnel intakes which supply the city with water.

No one will question the desirability of preventing the ordinary dumping of refuse in the lake, but some objection has been made to the requirement that contractors dredging the harbors and rivers at

government expense shall be required to carry their excavated material into the lake a distance of 8 miles, and the Chief of Engineers has suggested that this should only be required if the city of Chicago or other local authorities bear the added expense.

The provision of the bill is that such material shall be dumped either a distance of 8 miles from the shore or else behind closed breakwaters. The 8-mile limit is fixed by the bill, because that will carry the dumping out to where the water is about 65 feet in depth, and at that depth material on the bottom of the lake will not be disturbed by the wave action caused by storms. There is no way of ascertaining the increased expense in definite figures. Most of the excavated earth has been dumped behind breakwaters. The dumping in the open lake has usually been a character of material which was not suitable for filling. It would be impossible to correctly ascertain what would be the added expense by reason of the passage of this bill in case contracts shall hereafter be let for excavating in the harbors and rivers, but it is not likely that the added expense will be great.

Congress can if it chooses, when it provides for such improvements, make provision in regard to any supposed added expense.

The necessity for the passage of this bill is obvious and urgent. The water of Lake Michigan adjacent to several of the principal water tunnel intakes is becoming foul and dangerous to health, because of the dumping of refuse material in the lake. Delay is unsafe and extremely dangerous to health.

The passage of this bill is urged by the health authorities of the cities of Chicago; Lansing, Mich.; Grand Rapids, Mich.; Whiting, Ind.; La Fayette, Ind.; Milwaukee, Wis.; Evanston, Ill.; Wilmette, Ill.; and Garry and Hammond, Ind.; and other cities, and by the board of health of Michigan, Indiana, Wisconsin, and Illinois; by the Public Health and Marine-Hospital Service hospital at Chicago; the Illinois state water survey, sanitary district of Chicago; Chicago River and Harbor Association, and many others.

DEPARTMENT OF HEALTH,
Chicago, March 29, 1910.

MY DEAR SIR: We are sending you some photographs of scows that are loaded with refuse material. These scows are hauled out into the lake and their contents are dumped. The other set of photographs consists of pictures offshore at Jackson Park. They were furnished us by Superintendent Foster. This is stuff that has been dumped in the lake and that washes up on their shore.

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We get similar complaints from the Chicago Beach Hotel. They have brought us in letters bearing the address of Chicago firms. These letters were a part of the store refuse which had been dumped in the lake from scows and later

washed on the beach at Fifty-first street.

We have just had a telephone complaint that scows are dumping a greasy, tarry manufacturing waste.

Some part of this we are able to control under our present ordinances, and yet it is difficult. The other parts we can not think of controlling without additional legislation and your bill is just the type of legislation that is most needed.

We have other material to furnish you, should you desire it.

Yours, very truly,

W. A. EVANS, *Commissioner of Health.*

Hon. JAMES R. MANN.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, April 2, 1910.

SIR: 1. I have the honor to return herewith a letter dated January 20, 1910, from the Committee on Interstate and Foreign Commerce of the House of Representatives, inclosing, for the views of the War Department thereon, H. R. 18700, Sixty-first Congress, second session, "A bill to prevent the dumping of refuse material in Lake Michigan at or near Chicago."

2. It is proposed by the bill to make it unlawful to deposit refuse matter of any kind, other than that flowing in a liquid state from streets and sewers, into Lake Michigan within 8 miles of the shore opposite Cook County, Ill., and Lake County, Ind., unless such matter is inclosed within bulkheads so arranged as to prevent its escape into the body of the lake and cause contamination thereof.

3. The enactment of this measure is not needed in the interest of commerce and navigation, but its object is thought to be to protect the health of the local community which obtains its water supply from the lake.

4. The present general law, section 13 of the river and harbor act of March 3, 1899, makes it unlawful to deposit refuse matter into any navigable water of the United States, but provides that it shall not apply to the operations of the Federal Government in connection with the improvement of navigable waters, and that the Secretary of War, whenever in the judgment of the Chief of Engineers anchorage and navigation will not be injured thereby, may permit the deposit of such refuse matter within limits to be defined and under conditions to be prescribed by him. This law was intended for the protection of the interests of navigation and commerce and is thought to be sufficient for that purpose. It is also competent for the Secretary of War, in the exercise of the powers conferred upon him in respect to defining the limits and prescribing the conditions within and under which deposits of material may be allowed, to give consideration to questions of sanitation, and it has been his practice to do so. In pursuance of this law, he has from time to time defined the limits and prescribed the conditions for the deposit of refuse matter in the locality named in the bill, and the question of changing existing regulations to meet the wishes of the health authorities of the city of Chicago is now pending in the department.

5. A pure water supply is unquestionably a desideratum in any community and whatever tends to prevent its pollution and promote the health of the public is deserving of commendation. This has been universally recognized by the officers of the Federal Government charged with the prosecution of works of river and harbor improvement in the vicinity of Chicago, but lines 14 and 15, page 1, and part of line 1, page 2, appear to apply specifically to them. On the other hand, matter flowing from streets and sewers, a prolific source of contami-

nation, is expressly excepted from the material prohibited; this permits the local authorities to discharge disease-laden sewage into the waters of the lake without restriction.

6. The Federal Government has expended large sums of money for river and harbor improvement at this locality, and the river and harbor bill now pending in Congress carries appropriations for such work aggregating more than \$600,000. The cost to the Government of this and all future work of this kind will be materially increased should the bill under consideration be passed in its present form. Moreover, the proper enforcement of the law would call for constant and vigilant inspection, requiring a special organization of employees and vessels such as is provided for New York Harbor.

7. In the absence of suitable provision by Congress or the local authorities for such an organization, it is believed the actual pollution of the water supplies of the cities concerned, due to dumping near the intakes, particularly at night and in thick weather, would be greater than is possible under present conditions.

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8. As the present dumping grounds are unobjectionable from the standpoint of anchorage and navigation, an important question to consider in connection with the bill is to what extent the people of the United States should be taxed, not for the benefit of general commerce and navigation, but solely in the interest of local sanitation. If Congress should, in its wisdom, favor the bill it should be so amended as to provide that it shall not apply to the operations of the United States in connection with the repair and protection of breakwaters and other structures built in aid of navigation, nor prohibit the deposit around such structures of rock excavated in the vicinity, even though such material may not be entirely free from contamination. And, further, it is thought that the act should not become effective until the city of Chicago has made provision satisfactory to the Secretary of War for paying the cost of proper inspection and has either provided suitable dumping grounds behind bulkheads accessible to dump scows in which to deposit material dredged in the execution of government work, or has made provision for the extra expense of long hauls to which the Government will be subjected.

Very respectfully,

THE SECRETARY OF WAR.

W. L. MARSHALL,
Chief of Engineers, U.S. Army.

DEPARTMENT OF HEALTH,
Chicago, April 13, 1910.

MY DEAR SIR: Some days ago we sent you some pictures bearing on the matter of dumping in the lake.

Yesterday we attended a meeting of the Illinois Manufacturers' Association. This meeting was for the purpose of discussing disposal of city waste. The talk of greatest interest from our standpoint was that of Mr. Jackson. He told them that his disposal plant could take care of 10,000 cubic yards of waste a day; that they were now taking care of 3,000 a day, and that 1,500 of this 3,000 was factory and store waste which was hauled to the scows and then taken out into the lake.

The association did not go on record as favoring this disposal of waste, nor was anything said by anybody other than Mr. Jackson in its favor.

How is your bill coming on?

Yours, very truly,

W. A. EVANS,
Commissioner of Health.

HON. JAMES R. MANN.

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1.29a(2) COMMITTEE ON CONFERENCE

H. R. REP. No. 1613, 61st Cong., 2nd Sess. (1910)

[No Relevant Discussion of Pertinent Section]

1.29a(3) CONGRESSIONAL RECORD, VOL. 45 (1910):

1.29a(3) (a) May 2: Amended and passed House, p. 5672

[No Relevant Discussion of Pertinent Section]

1.29a(3) (b) May 12: Amended and passed Senate, p. 6119

[No Relevant Discussion of Pertinent Section]

1.29a(3) (c) June 16: Senate agreed to conference report, p. 8219

[No Relevant Discussion of Pertinent Section]

1.29a(3) (d) June 17: House agrees to conference report, p. 8439

[No Relevant Discussion of Pertinent Section]

1.30 SUPERVISORY HARBORS ACT OF 1888, AS AMENDED

33 U.S.C. §§ 441-451b (1958)

NEW YORK HARBOR, HARBOR OF HAMPTON ROADS, AND HARBOR OF BALTIMORE

§441. Deposit of refuse prohibited; penalty

The placing, discharging, or depositing, by any process or in any manner, of refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind, other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the waters of any harbor subject to sections 441 to 451b of this title, within the limits which shall be prescribed by the supervisor of the harbor, is strictly forbidden, and every such act is made a misdemeanor, and every person engaged in or who shall aid, abet, authorize, or instigate

a violation of this section, shall, upon conviction, be punishable by fine or imprisonment, or both, such fine to be not less than \$250 nor more than \$2,500, and the imprisonment to be not less than thirty days nor more than one year, either or both united, as the judge before whom conviction is obtained shall decide, one-half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor.

June 29, 1888, c. 496, §1, 25 Stat. 209; Aug. 28, 1958, Pub.L. 85-802, §1 (1), 72 Stat. 970.

§442. Liability of officers of towing vessel

Any and every master and engineer, or person or persons acting in such capacity, respectively, on board of any boat or vessel, who shall knowingly engage in towing any scow, boat, or vessel loaded with any such prohibited matter to any point or place of deposit, or discharge in the waters of any harbor subject to sections 441 to 451b of this title, or to any point or place elsewhere than within the limits defined and permitted by the supervisor of the harbor, shall be deemed guilty of a violation of section 441 of this title, and shall, upon conviction, be punishable as provided for offenses in violation of section 441 of this title, and shall also have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

June 29, 1888, c. 496, §2, 25 Stat. 209; Aug. 28, 1958, Pub.L. 85-802, §1 (2), 72 Stat. 970.

§443. Permit for dumping; penalty for taking or towing boat or scow without permit

In all cases of receiving on board of any scows or boats such forbidden matter or substance as described in section 441 of this title, the owner or master, or person acting in such capacity on board of such scows or boats, before proceeding to take or tow the same to the place of deposit, shall apply for and obtain from the supervisor of the harbor appointed, as provided in section 451 of this title, a permit defining the precise limits within which the discharge of such scows or boats may be made; and it shall not be lawful for the owner or master, or person acting in such capacity, of any tug or towboat to tow or move any scow or boat so loaded with such forbidden matter until such permit shall have been obtained; and every person violating the foregoing provisions of this section shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than \$1,000 nor less than \$500, and in addition thereto the master of any tug or towboat so offending shall have his license re-

voked or suspended for a term to be fixed by the judge before whom tried and convicted.

June 29, 1888, c. 496, §3, 25 Stat. 209; Aug. 18, 1894, c. 299, §3, 28 Stat. 360; May 28, 1908, c. 212, §8, 35 Stat. 426.

§444. Dumping at other place than designated dumping grounds; penalty; person liable; excuses for deviation

Any deviation from such dumping or discharging place specified in such permit shall be a misdemeanor, and the owner and master, or person acting in the capacity of master, of any scows or boats dumping or discharging such forbidden matter in any place other than that specified in such permit shall be liable to punishment therefor as provided in section 441 of this title; and the owner and master, or person acting in the capacity of master, of any tug or towboat towing such scows or boats shall be liable to equal punishment with the owner and master, or person acting in the capacity of master, of the scows or boats; and, further, every scowman or other employee on board of both scows and towboats shall be deemed to have knowledge of the place of dumping specified in such permit, and the owners and masters, or persons acting in the capacity of masters, shall be liable to punishment, as aforesaid, for any unlawful dumping, within the meaning of sections 441 to 452 of this title, which may be caused by the negligence or ignorance of such scowman or other employee; and, further, neither defect in machinery nor avoidable accidents to scows or towboats, nor unfavorable weather, nor improper handling or moving of scows or boats of any kind whatsoever shall operate to release the owners and master and employees of scows and towboats from the penalties mentioned in section 441 of this title.

June 29, 1888, c. 496, §3, 25 Stat. 209; Aug. 18, 1894, c. 299, §3, 28 Stat. 360; May 28, 1908, c. 212, §8, 35 Stat. 426.

§445. Equipment and marking of boats or scows

Every scow or boat engaged in the transportation of dredgings, earth, sand, mud, cellar dirt, garbage, or other offensive material of any description shall have its name or number and owner's name painted in letters and numbers at least fourteen inches long on both sides of the scow or boat; these names and numbers shall be kept distinctly legible at all times, and no scow or boat not so marked shall be used to transport or dump any such material. Each such scow or boat shall be equipped at all times with a life line or rope extending at least the length of and three feet above the deck thereof, such rope to be attached to the coaming thereof, also with a life preserver and a life buoy for each person on board thereof, also with

anchor to weigh not less than two hundred and seventy-five pounds, and at least one hundred feet of cable attached thereto; a list of the names of all men employed on any such scow or boat shall be kept by the owner or master thereof and the said list shall be open to the inspection of all parties. Failure to comply with any of the foregoing provisions shall render the owner of such scow or boat liable upon conviction thereof to a penalty of not more than \$500: *Provided*, That the requirements in regard to life line or rope contained in this section shall not apply to any scow or boat the deck outside the coaming or rail of which shall not exceed one foot in width: *And provided further*, That on any such scow or boat its name or number and owner's name painted in letters and numbers, at least fourteen inches long on both ends of such scow or boat, shall be a compliance with the provisions of this section in regard to name, number, and owner's name.

June 29, 1888, c. 496, §3, 25 Stat. 209; Aug. 18, 1894, c. 299, §3, 28 Stat. 360; May 28, 1908, c. 212, §8, 35 Stat. 426; Feb. 16, 1909, c. 132, 35 Stat. 623.

§446. Inspectors; appointment, powers, and duties

Each supervisor of a harbor is authorized and directed to appoint inspectors and deputy inspectors, and, for the purposes of enforcing sections 441 to 452 of this title, and of detecting and bringing to punishment offenders against the same, the said supervisor of the harbor, and the inspectors and deputy inspectors so appointed by him, shall have power and authority:

First. To arrest and take into custody, with or without process, any person or persons who may commit any of the acts or offenses prohibited by sections 441 to 451b of this title, or who may violate any of the provisions of the same: *Provided*, That no person shall be arrested without process for any offense not committed in the presence of the supervisor or his inspectors or deputy inspectors, or either of them: *And provided further*, That whenever any such arrest is made the person or persons 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 case of crimes against the United States.

Second. To go on board of any scow or towboat engaged in unlawful dumping of prohibited material, or in moving the same without a permit, as required in section 443 of this title, or otherwise violating any of the provisions of sections 443 to 448 of this title, and to seize and hold said boats until they are discharged by action of

the commissioner, judge, or court of the United States before whom the offending persons are brought.

Third. To arrest and take into custody any witness or witnesses to such unlawful dumping of prohibited material, the said witnesses to be released under proper bonds.

Fourth. To go on board of any towboat having in tow scows or boats loaded with such prohibited material, and accompany the same to the place of dumping, whenever such action appears to be necessary to secure compliance with the requirements of sections 441 to 452 of this title.

Fifth. To enter gas and oil works and all other manufacturing works for the purpose of discovering the disposition made of sludge, acid, or other injurious material, whenever there is good reason to believe that such sludge, acid, or other injurious material is allowed to run into tidal waters of the harbor in violation of section 441 of this title.

June 29, 1888, c. 496, § 3, 25 Stat. 209; Aug. 18, 1894, c. 299, § 3, 28 Stat. 360; May 28, 1908, c. 212, § 8, 35 Stat. 426; Aug. 28, 1958, Pub.L. 85-802, § 1 (3), 72 Stat. 970.

§447. Bribery of inspector; penalty

Every person who, directly or indirectly, gives any sum of money or other bribe, present, or reward, or makes any offer of the same to any inspector, deputy inspector, or other employee of the office of any supervisor of a harbor with intent to influence such inspector, deputy inspector, or other employee to permit or overlook any violation of the provisions of sections 441 to 451b of this title, shall, on conviction thereof, be fined not less than \$500 nor more than \$1,000, and be imprisoned not less than six months nor more than one year.

June 29, 1888, c. 496, § 3, 25 Stat. 209; Aug. 18, 1894, c. 299, § 3, 28 Stat. 360; May 28, 1908, c. 212, § 8, 35 Stat. 426; Aug. 28, 1958, Pub.L. 85-802, § 1 (4), 72 Stat. 970.

§448. Return of permit; penalty for failure to return

Every permit issued in accordance with the provisions of section 443 of this title, which may not be taken up by an inspector or deputy inspector, shall be returned within four days after issuance to the office of the supervisor of the harbor; such permit shall bear an indorsement by the master of the towboat, or the person acting in such capacity, stating whether the permit has been used, and, if so, the time and place of dumping. Any person violating the provi-

sions of this section shall be liable to a fine of not more than \$500 nor less than \$100.

June 29, 1888, c. 496, § 3, 25 Stat. 209; Aug. 18, 1894, c. 299, § 3, 28 Stat. 360; May 28, 1908, c. 212, § 8, 35 Stat. 426.

§449. Disposition of dredged matter; persons liable; penalty

All mud, dirt, sand, dredgings, and material of every kind and description whatever taken, dredged, or excavated from any slip, basin, or shoal in any harbor subject to sections 441 to 451b of this title, and placed on any boat, scow, or vessel for the purpose of being taken or towed upon the waters of that harbor to a place of deposit, shall be deposited and discharged at such place or within such limits as shall be defined and specified by the supervisor of the harbor, as in section 443 of this title prescribed, and not otherwise. Every person, firm, or corporation being the owner of any slip, basin, or shoal, from which such mud, dirt, sand, dredgings, and material shall be taken, dredged, or excavated, and every person, firm, or corporation in any manner engaged in the work of dredging or excavating any such slip, basin, or shoal, or of removing such mud, dirt, sand, or dredgings therefrom, shall severally be responsible for the deposit and discharge of all such mud, dirt, sand, or dredgings at such place or within such limits so defined and prescribed by said supervisor of the harbor; and for every violation of the provisions of this section the person offending shall be guilty of an offense, and shall be punished by a fine equal to the sum of \$5 for every cubic yard of mud, dirt, sand, dredgings, or material not deposited or discharged as required by this section.

June 29, 1888, c. 496, § 4, 25 Stat. 210; Aug. 28, 1958, Pub.L. 85-802, § 1(5), 72 Stat. 970.

§450. Liability of vessel

Any boat or vessel used or employed in violating any provision of sections 441 to 451b of this title, shall be liable to the pecuniary penalties imposed thereby, and may be proceeded against, summarily by way of libel in any district court of the United States having jurisdiction thereof.

June 29, 1888, c. 496, § 4, 25 Stat. 210.

§451. Supervisor of harbor; appointment and duties

An officer of the Corps of Engineers shall, for each harbor subject to sections 441 to 451b of this title, be designated by the Secretary of the Army as supervisor of the harbor, to act under the direction of the Chief of Engineers in enforcing the provisions of sec-

tions 441 to 451b of this title, and in detecting offenders against the same. Each such officer shall have personal charge and supervision under the Chief of Engineers, and shall direct the patrol boats and other means to detect and bring to punishment offenders against the provisions of said sections.

June 29, 1888, c. 496, § 5, 25 Stat. 210; June 29, 1949, c. 278, 63 Stat. 300; July 12, 1952, c. 707, 66 Stat. 596; Aug. 28, 1958, Pub.L. 85-802, § 1(6), 72 Stat. 970.

§451a. Harbors subject to sections 441 to 451b of this title

The following harbors shall be subject to sections 441 to 451b of this title:

- (1) The harbor of New York.
- (2) The harbor of Hampton Roads.
- (3) The harbor of Baltimore.

June 29, 1888, c. 496, § 6, 25 Stat. 210; Aug. 28, 1958, Pub.L. 85-802, § 1(7), 72 Stat. 970.

§451b. Same; waters included

For the purposes of sections 441 to 451b of this title—

(1) The term "harbor of New York" means the tidal waters of the harbor of New York, its adjacent and tributary waters, and those of Long Island Sound.

(2) The term "harbor of Hampton Roads" means the tidal waters of the harbors of Norfolk, Portsmouth, Newport News, Hampton Roads, and their adjacent and tributary waters, so much of the Chesapeake Bay and its tributaries as lies within the State of Virginia, and so much of the Atlantic Ocean and its tributaries as lies within the jurisdiction of the United States within or to the east of the State of Virginia.

(3) The term "harbor of Baltimore" means the tidal waters of the harbor of Baltimore and its adjacent and tributary waters, and so much of Chesapeake Bay and its tributaries as lie within the State of Maryland.

June 29, 1888, c. 496, § 7, as added Aug. 28, 1958, Pub.L. 85-802, § 1(8), 72 Stat. 970.

1.30a NEW YORK HARBOR ACT OF 1888

June 29, 1888, P.L. 50-496, 25 Stat. 209

CHAP. 496.—An act to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the placing, discharging, or depositing, by any process or in any manner, of refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind, other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the tidal waters of the harbor of New York, or its adjacent or tributary waters, or in those of Long Island Sound, within the limits which shall be prescribed by the supervisor of the harbor, is hereby strictly forbidden, and every such act is made a misdemeanor, and every person engaged in or who shall aid, abet, authorize, or instigate a violation of this section, shall, upon conviction, be punishable by fine or imprisonment, or both, such fine to be not less than two hundred and fifty dollars nor more than two thousand five hundred dollars, and the imprisonment to be not less than thirty days nor more than one year, either or both united, as the judge before whom conviction is obtained shall decide, one half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor.

SEC. 2. That any and every master and engineer, or person or persons acting in such capacity, respectively, on board of any boat or vessel, who shall knowingly engage in towing any scow, boat, or vessel loaded with any such prohibited matter to any point or place of deposit, or discharge in the waters of the harbor of New York, or in its adjacent, or tributary waters, or in those of Long Island Sound, or to any point or place elsewhere than within the limits defined and permitted by the supervisor of the harbor hereinafter mentioned, shall be deemed guilty of a violation of this act, and shall, upon conviction, be punishable as hereinbefore provided for offenses in violation of section one of this act, and shall also have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

SEC. 3. That in all cases of receiving on board of any scows or boats such forbidden matter or substance as herein described, it shall be the duty of the owner or master, or person acting in such capacity, on board of such scows or boats, before proceeding to take or tow the same to the place of deposit, to apply for and obtain from the supervisor of the harbor appointed hereunder a permit defining the precise limits within which the discharge of such scows or boats may be

made; and any deviation from such dumping or discharging place specified in such permit shall be a misdemeanor within the meaning of this act; and the master and engineer, or person or persons acting in such capacity, on board of any tow-boat towing such scows or boats, shall be equally guilty of such offense with the master or person acting in the capacity of master of the scow, and be liable to equal punishment.

SEC. 4. That all mud, dirt, sand, dredgings, and material of every kind and description whatever taken, dredged, or excavated from any slip, basin, or shoal in the harbor of New York, or the waters adjacent or tributary thereto, and placed on any boat, scow, or vessel for the purpose of being taken or towed upon the waters of the harbor of New York to a place of deposit, shall be deposited and discharged at such place or within such limits as shall be defined and specified by the supervisor of the harbor, as in the third section of this act prescribed, and not otherwise. Every person, firm, or corporation being the owner of any slip, basin, or shoal, from which such mud, dirt, sand, dredgings, and material shall be taken, dredged, or excavated, and every person, firm, or corporation in any manner engaged in the work of dredging or excavating any such slip, basin, or shoal, or of removing such mud, dirt, sand, or dredgings therefrom, shall severally be responsible for the deposit and discharge of all such mud, dirt, sand, or dredgings at such place or within such limits so defined and prescribed by said supervisor of the harbor; and for every violation of the provisions of this section the person offending shall be guilty of an offense against this act, and shall be punished by a fine equal to the sum of five dollars for every cubic yard of mud, dirt, sand, dredgings, or material not deposited or discharged as required by this section. Any boat or vessel used or employed in violating any provision of this act, shall be liable to the pecuniary penalties imposed thereby, and may be proceeded against, summarily by way of libel in any district court of the United States, having jurisdiction thereof.

SEC. 5. That a line officer of the Navy shall be designated by the President of the United States as supervisor of the harbor, to act under the direction of the Secretary of War in enforcing the provisions of this act, and in detecting offenders against the same. This officer shall receive the sea-pay of his grade, and shall have personal charge and supervision under the Secretary of War, and shall direct the patrol boats and other means to detect and bring to punishment offenders against the provisions of this act.

SEC. 6. That the sum of thirty thousand dollars or so much thereof as may be necessary, is hereby appropriated to carry out the provisions of this act; and the Secretary of the Treasury is hereby author-

ized to pay that sum from moneys in the Treasury not otherwise appropriated.

Approved, June 29, 1888.

1.30a(1) SENATE COMMITTEE ON COMMERCE

S. REP. No. 224, 50th Cong., 1st Sess. (1888)

IN THE SENATE OF THE UNITED STATES.

FEBRUARY 9, 1888.—Ordered to be printed.

Mr. DOLPH, from the Committee on Commerce, submitted the following

REPORT:

[To accompany bill S. 27.]

The Committee on Commerce, to whom was referred the bill (S. 27) to prevent the obstruction of navigable waters and to protect public works against trespass or injury, having had the same under consideration, respectfully report the same back favorably with amendments.

The bill is substantially like one reported favorably from the Senate Committee on Commerce at the Forty-ninth Congress. It has been referred to the Secretary of War and meets with his approval, as will appear from the following letter:

WAR DEPARTMENT,

Washington City, December 29, 1887.

SIR: I have the honor to acknowledge the receipt of a letter of the 15th instant from the clerk of your committee, inclosing, for such suggestions as may be deemed proper, Senate bill 27, Fiftieth Congress, first session, "to prevent the obstruction of navigable waters, and to protect public works against trespass or injury."

In reply I beg to advise you that the Chief of Engineers reports that the bill is substantially in accord with the draft of a bill for the same purpose, submitted from his office to comply with the requirements of section 3 of the river and harbor act of August 14, 1876, and that it is believed that it will accomplish the purpose for which it is designed.

A copy of Appendix W of the annual report of the Chief of Engineers for 1877, containing his letter in reference to the subject and the draft of the bill referred to, are inclosed.

The views of the Chief of Engineers are concurred in by the Department.

Very respectfully, your obedient servant,

WILLIAM C. ENDICOTT,
Secretary of War.

Hon. W. P. FRYE,

Chairman Committee on Commerce, United States Senate.

The following is a copy of Appendix W of the Annual Report of the Chief of Engineers for 1877 referred to in the above letter:

W 3.

PROTECTION OF PUBLIC WORKS AGAINST TRESPASS OR INJURY.

OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., January 13, 1877.

SIR: With the view to a compliance with the third section of the river and harbor act of August 14, 1876, which requires a report to Congress of all the instances in which piers, breakwaters, or other structures built by the United States in aid of

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commerce or navigation are used, occupied, or injured by a corporation or an individual, and the extent and mode of such use or injury, and the facts touching the same, and also what legislation is necessary to protect public works constructed by the United States against trespass or injury thereto, I instructed the officers and agents of this office in charge of public works to report all such instances within their knowledge, and also their views as to the legislation which would best prevent the evils in question.

It appears that, with the exception of the occupancy of the East Pier at Cleveland, Ohio, by the Pittsburgh and Cleveland Railroad Company, the terms of which are now being adjusted, there has not been to any serious or great extent injurious use or occupation of structures or works built by the United States to report to this office.

There have been instances of temporary occupation of piers as landing-places for cargoes which, by their weight, might injure the works; but in most cases the practice was discontinued upon notification.

There are instances of injury to piers from collision of vessels, from carelessness as well as from unavoidable causes.

There are also instances of willful injury arising from the pulling up of the deck-planks of wooden piers for the purpose of tying vessels.

There are instances of serious injury to navigable waters by the discharge of sawmill waste into streams; also from booms for logs being placed in such a way as to seriously, and sometimes totally, impede navigation, and also instances of removal of stone from wing-dams, and of breaking openings through them for the passage of small boats or running of logs, thus rendering the dams incapable of effecting the object for which they were built.

There are instances of injury to water-gauges permanently established for the record of fluctuations of water-surface.

In fair-ways of harbors, channels are injured from deposits of ballast, steam-boat ashes, oysters, and rubbish from passing vessels.

In some instances the local authorities have exercised a control over the public

works in their vicinity, and in most cases the trespass or injury has been corrected upon notification.

So long as works are in progress and in charge of an officer or agent these evils are rare, but as they pass out of his hands they are at the mercy of evil-disposed persons, and it would be well under those circumstances to make it the duty of all officers of the Government, especially custom-house and revenue officers and light-house keepers, to report all cases of trespass or injury coming under their observation, either to their own department or to the nearest United States district attorney.

In many cases of harbor improvements on the lakes the Government has not acquired title to the land on which the structure is built, so that it is a question as to the right of the Government to prevent the use of the piers by the owners of the adjacent land and prevent them from having access to the stream. In the case of breakwaters isolated from the shore and resting on land owned by the United States, or State, the question of control is simple.

The object of these works being for the benefit of commerce, there should be no objection to their occupancy by private parties or corporations when finished, provided that the improvement of navigation for which they were built is unimpaired and the Government relieved of the expense of maintaining them.

A majority of the officers and agents of this office in charge of public works deem the penalty inflicted by the concluding paragraph of section 3 of the act of August 14, 1876, a sufficient protection, but it has also been suggested that its provisions should be extended so as—

(1) To cover all cases of trespass on United States grounds and structures.

(2) To cover all cases of neglect as well as willful injury.

(3) To cover not only river, harbor, and navigation works, but also all structures or marks established by the United States, so as to include all boundary-marks, tide-gauges, stations, buoys, etc.

The special act of Congress (see vol. 18, Statutes at Large, part 3, p. 50) for the protection of the work in progress for the improvement of the navigation of the mouths of the Mississippi by dredging has proved defective, inasmuch as it requires proof of malice or intention, instead of simple proof of fact of injury or impediment to navigation.

In the case of the Louisville and Portland Canal, and at the Harbor of Refuge at Sand Beach, Lake Huron, experience has shown the necessity of some enactment to regulate the movement of vessels therein, to avoid danger to vessels and injury to the works. I have already, on the 29th February last, submitted a letter from Major Weitzel, Corps of Engineers, with inclosed form of an act which he recommends should be enacted by Congress for the government and control of this harbor of refuge. This was embodied in bill H. R. No. 2927 of last session of Congress.

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To cover all cases of trespass and injury herein mentioned, and to conform as near as may be to the conditions required, I beg leave to suggest, as a modification of House bill No. 1079, of the last session of Congress, the inclosed form of an act which may cover all cases likely to arise, including the control of the Harbor of Refuge on Lake Huron, and of the Louisville and Portland Canal.

Very respectfully, your obedient servant,

A. A. HUMPHREYS,

Brig. Gen. and Chief of Engineers.

Hon. J. D. CAMERON,

Secretary of War.

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1.30a(2) HOUSE COMMITTEE ON COMMERCE**H.R. REP. No. 1963, 50th Cong., 1st Sess. (1888)****NEW YORK HARBOR.**

APRIL 27, 1888.—Committed to the Committee of the Whole House on the state of the Union and ordered to be printed.

Mr. BRYCE, from the Committee on Commerce, submitted the following

R E P O R T :

[To accompany bill S. 1241.]

The Committee on Commerce, to whom was referred the bill (S. 1241) "to prevent obstructive and injurious deposits in the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses," have had same under consideration, and beg leave to report it back to the House with amendments, which makes its provisions similar to those of the House bill heretofore reported, and already on the Calendar of the House, with a favorable recommendation from your committee.

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1.30a(3) CONGRESSIONAL RECORD, VOL. 19 (1888):

1.30a(3)(a) March 21, April 6: Debated, amended and passed Senate, pp. 2300–2301, 2775

[No Relevant Discussion of Pertinent Section]

1.30a(3)(b) June 4: Debated, amended and passed House, pp. 4889–4890

DEPOSITS IN NEW YORK HARBOR.

Mr. COX. I ask unanimous consent that the Committee of the Whole on the state of the Union be discharged from the further consideration of Senate bill 1241, to prevent obstructive and injurious deposits in the harbor and adjacent waters of New York. A similar bill has been reported from the Committee on Commerce of this House, and I now ask unanimous consent that the Senate bill be substituted for the House bill and be put upon its passage.

* * * * *

The SPEAKER *pro tempore*. Is there objection to the request of the gentleman from New York?

Mr. ROGERS. Mr. Speaker, I reserve the point of order, for the purpose of trying to learn something about this bill. I do not want to object at this time, but I would like to know what committee reported this bill.

Mr. COX. A bill for this purpose has been reported by my colleague [Mr. BRYCE] from the Committee on Commerce. Several times in several Congresses this measure substantially has been reported. The Senate bill which I ask to have substituted is almost identical with the House bill reported by my colleague. A bill almost similar with this—introduced by myself—passed this House in the Forty-seventh Congress. It was upon a river and harbor bill, and was eliminated from it in the Senate as being rather incongruous upon that bill.

Mr. ROGERS. Has it passed the Senate?

Mr. COX. It has.

Mr. ROGERS. What committee reported it there?

Mr. COX. The Committee on Commerce.

Mr. ROGERS. Let me make another inquiry: What court has jurisdiction of the offenses described in the bill?

Mr. SPINOLA. Any district court of the United States.

Mr. COX. I will state for the information of the House that a Federal bill, like this, is rendered necessary, because these waters come within the jurisdiction of two States—New Jersey and New York; and unless we have Federal jurisdiction over them we can never protect the harbor from the continual dumping that is shoaling it to its ruin. The Committees on Commerce of the House and of the Senate have approved and reported this bill.

Mr. BLANCHARD. In what respect does the Senate bill, which the gentleman proposes to substitute, differ from the House bill?

Mr. COX. It does not differ except in the situation—the Senate has passed the bill and we have not.

[p. 4889]

Mr. FARQUHAR. Does it not differ also in respect to the commission? The original bill proposed a commission. The Senate bill puts the matter under the control of the supervisor of the harbor.

Mr. COX. The House bill introduced by myself struck out the commission, and left the matter under the control of the supervisor of the harbor. He is to be under the control of the War Department, because the engineers have control of harbor improvements, and harmony of action is a *desideratum*.

Mr. ROGERS. Mr. Speaker, the object of this bill is undoubtedly very laudable, and I am in favor of it so far as I understand the measure; but I think this is a most important matter and that we ought to hear the Senate bill read. I make that suggestion because of the great confusion that was in the Hall while the bill was being read.

The SPEAKER *pro tempore*. It was the Senate bill that was read.

Mr. ROGERS. Then I have got the wrong bill. I still reserve the point of order until I can hear further from the gentleman from New York.

Mr. REED. What is the meaning of section 5?

Mr. SPINOLA. Section 5 is wrong in the Senate bill.

Mr. REED. Section 5 can not mean anything.

Mr. COX. I desire to have the Senate bill pass.

Mr. REED. But the Senate bill has a section, section 5, providing for the meetings of a board, and there is no board provided for in the bill.

Mr. COX. That has been stricken out in the Senate. It has no place in the bill before us. It is a mistake.

Mr. BLAND called for the regular order, but subsequently withdrew the call.
Mr. SPINOLA. I ask that section 5 of the Senate bill be read.

The Clerk read as follows:

That a suitable office for the meetings of the board shall be provided in some building of the General Government in New York City or its vicinity.

Mr. COX. That has been stricken out.

Mr. BLANCHARD. Let the amendment relating to that section be read.

The SPEAKER *pro tempore*. The Clerk informs the Chair that there is no amendment relating to that section.

Mr. COX. What we want is the Senate bill in its entirety.

Mr. BLANCHARD. Does section 5 provide for a commission?

Mr. COX. It does not.

Mr. BLANCHARD. Then what is the meaning of the language which has been read?

Several MEMBERS. It ought to be struck out.

Mr. COX. I desire to move to strike out section 5 if it is in the bill.

The SPEAKER *pro tempore*. The bill is not before the House.

Mr. COX. I am aware of that. I ask unanimous consent that the Senate bill and this amendment be considered as pending.

Mr. ROGERS. Mr. Speaker, what I am most interested in with reference to this bill is a point which has recently come before the Judiciary Committee of the House and has had a most careful consideration by it. It is the question whether or not Congress has constitutional power to confer upon the courts of the United States criminal jurisdiction over the inland waters of the country. If we have complete jurisdiction it must extend, I take it, to every navigable river of the United States upon which there is any interstate commerce. It certainly goes this far, if it does not extend to all the navigable waters. Now, I regard this as an exceedingly doubtful power. Our Government has now been in existence a hundred years, and we have never until the present Congress undertaken to exercise criminal jurisdiction over the Great Lakes.

Mr. COX. This bill has reference to maritime cases—to Federal waters.

Mr. ROGERS. I am referring to criminal jurisdiction. The maritime jurisdiction of the United States extends over the Great Lakes, of course.

Several MEMBERS. No doubt of that.

Mr. COX. This bill only proposes to extend jurisdiction over tide-water.

Mr. ROGERS. But you say "the harbor of New York or its adjacent or tributary waters or those of Long Island Sound."

Mr. COX. Those are tide-waters. The tide runs nearly a hundred miles up the Hudson, certainly as far as Poughkeepsie.

Mr. ROGERS. I do not profess to be very familiar with the geography of that part of the country, and upon the assurance of the gentleman from New York I withdraw my objection to the consideration of the bill.

There being no objection, the House proceeded to the consideration of the bill.

Mr. COX. I move to amend by striking out section 5.

The amendment was agreed to.

The SPEAKER *pro tempore*. Several amendments to this bill have been reported by the Committee on Commerce.

The amendments reported by the Committee on Commerce were read, as follows:

After the word "waters," in line 8, section 1, insert "or in those of Long Island Sound."

At the end of section 1, add "one-half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor."

After the words "harbor of New York," in line 6, section 2, insert "or in its adjacent or tributary waters or in those of Long Island Sound."

The SPEAKER *pro tempore*. If there be no objection, the question on these amendments will be taken in gross.

The amendments were agreed to.

Mr. SPINOLA. I move to amend the fourth section by adding the provision which I send to the desk.

The Clerk read as follows:

Any boat or vessel used or employed in violating any provision of this act shall be liable to the pecuniary penalties imposed thereby, and may be proceeded against summarily by way of libel in any district court of the United States having jurisdiction thereof.

Mr. COX. I have no objection to that amendment. It strengthens the bill. It gives it a vigorous penalty which will assist its enforcement.

Mr. FARQUHAR. And makes it more clear.

The amendment was agreed to.

Mr. SOWDEN. I move to amend by inserting after the word "dollars," in line 1, section 7, the words "or so much thereof as may be necessary."

Mr. COX. There is no objection to that amendment.

Mr. FARQUHAR. That is correct.

The amendment was agreed to.

Mr. BUCHANAN. My observation has been that the prescribing of minimum terms of imprisonment very often prevents conviction. I therefore move to amend section 1 by striking out, in line 17, the words "less than thirty days nor;" so that the clause will read "and the imprisonment not to be more than one year," etc.

Mr. ROGERS and others. That is right.

The amendment was agreed to.

Mr. COX. I now call the previous question.

The previous question was ordered; and under the operation thereof the bill as amended was ordered to a third reading, was accordingly read the third time, and passed.

Mr. COX moved to reconsider the vote by which the bill was passed; and also moved that the motion to reconsider be laid on the table.

The latter motion was agreed to.

The SPEAKER *pro tempore*. If there be no objection, House bill No. 8947, now on the Calendar, and similar in substance to the Senate bill just passed, will be laid on the table.

There was no objection, and it was ordered accordingly.

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1.30a(3)(c) June 14: Senate concurs in House amendments, p. 5239 [No Relevant Discussion of Pertinent Section]

1.30b RIVER AND HARBOR ACT OF 1894

August 18, 1894, P.L. 53-299, §§3, 5, 28 Stat. 360

SEC. 3. That section three of the "Act to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such

offenses," approved June twenty-ninth, eighteen hundred and eighty-eight, shall be, and hereby is, amended so as to read as follows:

"SEC. 3. That in all cases of receiving on board of any scows or boats such forbidden matter or substance as herein described, the owner or master, or person acting in such capacity on board of such scows or boats, before proceeding to take or tow the same to the place of deposit, shall apply for and obtain from the supervisor of the harbor appointed hereunder a permit defining the precise limits within which the discharge of such scows or boats may be made; and it shall not be lawful for the owner or master, or person acting in such capacity, of any tug or towboat to tow or move any scow or boat so loaded with such forbidden matter until such permit shall have been obtained; and every person violating the foregoing provisions of this section shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one thousand nor less than five hundred dollars, and in addition thereto the master of any tug or towboat so offending shall have his license revoked, or suspended for a term to be fixed by the judge before whom tried and convicted.

"And any deviation from such dumping or discharging place specified in such permit shall be a misdemeanor, and the owner and master, or person acting in the capacity of master, of any scows or boats dumping or discharging such forbidden matter in any place other than that specified in such permit shall be liable to punishment therefor as provided in section one of the said Act of June twenty-ninth, eighteen hundred and eighty-eight; and the owner and master, or person acting in the capacity of master, of any tug or towboat towing such scows or boats shall be liable to equal punishment with the owner and master, or person acting in the capacity of master, of the scows or boats; and, further, every scowman or other employee on board of both scows and towboats shall be deemed to have knowledge of the place of dumping specified in such permit, and the owners and masters, or persons acting in the capacity of masters, shall be liable to punishment, as aforesaid, for any unlawful dumping, within the meaning of this Act or of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, which may be caused by the negligence or ignorance of such scowman or other employee; and, further, neither defect in machinery nor avoidable accidents to scows or towboats, nor unfavorable weather, nor improper handling or moving of scows or boats of any kind whatsoever, shall operate to release the owners and masters and employees of scows and towboats from the penalties hereinbefore mentioned."

Every scow or boat engaged in the transportation of dredgings, earth, sand, mud, cellar dirt, garbage, or other offensive material of

any description shall have its name or number and owner's name painted in letters and numbers at least fourteen inches long on both sides of the scow or boat; these names and numbers shall be kept distinctly legible at all times, and no scow or boat not so marked shall be used to transport or dump any such material.

The supervisor of the harbor of New York, designated as provided in section five of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, is authorized and directed to appoint inspectors and deputy inspectors, and, for the purpose of enforcing the provisions of this Act and of the Act aforesaid, and of detecting and bringing to punishment offenders against the same, the said supervisor of the harbor, and the inspectors and deputy inspectors so appointed by him, shall have power and authority:

First. To arrest and take into custody, with or without process, any person or persons who may commit any of the acts or offenses prohibited by this section and by the Act of June twenty-ninth, eighteen hundred and eighty-eight, aforesaid, or who may violate any of the provisions of the same: *Provided*, That no person shall be arrested without process for any offense not committed in the presence of the supervisor or his inspectors or deputy inspectors, or either of them: *And provided further*, That whenever any such arrest is made the person or persons 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 case of crimes against the United States.

Second. To go on board of any scow or towboat engaged in unlawful dumping of prohibited material, or in moving the same without a permit as required in this section of this Act, and to seize and hold said boats until they are discharged by action of the commissioner, judge, or court of the United States before whom the offending persons are brought.

Third. To arrest and take into custody any witness or witnesses to such unlawful dumping of prohibited material, the said witnesses to be released under proper bonds.

Fourth. To go on board of any towboat having in tow scows or boats loaded with such prohibited material, and accompany the same to the place of dumping, whenever such action appears to be necessary to secure compliance with the requirements of this Act and of the Act aforesaid.

Fifth. To enter gas and oil works and all other manufacturing works for the purpose of discovering the disposition made of sludge, acid, or other injurious material, whenever there is good reason to believe that such sludge, acid, or other injurious material is allowed to run

into the tidal waters of the harbor in violation of section one of the aforesaid Act of June twenty-ninth, eighteen hundred and eighty-eight.

Every person who, directly or indirectly, gives any sum of money or other bribe, present, or reward or makes any offer of the same to any inspector, deputy inspector, or other employee of the office of the supervisor of the harbor with intent to influence such inspector, deputy inspector, or other employee to permit or overlook any violation of the provisions of this section or of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, shall, on conviction thereof, be fined not less than five hundred dollars nor more than one thousand dollars, and be imprisoned not less than six months nor more than one year.

Every permit issued in accordance with the provisions of this section of this Act which may not be taken up by an inspector or deputy inspector shall be returned within forty-eight hours after issuance to the office of the supervisor of the harbor; such permit shall bear an indorsement by the master of the towboat, or the person acting in such capacity, stating whether the permit has been used, and if so the time and place of dumping. Any person violating the provisions of this section shall be liable to a fine of not more than five hundred dollars nor less than one hundred dollars.

SEC. 5. That it shall be the duty of all persons owning, operating, and tending the drawbridges now built, or which may hereafter be built across the navigable rivers and other waters of the United States, to open, or cause to be opened, the draws of such bridges under such rules and regulations as in the opinion of the Secretary of War the public interests require to govern the opening of drawbridges for the passage of vessels and other water crafts, and such rules and regulations, when so made and published, shall have the force of law. Every such person who shall willfully fail or refuse to open, or cause to be opened, the draw of any such bridge for the passage of a boat or boats, or who shall unreasonably delay the opening of said draw after reasonable signal shall have been given, as provided in such regulations, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than two thousand dollars nor less than one thousand dollars, or by imprisonment (in the case of a natural person) for not exceeding one year, or by both such fine and imprisonment, in the discretion of the court: *Provided*, That the proper action to enforce the provisions of this section may be commenced before any commissioner, judge, or court of the United States, and such commissioner, judge, or court shall proceed in respect thereto as authorized by law in case of crimes against the United States: *Provided further*, That whenever, in the opinion of

the Secretary of War, the public interests require it, he may make rules and regulations to govern the opening of drawbridges for the passage of vessels and other water crafts, and such rules and regulations, when so made and published, shall have the force of law, and any violation thereof shall be punished as hereinbefore provided.

SEC. 6. That it shall not be lawful to place, discharge, or deposit, by any process or in any manner, ballast, refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the waters of any harbor or river of the United States, for the improvement of which money has been appropriated by Congress, elsewhere than within the limits defined and permitted by the Secretary of War; neither shall it be lawful for any person or persons to move, destroy, or injure in any manner whatever any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States, in whole or in part, for the preservation and improvement of any of its navigable waters, or to prevent floods, or as boundary marks, tide gauges, surveying stations, buoys, or other established marks; any and every such act is made a misdemeanor, and every person knowingly engaged in or who shall knowingly aid, abet, authorize, or instigate a violation of this section shall, upon conviction, be punishable by fine or imprisonment, or both, such fine to be not less than two hundred and fifty dollars nor more than twenty-five hundred dollars, and the imprisonment to be not less than thirty days nor more than one year, either or both united, as the judge before whom conviction is obtained shall decide, one-half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor.

SEC. 7. That any and every master, pilot, and engineer, or person or persons acting in such capacity, respectively, on board of any boat or vessel who may willfully injure or destroy any work of the United States contemplated in section six of this Act, or who shall knowingly engage in towing any scow, boat, or vessel loaded with any such prohibited matter to any point or place of deposit or discharge in any harbor contemplated in section six of this Act, elsewhere than within the limits defined and permitted by the Secretary of War, shall be deemed guilty of a violation of this Act and shall, upon conviction, be punishable as hereinbefore provided for offenses in violation of section six of this Act, and shall also have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

SEC. 8. Any boat, vessel, scow or other craft used or employed in violating any of the provisions of sections six and seven of this Act shall be liable to the pecuniary penalties imposed thereby, and in

addition thereto to the amount of the damages done by said boat, vessel, scow, or other craft, which latter sum shall be placed to the credit of the appropriation for the improvement of the harbor in which the damage occurred, and said boat, vessel, scow, or other craft may be proceeded against summarily by way of libel in any district court of the United States having jurisdiction thereof.

1.30b(1) HOUSE COMMITTEE ON RIVERS AND HARBORS

H.R. REP. No. 639, 53rd Cong., 2d Sess. (1894)

[No Relevant Discussion on Pertinent Section]

1.30b(2) SENATE COMMITTEE ON COMMERCE

S. REP. No. 519, 53rd Cong., 2d Sess. (1894)

[No Relevant Discussion on Pertinent Section]

1.30b(3) COMMITTEE OF CONFERENCE, 53RD CONG., 2D SESS.

Congressional Record, Vol. 26 (1894), pp. 8173-8175

[No Relevant Discussion on Pertinent Section]

1.30b(4) CONGRESSIONAL RECORD, VOL. 26 (1894):

1.30b(4)(a) May 4: Debated, amended and passed House, pp. 4376, 4430

Mr. CATCHINGS. Now, Mr. Chairman, another feature of the general legislation embraced in this bill is a further provision for enforcing the act approved June 29, 1888, to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City by dumping or otherwise and to punish and prevent such offenses. Experience has shown that this law in its details is entirely ineffective. It has been evaded by various contrivances so as to make it impossible to enforce it by any sort of legal proceedings. By the supplementary legislation now proposed it is hoped that the law can be made more effective. The danger is much more serious than is generally known. The Government of the United States has expended, according to the report, over \$8,000,000 in improving the harbor of New York and its tributary waters, and we have now on hand projects which will involve the expenditure of several million dollars more.

The total amount of dredging which was estimated as necessary for improving the main entrance of New York Harbor was 4,300,000 cubic yards. The report of the supervisor of the harbor for the fiscal year 1893 shows that permits were issued by his office during that period for depositing over 9,000,000 cubic yards of city refuse, cellar dirt, garbage, ashes, etc. In other words, the report for 1893 shows that in that single year permits were issued for dumping more cubic yards of refuse material than the estimates required to be removed in order to perfect the channel. From this will be seen the absolute importance of controlling this vast deposit. The amount of refuse matter from a great city like New York is

almost inconceivable. I repeat, that nearly twice as much was dumped into the ocean last year as it will be necessary to remove in order to perfect the entrance and channel ways of New York Harbor. The provision in the pending bill is intended simply to regulate the disposition of that enormous mass of refuse material.

Another provision of general legislation is intended to enable the Secretary of War to make such rules and regulations for the use, administration, and navigation of all canals and other works under the control of the Government as in his judgment may be necessary and proper. By special act we did confer that power on him in regard to the Des Moines Rapids Canal, the St. Marys Falls Canal, the Louisville and Portland Canal, the St. Clair Flats Canal, the South Pass of the Mississippi River, and the Des Moines River Rapids Dry Dock. This is a provision to extend similar authority under the same circumstances over all similar works, and I presume that there can be no objection on the part of any gentleman to that.

Another feature of the general legislation embodied in the bill is designed to control the dumping of refuse matter in the harbors of the country which the Government is improving and on which it has established dock lines. Special regulations were required for dealing with a great harbor like that of New York, and we have inserted a general provision applicable to all the harbors of the country. I presume no gentleman can dispute the propriety of suitable legislation to control the deposit of refuse matter in these harbors, on which we are expending money.

I believe, Mr. Chairman, I have about gone over the general legislation in the bill in a rapid way. I will state that all of it has been recommended by Gen. Casey—every bit of it. Not a line of it was suggested by the committee itself; but after hearing him we considered his proposed legislation and agreed to it, believing it wise and proper to do so.

Now, unless some gentleman desires to ask a further question, I will yield the floor.

[p. 4376]

1.30b(4)(b) July 13: Amended and passed Senate, p. 7414

[No Relevant Discussion on Pertinent Section]

1.30b(4)(c) Aug. 6: Senate agreed to conference report, p. 8230

[No Relevant Discussion on Pertinent Section]

1.30b(4)(d) Aug. 6: House agreed to conference report, p. 8251

[No Relevant Discussion on Pertinent Section]

1.30c 1908 AMENDMENTS TO 1894 ACT

May 28, 1908, P.L. 60-152, §8, 35 Stat. 426

SEC. 8. That section three of the Act of August eighteenth, eighteen hundred and ninety-four, entitled "An Act making appropriations for the construction, repair, and preservation of certain public works on

rivers and harbors, and for other purposes," be, and the same hereby is, amended so as to read as follows, sixty days after the passage of this Act:

"SEC. 3. That section three of the Act to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses, approved June twenty-ninth, eighteen hundred and eighty-eight, shall be, and hereby is, amended so as to read as follows:

"SEC. 3. That in all cases of receiving on board of any scows or boats such forbidden matter or substance as herein described, the owner or master, or person acting in such capacity on board of such scows or boats, before proceeding to take or tow the same to the place of deposit, shall apply for and obtain from the supervisor of the harbor appointed hereunder a permit defining the precise limits within which the discharge of such scows or boats may be made; and it shall not be lawful for the owner or master, or person acting in such capacity, of any tug or towboat to tow or move any scow or boat so loaded with such forbidden matter until such permit shall have been obtained; and every person violating the foregoing provisions of this section shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one thousand nor less than five hundred dollars, and in addition thereto the master of any tug or towboat so offending shall have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

"And any deviation from such dumping or discharging place specified in such permit shall be a misdemeanor, and the owner and master, or person acting in the capacity of master, of any scows or boats dumping or discharging such forbidden matter in any place other than that specified in such permit shall be liable to punishment therefor as provided in section one of the said Act of June twenty-ninth, eighteen hundred and eighty-eight; and the owner and master, or person acting in the capacity of master, of any tug or towboat towing such scows or boats shall be liable to equal punishment with the owner and master, or person acting in the capacity of master, of the scows or boats; and, further, every scowman or other employee on board of both scows and towboats shall be deemed to have knowledge of the place of dumping specified in such permit, and the owners and masters, or persons acting in the capacity of masters, shall be liable to punishment, as aforesaid, for any unlawful dumping, within the meaning of this Act or of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, which may be caused by the negligence or ignorance of such scowman or other employee; and, further, neither defect in machinery nor avoidable accidents to scows or towboats, nor unfavorable weather, nor improper handling or moving of scows or

boats of any kind whatsoever shall operate to release the owners and master and employees of scows and towboats from the penalties hereinbefore mentioned.

“Every scow or boat engaged in the transportation of dredgings, earth, sand, mud, cellar dirt, garbage, or other offensive material of any description shall have its name or number and owner's name painted in letters and numbers at least fourteen inches long on both sides of the scow or boat; these names and numbers shall be kept distinctly legible at all times, and no scow or boat not so marked shall be used to transport or dump any such material. Each such scow or boat shall be equipped at all times with a life line or rope extending at least the length of and three feet above the deck thereof, such rope to be attached to the coaming thereof, also with a life-preserver and a life buoy for each person on board thereof, also with anchor to weigh not less than two hundred and seventy-five pounds, and at least one hundred feet of cable attached thereto; a list of the names of all men employed on any such scow or boat shall be kept by the owner or master thereof and the said list shall be open to the inspection of all parties. Failure to comply with any of the foregoing provisions shall render the owner of such scow or boat liable upon conviction thereof to a penalty of not more than five hundred dollars.

“The supervisor of the harbor of New York, designated as provided in section five of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, is authorized and directed to appoint inspectors and deputy inspectors, and, for the purpose of enforcing the provisions of this Act and of the Act aforesaid, and of detecting and bringing to punishment offenders against the same, the said supervisor of the harbor, and the inspectors and deputy inspectors so appointed by him, shall have power and authority:

“First. To arrest and take into custody, with or without process, any person or persons who may commit any of the acts or offenses prohibited by this section and by the Act of June twenty-ninth, eighteen hundred and eighty-eight, aforesaid, or who may violate any of the provisions of the same: *Provided*, That no person shall be arrested without process for any offense not committed in the presence of the supervisor or his inspectors or deputy inspectors, or either of them: *And provided further*, That whenever any such arrest is made the person or persons 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 case of crimes against the United States.

“Second. To go on board of any scow or towboat engaged in unlawful dumping of prohibited material, or in moving the same with-

out a permit, as required in this section of this Act, or otherwise violating any of the provisions of this section of this Act, and to seize and hold said boats until they are discharged by action of the commissioner, judge, or court of the United States before whom the offending persons are brought.

“Third. To arrest and take into custody any witness or witnesses to such unlawful dumping of prohibited material, the said witnesses to be released under proper bonds.

“Fourth. To go on board of any towboat having in tow scows or boats loaded with such prohibited material, and accompany the same to the place of dumping, whenever such action appears to be necessary to secure compliance with the requirements of this Act and of the Act aforesaid.

“Fifth. To enter gas and oil works and all other manufacturing works for the purpose of discovering the disposition made of sludge, acid, or other injurious material, whenever there is good reason to believe that such sludge, acid, or other injurious material is allowed to run into the tidal waters of the harbor in violation of section one of the aforesaid Act of June twenty-ninth, eighteen hundred and eighty-eight.

“Every person who, directly or indirectly, gives any sum of money or other bribe, present, or reward, or makes any offer of the same to any inspector, deputy inspector, or other employee of the office of the supervisor of the harbor with intent to influence such inspector, deputy inspector, or other employee to permit or overlook any violation of the provisions of this section or of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, shall, on conviction thereof, be fined not less than five hundred dollars nor more than one thousand dollars, and be imprisoned not less than six months nor more than one year.

“Every permit issued in accordance with the provisions of this section of this Act, which may not be taken up by an inspector or deputy inspector, shall be returned within four days after issuance to the office of the supervisor of the harbor; such permit shall bear an indorsement by the master of the towboat, or the person acting in such capacity, stating whether the permit has been used, and, if so, the time and place of dumping. Any person violating the provisions of this section shall be liable to a fine of not more than five hundred dollars nor less than one hundred dollars.’”

1.30c(1) HOUSE COMMITTEE ON THE MERCHANT MARINE
AND FISHERIES

H.R. REP. No. 1672, 60th Cong., 1st Sess. (1908)

TO AMEND LAWS RELATING TO NAVIGATION, AND FOR
OTHER PURPOSES

MAY 12, 1908.—Referred to the House Calendar and ordered to be printed.

Mr. GREENE, from the Committee on the Merchant Marine and Fisheries, submitted the following

R E P O R T .

[To accompany H. R. 21815]

The Committee on the Merchant Marine and Fisheries, to whom was referred the bill (H. R. 21815) to amend the laws relating to navigation, and for other purposes, having considered the same, recommend that it pass with the following amendments:

* * * * *

[p. 1]

Section 8: This section is S. 7023, introduced by Senator Depew and passed by the Senate, and is similar to H. R. 21005, introduced by Mr. Parsons. It applies exclusively to New York Bay and Harbor. Although the section is voluminous, the only change from existing law is the insertion of the following words, beginning at page 7, line 20, after the word "material," and ending at page 8, line 5, inclusive:

Each such scow or boat shall be equipped at all times with a life line or rope extending at least the length of and three feet above the deck thereof, such rope to be attached to the coaming thereof; also with a life-preserver and a life buoy for each person on board thereof; also with anchor to weigh not less than two hundred and seventy-five pounds, and at least one hundred feet of cable attached thereto. A list of the names of all men employed on any such scow or boat shall be kept by the owner or master thereof and the said list shall be open to the inspection of all parties. Failure to comply with any of the foregoing provisions shall render the owner of such scow or boat liable upon conviction thereof to a penalty of not more than five hundred dollars.

To conform to this amendment, for obvious reasons, at page 9, lines 7 and 8, the following words are inserted:

or otherwise violating any of the provisions of this section of this act.

In reporting in favor of the bill included in this section, the Secretary of Commerce and Labor states:

The bill compels scows and similar vessels carrying the refuse of New York City out to sea to be equipped with rails or ropes, life buoys, and simple appliances necessary to safety to life.

The situation which the amendment is designed to meet is doubtless familiar to members of the committee who have visited the harbor of New York. When loaded these mud or garbage scows have practically no free board, and the decks are awash at times merely from the passing swells of large ocean steamers entering or leaving the port. In the rough weather which at times prevails in the lower bay and out at sea, where refuse must be dumped, the condition of those on board is pitifully perilous. There is no accurate record of the number of men washed overboard from these scows and drowned, but the press of New York shows such casualties are not infrequent. The need of the guard rail or rope and life-preserver and life buoy are thus evident.

The scows are taken to sea often in long tows, and if the line parts a scow drifts helplessly, a menace to other vessels in the thronged approaches to New York. The anchor will help to reduce this danger.

This section accordingly serves two useful purposes, (1) the protection of unguarded lives on these scows in the harbor and bay of New York, and (2) it decreases the danger of collisions between tows of these scows or barges and incoming or outgoing steamers. The sea-borne traffic of New York is growing so rapidly and the water area is so restricted that the commercial value of the water is approaching the commercial value of the land, and every reasonable measure must be taken to secure safe navigation.

At page 8, the substitute for lines 1 to 5, inclusive, is a more exact penalty than the vague penalties prescribed in the text of the Senate and House bills as introduced.

[p. 4]

At page 10, lines 17 and 18, the words "forty-eight hours" are changed to "four days" to secure a wider margin of time between the issuance of a dumping permit and the return of the permit, to accord better with the present conditions and requirements of the business.

[p. 5]

**1.30c(2) SENATE COMMITTEE ON COMMERCE, 60TH CONG.,
1ST SESS.**

Congressional Record, Vol. 42 (1908), p. 6963

[No Relevant Discussion on Pertinent Section]

1.30c(3) CONGRESSIONAL RECORD, VOL. 42 (1908):

1.30c(3)(a) May 25: Considered and passed House, pp. 6901-6905

Mr. GREENE.

* * * * *

Section 8 embodies the provisions of a bill introduced by the gentleman from New York [Mr. PARSONS], and I now yield to him three minutes.

Mr. PARSONS. Mr. Speaker, section 8 consists of a bill introduced by me. It is a long section, but the only part of it that is new law is the part in italics on page 8. It relates entirely to the mud scows or boats in the harbor of New York that take garbage out to sea, and the object of the amendment is to require on each one of these scows a life line or rope, which they are now not required to have, and a life-preserver and life buoy for each person on board, and a drag anchor, so that if they get adrift the anchor will retard the progress of the scow, and it will be possible to overtake it. It also requires them to keep a list of all the men employed.

This section was recommended by the Legal Aid Society and the Seamen's Church Institute in New York, which have done a great deal of work among the seamen and which were active a couple of years ago in behalf of the bill that we passed to prevent shanghaiing. There was a hearing before the committee, where the scow people were represented, and the provision that is now in the bill is the compromise provision that was evolved at that time.

* * * * *

Mr. GOULDEN.

* * * * *

The second part to which I wish to direct the attention of the House is that in relation to providing safety lines aboard the mud scows and sea barges that go out, particularly from New York Harbor. All of the refuse of the city of New York is taken out of New York and dumped into the sea, and scores of men are drowned each year by not having the necessary protection on these boats. It provides that life lines shall be put on each scow and barge, kept there at all times, extending the length of the boat and 3 feet above the deck, such rope to be attached to the coaming, and also that a life-preserver and a life buoy shall be kept for each person on board; also an anchor, to weigh not less than 275 pounds and with at least 100 feet of cable attached thereto. Then a list of the names of all the men employed on any such scow or boat shall be kept by the owner or the master thereof, and said list shall be open to the inspection of all parties. Failure to comply with any of the foregoing provisions shall render the owner of any such scow or boat liable upon conviction thereof to a penalty of not more than \$500. Now, this has been found absolutely necessary for the protection of human life. As I said, scores of men are drowned or lost or missing each year who work aboard these boats. Something therefore must be done in the cause of humanity and the safety to human life. This was thought to be the best and simplest method of protecting life and giving it some degree of safety. The anchor pro-

vision is intended in case the scow breaks loose from its tow, that they can throw out the anchor and drag. We do not mean to say for a moment that they would be able perhaps to keep off the shore, but they would drag slowly so that some tugboat could pick them up and save them from being wrecked.

The other parts of the bill, Mr. Speaker, containing fifteen amendments, have met with the approval of the minority members of the committee, and we believe, upon the whole, that the entire bill is entitled to a favorable consideration on the part of the Members of the House. I commend it to their support and hope that it will pass. [Applause.]

Mr. SPIGHT. Mr. Speaker, the gentleman from New York [Mr. GOULDEN] has discussed the most important feature of this bill, the question of the protection of life on the scows in

[p. 6903]

New York Harbor. There is another provision of the bill, however, which seems to me to be objectionable. It is a provision which discriminates against yachts constructed in foreign yards and not acquired by American citizens prior to 1897. I think that is objectionable. I think that the provision ought to apply to all American owners of yachts at the time of the passage of this bill, if it is going to apply to any, without regard to when they were built or when acquired. In the main, I think the bill is a good one and ought to pass.

I now yield five minutes to the gentleman from Indiana [Mr. Cox].

Mr. COX of Indiana. Mr. Speaker, as was said by the gentleman from New York, there is no opposition to this bill from any of the minority members of the committee. One part of this bill I do not approve of; however, upon the main, I am going to vote for the bill as it is presented. The part of the bill which I do not approve of is the part which provides for the exemption of foreign yacht owners from paying tonnage taxes and clearance dues. I do not approve of that, because I can see no reason why the class of people who are able to own and equip yachts should be permitted to enter and clear without paying tonnage taxes and clearance dues; but upon the principle of comity between this Government and other nations, if they extend to our people the same privilege, probably there is not so much serious objection to it after all. The most important section of this bill, as I consider it, is that part of the bill which relates to New York Harbor.

The evidence disclosed before the committee from whence this bill comes is that for years and years there has been a practice going on in New York Harbor of dumping the refuse of New York City out into the ocean, where a great many human lives have been lost. An opposition was disclosed before the committee upon this part of the bill upon the ground, as usual, that if the scow owners were compelled to safeguard them, so as to protect the lives of their employees, it would add greatly to the expense of the scows. The committee determined that when the question of cost was upon one side and the question of human life upon the other, that the argument in favor of the preservation of human life far outweighed that of the cost of taking such precautions upon the other so as to preserve human life. The evidence failed to disclose the number of people who were lost every year who are engaged in this occupation, but according to the best evidence that we could get hold of not less than one person was lost every month in this hazardous employment by reason of the fact that the scows were not safeguarded with proper safety equipment. Therefore I regard that part of the bill as being the most important, purely, however, of a local nature, affecting only the city of New York, and if there was nothing else in the bill except this it would commend itself to me very strongly. Up until this bill was reported, as I understand the navigation laws, there has been no Federal statute in force

giving to the inspectors power to inspect seagoing barges of 100 tons and over. This bill gives to the inspectors power to inspect seagoing barges of 100 tons and over, and the right to inspect each with a view of seeing whether or not they are seaworthy and are safe to operate upon the high seas. The evidence disclosed that by reason of failure to have a Federal statute conferring upon the local inspectors power to inspect seagoing barges the loss of property heretofore has been considerable, as well as the loss of life. These two measures taken together, in my judgment, commends the bill to its passage and appeals to the Members of this House. There is another section of the bill which adds likewise a delinquent statute, as it were——

The SPEAKER pro tempore. The time of the gentleman from Indiana has expired.

Mr. SPIGHT. I yield the gentleman two more minutes.

Mr. COX of Indiana. And that is the section of the statute which authorizes the Commissioner of Navigation to appoint a board of inspectors at Hawaii and Porto Rico. While that is going to add some additional expense to the Government in maintaining those two boards, yet the proof disclosed the fact that it was exceedingly necessary that he be given the power to appoint these boards of inspectors for Hawaii and for Porto Rico, because the evidence disclosed the fact that for as much as two weeks at a time vessels had been tied up in Hawaii and in Porto Rico awaiting inspectors to be sent from the continent of the United States to inspect the hulls and the vessels, with a view of seeing whether or not they were seaworthy. Therefore, in the main, I believe, the entire bill commends itself to the support of every Member in this House. [Applause.]

Mr. SPIGHT. I yield two minutes to the gentleman from New York [Mr. SULZER].

Mr. SULZER. Mr. Speaker, all I desire to say is that, in my judgment, this is a most commendable bill, and it ought to receive the unanimous approval of the Members of this House. The bill is designed to regulate, so far as may be feasible at this time, the most dangerous form of navigation along our seaboard. There are between 400 and 450 seagoing barges of over 100 gross tons employed at present. During the past two fiscal years 60 of these barges were lost. Of the 60 vessels lost 49 were built before 1898, and nearly half were over 30 years old. Many of these barges years ago were staunch ships and barks. As they have deteriorated they have been dismantled, and large hatches have been cut in them, rendering them structurally even weaker. When from any cause these towed barges break loose from the towing steamer those on board are practically helpless. Of 192 persons on board these 60 barges 49 lost their lives, or over 25 per cent, a death rate far in excess of the rate in other classes of marine casualties here or abroad. A great demand in favor of this legislation comes from prominent people of New York desirous to more carefully safeguard life on these seagoing barges. It should have been done long ago, and I hope this bill will now pass and go over to the Senate and meet the approval of that body before we adjourn.

Mr. SPIGHT. How much time have I remaining, Mr. Speaker?

The SPEAKER pro tempore. The gentleman from Mississippi has five minutes remaining.

Mr. SPIGHT. Well, I yield two minutes to the gentleman from New Jersey [Mr. HUGHES].

Mr. HUGHES of New Jersey. It has been impossible, of course, for me or any other Member of the House not specially interested in this bill to make himself familiar with all its provisions. There is one section, however, with the provisions of which I am familiar, and so far as it is concerned it commends itself

to me. Of course I do not like to pass upon the other provisions. I do not like to vote upon the whole bill without having had an opportunity to examine into its provisions and hearing it freely discussed and debated before this House. The situation as it now exists with regard to sailing vessels of any tonnage, as I understand it, is that they are now and may be lawfully in charge of a man who is not a master, not a licensed inspector, or who has not any particular knowledge of navigation. For instance, at the present time there is nothing that I know of to prevent a man from going upon a sailing vessel in the harbor of New York, and if circumstances were such that he could get control of it lawfully, to navigate it up and down that very important highway to the great risk and detriment of other men who are engaged in navigation and are familiar with the rules that obtain upon the waters of the harbors and the high seas. I have sailed small craft myself, and I know the grave danger involved, and how the danger increases as the size of the craft and the traffic increases.

The SPEAKER pro tempore. The gentleman's time has expired.

Mr. GREENE. I yield one minute more.

Mr. HUGHES of New Jersey. It is really a matter of surprise to me that this very important subject has not long before this had the consideration of Congress. This section provides:

The boards of local inspectors shall license and classify the masters, chief mates, and second and third mates, if in charge of a watch, engineers, and pilots of all steam vessels, and masters of sail vessels of over 700 gross tons, and all other vessels of over 100 gross tons carrying passengers for hire.

So the very language of the act shows that up to this time it has not been necessary for a man, in order to sail a vessel of that tonnage and to carry passengers for hire on the high seas or on any harbor over which we have control or jurisdiction, to pass any sort of an examination at all. I propose to vote for this bill in order to place this provision upon the statute books.

The SPEAKER pro tempore. The gentleman's time has again expired.

Mr. GREENE. Will the gentleman from Mississippi [Mr. SPIGHT] kindly use his time now?

Mr. SPIGHT. Mr. Speaker, I yield my time to the gentleman from Washington [Mr. HUMPHREY].

The SPEAKER pro tempore. The gentleman from Washington [Mr. HUMPHREY] is recognized for two minutes.

Mr. HUMPHREY of Washington. Mr. Speaker, I just wish to say this to the House: There is not time to discuss the details of the bill, but it was reported unanimously. It contains a great deal of very valuable legislation, for which there is great necessity for immediate action. There is no one on the committee who is opposed to the bill, and I trust that the House will pass it, so that it can get to the Senate and become a law before Congress adjourns.

[p. 6904]

Mr. MANN. Does not the gentleman think that the House ought to know what the important legislation is that is brought in in a bill of this sort?

Mr. HUMPHREY of Washington. I think the majority of the House do, excluding the gentleman from Illinois [Mr. MANN] in that statement.

Mr. MANN. I know the gentleman from Washington always knows more than anyone else, but I have asked a dozen gentlemen on the floor of the House as to what is in the bill, and I have found no one that knew.

Mr. HUMPHREY of Washington. I will say to the gentleman that in two minutes I would not undertake to explain to him.

Mr. MANN. I do not think the gentleman could.

The SPEAKER pro tempore. The question is on suspending the rules and passing the bill.

The question was taken, and the Speaker pro tempore announced that the ayes seemed to have it.

Mr. SPIGHT. The yeas and nays, Mr. Speaker.

The yeas and nays were ordered.

Mr. WANGER. Mr. Speaker, I make the point that there is no quorum present.

The SPEAKER pro tempore. There is evidently no quorum present. The Doorkeeper will close the doors and the Sergeant-at-Arms will notify absent Members. Those in favor of suspending the rules and passing this bill will, as their names are called, answer "yea," those opposed will answer "nay," those present and not voting will answer "present," and the Clerk will call the roll.

The question was taken, and there were—yeas 230, nays 7, answered "present" 14, not voting, 136, as follows:

* * * * *

[p. 6905]

1.30c(3)(b) May 26: Considered and passed Senate, pp. 6963–6972

[No Relevant Discussion on Pertinent Section]

1.30d 1909 AMENDMENTS TO 1908 ACT

February 16, 1909, P.L. 60–231, 35 Stat. 623

CHAP. 132. An Act To amend section eight of the Act approved May twenty-eighth, nineteen hundred and eight, entitled "An Act to amend the laws relating to navigation, and for other purposes."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the requirements in regard to life line or rope contained in section eight of the Act approved May twenty-eighth, nineteen hundred and eight (being chapter two hundred and twelve of the Statutes at Large, first session Sixtieth Congress) entitled "An Act to amend the laws relating to navigation, and for other purposes," shall not apply to any scow or boat the deck outside the coaming or rail of which shall not exceed one foot in width. On any such scow or boat its name or number and owner's name painted in letters and numbers, at least fourteen inches long on both ends of such scow or boat, shall be a compliance with the provisions of the said section in regard to name, number, and owner's name.

Approved, February 16, 1909.

1.30d(1) HOUSE COMMITTEE ON THE MERCHANT MARINE
AND FISHERIES

H.R. REP. No. 2102, 60th Cong., 2d Sess. (1909)

AMENDING LAWS RELATING TO NAVIGATION

FEBRUARY 9, 1909.—Referred to the House Calendar and ordered to be printed.

Mr. CALDER, from the Committee on the Merchant Marine and Fisheries, submitted the following

REPORT

[To accompany H. R. 27970.]

The Committee on the Merchant Marine and Fisheries, to whom was referred the bill (H. R. 27970) to amend section 8 of the act approved May 28, 1908, entitled "An act to amend the laws relating to navigation, and for other purposes," having considered the same, report the following substitute and recommend that it do pass:

That the requirements in regard to life line or rope contained in section eight of the act approved May twenty-eighth, nineteen hundred and eight (being chapter two hundred and twelve of the Statutes at Large, first session Sixtieth Congress), entitled "An act to amend the laws relating to navigation, and for other purposes," shall not apply to any scow or boat the deck outside the coaming or rail of which shall not exceed one foot in width. On any such scow or boat its name or number and owner's name painted in letters and numbers, at least fourteen inches long, on both ends of such scow or boat shall be a compliance with the provisions of the said section in regard to name, number, and owner's name.

This bill applies exclusively to scows or boats operated in New York Harbor and seeks to permit the owners of these scows to place their name and number on the ends rather than the sides, and eliminates from the operation of the law flat-deck scows or boats, in so far as it applies to the life line or rope. These flat-deck scows and boats rarely go outside of the landlocked harbor, and the way in which they are loaded renders the life line or rope not only impracticable, but absolutely useless, and even dangerous.

This bill is recommended by the Chief of Engineers of the War Department and the supervisor of the port of New York

1.30d(2) CONGRESSIONAL RECORD, VOL. 43 (1909):

1.30d(2)(a) Feb. 10: Amended and passed House, p. 2149
[No Relevant Discussion on Pertinent Section]

1.30d(2)(b) Feb. 11: Passed Senate, pp. 2195–2196
[No Relevant Discussion on Pertinent Section]

**1.30e REPEALING CERTAIN OBSOLETE PROVISIONS OF
LAW RELATING TO THE NAVAL SERVICE**

June 29, 1949, P.L. 81–144, 63 Stat. 300

[No Relevant Discussion]

**1.30f 1952 AMENDMENTS TO NEW YORK HARBOR ACT OF
1888**

July 12, 1952, P.L. 82–526, 66 Stat. 596

Public Law 526

CHAPTER 707

AN ACT

To amend section 5 of the Act of June 29, 1888, relating to the office of Supervisor of New York Harbor.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 5 of the Act entitled “An Act to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses”, approved June 29, 1888, as amended (33 U. S. C. 451), is hereby amended to read as follows:

“Sec. 5. That an officer of the Corps of Engineers shall be designated by the Secretary of the Army as supervisor of the harbor, to

New York Har-
bor, supervisor.
25 Stat. 210.

act under the direction of the Chief of Engineers in enforcing the provisions of this Act, and in detecting offenders against the same. This officer shall have personal charge and supervision under the Chief of Engineers, and shall direct the patrol boats and other means to detect and bring to punishment offenders against the provisions of this Act.”

Approved July 12, 1952.

1.30f(1) **HOUSE COMMITTEE ON PUBLIC WORKS****H.R. REP. No. 2260, 82d Cong., 2d Sess. (1952)**

AMENDING SECTION 5 OF THE ACT OF JUNE 29, 1888,
RELATING TO THE OFFICE OF SUPERVISOR OF NEW
YORK HARBOR

JUNE 20, 1952.—Committed to the Committee of the Whole House on the State
of the Union and ordered to be printed

Mr. BUCKLEY, from the Committee on Public Works, submitted the
following

R E P O R T

[To accompany H. R. 8234]

The Committee on Public Works, to whom was referred the bill (H. R. 8234) to amend section 5 of the act of June 29, 1888, relating to the office of supervisor of New York Harbor, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

The act of June 29, 1888, referred to in this bill, is now enforced by a line officer of the Navy under the direction of the Secretary of the Army, and the purpose of H. R. 8234 is to eliminate the need for assignment of a Navy officer by adding the responsibility of enforcement to the present duties of the district engineer at New York.

The Department of Defense has requested the enactment of this legislation and in support thereof has submitted a letter from the Assistant Secretary of Defense to the Speaker of the House of Representatives, advising that this proposal is a part of the Department of Defense legislative program for 1952 and has been approved by the Bureau of the Budget.

No expenditure of Federal funds is involved in this bill.

The comments of the Department of Defense are contained in the following communication:

ASSISTANT SECRETARY OF DEFENSE,
Washington 25 D.C., June 11, 1952.

HON. SAM RAYBURN.

Speaker of the House of Representatives.

DEAR MR. SPEAKER: There is forwarded herewith a draft of proposed legislation to amend section 5 of the act of June 29, 1888, relating to the office of supervisor of New York Harbor.

This proposal is a part of the Department of Defense legislative program for 1952, and it has been approved by the Bureau of the Budget. The Department of Defense recommends that it be enacted by the Congress.

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PURPOSE OF THE LEGISLATION

The 1888 act is now enforced by a line officer of the Navy under the direction of the Secretary of the Army and the purpose of the proposed legislation is to eliminate the need for assignment of a Navy officer by adding the responsibility of enforcement to the present duties of the district engineer at New York. The act prohibits the deposits of any matter which would be injurious to navigation except as may be permitted by the supervisor of the harbor. It applies only to New York Harbor and adjacent waters. Subsequently, the Congress enacted similar but general legislation in the River and Harbor Act of March 3, 1899 (33 U.S.C. 403-407) applying to all the navigable waters of the United States, administered by the Chief of Engineers under the direction of the Secretary of the Army. In practice, close liaison has been maintained by the district engineer at New York with the supervisor to avoid any duplication and the principal value of the proposed legislation would be in eliminating the need for assignment of a naval officer to perform the duties of the supervisor. Substantial monetary savings, however, would also result mainly because certain plant and equipment presently engaged in river and harbor work under the district engineer could be used in a dual capacity.

COST AND BUDGET DATA

The present annual operating budget of the office of the supervisor of New York Harbor is about \$400,000, and it is believed that a saving of about 25 per cent could be effected by the proposed legislation.

DEPARTMENT OF DEFENSE ACTION AGENCY

The Department of the Army has been designated as the representative of the Department of Defense for this legislation.

Sincerely yours,

CHARLES A. COOLIDGE.

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1.30f(2) SENATE COMMITTEE ON PUBLIC WORKS**S. REP. No. 2088, 82d Cong., 2d Sess. (1952)**

AMENDING SECTION 5 OF THE ACT OF JUNE 29, 1888,
RELATING TO THE OFFICE OF SUPERVISOR OF NEW
YORK HARBOR

JULY 3 (legislative day, JUNE 27), 1952.—Ordered to be printed

Mr. CHAVEZ, from the Committee on Public Works, submitted the
following

R E P O R T

[To accompany H. R. 8234]

The Committee on Public Works, to whom was referred the bill (H. R. 8234) to amend section 5 of the act of June 29, 1888, relating to the office of Supervisor of New York Harbor, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

The act of June 29, 1888, referred to in this bill, is now enforced by a line officer of the Navy under the direction of the Secretary of the Army, and the purpose of H. R. 8234 is to eliminate the need for assignment of a Navy officer by adding the responsibility of enforcement to the present duties of the district engineer at New York.

The Department of Defense has requested the enactment of this legislation and in support thereof has submitted a letter from the Assistant Secretary of Defense to the Speaker of the House of Representatives, advising that this proposal is a part of the Department of Defense legislative program for 1952 and has been approved by the Bureau of the Budget.

Enactment of this bill would effect a saving in Federal funds and permit more efficient operations. The Department of Defense and the Bureau of the Budget approve this legislation.

1.30f(3) CONGRESSIONAL RECORD, VOL. 98 (1952):**1.30f(3)(a) June 25: Passed House, p. 8079****[No Relevant Discussion on Pertinent Section]****1.30f(3)(b) July 4: Passed Senate, p. 9317****[No Relevant Discussion on Pertinent Section]****1.30g 1958 AMENDMENTS TO ACT OF 1888****August 28, 1958, P.L. 85-802, §1, 72 Stat. 970****AN ACT**

To amend the Act of June 29, 1888, relating to the prevention of obstructive and injurious deposits in the harbor of New York, to extend the application of that Act to the harbor of Hampton Roads.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Act entitled "An Act to prevent obstructive and injurious deposits within the harbor and adjacent waters of New York, by dumping or otherwise, and to punish and prevent such offenses", approved June 29, 1888 (25 Stat. 209; 33 U. S. C. 441-451), as amended, is amended as follows:

(1) The first section (33 U. S. C. 441) is amended by striking out "tidal waters of the harbor of New York, or its adjacent or tributary waters, or in those of Long Island Sound," and inserting in lieu thereof "waters of any harbor subject to this Act,".

(2) Section 2 (33 U. S. C. 442) is amended—

(A) by striking out "the harbor of New York, or in its adjacent or tributary waters, or in those of Long Island Sound," and inserting in lieu thereof "any harbor subject to this Act,"; and

(B) by striking out "hereinafter mentioned".

(3) The fourth paragraph of section 3 (33 U. S. C. 446) is amended by striking out "The supervisor of the harbor of New York, designated as provided in section 5 of the said Act of June twenty-nine, eighteen hundred and eighty-eight, is authorized and directed to appoint inspectors and deputy inspectors, and, for the purpose of enforcing the provisions of this Act and of the Act aforesaid," and inserting in lieu thereof "Each supervisor of a harbor is authorized and directed to appoint inspectors and deputy inspectors, and, for the purposes of enforcing this Act and the Act of August 18, 1894, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes' (28 Stat. 338),".

(4) The fifth full paragraph of section 3 (33 U. S. C. 447) (relating to bribery of employees of the supervisor of the harbor) is amended by striking out "the supervisor of the harbor" and inserting in lieu thereof "any supervisor of a harbor".

(5) Section 4 (33 U. S. C. 449) is amended—

(A) by striking out "the harbor of New York, or the waters adjacent or tributary thereto", and inserting in lieu thereof "any harbor subject to this Act"; and

(B) by striking out "the waters of the harbor of New York", and inserting in lieu thereof "the waters of that harbor".

(6) Section 5 (33 U. S. C. 451) is amended—

(A) by inserting after "That an officer of the Corps of Engineers shall" a comma and the following: "for each harbor subject to this Act,,"; and

(B) by striking out "This officer" and inserting in lieu thereof "Each such officer".

(7) Section 6 is amended to read as follows:

"SEC. 6. That the following harbors shall be subject to this Act:

"(1) The harbor of New York.

"(2) The harbor of Hampton Roads.

"(3) The harbor of Baltimore."

(8) The following new section is added at the end:

"SEC. 7. That for the purposes of this Act—

"(1) The term 'harbor of New York' means the tidal waters of the harbor of New York, its adjacent and tributary waters, and those of Long Island Sound.

"(2) The term 'harbor of Hampton Roads' means the tidal waters of the harbors of Norfolk, Portsmouth, Newport News, Hampton Roads, and their adjacent and tributary waters, so much of the Chesapeake Bay and its tributaries as lies within the State of Virginia, and so much of the Atlantic Ocean and its tributaries as lies within the jurisdiction of the United States within or to the east of the State of Virginia.

"(3) The term 'harbor of Baltimore' means the tidal waters of the harbor of Baltimore and its adjacent and tributary waters, and so much of Chesapeake Bay and its tributaries as lie within the State of Maryland."

SEC. 2. This Act shall take effect on the sixtieth day after the date of its enactment.

Approved August 28, 1958.

1.30g(1) HOUSE COMMITTEE ON PUBLIC WORKS**H. R. REP. No. 2233, 85th Cong., 2d Sess. (1958)**

AMENDING THE ACT OF JUNE 29, 1888, RELATING TO THE PREVENTION OF OBSTRUCTIVE AND INJURIOUS DEPOSITS IN THE HARBOR OF NEW YORK, TO EXTEND THE APPLICATION OF THAT ACT TO THE HARBOR OF HAMPTON ROADS.

JULY 21, 1958.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BLATNIK, from the Committee on Public Works, submitted the following

R E P O R T

[To accompany H. R. 11697]

The Committee on Public Works, to whom was referred the bill (H. R. 11697) to amend the act of June 29, 1888, relating to the prevention of obstructive and injurious deposits in the harbor of New York, to extend the application of that act to the harbor of Hampton Roads, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

PURPOSE OF THE BILL

The purpose of this bill is to further amend the act of June 29, 1888 (25 Stat. 209; 33 U. S. C. 441-451), as amended, relating to the prevention of obstructions and injurious deposits in the harbor of New York, to extend the application of that act to the harbor of Hampton Roads, Va.

GENERAL STATEMENT

The act of 1888, as amended, prohibits the deposit of waste or other kinds of matter in the tidal waters of New York Harbor and certain adjacent waters, including Long Island Sound.

An officer of the Corps of Engineers designated by the Secretary of the Army as supervisor of the harbor is charged with the enforcement of the provisions of the act. This supervisor has the duty of preventing any obstructive or injurious deposits in all waters under his jurisdiction and preventing fishing and dredging of shell fish and

other activity which would interfere with navigation of the entrance channels of the harbor by ships of deep draft.

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H. R. 11697 would apply the provisions of act of June 29, 1888, to the tidal waters of the Hampton Roads area, including Norfolk Harbor, Portsmouth Harbor, Newport News, and Chesapeake Bay within the State of Virginia.

Testimony received by the committee pointed up the fact that the principal problem in the Hampton Roads area is one of oil pollution. This condition is created by the discharge of oil from vessels at anchor or at piers into the tidal waters of Hampton Roads. This discharge creates a hazardous situation from a fire standpoint. It also has the effect of fouling the condensers of vessels navigating in the waters.

The application of the 1888 act to the Hampton Roads area would permit the Corps of Engineers to patrol the affected waters; make periodic inspections to detect violations and more rigidly enforce the provisions of the various laws for preservation of navigable waters. In addition, before any type of material could be discharged into the waters a permit for such discharge would be required. This permit would require the discharge of the material at a specific location which would not be detrimental to commerce. At the present time the policy of the Corps of Engineers is to act in connection with local polluted waters only on a specific complaint from the community involved. This bill would permit all year round supervision of the Hampton Roads area at an estimated average yearly cost of \$150,000 to the Federal Government. This estimate of cost was included in testimony presented by the Corps of Engineers.

The committee believes that this is desirable legislation and recommends its enactment.

The Department of the Army has no objection to the enactment of H. R. 11697 and report of the Secretary to the chairman of the committee is hereinbelow set forth in full and made a part of this report.

JULY 2, 1958.

HON. CHARLES A. BUCKLEY,
*Chairman, Committee on Public Works,
House of Representatives.*

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Department of the Army with respect to H. R. 11697, 85th Congress, a bill to amend the act of June 29, 1888, relating to the prevention of obstructive and injurious deposits in the harbor of New York, to extend the application of that act to the harbor of Hampton Roads.

The act of June 29, 1888, as amended (33 U. S. C. 441–451), prohibits the deposit of refuse or other kinds of matter in the tidal waters New York Harbor and certain adjacent waters. An officer of the Corps of Engineers designated by the Secretary of the Army as supervisor of the harbor is charged with enforcement of the provisions of the act. This bill, H. R. 11697, would amend the act of 1888 by extending the application thereof to the harbor of Hampton Roads, Va., and adjacent waters.

The Department of the Army interposes no objection to the enactment of the above-mentioned bill.

Enactment of this bill would cause no apparent increase in the budgetary requirements of the Department.

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The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

CHANGES IN EXISTING LAW

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as introduced, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in *italic*, existing law in which no change is proposed is shown in roman):

THE ACT OF JUNE 29, 1888, AS AMENDED (25 STAT. 209; 33 U. S. C. 441 THROUGH 451)

AN ACT To prevent obstructive and injurious deposits within the harbor and adjacent waters of New York City, by dumping or otherwise, and to punish and prevent such offenses

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the placing, discharging, or depositing, by any process or in any manner, of refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind, other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the [tidal waters of the harbor of New York, or its adjacent or tributary waters, or in those of Long Island Sound,] *waters of any harbor subject to this Act*, within the limits which shall be prescribed by the supervisor of the harbor, is hereby strictly forbidden, and every such act is made a misdemeanor, and every person engaged in or who shall aid, abet, authorize, or instigate a violation of this section, shall, upon conviction, be pun-

ishable by fine or imprisonment, or both, such fine to be not less than two hundred and fifty dollars nor more than two thousand five hundred dollars, and the imprisonment to be not less than thirty days nor more than one year, either or both united, as the judge before whom conviction is obtained shall decide, one half of said fine to be paid to the person or persons giving information which shall lead to conviction of this misdemeanor.

SEC. 2. That any and every master and engineer, or person or persons acting in such capacity, respectively, on board of any boat or vessel, who shall knowingly engage in towing any scow, boat, or vessel loaded with any such prohibited matter to any point or place of deposit, or discharge in the waters of [the harbor of New York, or in its adjacent, or tributary waters, or in those of Long Island Sound,] *any harbor subject to this Act*, or to any point or place elsewhere than within the limits defined and permitted by the supervisor of the harbor [hereinafter mentioned], shall be deemed guilty of a violation of this act, and shall, upon conviction, be punishable as hereinbefore provided for offenses in violation of section one of this act, and shall also have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

SEC. 3. That in all cases of receiving on board of any scows or boats such forbidden matter or substance as herein described, the owner or master, or person acting in such capacity on board of such scows or boats, before proceeding to take or tow the same to the place

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of deposit, shall apply for and obtain from the supervisor of the harbor appointed hereunder a permit defining the precise limits within which the discharge of such scows or boats may be made; and it shall not be lawful for the owner or master, or person acting in such capacity, of any tug or towboat to tow or move any scow or boat so loaded with such forbidden matter until such permit shall have been obtained; and every person violating the foregoing provisions of this section shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one thousand nor less than five hundred dollars, and in addition thereto the master of any tug or towboat so offending shall have his license revoked or suspended for a term to be fixed by the judge before whom tried and convicted.

And any deviation from such dumping or discharging place specified in such permit shall be a misdemeanor, and the owner and master, or person acting in the capacity of master, of any scows or boats dumping or discharging such forbidden matter in any place other than that specified in such permit shall be liable to punishment therefor as provided in section one of the said Act of June twenty-

ninth, eighteen hundred and eight-eight; and the owner and master, or person acting in the capacity of master, of any tug or towboat towing such scows or boats shall be liable to equal punishment with the owner and master, or person acting in the capacity of master, of the scows or boats; and, further, every scowman or other employee on board of both scows and towboats shall be deemed to have knowledge of the place of dumping specified in such permit, and the owners and masters, or persons acting in the capacity of masters, shall be liable to punishment, as aforesaid, for any unlawful dumping, within the meaning of this Act or of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, which may be caused by the negligence or ignorance of such scowman or other employee; and, further, neither defect in machinery nor avoidable accidents to scows or towboats, nor unfavorable weather, nor improper handling or moving of scows or boats of any kind whatsoever shall operate to release the owners and master and employees of scows and towboats from the penalties hereinbefore mentioned.

Every scow or boat engaged in the transportation of dredgings, earth, sand, mud, cellar dirt, garbage, or other offensive material of any description shall have its name or number and owner's name painted in letters and numbers at least fourteen inches long on both sides of the scow or boat; these names and numbers shall be kept distinctly legible at all times, and no scow or boat not so marked shall be used to transport or dump any such material. Each such scow or boat shall be equipped at all times with a life line or rope extending at least the length of and three feet above the deck thereof, such rope to be attached to the coaming thereof, also with a life-preserver and a life buoy for each person on board thereof, also with anchor to weigh not less than two hundred and seventy-five pounds, and at least one hundred feet of cable attached thereto; a list of the names of all men employed on any such scow or boat shall be kept by the owner or master thereof and the said list shall be open to the inspection of all parties. Failure to comply with any of the foregoing provisions shall render the owner of such scow or boat liable upon conviction thereof to a penalty of not more than five hundred dollars.

[The supervisor of the harbor of New York, designated as provided in section five of the said Act of June twenty-ninth, eighteen hundred

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and eighty-eight, is authorized and directed to appoint inspectors and deputy inspectors, and, for the purpose of enforcing the provisions of this Act and of the Act aforesaid,] *Each supervisor of a harbor is authorized and directed to appoint inspectors and deputy inspectors, and, for the purposes of enforcing this Act and the Act of August 18,*

1894, entitled "*An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes*" (28 Stat. 338), and of detecting and bringing to punishment offenders against the same, the said supervisor of the harbor, and the inspectors and deputy inspectors so appointed by him, shall have power and authority:

First. To arrest and take into custody, with or without process, any person or persons who may commit any of the acts or offenses prohibited by this section and by the Act of June twenty-ninth, eighteen hundred and eighty-eight, aforesaid, or who may violate any of the provisions of the same: *Provided*, That no person shall be arrested without process for any offense not committed in the presence of the supervisor or his inspectors or deputy inspectors, or either of them: *And provided further*, That whenever any such arrest is made the person or persons 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 case of crimes against the United States.

Second. To go on board of any scow or towboat engaged in unlawful dumping of prohibited material, or in moving the same without a permit, as required in this section of this Act, or otherwise violating any of the provisions of this section of this Act, and to seize and hold said boats until they are discharged by action of the commissioner, judge, or court of the United States before whom the offending persons are brought.

Third. To arrest and take into custody any witness or witnesses to such unlawful dumping of prohibited material, the said witnesses to be released under proper bonds.

Fourth. To go on board of any towboat having in tow scows or boats loaded with such prohibited material, and accompany the same to the place of dumping, whenever such action appears to be necessary to secure compliance with the requirements of this Act and of the Act aforesaid.

Fifth. To enter gas and oil works and all other manufacturing works for the purpose of discovering the disposition made of sludge, acid, or other injurious material, whenever there is good reason to believe that such sludge, acid, or other injurious material is allowed to run into the tidal waters of the harbor in violation of section one of the aforesaid Act of June twenty-ninth, eighteen hundred and eighty-eight.

Every person who, directly or indirectly, gives any sum of money or other bribe, present, or reward, or makes any offer of the same to any inspector, deputy inspector, or other employee of the office of

[the supervisor of the harbor] *any supervisor of a harbor* with intent to influence such inspector, deputy inspector, or other employee to permit or overlook any violation of the provisions of this section or of the said Act of June twenty-ninth, eighteen hundred and eighty-eight, shall, on conviction thereof, be fined not less than five hundred dollars nor more

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than one thousand dollars, and be imprisoned not less than six months nor more than one year.

Every permit issued in accordance with the provisions of this section of this Act, which may not be taken up by an inspector or deputy inspector, shall be returned within four days after issuance to the office of the supervisor of the harbor; such permit shall bear an indorsement by the master of the towboat, or the person acting in such capacity, stating whether the permit has been used, and, if so, the time and place of dumping. Any person violating the provisions of this section shall be liable to a fine of not more than five hundred dollars nor less than one hundred dollars.

SEC. 4. That all mud, dirt, sand, dredgings, and material of every kind and description whatever taken, dredged, or excavated from any slip, basin, or shoal in [the harbor of New York, or the waters adjacent or tributary thereto,] *any harbor subject to this Act* and placed on any boat, scow, or vessel for the purpose of being taken or towed upon [the waters of the harbor of New York] *the waters of that harbor* to a place of deposit, shall be deposited and discharged at such place or within such limits as shall be defined and specified by the supervisor of the harbor, as in the third section of this act prescribed, and not otherwise. Every person, firm, or corporation being the owner of any slip, basin, or shoal, from which such mud, dirt, sand, dredgings, and material shall be taken, dredged, or excavated, and every person, firm, or corporation in any manner engaged in the work of dredging or excavating any such slip, basin, or shoal, or of removing such mud, dirt, sand, or dredgings therefrom, shall severally be responsible for the deposit and discharge of all such mud, dirt, sand, or dredgings at such place or within such limits so defined and prescribed by said supervisor of the harbor; and for every violation of the provisions of this section the person offending shall be guilty of an offense against this act, and shall be punished by a fine equal to the sum of five dollars for every cubic yard of mud, dirt, sand, dredgings, or material not deposited or discharged as required by this section. Any boat or vessel used or employed in violating any provision of this act, shall be liable to the pecuniary penalties imposed thereby, and may be proceeded against, summarily by way

of libel in any district court of the United States, having jurisdiction thereof.

SEC. 5. That an officer of the Corps of Engineers shall, for each harbor subject to this Act, be designated by the Secretary of the Army as supervisor of the harbor, to act under the direction of the Chief of Engineers in enforcing the provisions of this Act, and in detecting offenders against the same. [This officer] *Each such officer* shall have personal charge and supervision under the Chief of Engineers, and shall direct the patrol boats and other means to detect and bring to punishment offenders against the provisions of this Act.

[SEC. 6. That the sum of thirty thousand dollars or so much thereof as may be necessary, is hereby appropriated to carry out the provisions of this act; and the Secretary of the Treasury is hereby authorized to pay that sum from moneys in the Treasury not otherwise appropriated.]

Sec. 6. *That the following harbors shall be subject to this Act:*

- (1) *The harbor of New York.*
- (2) *The harbor of Hampton Roads.*

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Sec. 7. *That for the purposes of this Act—*

(1) *The term "harbor of New York" means the tidal waters of the harbor of New York, its adjacent and tributary waters, and those of Long Island Sound.*

(2) *The term "harbor of Hampton Roads" means the tidal waters of the harbors of Norfolk, Portsmouth, Newport News, Hampton Roads, and their adjacent and tributary waters, so much of the Chesapeake Bay and its tributaries as lies within the State of Virginia, and so much of the Atlantic Ocean and its tributaries as lies within the jurisdiction of the United States within or to the east of the State of Virginia.*

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1.30g(2) SENATE COMMITTEE ON PUBLIC WORKS**S. REP. No. 2383, 85th Cong., 2d Sess. (1958)**

EXTENDING TO THE HARBORS OF HAMPTON ROADS AND BALTIMORE THE APPLICATION OF THE ACT OF JUNE 29, 1888, RELATING TO THE PREVENTION OF OBSTRUCTIVE AND INJURIOUS DEPOSITS IN THE HARBOR OF NEW YORK.

AUGUST 14, 1958.—Ordered to be printed

Mr. CHAVEZ, from the Committee on Public Works, submitted the following

R E P O R T

[To accompany H. R. 11697]

The Committee on Public Works, to whom was referred the bill (H. R. 11697) to amend the act of June 29, 1888, relating to the prevention of obstructive and injurious deposits in the harbor of New York, to extend the application of that act to the harbor of Hampton Roads, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

PURPOSE OF THE BILL

The purpose of this bill is to further amend the act of June 29, 1888 (25 Stat. 209; 33 U. S. C. 441-451), as amended, relating to the prevention of obstructions and injurious deposits in the harbor of New York, to extend the application of that act to the harbor of Hampton Roads, Va., and Baltimore, Md.

GENERAL STATEMENT

The act of 1888, as amended, prohibits placing, discharging, or depositing, by any process or in any manner, waste, sludge, acid or any other matter of any kind, other than that in a liquid state passing from streets or sewers, that might be obstructive and injurious to the use of the tidal waters of New York Harbor and certain adjacent waters, including Long Island Sound, for navigation and related purposes.

An officer of the Corps of Engineers designated by the Secretary of the Army as supervisor of the harbor is charged with the enforcement

of the provisions of the act. This supervisor has the duty of prevent-
[p. 1]

ing any obstructive or injurious deposits in all waters under his jurisdiction and preventing fishing and dredging of shellfish and other activity which would interfere with navigation of the entrance channels of the harbor by ships of deep draft. Penalties are provided for violation of the provisions of the act.

H. R. 11697 would make the provisions of the act of June 29, 1888, applicable to the tidal waters of the Hampton Roads area, including Norfolk Harbor, Portsmouth Harbor, Newport News Harbor, Hampton Roads, and so much of the Chesapeake Bay and its tributary waters and adjacent areas as lie within the State of Virginia, and so much of the Atlantic Ocean and tributaries as lie within the jurisdiction of the United States within or to the east of the State of Virginia, and to the tidal waters of the Baltimore Harbor and its adjacent and tributary waters, and so much of Chesapeake Bay and its tributaries as lie within the State of Maryland.

The committee was advised that the principal problem in the Hampton Roads and Baltimore areas is one of oil pollution. This condition is created by the promiscuous discharge of bilge oil from vessels at anchor or at piers into the tidal waters of these harbors. This discharge creates a hazardous situation from a fire standpoint. It also has the effect of fouling the condensers of vessels navigating in these waters and, when washed up on the beaches, interferes with their normal use for recreational purposes.

The application of the 1888 act to the Hampton Roads and Baltimore Harbor areas would permit the Corps of Engineers to patrol the affected waters, make periodic inspections to detect violations, and more rigidly enforce the provisions of the various laws for preservation of navigable waters. In addition, before any type of material could be discharged into the waters a permit for such discharge would be required. This permit would require the discharge of the material at a specific location which would not be detrimental to commerce. At the present time, the policy of the Corps of Engineers is to act in connection with local polluted waters only on a specific complaint from the community involved. This bill would permit all-year-round supervision of the Hampton Roads and Baltimore Harbor areas at an estimated average annual cost of \$300,000 to the Federal Government.

The committee was advised that officials of the cities, towns, and counties in the affected areas have held conferences and made studies of the oil-pollution problem, but it appears to be growing, in spite of the excellent cooperation from naval and shipping authorities.

The committee believes this legislation to be highly desirable and recommends its enactment.

The Department of the Army and the Bureau of the Budget have no objection to the enactment of H. R. 11697, as outlined in the following communication:

* * * * *

[p. 2]

1.30g(3) CONGRESSIONAL RECORD, VOL. 104 (1958):

1.30g(3) (a) August 4: Amended and passed House, pp. 16021–16022

[No Relevant Discussion on Pertinent Section]

1.30g(3) (b) August 18: Passed Senate, p. 18083

[No Relevant Discussion on Pertinent Section]

1.31 WATERSHED PROTECTION AND FLOOD PREVENTION ACT, AS AMENDED

16 U. S. C. § 1005(4) (1972)

§ 1005. Works of improvement—Engineering and other services; reimbursement; advances

(1) At such time as the Secretary and the interested local organization have agreed on a plan for works of improvement, and the Secretary has determined that the benefits exceed the costs, and the local organization has met the requirements for participation in carrying out the works of improvement as set forth in section 1004 of this title, the local organization may secure engineering and other services, including the design, preparation of contracts and specifications, awarding of contracts, and supervision of construction, in connection with such works of improvement, by retaining or employing a professional engineer or engineers satisfactory to the Secretary or may request the Secretary to provide such services: *Provided*, That if the local organization elects to employ a professional engineer or engineers, the Secretary shall reimburse the local organization for the costs of such engineering and other services secured by the local organization as are properly chargeable to such works of improvement in an amount not to exceed the amount agreed upon in the plan for works of improvement or any modification thereof: *Provided further*, That the Secretary may advance such amounts as may be necessary to pay for such services, but such advances with respect to any works of improvement shall not exceed 5 per centum of the estimated installation cost of such works.

Federal construction; request by local organization

(2) Except as to the installation of works of improvement on Federal lands, the Secretary shall not construct or enter into any contract for the construction of any structure: *Provided*, That, if requested to do so by the local organization, the Secretary may enter into contracts for the construction of structures.

Transmission of certain plans to Congress

(3) Whenever the estimated Federal contribution to the construction cost of works of improvement in the plan for any watershed or subwatershed area shall exceed \$250,000 or the works of improvement include any structure having a total capacity in excess of twenty-five hundred acre-feet, the Secretary shall transmit a copy of the plan and the justification therefor to the Congress through the President.

Transmission of certain plans and recommendations to Congress

(4) Any plans for works of improvement involving an estimated Federal contribution to construction costs in excess of \$250,000 or including any structure having a total capacity in excess of twenty-five hundred acre-feet (a) which includes works of improvement for reclamation or irrigation, or which affects public or other lands or wildlife under the jurisdiction of the Secretary of the Interior, (b) which includes Federal assistance for goodwater¹ detention structures, (c) which includes features which may affect the public health, or (d) which includes measures for control or abatement of water pollution, shall be submitted to the Secretary of the Interior, the Secretary of the Army, the Secretary of Health, Education, and Welfare, or the Administrator of the Environmental Protection Agency, respectively, for his views and recommendations at least thirty days prior to transmission of the plan to the Congress through the President. The views and recommendations of the Secretary of the Interior, the Secretary of the Army, the Secretary of Health, Education, and Welfare, and the Administrator of the Environmental Protection Agency, if received by the Secretary prior to the expiration of the above thirty-day period, shall accompany the plan transmitted by the Secretary to the Congress through the President.

Rules and regulations

(5) Prior to any Federal participation in the works of improvement under this chapter, the President shall issue such rules and regulations as he deems necessary or desirable to carry out the purposes of this chapter, and to assure the coordination of the work authorized under this chapter and related work of other agencies, including the Department of the Interior and the Department of the Army.

As amended Sept. 27, 1962, Pub.L. 87-703, Title I, § 105, 76 Stat. 609; June 27, 1968, Pub.L. 90-361, 82 Stat. 250; Aug. 30, 1972, Pub.L. 92-419, Title II, § 201(g), 86 Stat. 669.

1.31a RURAL DEVELOPMENT ACT OF 1972

August 30, 1972, P.L. 92-419, § 201(g), 86 Stat. 669

AN ACT

To provide for improving the economy and living conditions in rural America.

Be it enacted by the Senate and House of Representatives of the

¹ So in original. Probably should read "floodwater" as originally enacted.

United States of America in Congress assembled, That this Act may be cited as the "Rural Development Act of 1972".

* * * * *

[p. 1]

TITLE II—AMENDMENTS TO THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT, AS AMENDED

SEC. 201. AMENDMENTS TO PUBLIC LAW 83-566.—The Watershed Protection and Flood Prevention Act (68 Stat. 666), as amended, is amended as follows:

* * * * *

[p. 10]

(g) Subsection (4) of section 5 is amended to read as follows: "(4) Any plans for works of improvement involving an estimated Federal contribution to construction costs in excess of \$250,000 or including any structure having a total capacity in excess of twenty-five hundred acre-feet (a) which includes works of improvement for reclamation or irrigation, or which affects public or other lands or wildlife under the jurisdiction of the Secretary of the Interior, (b) which includes Federal assistance for goodwater detention structures, (c) which includes features which may affect the public health, or (d) which includes measures for control or abatement of water pollution, shall be submitted to the Secretary of the Interior, the Secretary of the Army, the Secretary of Health, Education, and Welfare, or the Administrator of the Environmental Protection Agency, respectively, for his views and recommendations at least thirty days prior to transmission of the plan to the Congress through the President. The views and recommendations of the Secretary of the Interior, the Secretary of the Army, the Secretary of Health, Education, and Welfare, and the Administrator of the Environmental Protection Agency, if received by the Secretary prior to the expiration of the above thirty-day period, shall accompany the plan transmitted by the Secretary to the Congress through the President."

[p. 12]

1.31a(1) HOUSE COMMITTEE ON AGRICULTURE**H. R. REP. No. 92-835, 92d Cong., 2d Sess. (1972)****RURAL DEVELOPMENT ACT OF 1972**

FEBRUARY 16, 1972.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed.

Mr. POAGE, from the Committee on Agriculture, submitted the following

R E P O R T

together with

**ADDITIONAL VIEWS, MINORITY VIEWS, AND
SUPPLEMENTARY VIEWS**

[To accompany H.R. 12931]

The Committee on Agriculture, to whom was referred the bill (H. R. 12931) to provide for improving the economy and living conditions in rural America, having considered the same, report favorably thereon with amendments and recommend that the bill do pass.

[p. 1]

* * * * *

Title II of the bill would amend the Watershed Protection and Flood Prevention Act (Public Law 83-566) as amended, (1) to authorize the Secretary of Agriculture to cost share in watershed projects for needed measures planned and installed in cooperation with public agencies and local organizations that would restore, improve and maintain the quality of the environment, and storage for water quality management, (2) to authorize the Secretary of Agriculture to enter into long-term contracts with landowners and operators for making changes in cropping systems and land uses and for installing needed soil and water conservation practices in watershed projects, (3) to authorize local organizations to use Federal funds available to them other than those appropriated for the purposes of the Watershed Protection and Flood Prevention Act, in acquisition of land, easements, and rights-of-way needed in connection with works of improvement in watershed projects, and (4) to authorize the Secretary

of Agriculture to bear not to exceed one-half the cost of storage of water added to any reservoir constructed or modified under the Act to meet present demands for municipal, industrial or rural development needs. Also included are provisions for coordination with the Administrator of the Environmental Protection Agency and the Secretary of Health, Education and Welfare, respectively, on work plans which would include works of improvement for the prevention, control and abatement of water pollution or which include features which may affect the public health.

We support those amendments relating to storage for water quality and long-term contracting, and oppose those amendments relating to cost sharing for pollution abatement facilities, municipal and industrial water storage, and permitting the use of other Federal funds. Our position is explained in the attached supplemental material.

SUPPLEMENTAL MATERIAL—TITLE II—H.R. 10867

1. Water Quality Management

The Administration endorses the amendment to provide Federal cost sharing in watershed projects for needed measures planned and installed in cooperation with public agencies and local organizations for water quality management.

The National Environmental Policy Act of 1969 requires Federal agencies to administer existing policies, regulations, and laws in the broadest sense possible to improve, maintain, and preserve the quality of the environment. Steps have been taken to implement this policy. Nevertheless, it would in specific cases be desirable to add water quality management to watershed projects.

Federal cost sharing for water quality management is now authorized for mainstem developments under other Federal programs. This amendment would remove this inconsistency and improve the effective-

[p. 9]

ness of the upstream watershed program. It would help to round out a successful ongoing program under which multiple-purpose works of improvement are developed for each watershed on a package basis. The Federal cost share would be such proportionate share of the cost of providing storage for water quality management as the Secretary of Agriculture determines to be equitable in consideration of national needs and the assistance authorized for providing storage for this purpose under other Federal programs.

Comments received from various agencies during interagency review of watershed project work plans clearly indicates that the need exists in a number of watersheds for including water quality manage-

ment as a project purpose.

Just as management and control of runoff and waterflows for optimum use should begin in the upstream areas where rain and snow falls, so should provision for maintenance of good water quality begin at the farthest possible upstream points.

By this coordinated approach in upstream areas, optimum use can be made of available water and related land resources in these areas and feasible contributions also can be made to downstream water quality management. Benefits will accrue to municipalities, industries, recreation, fish and wildlife, irrigators, and other water users. Consideration needs to be given to all storage needs during the project formulation stage if truly comprehensive resource planning and development is to be achieved. Otherwise, the fullest feasible potential use of the limited number of available reservoir sites will not be made. Where the need is evident for water quality management in a watershed, it would be given full consideration along with other objectives.

2. Long-Term Contracting in Watersheds

The Administration endorses the amendment which would enable the Department of Agriculture to enter into long-term contracts (up to 10 years) with owners of watershed lands in order to assure the orderly establishment of needed conservation measures.

The timely installation of needed land treatment measures on a planned, systematic basis with assured cost sharing and technical assistance, such as the bill would authorize for Public Law 566 watershed projects has proven its value in the Great Plains Conservation Program. This demonstrated effective approach would assist local sponsors and the Department to more effectively plan and install the works of improvement in approved watershed projects. The additional authority for entering into long-term contracts for conservation cost sharing would supplement, but not supplant, the cost sharing authorized under the Rural Environmental Assistance Program, the Great Plains Conservation Program, or other programs which provide conservation practice cost sharing in those areas.

Experience has demonstrated that an agreement that is based on a conservation farm plan and that allows the landowner or operator to install land treatment with known and assured cost sharing for planned conservation work, lessens the uncertainties of farmers in planning and programming their activities with a resulting improvement in the conservation program. This, in turn, would reduce the construction costs of the works of improvement. It also would reduce the cost of

operation and maintenance of the structures and further insure their useful life expectancy. This is especially important in watershed areas above reservoir structures installed with Federal assistance. In these areas, local organizations are required by the Watershed Protection and Flood Prevention Act to obtain agreements from owners of not less than 50 percentum of the lands to carry out recommended soil conservation measures and proper farm plans.

- Land treatment constitutes the initial increment of sound watershed development and management.
- Delays in completion of watershed projects oftentimes are due to slow progress in installation of needed land treatment measures.
- When land treatment measures can be planned and installed on a definite schedule, the installation of needed structural works of improvement can be accelerated.
- Installation of project works of improvement on a planned time schedule reduces installation costs and the costs of operation and maintenance, thereby assuring their useful life expectancy.

3. Use of Available Federal Funds

The Administration opposes the amendment which would permit the use of Federal funds available to local sponsoring organizations under other Federal programs to be used for acquiring land, easements, and rights-of-way needed in connection with works of improvement installed in watershed projects.

The land rights acquisition is a significant part of local cost and it is not termed appropriate in that it might result in a 100 percent financing of these projects.

4. Municipal and Industrial Water Supply

The Administration opposes the amendment which would provide Federal cost sharing (up to 50%) to meet present municipal, industrial, and rural community water supply needs in watershed projects.

Under the existing provision for storage for future municipal or industrial water supply needs, brought about by enactment of Public Law 87-703, amending Public Law 83-566, the local interests must bear, but are granted deferred repayment of the entire cost of storage capacity for future use of water supply purposes incorporated in any reservoir.

The Administration believes that the provisions in the Act as they relate to water supply storage to meet municipal or industrial needs are adequate.

5. Pollution Abatement Facilities

The Administration opposes the amendment which would provide technical and cost sharing assistance for pollution abatement facili-

ties, including solid wastes in Public Law 566 watersheds. The Environmental Protection Agency has research and technical assistance programs for solid wastes disposal, and is charged with the general responsibility of pollution abatement. Also, there is no provision in this bill for recovery of funds when industrial wastes go through municipal systems.

Title III, Section 601 and 602 of the bill provides for "amending the Bankhead-Jones Farm Tenant Act, as amended." These amend-
[p. 11]

ments would add to the present authorizations in the Act by authorizing the Secretary of Agriculture to assist State and local public agencies and local non-profit organizations by (1) providing technical and cost sharing assistance (up to 50%) for the storage of water to meet rural community water supply needs; (2) providing technical and cost sharing assistance for installing measures and facilities for water quality management, for the control and abatement of agriculture-related pollution, and for the disposal of solid wastes; (3) providing technical and cost sharing assistance for the storage of water in reservoirs, farm ponds, or other impoundments having community benefits, together with the necessary water withdrawal appurtenances for the purpose of rural fire protection; and (4) carrying out a land inventory and monitoring program to include studies and surveys of erosion and sediment damages, land use changes and trends, and environmental degradation resulting from improper use of soil, water and related resources. A land inventory report shall be issued at not less than five-year intervals reflecting soil, water and related resource conditions.

We support those amendments relating to storage for water quality and inventorying and monitoring, and oppose the remaining provisions of Title III. Our position is explained in the attached supplemental material.

SUPPLEMENTAL MATERIAL—TITLE III—H.R. 10867

1. Rural Community Water Supply

The Administration opposes the amendment which would provide Federal cost sharing assistance (up to 50%) for the storage of water to meet rural community water supply needs.

The Administration feels that assistance from other Federal programs are adequate at this time to deal with this problem.

2. Water Quality Management

The Administration endorses the amendment which would authorize the Secretary to cooperate with State and local public agencies in

RC&D projects by providing technical and financial assistance for installing works of improvement for the purpose of water quality management. These improvements would consist mostly of water retention reservoirs constructed under this authority, to release water during low stream flow periods or other critical periods to improve fish and aquatic habitat, reduce odor, improve the quality of water, lessen biodegradation, and to provide sustained water flows to water users downstream.

3. *Control and Abatement of Agriculture-Related Pollution*

The Administration opposes the amendment which would provide cost sharing for the abatement of agriculture-related pollution. The Administration, through the Environmental Protection Agency (EPA), is charged with this general responsibility. EPA has no such cost sharing arrangements.

4. *Solid Waste Disposal in Rural Areas*

The Administration opposes the amendment which would provide technical and cost sharing assistance for the disposal of solid wastes in rural areas. The Administration, through the Environmental Pro-

[p. 12]

tection Agency, has a research and technical assistance program for solid wastes, but it does not have a cost sharing program for solid wastes disposal.

* * * * *

[p. 13]

COMMITTEE INTENT

1. Definition of public body. The term "public body" is intended to include not only the conventional units of State and local government, such as cities and counties, but government organizations created by State or local laws, such as, for example, conservation districts.

2. Third party treatment on pollution abatement and control. The committee intends that pollution abatement and control grants authority be administered in such a manner that the recipient of the grant will be directly responsible for carrying out the practice or action for which the grant was made. The committee does not intend that these grants be used, directly or indirectly, by third parties not eligible to receive the grants themselves.

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SECTION-BY-SECTION ANALYSIS

* * * * *

TITLE II—AMENDMENTS TO THE WATERSHED PROTECTION AND FLOOD
PREVENTION ACT

Section 201. This section makes the following changes in the small watershed program:

1. *Restoring, Improving, and Maintaining Environmental Quality*—This amendment for the first time would provide cost sharing for water quality management, land utilization, and agricultural waste management. The proposed amendment would provide an effective means to plan and install desirable measures and works that would restore, improve, and maintain the quality of the environment within the watersheds involved. Works of improvement for water quality management would consist primarily of water storage capacity in reservoirs for streamflow regulation and would not be in substitution for controlling waste at its source. Cost sharing would be consistent with standards and regulations adopted by the Water Resources Council.

2. *Municipal and Industrial Water Supply*—This amendment would authorize the Secretary of Agriculture to bear up to one-half the cost of the storage of water for present use, for municipal and industrial water that may be provided in any reservoir structure constructed or modified under the provisions of Public Law 83-566.

3. *Use of Available Federal Funds*—This amendment would permit local sponsoring organizations to utilize any funds that may be available to them under other Federal programs that might be used in the purchase of land rights within a watershed.

4. *Long-Term Contracting in Watersheds*—This amendment would authorize the Secretary of Agriculture to enter into agreements for periods of not to exceed ten years with land owners and operators, individually or collectively, to share the cost of carrying out conservation plans within watershed projects. Such plans will be developed in

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cooperation with and approval by the soil and water conservation district involved.

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**1.31a(2) SENATE COMMITTEE ON AGRICULTURE
AND FORESTRY****S. REP. No. 92-734, 92 Cong., 2d Sess. (1972)****RURAL DEVELOPMENT ACT OF 1972**

APRIL 7, 1972.—Ordered to be printed

Mr. TALMADGE, from the Committee on Agriculture and Forestry,
submitted the following

R E P O R T

together with additional and

INDIVIDUAL VIEWS

[To accompany S. 3462]

The Committee on Agriculture and Forestry, reported an original bill (.....), to provide for the development of rural areas, with a recommendation that it do pass.

[p. 1]

* * * * *

**TITLE IV—AMENDMENTS TO THE WATERSHED PROTECTION AND FLOOD
PREVENTION ACT****SHORT EXPLANATION**

This title would amend the Watershed Protection and Flood Prevention Act to—

(1) extend the definition of “works of improvement” to any undertaking for the conservation and proper utilization of land and permit cost-sharing therefor; (Section 1301 (a), (b) and (f))

(2) provide for up to ten year agreements under which the Secretary would share the cost of soil and water conservation practices on lands within the areas covered by watershed projects under that act or section 13 of the act of December 22, 1944; (Section 1301 (c))

(3) permit funds appropriated for other acts to be used in the acquisition of lands now required to be acquired by the local

organization without cost to the Federal government; (Section 1301(d))

(4) authorize the Secretary to pay the cost of Indian lands needed for works of improvement thereon; (Section 1301(e))

(5) permit the Secretary to assume an appropriate part of the cost of installing any work of improvement applicable to water quality management; (Section 1301(f))

(6) permit the Secretary to pay up to 50 percent of the cost of storage for present municipal and industrial water demands; (Section 1301(g))

(7) require plans which include (a) features which may affect the public health, or (b) water pollution control measures, to be submitted to the Secretary of Health, Education and Welfare or the Administrator of the Environmental Protection Agency, respectively. (Section 1301(h))

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Title IV would further broaden and increase the usefulness of the watershed program under Public Law 83-566. The watershed program has been a major force in meeting the water, land, and related resource needs in watersheds and in improving the economy of rural communities. There are two related areas in which the program can make a greater contribution toward meeting broad national needs. These are in dealing with problems relating to (1) rural development and (2) the total environment.

Title IV would amend the Watershed Protection and Flood Prevention Act (Public Law 83-566) as amended, to (1) authorize the Secretary of Agriculture to cost-share in watershed projects for needed measures planned and installed in cooperation with public agencies and local organizations that would restore, improve, and maintain the quality of the environment, and cost-share for reservoir storage for water quality management; (2) authorize the Secretary of Agriculture to enter into long-term contracts with landowners and operators for making changes in cropping systems and land uses and for installing needed soil and water conservation practices in watershed projects; (3) authorize local organizations to use federal funds available to them, other than those appropriated for the purposes of the Watershed Protection and Flood Prevention Act, in acquisition of land, easements, and rights-of-way needed in connection with works of improvement in watershed projects; (4) authorize the Secretary of Agriculture to pay the cost of lands, easements, and rights-of-way needed for works of improvement to be installed on privately owned Indian lands; (5) authorize the Secretary of Agriculture to bear not to exceed one-half the cost of storage of water added to any

reservoir constructed or modified under the Act to meet present demands for municipal, industrial, or rural development needs; and (6) modify the language in the Act with respect to assurances for repayment of costs of water supply for anticipated future needs by requiring a reasonable showing that there is an anticipated need for the water and that the local organization or an authorized state agency gives assurances satisfactory to the Secretary of Agriculture that the federal government will be reimbursed the cost of such water supply. Also included are provisions for coordination with the Administrator of the Environmental Protection Agency and the Secretary of Health, Education, and Welfare, respectively, on work plans which would include works of improvement for the prevention, control, and abatement of water pollution or which include features which may affect the public health.

Acquisition of Land Rights on Privately Owned Indian Lands.—In some states, Indian holdings are owned by private individuals although the Indians are under the jurisdiction of the Bureau of Indian Affairs, U.S. Department of the Interior. It is the policy of that Department that no Indian can convey an interest in rights to such land without being reimbursed. This requirement has hindered, or in some cases, prevented, the carrying out of needed project measures. Since this requirement stems from a federal agency policy, the Committee thinks it reasonable that the Secretary of Agriculture be authorized to pay for needed land, easements, and rights-of-way involving such privately owned Indian lands.

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Long-term Contracting in Watersheds.—This amendment would authorize the Secretary of Agriculture to enter into agreements for periods of not to exceed ten years with landowners and operators to share the cost of carrying out conservation plans within watershed projects. It would result in accelerated and intensified application of practices and measures for erosion control and otherwise to conserve and develop the soil and water resources of farms, ranches, and other lands in project areas. It would assist in bringing about orderly community and resource development. Cost-sharing contracts between landowners and the Department of Agriculture, based on plans developed in cooperation with and approved by the soil and water conservation district involved, would assure application of planned measures on a definite time schedule. This arrangement would accelerate establishment of needed land treatment and speed up scheduling of structural works of improvement. Similar cost-sharing arrangements have already proved their effectiveness in the Great

Plains Conservation Program administered by the Soil Conservation Service.

Municipal, Industrial, or Rural Community Water Supply

The Secretary of Agriculture would be authorized by this title to bear up to one half of the cost of the storage of water for present use, for municipal, industrial, or rural community water that may be provided in any reservoir structure constructed or modified under the provisions of Public Law 83-566. At the present time, local interests are required to bear the entire cost allocated to that purpose from sources other than funds appropriated under the Act.

An adequate, dependable supply of good quality water is basic to the stability and potential for growth of any rural community, town, or industry. Reservoirs with the amount of capacity authorized for inclusion in watershed projects can provide a dependable supply of water to meet the needs in rural America. Unfortunately, many rural communities lack sufficient funds and legal authority to provide the needed water supply facilities by themselves.

Broadening the authority of Public Law 83-566 to provide federal cost-sharing for water supply to rural communities can have a major impact in producing economic growth, providing jobs, and developing a more comfortable and better way of life in many town and country areas. In addition, improvement of the economy of these areas should help to reduce the migration of rural residents to already crowded urban centers. This amendment will do a great deal to increase the already large contribution of this program to rural community development.

STATUS OF WATERSHED PROGRAMS

The 1968 revision of the Soil and Water Conservation Needs Inventory shows over 19,000 upstream watershed areas with resource problems. About 8,900 containing over 726 million acres, or about one-third of all land in the United States and Puerto Rico, are considered feasible for project action at this time. As of March 1972, applications under Public Law 83-566 had been received on 2,937 watersheds. Planning assistance had been authorized on 1,643, and 1,059 projects—slightly under 12 percent of the potential—had been approved for operations.

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The 5,788 floodwater-retarding and multipurpose dams, 6,646 miles of channel improvement, and other structural and land treatment measures already installed provide increasing benefits each year as they continue to function. They have upgraded the living conditions of many thousands of people by preventing an estimated \$220 million

in flood and sediment damages. The quality of downstream waters has been maintained or improved through soil conserving practices which keep an estimated 208 million tons of productive topsoil in place. In addition, about 15 million tons of sediment have been trapped in floodwater-retarding dams to date and thus removed from further travel downstream.

Equally important to rural residents are the water supply and recreational developments they have built into their projects. Some 78 communities and 464,300 people no longer have to worry about adequacy of municipal water supplies. Water-based recreation is a reality in terms of more than 5 million visitor-days of use on 94 lakes behind dams which also serve to hold floodwaters when needed. Most of these 94 lakes are ones on which the Soil Conservation Service has provided cost-sharing for recreation facilities. They do not include the hundreds of others where incidental recreation has developed in the sediment pools of floodwater-retarding structures.

* * * * *

SECTION-BY-SECTION EXPLANATION

Section 1301 amends the Watershed Protection and Flood Prevention Act, as amended.

Subsection (a) amends section 1 of the Act to broaden its purposes to include the conservation and utilization of land, as well as the conservation, development, utilization and disposal of water. The inclusion of these purposes recognizes the interrelationship between land

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and water resources, and will permit greater utilization of this Act in the enhancement of the quality of the environment.

Subsection (b) amends section 2 of the Act to include in the definition of "works of improvement" authorized to be included in plans, works of improvement for the conservation and proper utilization of land. This amendment is needed to assure that all authorities under the Act will be consonant with the broadened purposes of the Act.

Subsection (c) amends section 3 of the Act to authorize the Secretary to enter into long term agreements of not to exceed 10 years with landowners, operators, and occupiers in the development and carrying out of conservation plans in project areas which are needed to fully implement the land treatment aspects of work plans required by the Act. Such authority would also be extended to the eleven watershed improvement programs authorized by section 13 of the Flood Control Act of December 22, 1944. Provision is included which would permit the Secretary to preserve cropland, crop acreage, and allotment histories in connection with such agreements.

Subsection (d) amends the strict requirements of paragraph (1) of section 4 of the Act to permit local organizations in the furnishing of required lands, easements, and rights-of-way for projects to use Federal funds which otherwise could be made available to them under other Federal programs.

Subsection (e) also amends the strict requirements of paragraph (1) of section 4 with respect to the acquisition of lands, easements, and rights-of-way, and would permit the Secretary to pay from funds appropriated for purposes of the Act the cost of such lands, easements, and rights-of-way needed for project works of improvement which are located on privately owned Indian lands.

Subsection (f) amends clause (A) of paragraph (2) of section 4 to include works of improvement for water quality management as eligible for cost-sharing assistance by the Secretary. Such works of improvement currently may be included in plans, but are not eligible for cost-sharing assistance. It also adds as eligible for cost-sharing assistance works of improvement for the conservation and proper utilization of land, which is consistent with the broadened objectives of the Act.

Subsection (g) would authorize the Secretary to bear up to 50 percent of the cost of water storage included in any reservoir for present municipal and industrial use. It would also amend the Act to provide, with respect to future water supply, that the Secretary may also accept assurances of repayment by an authorized State agency, which assurances need not be supported by the immediate issuance of bonds or other obligations.

Subsection (h) amends subsection (4) of section 5 of the Act which presently provides interagency consultation on watershed work plans developed under the Act. In addition to consultations presently provided for, consonant with the broadened environmental and rural development purposes of the Act, plans which include features which will affect the public health will receive a review by the Secretary of Health, Education, and Welfare, and plans which include measures for the control and abatement of water pollution will receive the review of the Environmental Protection Agency.

1.31a(3) COMMITTEE OF CONFERENCE**H. R. REP. No. 92-1129, 92d Cong., 2d Sess. (1972)****RURAL DEVELOPMENT**

JUNE 14, 1972.—Ordered to be printed

Mr. POAGE, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany H.R. 12931]

The committee of conference on the disagreeing votes of the two Houses on the Amendment of the Senate to the bill (H.R. 12931) to provide for improving the economy and living conditions in rural America, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the House recede from its disagreement to the amendment of the Senate and agree to the same with an amendment as follows:

In lieu of the matter proposed to be inserted by the Senate amendment insert the following:

That this Act may be cited as the "Rural Development Act of 1972"

* * * * *

[p. 1]

1.31a(4) CONGRESSIONAL RECORD, VOL. 118 (1972):**1.31a(4)(a) Feb. 23: Considered and passed House**

[No Relevant Discussion on Pertinent Section]

1.31a(4)(b) April 19, 20: Considered and passed Senate; amended in lieu of S. 3462

[No Relevant Discussion on Pertinent Section]

1.31a(4)(c) July 27: House agreed to conference report

[No Relevant Discussion on Pertinent Section]

1.31a(4)(d) Aug. 17: Senate agreed to conference report

[No Relevant Discussion on Pertinent Section]

1.32 REEFS FOR MARINE LIFE CONSERVATION

16 U.S.C. § 1220 (1972)

**CHAPTER 25B.—REEFS FOR MARINE LIFE
CONSERVATION**

§ 1220. State applications for Liberty ships for use as offshore reefs—Conservation of marine life

(a) Any State may apply to the Secretary of Commerce (hereafter referred to in this chapter as the "Secretary") for Liberty ships which, but for the operation of this chapter, would be designated by the Secretary for scrapping if the State intends to sink such ships for use as an offshore artificial reef for the conservation of marine life.

Manner and form of applications; minimum requirements

(b) A State shall apply for Liberty ships under this chapter in such manner and form as the Secretary shall prescribe, but such application shall include at least (1) the location at which the State proposes to sink the ships, (2) a certificate from the Administrator, Environmental Protection Agency, that the proposed use of the particular vessel or vessels requested by the State will be compatible with water quality standards and other appropriate environmental protection requirements, and (3) statements and estimates with respect to the conservation goals which are sought to be achieved by use of the ships.

Copies to Federal officers for official comments and views

(c) Before taking any action with respect to an application submitted under this chapter, the Secretary shall provide copies of the application to the Secretary of the Interior, the Secretary of Defense, and any other appropriate Federal officer, and shall consider comments and views of such officers with respect to the application.

Pub.L. 92-402, § 3, Aug. 22, 1972, 86 Stat. 618.

1.32a COMMERCE DEPARTMENT MARITIME PROGRAMS

August 22, 1972, P.L. 92-402, § 3, 86 Stat. 617

**APPROPRIATIONS AUTHORIZATIONS—MARITIME
PROGRAMS**

[H.R. 13324]

An Act to authorize appropriations for the fiscal year 1973 for certain maritime programs of the Department of Commerce, and for related purposes.

SEC. 3. (a) Any State may apply to the Secretary of Commerce (hereafter referred to in this Act as the "Secretary") for Liberty ships which, but for the operation of this Act, would be designated by the Secretary for scrapping if the State intends to sink such ships for use as an offshore artificial reef for the conservation of marine life.

(b) A State shall apply for Liberty ships under this Act in such manner and form as the Secretary shall prescribe, but such applica-

tion shall include at least (1) the location at which the State proposes to sink the ships, (2) a certificate from the Administrator, Environmental Protection Agency, that the proposed use of the particular vessel or vessels requested by the State will be compatible with water quality standards and other appropriate environmental protection requirements, and (3) statements and estimates with respect to the conservation goals which are sought to be achieved by use of the ships.

(c) Before taking any action with respect to an application submitted under this Act, the Secretary shall provide copies of the application to the Secretary of the Interior, the Secretary of Defense, and any other appropriate Federal officer, and shall consider comments and views of such officers with respect to the application.

1.32a(1) HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES

H. R. REP. No. 92-934, 92d Cong., 2d Sess. (1972)

MARITIME AUTHORIZATION, 1973

MARCH 20, 1972.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. GARMATZ, from the Committee on Merchant Marine and Fisheries, submitted the following

R E P O R T

[To accompany H.R. 13324]

The Committee on Merchant Marine and Fisheries, to whom was referred the bill (H.R. 13324), to authorize certain appropriations for programs of the Maritime Administration within the Department of Commerce for fiscal year 1973, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

* * * * *

[p. 1]

[No Relevant Discussion on Pertinent Section]

1.32a(2) SENATE COMMITTEE ON COMMERCE**S. REP. No. 92-841, 92d Cong., 2d Sess. (1972)****MARITIME PROGRAMS**

JUNE 8, 1972.—Ordered to be printed

Mr. LONG, from the Committee on Commerce,
submitted the following

REPORT

[To accompany H.R. 13324]

The Committee on Commerce, to which was referred the bill (H.R. 13324), to authorize appropriations for the fiscal year 1973 for certain maritime programs of the Department of Commerce, having considered the same, reports favorably thereon with amendments and recommends that the bill as amended do pass.

* * * * *

[p. 1]

[No Relevant Discussion on Pertinent Section]**1.32a(3) CONGRESSIONAL RECORD, VOL. 118 (1972):****1.32a(3)(a) April 11: Considered and passed House****[No Relevant Discussion on Pertinent Section]****1.32a(3)(b) July 26: Considered and passed Senate, amended, pp. S11935-S11938****AMENDMENT NO. 1355**

Mr. SPARKMAN. Mr. President, I call up my amendment No. 1355 and ask that it be stated.

The PRESIDING OFFICER (Mr. MCINTYRE). The amendment will be stated.

The assistant legislative clerk read as follows:

Add at the end of the bill the following:

SEC. 4 (a) Any State may apply to the Secretary of Commerce (hereafter referred to in this Act as the "Secretary") for Liberty ships which, but for the operation of this Act, would be designated by the Secretary for scrapping if the State intends to sink such ships for use as an offshore artificial reef for the conservation of marine life.

(b) A State shall apply for liberty ships under this Act in such manner and form as the Secretary shall prescribe, but such application shall include at least (1) the location at which the State proposes to sink the ships, (2) a certificate from the

Administrator, Environmental Protection Agency, that the proposed use of the particular vessel or vessels requested by the State will be compatible with water quality standards and other appropriate environmental protection requirements, and (3) statements and estimates with respect to the conservation goals which are sought to be achieved by use of the ships.

(c) Before taking any action with respect to an application submitted under this Act, the Secretary shall provide copies of the application to the Secretary of the Interior, the Secretary of Defense, and any other appropriate Federal officer, and shall consider comments and views of such officers with respect to the application.

Sec. 5. If, after consideration of such comments and views as are received pursuant to section 4(c), the Secretary finds that the use of Liberty ships proposed by a State will not violate any Federal law, contribute to degradation of the marine environment, create undue interference with commercial fishing or navigation, and is not frivolous, he shall transfer without consideration to the State all right, title, and interest of the United States in and to any Liberty ships which are available for transfer under this Act if—

(1) the State gives to the Secretary such assurances as he deems necessary that such ships will be utilized and maintained only for the purposes stated in the application and, when sunk, will be charted and marked as a hazard to navigation;

(2) the State agrees to secure any licenses or permits which may be required under the provisions of any other applicable Federal law;

(3) the State agrees to such other terms and conditions as the Secretary shall require in order to protect the marine environment and other interests of the United States; and

(4) the transfer would be at no cost to the Government with the State taking delivery of such Liberty ships at fleetside of the National Defense Reserve Fleet in an "as is—where is" condition.

Sec. 6. A State may apply for more than one Liberty ship under this Act. The Secretary shall, however, taking into account the number of Liberty ships which may be or become available for transfer under this Act, administer this Act in an equitable manner with respect to the various States.

Sec. 7. A decision by the Secretary denying any application for a Liberty ship under this Act is final.

Mr. LONG. Mr. President, for the benefit of Senators who have worked so long and hard today, I do not anticipate that we will have any more rollcall votes unless someone wants to insist on one on

final passage. So far as I am concerned, the bill will pass on a voice vote. Otherwise, if I thought it would not, I would put the vote off until tomorrow.

I make this statement so that Senators can make their plans. I know of no more controversial amendments.

Mr. SPARKMAN. Mr. President, last year along with my colleague, Senator ALLEN, I introduced a bill, S. 2243, which would authorize the Secretary of Commerce to transfer surplus Liberty ships to a State for use by the State in promoting marine life conservation. Specifically, under our bill, States would be authorized to sink these old ships offshore for the purpose of creating an artificial fishing reef. The ships that will be made available for this purpose will be those that are designated by the Secretary of Commerce to be scrapped.

Similar bills were introduced in the House of Representatives. Hearings were held by the Subcommittee on Merchant Marine of the House Committee on Merchant Marine and Fisheries, and the committee reported the bill late last month. As yet, no further action has been taken in the House.

Mr. President, the amendment that we are offering at this time would accomplish the same purpose as the bill we introduced earlier and the bill which is now pending in the House of Representatives. Our bill was referred here in the Senate to the Commerce Committee. That committee requested comments from the Department of Commerce, the Department of Interior, the Department of the Navy, the General Accounting Office, and the Justice Department. Responses were received from these agencies, and I ask unanimous consent to have these five responses printed in the RECORD.

There being no objection, the letters were ordered to be printed in the RECORD, as follows:

* * * * *

GENERAL COUNSEL OF THE
DEPARTMENT OF COMMERCE,

Washington, D.C., November 10, 1971.

Hon. WARREN G. MAGNUSON,

Chairman, Committee on Commerce, U.S.
Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in further
reply to your request for the views of this
Department concerning S. 2243, a bill—

"To authorize the Secretary of Commerce
to transfer surplus Liberty ships to States for
use in marine life conservation programs."

S. 2243 would authorize the Secretary of
Commerce to transfer certain Liberty ships,
otherwise scheduled to be scrapped, to States
for use as offshore artificial reefs for the
conservation of marine life. A State would
apply for these Liberty ships in accordance
with regulations to be prescribed by the Sec-
retary of Commerce. Information on the lo-
cation where the State proposes to sink the
ships and the conservation goals sought to
be achieved would be required to be in-
cluded in such application. Prior to taking
any action, the Secretary of Commerce would
provide copies of the application to the Sec-
retary of the Interior, the Secretary of the
Army and any other appropriate Federal
officer, and obtain their comments and views.
If the Secretary of Commerce finds that such
use of these Liberty ships does not violate
Federal law and is not frivolous, and the
State agrees to the required terms and con-
ditions, including the furnishing of assur-
ances that the vessels will be used for the
stated purpose, he would be authorized to
transfer without consideration to the appli-
cant State all right, title, and interest of the
United States in such vessels.

This Department generally supports S. 2243
as we have vessels in the National Defense
Reserve Fleet that would be suitable for the
purpose of the bill. Further, sunken ships
are known to concentrate fish and other
marine life. The deliberate creation of such
artificial reefs could enhance marine life
habitat, thus providing benefits to sport fish-
ermen and some commercial fishing activi-
ties. Such reefs may also be attractive to
scuba divers. However, if such structures
are not located properly, they can interfere
with commercial fishing activities, naviga-
tion, or offshore drilling and mining.
Sunken ships could also present a special
hazard if pollutants, such as lubricants and
the remnants of toxic cargoes, were not
removed prior to scuttling.

The responsibility to set specific terms
and conditions would be assigned to the Sec-
retary of Commerce under section 3 of the
proposed bill. However, to assure proper
consideration by the Secretary of Commerce
of situations such as noted above and to
stipulate where, how, and in what condition
the vessels would be transferred to applicant

States, we suggest the following additions
and changes:

Page 2, lines 2 and 3—strike "and (2)" and
insert in lieu thereof "(2) a certificate from
the Administrator, Environmental Protection
Agency, that the proposed use of the par-
ticular vessel or vessels requested by the
State will be compatible with water quality
standards and other appropriate environmen-
tal protection requirements, and (3)"

Page 2, line 9—substitute the word "con-
sider" for the word "obtain"

Page 2, lines 11 through 13—revise to read
"Sec. 3. If, after consideration of such com-
ments and views as are received pursuant to
section 2(b), the Secretary finds that the
use of Liberty ships proposed by a State will
not violate any Federal law, contribute to
degradation of the marine environment, cre-
ate undue interference with commercial fish-
ing or navigation, and is not frivolous, he
shall transfer without consideration to"

Page 2, lines 17 through 20—revise to read
"(1) the State gives to the Secretary such
assurances as he deems necessary that such
ships will be utilized and maintained only for
the purposes stated in the application and,
when sunk, will be charted and marked as a
hazard to navigation."

Page 2, line 21—revise to read "(2) the
State agrees to secure any licenses or per-
mits which may be required under the pro-
visions of any other applicable Federal law
and (3) the State agrees to such other terms
and condi-"

Page 3, line 2—insert between the words
"the" and "interests" the words "marine en-
vironment and other" and add "and" after
the words "United States."

Page 3, after line 2—add "(4) the transfer
would be at no cost to the Government with
the State taking delivery of such Liberty
ships at fleetsite of the National Defense Re-
serve Fleet in an "as is-where is" condition."

There is enclosed an environmental impact
statement with respect to this legislation as
required by Public Law 91-190.

We have been advised by the Office of
Management and Budget that there would
be no objection to the submission of this
report to your Committee from the stand-
point of the Administration's program.

Sincerely,

KARL E. BAKKE,
Acting General Counsel.

[U.S. Department of Commerce]

ENVIRONMENTAL IMPACT STATEMENT—USE OF
SURPLUS LIBERTY SHIPS AS ARTIFICIAL REEFS

The legislation proposed to allow surplus
Liberty ships to be used by States in marine
life conservation programs, would authorize
the Secretary of Commerce to transfer cer-
tain Liberty ships, otherwise scheduled to be

scrapped, to States for use as offshore artificial reefs. These vessels would be placed on the continental shelf in designated reef sites selected by the States with technical assistance from the National Marine Fisheries Service and with proper authorization from the U.S. Army Corps of Engineers.

The environmental impact of the proposed action: The environmental impact of using these vessels to build artificial reefs on the continental shelf would be beneficial if properly located. The shelf off the Atlantic and Gulf States, an expanse of shallow ocean bottom stretching from the coast out to a depth of about 600 feet, is the area inhabited by the majority of our valuable sport and commercial fish. However, much of this shelf area is relatively unproductive with little or no irregular, hard substrate (relief). Such hard substrate, or relief, is necessary for the encrusting organisms such as barnacles, hydroids, corals, and mussels to settle. It also provides protective areas, food sources, and spawning sites for finfish.

Many marine animals need solid substrates to complete their life cycles and it is well known that coral reefs, rock ledges, and other areas of relief on the shelf are effective habitats for numbers of fishes and invertebrates.

These ships could form the nucleus of large artificial reefs which would increase the area of favorable habitat and provide more food and shelter for finfish and invertebrates. The increase in favorable habitat should effectively increase the carrying capacity of the shelf and would potentially increase the survival rate of both fish and some shellfish in these areas.

Most Liberty ships are more than 250 feet long and as much as 80 feet high. Since the Coast Guard regulations require 60 feet clearance for surface vessels, such artificial reef sites must necessarily be located at depths of 150 feet or more. Some reefs ranging up to 200 feet deep have been effective for sport fishing. While the possibility exists that such artificial reefs might conflict with commercial fishing, offshore mining activities, or other potential uses, it is felt that the review mechanism for site selection provided in the proposed bill, as well as legal controls already in existence, can insure adequate resolution of such conflicts. If this bill is enacted, the Department of Commerce would assume the responsibility to assure adequate review of reef sites at the State level.

It should also be noted that there already exist a number of areas where there is no commercial fishing but which meet other requirements for sport fishing reefs. In creating artificial reefs, sites would be selected in areas where there is 1) adequate water over the reef; 2) no interference with commercial fishing; and 3) assured accessibility

to sport fishermen and divers. Such requirements would tend to make these carefully sunken vessels beneficial rather than harmful, or at least no more harmful than natural reefs or accidentally sunken wrecks.

In addition, it should be stated that the creation of reefs using surplus ships does not constitute a violation of the Government's anti-dumping policy. Dumping tends to be random, a "non-use" of surplus products. Reef sites, on the other hand, are deliberately selected with definite criteria for use. Construction of a reef requires a permit from either the Coast Guard or Army Corps of Engineers depending on the location. At this time, the reef site is informally identified on all pertinent charts. Before such a permit can be issued, practice in accordance with the Fish and Wildlife Coordination Act requires that the application be reviewed by the Bureau of Sport Fisheries and Wildlife (Department of Interior) and the National Marine Fisheries Service (Department of Commerce). Furthermore, in the case of any Federal, or Federally-sponsored project such as this would be, the Environmental Protection Act requires the prior filing of environmental impact statements, which again ultimately would receive review by both N.M.F.S. and B.S.F.W.

Coupled with the above criteria for reef site selection, it is important that the final attitude of the sunken vessel on the ocean floor be predetermined to provide the most efficient position as an effective habitat for fish and invertebrates. In the case of Liberty ships, sinking them in an upright position at a precise location will require the flooding of at least two watertight compartments. Opening sea cocks in the machinery must be augmented by additional flooding holes in the forward transverse bulkhead so that the cargo compartment forward of the machinery space will flood progressively. Under such flooding conditions, in which the ship could possibly capsize and land on her side, it may be necessary to flood additional forward and aft compartments to insure that sinking will occur in a reasonably upright position. This could be accomplished by explosive charges in each compartment holding in the shell plating, a procedure which would also permit access for fish into the ship's interior.

In studying this proposal, the National Marine Fisheries Service recommends scuttling by explosion. However, if explosive holing in the shell plating is deemed undesirable from an ecologic point of view, flooding valves can be installed in each hold, fitted with reach rods to the main deck. Before sinking, the vessels should first be detoxified, all portholes and floatables should be removed, and hatches and passages opened. All of these steps will facilitate the later

entry of fish. It should be added that scuttling would necessarily take place only in calm weather.

Any adverse environmental effects which cannot be avoided should the proposal be implemented: The activities proposed should not have any significant adverse effect on the environment as long as proper precautions are followed. All hulks made available for this purpose would be carefully inspected

[p. S11936]

to assure that all toxic materials, fuels, or other contaminants have been removed or rendered non-toxic.

Alternatives to the proposed action: In many areas along the Atlantic and Gulf coasts where 202 of the total Reserve Fleet of 219 Liberty ships are located, the shelf slopes very gradually and the real need is for nearshore reefs in shallow water. For such sites, use of smaller surplus vessels, such as small naval craft, would be more desirable. As noted earlier, Coast Guard regulations would necessarily preclude sinking of Liberty ships in shallow seas.

Other reef materials have been proven to be as good as, or superior to, metal vessels. These include large rocks, concrete block, certain types of building rubble, special concrete structures, and rubber tires. Most of these can be used effectively in shallow water, which would provide reefs more accessible to sport fishermen. In constructing deep water reefs, however, we find no better alternative than surplus Liberty ships, particularly when the cost to the State government is considered.

The relationships between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity: These artificial reefs would provide almost immediate benefit in terms of increased catches by anglers and also help to maintain and enhance long-term productivity of the marine environment by providing more areas of favorable habitat for fish and invertebrates. It is not possible to affix a dollar value to this estimated increase in human well being and marine productivity, however. Ultimately, much of these hulks would disintegrate or be buried in the substrate after which the area would return to its original condition unless additional reef materials were provided.

Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented: In using these vessels, we are scuttling scrap metal which could be reused in industry. The scrap sale value of one of these ships on the world market is estimated to be about \$100,000. In addition, it is estimated that the costs to a State receiving Liberty ships to construct deep water reefs

would average \$40,000 per ship, which includes detoxification, towage and actual sinking operations.

Use of Liberty ships for the formation of artificial reefs may increase our fishery resources. However, at this time it is not possible to project a specific dollar value to the resulting increases to compare with the scrap value of the ships.

DEPARTMENT OF THE INTERIOR,
Washington, D.C., July 29, 1971.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: Your Committee has recently requested the comments of this Department on S. 2243, a bill "To authorize the Secretary of Commerce to transfer surplus Liberty ships to States for use in marine life conservation programs".

The Department has no objection to enactment of S. 2243, if amended as suggested by the Department of Commerce.

S. 2243 would make possible the acquisition by States of surplus Liberty ships for use in the construction of artificial reefs. Upon application by a State, the Secretary of Commerce would be authorized to transfer title without consideration and to impose upon the transfer such terms and conditions as he deems appropriate to protect the interests of the United States. It is further provided that each application would be submitted by the Secretary of Commerce for comments of the Secretary of the Interior, the Secretary of the Army, and other interested Federal officers.

Sunken ships are valued as points of concentration for fish and other marine life. The deliberate creation of artificial reefs could enhance marine life habitat, providing benefits to sport and commercial fishermen. Such reefs may also be attractive to scuba divers. Unfortunately, iron and steel are among the least satisfactory materials for construction of artificial reefs because of their tendency to disintegrate and despoil the marine environment. Sunken ships would present a special hazard if pollutants such as lubricants and the remnants of toxic cargoes were not removed prior to scuttling.

For these reasons, we would suggest that no such transfer as is contemplated by S. 2243 be authorized without careful consideration of the environmental consequences. We also recommend that participating States be required to chart and mark such vessels, once sunken. These precautions would minimize the hazard to navigation and protect against damage to fishing equipment.

We believe that amendments proposed by the Department of Commerce would afford an opportunity to review the environmental

consequences of each transfer, and assure that no ship is used in a way that would violate existing or prospective water quality standards. As stated by the Department of Commerce in its report on this bill, the amendments would require approval by the Environmental Protection Agency of each proposed transfer, and would condition approval upon continued compliance with applicable water quality standards.

The Office of Management and Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely yours,

NATHANIEL REED,
Assistant Secretary of the Interior.

DEPARTMENT OF THE NAVY,
Washington, D.C., July 29, 1971.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: Your request for comment on S. 2243, a bill "To authorize the Secretary of Commerce to transfer surplus Liberty ships to States for use in marine life conservation programs," has been assigned to this Department by the Secretary of Defense for the preparation of a report expressing the views of the Department of Defense.

This bill would authorize the Secretary of Commerce, under certain conditions, to transfer Liberty ships to any State that requests them. The ships would be ones designated for scrapping, and the requesting States must intend to sink the ships as offshore artificial reefs.

Under section 2(b) applications submitted for the use of surplus Liberty ships as provided by the bill are to be furnished by the Secretary of Commerce to the Secretary of the Army for comment. The sinking of such ships involves national security requirements in the continental shelf area. Accordingly, the bill should be revised to reflect Department of Defense interest rather than Secretary of the Army interest. It is recommended that the designation "Secretary of Defense" be substituted for "Secretary of the Army" in section 2(b), page 2, line 8 of the bill.

It is assumed that implementation of the legislation would take into consideration such requirements, for example, as marking and charting the derelicts to assure that commercial fishermen will be aware of their presence to avoid fouling their nets on them, and that excess oil, toxic residues and other contaminants be removed from the vessels before they are submerged.

With regard to the impact of this bill upon the environment, the Department of the Navy, on behalf of the Department of Defense, defers to the Department of Com-

merce.

Subject to the foregoing comments, the Department of the Navy, on behalf of the Department of Defense, interposes no objection to S. 2243.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Office of Management and Budget advises that, from the standpoint of the Administration's program, there is no objection to the presentation of this report on S. 2243 for the consideration of the Committee.

For the Secretary of the Navy.

Sincerely yours,

LANDO W. ZECH, Jr.,
Captain, U.S. Navy, Deputy Chief.

Mr. SPARKMAN. Mr. President, none of these agencies opposes this legislation. The response from the Department of Commerce includes an environmental impact statement, as required by law. This statement confirms the beneficial impact upon the environment which will result from the creation of these artificial fishing reefs. As stated in the environmental statement:

These artificial reefs would provide almost immediate benefit in terms of increased catches by anglers and also help to maintain and enhance long-term productivity of the marine environment by providing more areas of favorable habitat for fish and invertebrates.

The Department of Commerce and the Department of the Navy suggested amendments to the bill as introduced. These suggested changes have been incorporated into the amendment that we are offering at this time.

Mr. President, it is well known that sunken ships do enhance marine life

[p. S 11937]

habitat. The creation of these artificial reefs is extremely beneficial for both sport and commercial fishing interests. Several of the States have been able to obtain surplus ships from other sources and have been very successful in improving the sport and commercial fishing off their shores. I hope that the Senate will approve this amendment in order that these surplus Liberty ships can also

be made available for this most worthwhile purpose.

Mr. LONG. Mr. President, I know of no objection to the amendment. The committee did not have an opportunity to study it but the Senator discussed it with some of us on the committee. We know of no reason why we cannot agree to the amendment. We will be happy to take it to conference and if anyone in the House has any objection to it, we

will take care of it then.

Mr. President, I yield back the remainder of my time.

Mr. SPARKMAN. Mr. President, I yield back the remainder of my time.

The PRESIDING OFFICER (Mr. McIntyre). The question is on agreeing to the amendment of the Senator from Alabama.

The amendment was agreed to.

[p. S 11938]

1.33a(3)(c) Aug. 14: House concurred in Senate amendments.

[No Relevant Discussion on Pertinent Section]

1.33 COASTAL ZONE MANAGEMENT ACT OF 1972

16 U. S. C. § 1451 et seq. (1972)

COASTAL ZONE MANAGEMENT OF 1972

§ 1451. Congressional findings

The Congress finds that—

(a) There is a national interest in the effective management, beneficial use, protection, and development of the coastal zone;

(b) The coastal zone is rich in a variety of natural, commercial, recreational, industrial, and esthetic resources of immediate and potential value to the present and future well-being of the Nation;

(c) The increasing and competing demands upon the lands and waters of our coastal zone occasioned by population growth and economic development, including requirements for industry, commerce, residential development, recreation, extraction of mineral resources and fossil fuels, transportation and navigation, waste disposal, and harvesting of fish, shellfish, and other living marine resources, have resulted in the loss of living marine resources, wildlife, nutrient-rich areas, permanent and adverse changes to ecological systems, decreasing open space for public use, and shoreline erosion;

(d) The coastal zone, and the fish, shellfish, other living marine resources, and wildlife therein, are ecologically fragile and consequently extremely vulnerable to destruction by man's alterations;

(e) Important ecological, cultural, historic, and esthetic values in the coastal zone which are essential to the well-being of all citizens are being irretrievably damaged or lost;

(f) Special natural and scenic characteristics are being damaged by ill-planned development that threatens these values;

(g) In light of competing demands and the urgent need to protect and to give high priority to natural systems in the coastal zone, present state and local institutional arrangements for planning and regulating land and

water uses in such areas are inadequate; and

(h) The key to more effective protection and use of the land and water resources of the coastal zone is to encourage the states to exercise their full authority over the lands and waters in the coastal zone by assisting the states, in cooperation with Federal and local governments and other vitally affected interests in developing land and water use programs for the coastal zone, including unified policies, criteria, standards, methods, and processes for dealing with land and water use decisions of more than local significance.

Pub.L. 89-454, Title III, § 302, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1280.

§ 1452. Congressional declaration of policy

The Congress finds and declares that it is the national policy (a) to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations, (b) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development, (c) for all Federal agencies engaged in programs affecting the coastal zone to cooperate and participate with state and local governments and regional agencies in effectuating the purposes of this chapter, and (d) to encourage the participation of the public, of Federal, state, and local governments and of regional agencies in the development of coastal zone management programs. With respect to implementation of such management programs, it is the national policy to encourage cooperation among the various state and regional agencies including establishment of interstate and regional agreements, cooperative procedures, and joint action particularly regarding environmental problems.

Pub.L. 89-454, Title III, § 303, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1281.

§ 1453. Definitions

For the purposes of this chapter—

(a) "Coastal zone" means the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes transitional and intertidal areas, salt marshes, wetlands, and beaches. The zone extends, in Great Lakes waters, to the international boundary between the United States and Canada and, in other areas, seaward to the outer limit of the United States territorial sea. The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters. Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents.

(b) "Coastal waters" means (1) in the Great Lakes area, the waters within the territorial jurisdiction of the United States consisting of the Great Lakes, their connecting waters, harbors, roadsteads, and estuary-type areas

such as bays, shallows, and marshes and (2) in other areas, those waters, adjacent to the shorelines, which contain a measurable quantity or percentage of sea water, including, but not limited to, sounds, bays, lagoons, bayous, ponds, and estuaries.

(c) "Coastal state" means a state of the United States in, or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of this chapter, the term also includes Puerto Rico, the Virgin Islands, Guam, and American Samoa.

(d) "Estuary" means that part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term includes estuary-type areas of the Great Lakes.

(e) "Estuarine-sanctuary" means a research area which may include any part or all of an estuary, adjoining transitional areas, and adjacent uplands, constituting to the extent feasible a natural unit, set aside to provide scientists and students the opportunity to examine over a period of time the ecological relationships within the area.

(f) "Secretary" means the Secretary of Commerce.

(g) "Management program" includes, but is not limited to, a comprehensive statement in words, maps, illustrations, or other media of communication, prepared and adopted by the state in accordance with the provisions of this chapter, setting forth objectives, policies, and standards to guide public and private uses of lands and waters in the coastal zone.

(h) "Water use" means activities which are conducted in or on the water; but does not mean or include the establishment of any water quality standard or criteria or the regulation of the discharge or runoff of water pollutants except the standards, criteria, or regulations which are incorporated in any program as required by the provisions of section 1456(f) of this title.

(i) "Land use" means activities which are conducted in or on the shorelands within the coastal zone, subject to the requirements outlined in section 1456(g) of this title.

Pub.L. 89-454, Title III, § 304, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1281.

§ 1454. Management development program grants—Authorization

(a) The Secretary is authorized to make annual grants to any coastal state for the purpose of assisting in the development of a management program for the land and water resources of its coastal zone.

Program requirements

(b) Such management program shall include:

(1) an identification of the boundaries of the coastal zone subject to the management program;

(2) a definition of what shall constitute permissible land and water uses within the coastal zone which have a direct and significant impact on the coastal waters;

(3) an inventory and designation of areas of particular concern within the coastal zone;

(4) an identification of the means by which the state proposes to exert control over the land and water uses referred to in paragraph (2) of this

subsection, including a listing of relevant constitutional provisions, legislative enactments, regulations, and judicial decisions;

(5) broad guidelines on priority of uses in particular areas, including specifically those uses of lowest priority;

(6) a description of the organizational structure proposed to implement the management program, including the responsibilities and interrelationships of local, areawide, state, regional, and interstate agencies in the management process.

Limits on grants

(c) The grants shall not exceed 66⅔ per centum of the costs of the program in any one year and no state shall be eligible to receive more than three annual grants pursuant to this section. Federal funds received from other sources shall not be used to match such grants. In order to qualify for grants under this section, the state must reasonably demonstrate to the satisfaction of the Secretary that such grants will be used to develop a management program consistent with the requirements set forth in section 1455 of this title. After making the initial grant to a coastal state, no subsequent grant shall be made under this section unless the Secretary finds that the state is satisfactorily developing such management program.

Submission of program for review and approval

(d) Upon completion of the development of the state's management program, the state shall submit such program to the Secretary for review and approval pursuant to the provisions of section 1455 of this title, or such other action as he deems necessary. On final approval of such program by the Secretary, the state's eligibility for further grants under this section shall terminate, and the state shall be eligible for grants under section 1455 of this title.

Allocation of grants

(e) Grants under this section shall be allocated to the states based on rules and regulations promulgated by the Secretary: *Provided, however,* That no management program development grant under this section shall be made in excess of 10 per centum nor less than 1 per centum of the total amount appropriated to carry out the purposes of this section.

Reversion of unobligated grants

(f) Grants or portions thereof not obligated by a state during the fiscal year for which they were first authorized to be obligated by the state, or during the fiscal year immediately following, shall revert to the Secretary, and shall be added by him to the funds available for grants under this section.

Grants to other political subdivisions

(g) With the approval of the Secretary, the state may allocate to a local government, to an areawide agency designated under section 3334 of Title 42, to a regional agency, or to an interstate agency, a portion of the grant under this section, for the purpose of carrying out the provisions of this section.

Expiration date of grant authority

(h) The authority to make grants under this section shall expire on June 30, 1977.

Pub.L. 89-454, Title III, § 305, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1282.

§ 1455. Administrative grants—Authorization

(a) The Secretary is authorized to make annual grants to any coastal state for not more than 66⅔ per centum of the costs of administering the state's management program, if he approves such program in accordance with subsection (c) of this section. Federal funds received from other sources shall not be used to pay the state's share of costs.

Allocation of grants

(b) Such grants shall be allocated to the states with approved programs based on rules and regulations promulgated by the Secretary which shall take into account the extent and nature of the shoreline and area covered by the plan, population of the area, and other relevant factors: *Provided, however,* That no annual administrative grant under this section shall be made in excess of 10 per centum nor less than 1 per centum of the total amount appropriated to carry out the purposes of this section.

Program requirements

(c) Prior to granting approval of a management program submitted by a coastal state, the Secretary shall find that:

(1) The state has developed and adopted a management program for its coastal zone in accordance with rules and regulations promulgated by the Secretary, after notice, and with the opportunity of full participation by relevant Federal agencies, state agencies, local governments, regional organizations, port authorities, and other interested parties, public and private, which is adequate to carry out the purposes of this chapter and is consistent with the policy declared in section 1452 of this title.

(2) The state has:

(A) coordinated its program with local, areawide, and interstate plans applicable to areas within the coastal zone existing on January 1 of the year in which the state's management program is submitted to the Secretary, which plans have been developed by a local government, an areawide agency designated pursuant to regulations established under section 3334 of Title 42, a regional agency, or an interstate agency; and

(B) established an effective mechanism for continuing consultation and coordination between the management agency designated pursuant to paragraph (5) of this subsection and with local governments, interstate agencies, regional agencies, and areawide agencies within the coastal zone to assure the full participation of such local governments and agencies in carrying out the purposes of this chapter.

(3) The state has held public hearings in the development of the management program.

(4) The management program and any changes thereto have been reviewed and approved by the Governor.

(5) The Governor of the state has designated a single agency to receive and administer the grants for implementing the management program required under paragraph (1) of this subsection.

(6) The state is organized to implement the management program required under paragraph (1) of this subsection.

(7) The state has the authorities necessary to implement the program, including the authority required under subsection (d) of this section.

(8) The management program provides for adequate consideration of the national interest involved in the siting of facilities necessary to meet require-

ments which are other than local in nature.

(9) The management program makes provision for procedures whereby specific areas may be designated for the purpose of preserving or restoring them for their conservation, recreational, ecological, or esthetic values.

Required authority for management of coastal zone

(d) Prior to granting approval of the management program, the Secretary shall find that the state, acting through its chosen agency or agencies, including local governments, areawide agencies designated under section 3334 of Title 42, regional agencies, or interstate agencies, has authority for the management of the coastal zone in accordance with the management program. Such authority shall include power—

(1) to administer land and water use regulations, control development in order to ensure compliance with the management program, and to resolve conflicts among competing uses; and

(2) to acquire fee simple and less than fee simple interests in lands, waters, and other property through condemnation or other means when necessary to achieve conformance with the management program.

Required findings

(e) Prior to granting approval, the Secretary shall also find that the program provides:

(1) for any one or a combination of the following general techniques for control of land and water uses within the coastal zone;

(A) State establishment of criteria and standards for local implementation, subject to administrative review and enforcement of compliance;

(B) Direct state land and water use planning and regulation; or

(C) State administrative review for consistency with the management program of all development plans, projects, or land and water use regulations, including exceptions and variances thereto, proposed by any state or local authority or private developer, with power to approve or disapprove after public notice and an opportunity for hearings.

(2) for a method of assuring that local land and water use regulations within the coastal zone do not unreasonably restrict or exclude land and water uses of regional benefit.

Allocation to other political subdivisions

(f) With the approval of the Secretary, a state may allocate to a local government, an areawide agency designated under section 3334 of Title 42, a regional agency, or an interstate agency, a portion of the grant under this section for the purpose of carrying out the provisions of this section: *Provided*, That such allocation shall not relieve the state of the responsibility for ensuring that any funds so allocated are applied in furtherance of such state's approved management program.

Program modification

(g) The state shall be authorized to amend the management program. The modification shall be in accordance with the procedures required under subsection (c) of this section. Any amendment or modification of the program must be approved by the Secretary before additional administrative grants are made to the state under the program as amended.

Segmental development

(h) At the discretion of the state and with the approval of the Secretary, a

management program may be developed and adopted in segments so that immediate attention may be devoted to those areas within the coastal zone which most urgently need management programs: *Provided*, That the state adequately provides for the ultimate coordination of the various segments of the management program into a single unified program and that the unified program will be completed as soon as is reasonably practicable.

Pub.L. 89-454, Title III, § 306, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1283.

§ 1456. Interagency coordination and cooperation—Federal agencies

(a) In carrying out his functions and responsibilities under this chapter, the Secretary shall consult with, cooperate with, and, to the maximum extent practicable, coordinate his activities with other interested Federal agencies.

Adequate consideration of views of Federal agencies; mediation of disagreements

(b) The Secretary shall not approve the management program submitted by a state pursuant to section 1455 of this title unless the views of Federal agencies principally affected by such program have been adequately considered. In case of serious disagreement between any Federal agency and the state in the development of the program the Secretary, in cooperation with the Executive Office of the President, shall seek to mediate the differences.

Consistency of Federal activities with state management programs; certification

(c) (1) Each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs.

(2) Any Federal agency which shall undertake any development project in the coastal zone of a state shall insure that the project is, to the maximum extent practicable, consistent with approved state management programs.

(3) After final approval by the Secretary of a state's management program, any applicant for a required Federal license or permit to conduct an activity affecting land or water uses in the coastal zone of that state shall provide in the application to the licensing or permitting agency a certification that the proposed activity complies with the state's approved program and that such activity will be conducted in a manner consistent with the program. At the same time, the applicant shall furnish to the state or its designated agency a copy of the certification, with all necessary information and data. Each coastal state shall establish procedures for public notice in the case of all such certifications and, to the extent it deems appropriate, procedures for public hearings in connection therewith. At the earliest practicable time, the state or its designated agency shall notify the Federal agency concerned that the state concurs with or objects to the applicant's certification. If the state or its designated agency fails to furnish the required notification within six months after receipt of its copy of the applicant's certification, the state's concurrence with the certification shall be conclusively presumed. No license or permit shall be granted by the Federal agency until the state or its designated agency has concurred with the applicant's certification or until, by the state's failure to act, the concurrence is conclusively presumed, unless the Secretary, on his own initiative or upon appeal by the applicant, finds, after providing a reasonable opportunity for detailed comments from the Federal agency involved and from the state, that the activity is con-

sistent with the objectives of this chapter or is otherwise necessary in the interest of national security.

Applications of local governments for Federal assistance; relationship of activities with approved management programs

(d) State and local governments submitting applications for Federal assistance under other Federal programs affecting the coastal zone shall indicate the views of the appropriate state or local agency as to the relationship of such activities to the approved management program for the coastal zone. Such applications shall be submitted and coordinated in accordance with the provisions of title IV of the Intergovernmental Coordination Act of 1968. Federal agencies shall not approve proposed projects that are inconsistent with a coastal state's management program, except upon a finding by the Secretary that such project is consistent with the purposes of this chapter or necessary in the interest of national security.

Construction with other laws

(e) Nothing in this chapter shall be construed—

(1) to diminish either Federal or state jurisdiction, responsibility, or rights in the field of planning, development, or control of water resources, submerged lands, or navigable waters; nor to displace, supersede, limit, or modify any interstate compact or the jurisdiction or responsibility of any legally established joint or common agency of two or more states or of two or more states and the Federal Government; nor to limit the authority of Congress to authorize and fund projects;

(2) as superseding, modifying, or repealing existing laws applicable to the various Federal agencies; nor to affect the jurisdiction, powers, or prerogatives of the International Joint Commission, United States and Canada, the Permanent Engineering Board, and the United States operating entity or entities established pursuant to the Columbia River Basin Treaty, signed at Washington, January 17, 1961, or the International Boundary and Water Commission, United States and Mexico.

Construction with existing requirements of water and air pollution programs

(f) Notwithstanding any other provision of this chapter, nothing in this chapter shall in any way affect any requirement (1) established by the Federal Water Pollution Control Act, as amended, or the Clean Air Act, as amended, or (2) established by the Federal Government or by any state or local government pursuant to such Acts. Such requirements shall be incorporated in any program developed pursuant to this chapter and shall be the water pollution control and air pollution control requirements applicable to such program.

Concurrence with programs which affect inland areas

(g) When any state's coastal zone management program, submitted for approval or proposed for modification pursuant to section 1455 of this title, includes requirements as to shorelands which also would be subject to any Federally supported national land use program which may be hereafter enacted, the Secretary, prior to approving such program, shall obtain the concurrence of the Secretary of the Interior, or such other Federal official as may be designated to administer the national land use program, with respect to that portion of the coastal zone management program affecting such inland areas.

Pub.L. 89-454, Title III, § 307, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1285.

§ 1457. Public hearings

All public hearings required under this chapter must be announced at least thirty days prior to the hearing date. At the time of the announcement, all agency materials pertinent to the hearings, including documents, studies, and other data, must be made available to the public for review and study. As similar materials are subsequently developed, they shall be made available to the public as they become available to the agency.

Pub.L. 89-454, Title III, § 308, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1287.

§ 1458. Review of performance; termination of financial assistance

(a) The Secretary shall conduct a continuing review of the management programs of the coastal states and of the performance of each state.

(b) The Secretary shall have the authority to terminate any financial assistance extended under section 1455 of this title and to withdraw any unexpended portion of such assistance if (1) he determines that the state is failing to adhere to and is not justified in deviating from the program approved by the Secretary; and (2) the state had been given notice of the proposed termination and withdrawal and given an opportunity to present evidence of adherence or justification for altering its program.

Pub.L. 89-454, Title III, § 309, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1287.

§ 1459. Records and audit

(a) Each recipient of a grant under this chapter shall keep such records as the Secretary shall prescribe, including records which fully disclose the amount and disposition of the funds received under the grant, the total cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit.

(b) The Secretary and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records of the recipient of the grant that are pertinent to the determination that funds granted are used in accordance with this chapter.

Pub.L. 89-454, Title III, § 310, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1287.

§ 1460. Coastal Zone Management Advisory Committee

(a) The Secretary is authorized and directed to establish a Coastal Zone Management Advisory Committee to advise, consult with, and make recommendations to the Secretary on matters of policy concerning the coastal zone. Such committee shall be composed of not more than fifteen persons designated by the Secretary and shall perform such functions and operate in such a manner as the Secretary may direct. The Secretary shall insure that the committee membership as a group possesses a broad range of experience and knowledge relating to problems involving management, use, conservation, protection, and development of coastal zone resources.

(b) Members of the committee who are not regular full-time employees of the United States, while serving on the business of the committee, including travel-time, may receive compensation at rates not exceeding \$100 per diem; and while so serving away from their homes or regular places of business may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by section

5703 of Title 5, for individuals in the Government service employed intermittently. Pub.L. 89-454, Title III, § 311, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1287.

§ 1461. Estuarine sanctuaries

The Secretary, in accordance with rules and regulations promulgated by him, is authorized to make available to a coastal state grants of up to 50 per centum of the costs of acquisition, development, and operation of estuarine sanctuaries for the purpose of creating natural field laboratories to gather data and make studies of the natural and human processes occurring within the estuaries of the coastal zone. The Federal share of the cost for each such sanctuary shall not exceed \$2,000,000. No Federal funds received pursuant to section 1454 or 1455 of this title shall be used for the purpose of this section.

Pub.L. 89-454, Title III, § 312, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1288.

§ 1462. Annual report

(a) The Secretary shall prepare and submit to the President for transmittal to the Congress not later than November 1 of each year a report on the administration of this chapter for the preceding fiscal year. The report shall include but not be restricted to (1) an identification of the state programs approved pursuant to this chapter during the preceding Federal fiscal year and a description of those programs; (2) a listing of the states participating in the provisions of this chapter and a description of the status of each state's programs and its accomplishments during the preceding Federal fiscal year; (3) an itemization of the allocation of funds to the various coastal states and a breakdown of the major projects and areas on which these funds were expended; (4) an identification of any state programs which have been reviewed and disapproved or with respect to which grants have been terminated under this chapter, and a statement of the reasons for such action; (5) a listing of all activities and projects which, pursuant to the provisions of subsection (c) or subsection (d) of section 1456 of this title, are not consistent with an applicable approved state management program; (6) a summary of the regulations issued by the Secretary or in effect during the preceding Federal fiscal year; (7) a summary of a coordinated national strategy and program for the Nation's coastal zone including identification and discussion of Federal, regional, state, and local responsibilities and functions therein; (8) a summary of outstanding problems arising in the administration of this chapter in order of priority; and (9) such other information as may be appropriate.

(b) The report required by subsection (a) of this section shall contain such recommendations for additional legislation as the Secretary deems necessary to achieve the objectives of this chapter and enhance its effective operation.

Pub.L. 89-454, Title III, § 313, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1288.

§ 1463. Rules and regulations

The Secretary shall develop and promulgate, pursuant to section 553 of Title 5, after notice and opportunity for full participation by relevant Federal agencies, state agencies, local governments, regional organizations, port authorities, and other interested parties, both public and private, such rules and regulations as may be necessary to carry out the provisions of this chapter.

Pub.L. 89-454, Title III, § 314, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1288.

§ 1464. Authorization of appropriations

(a) There are authorized to be appropriated—

(1) the sum of \$9,000,000 for the fiscal year ending June 30, 1973, and for each of the fiscal years 1974 through 1977 for grants under section 1454 of this title, to remain available until expended;

(2) such sums, not to exceed \$30,000,000, for the fiscal year ending June 30, 1974, and for each of the fiscal years 1975 through 1977, as may be necessary, for grants under section 1455 of this title to remain available until expended; and

(3) such sums, not to exceed \$6,000,000 for the fiscal year ending June 30, 1974, as may be necessary, for grants under section 1461 of this title, to remain available until expended.

(b) There are also authorized to be appropriated such sums, not to exceed \$3,000,000, for fiscal year 1973 and for each of the four succeeding fiscal years, as may be necessary for administrative expenses incident to the administration of this chapter.

Pub.L. 89-454, Title III, § 315, as added Pub.L. 92-583, Oct. 27, 1972, 86 Stat. 1289.

**1.33a MARINE RESOURCES AND ENGINEERING
DEVELOPMENT ACT OF 1966. AMENDMENTS**

October 27, 1972, P. L. 92-583, § 307(3)(f), 86 Stat. 1286.

AN ACT

To establish a national policy and develop a national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's coastal zones, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Act entitled "An Act to provide for a comprehensive, long-range, and coordinated national program in marine science, to establish a National Council on Marine Resources and Engineering Development, and a Commission on Marine Science, Engineering and Resources, and for other purposes", approved June 17, 1966 (80 Stat. 203), as amended (33 U.S.C. 1101-1124), is further amended by adding at the end thereof the following new title:

TITLE III—MANAGEMENT OF THE COASTAL ZONE**SHORT TITLE**

SEC. 301. This title may be cited as the "Coastal Zone Management Act of 1972".

CONGRESSIONAL FINDINGS

SEC. 302. The Congress finds that—

(a) There is a national interest in the effective management, bene-

ficial use, protection, and development of the coastal zone;

(b) The coastal zone is rich in a variety of natural, commercial, recreational, industrial, and esthetic resources of immediate and potential value to the present and future well-being of the Nation;

(c) The increasing and competing demands upon the lands and waters of our coastal zone occasioned by population growth and economic development, including requirements for industry, commerce, residential development, recreation, extraction of mineral resources and fossil fuels, transportation and navigation, waste disposal, and harvesting of fish, shellfish, and other living marine resources, have resulted in the loss of living marine resources, wildlife, nutrient-rich areas, permanent and adverse changes to ecological systems, decreasing open space for public use, and shoreline erosion;

(d) The coastal zone, and the fish, shellfish, other living marine resources, and wildlife therein, are ecologically fragile and consequently extremely vulnerable to destruction by man's alterations;

(e) Important ecological, cultural, historic, and esthetic values in the coastal zone which are essential to the well-being of all citizens are being irretrievably damaged or lost;

(f) Special natural and scenic characteristics are being damaged by ill-planned development that threatens these values;

(g) In light of competing demands and the urgent need to protect and to give high priority to natural systems in the coastal zone, present state and local institutional arrangements for planning and regulating land and water uses in such areas are inadequate; and

(h) The key to more effective protection and use of the land and water resources of the coastal zone is to encourage the states to exercise their full authority over the lands and waters in the coastal zone by assisting the states, in cooperation with Federal and local governments and other vitally affected interests, in developing land and water use programs for the coastal zone, including unified policies, criteria, standards, methods, and processes for dealing with land and water use decisions of more than local significance.

DECLARATION OF POLICY

SEC. 303. The Congress finds and declares that it is the national policy (a) to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations, (b) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development, (c) for all Federal

agencies engaged in programs affecting the coastal zone to cooperate and participate with state and local governments and regional agencies in effectuating the purposes of this title, and (d) to encourage the participation of the public, of Federal, state, and local governments and of regional agencies in the development of coastal zone management programs. With respect to implementation of such management programs, it is the national policy to encourage cooperation among the various state and regional agencies including establishment of interstate and regional agreements, cooperative procedures, and joint action particularly regarding environmental problems.

DEFINITIONS

SEC. 304. For the purposes of this title—

(a) "Coastal zone" means the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes transitional and intertidal areas, salt marshes, wetlands, and beaches. The zone extends, in Great Lakes waters, to the international boundary between the United States and Canada and, in other areas, seaward to the outer limit of the United States territorial sea. The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters. Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents.

(b) "Coastal waters" means (1) in the Great Lakes area, the waters within the territorial jurisdiction of the United States consisting of the Great Lakes, their connecting waters, harbors, roadsteads, and estuary-type areas such as bays, shallows, and marshes and (2) in other areas, those waters, adjacent to the shorelines, which contain a measurable quantity or percentage of sea water, including, but not limited to, sounds, bays, lagoons, bayous, ponds, and estuaries.

(c) "Coastal state" means a state of the United States in, or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of this title, the term also includes Puerto Rico, the Virgin Islands, Guam, and American Samoa.

(d) "Estuary" means that part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term includes estuary-type areas of the Great Lakes.

(e) "Estuarine sanctuary" means a research area which may in-

clude any part or all of an estuary, adjoining transitional areas, and adjacent uplands, constituting to the extent feasible a natural unit, set aside to provide scientists and students the opportunity to examine over a period of time the ecological relationships within the area.

(f) "Secretary" means the Secretary of Commerce.

(g) "Management program" includes, but is not limited to, a comprehensive statement in words, maps, illustrations, or other media of communication, prepared and adopted by the state in accordance with the provisions of this title, setting forth objectives, policies, and standards to guide public and private uses of lands and waters in the coastal zone.

(h) "Water use" means activities which are conducted in or on the water; but does not mean or include the establishment of any water quality standard or criteria or the regulation of the discharge or runoff of water pollutants except the standards, criteria, or regulations which are incorporated in any program as required by the provisions of section 307 (f).

(i) "Land use" means activities which are conducted in or on the shorelands within the coastal zone, subject to the requirements outlined in section 307 (g).

MANAGEMENT PROGRAM DEVELOPMENT GRANTS

SEC. 305. (a) The Secretary is authorized to make annual grants to any coastal state for the purpose of assisting in the development of a management program for the land and water resources of its coastal zone.

(b) Such management program shall include:

(1) an identification of the boundaries of the coastal zone subject to the management program;

(2) a definition of what shall constitute permissible land and water uses within the coastal zone which have a direct and significant impact on the coastal waters;

(3) an inventory and designation of areas of particular concern within the coastal zone;

(4) an identification of the means by which the state proposes to exert control over the land and water uses referred to in paragraph (2) of this subsection, including a listing of relevant constitutional provisions, legislative enactments, regulations, and judicial decisions;

(5) broad guidelines on priority of uses in particular areas, including specifically those uses of lowest priority;

(6) a description of the organizational structure proposed to implement the management program, including the responsibilities and interrelationships of local, areawide, state, regional, and

interstate agencies in the management process.

(c) The grants shall not exceed 66 $\frac{2}{3}$ per centum of the costs of the program in any one year and no state shall be eligible to receive more than three annual grants pursuant to this section. Federal funds received from other sources shall not be used to match such grants. In order to qualify for grants under this section, the state must reasonably demonstrate to the satisfaction of the Secretary that such grants will be used to develop a management program consistent with the requirements set forth in section 306 of this title. After making the initial grant to a coastal state, no subsequent grant shall be made under this section unless the Secretary finds that the state is satisfactorily developing such management program.

(d) Upon completion of the development of the state's management program, the state shall submit such program to the Secretary for review and approval pursuant to the provisions of section 306 of this title, or such other action as he deems necessary. On final approval of such program by the Secretary, the state's eligibility for further grants under this section shall terminate, and the state shall be eligible for grants under section 306 of this title.

(e) Grants under this section shall be allocated to the states based on rules and regulations promulgated by the Secretary: *Provided, however,* That no management program development grant under this section shall be made in excess of 10 per centum nor less than 1 per centum of the total amount appropriated to carry out the purposes of this section.

(f) Grants or portions thereof not obligated by a state during the fiscal year for which they were first authorized to be obligated by the state, or during the fiscal year immediately following, shall revert to the Secretary, and shall be added by him to the funds available for grants under this section.

(g) With the approval of the Secretary, the state may allocate to a local government, to an areawide agency designated under section 204 of the Demonstration Cities and Metropolitan Development Act of 1966, to a regional agency, or to an interstate agency, a portion of the grant under this section, for the purpose of carrying out the provisions of this section.

(h) The authority to make grants under this section shall expire on June 30, 1977.

ADMINISTRATIVE GRANTS

SEC. 306. (a) The Secretary is authorized to make annual grants to any coastal state for not more than 66 $\frac{2}{3}$ per centum of the costs of administering the state's management program, if he approves such program in accordance with subsection (c) hereof. Federal funds

received from other sources shall not be used to pay the state's share of costs.

(b) Such grants shall be allocated to the states with approved programs based on rules and regulations promulgated by the Secretary which shall take into account the extent and nature of the shoreline and area covered by the plan, population of the area, and other relevant factors: *Provided, however,* That no annual administrative grant under this section shall be made in excess of 10 per centum nor less than 1 per centum of the total amount appropriated to carry out the purposes of this section.

(c) Prior to granting approval of a management program submitted by a coastal state, the Secretary shall find that:

(1) The state has developed and adopted a management program for its coastal zone in accordance with rules and regulations promulgated by the Secretary, after notice, and with the opportunity of full participation by relevant Federal agencies, state agencies, local governments, regional organizations, port authorities, and other interested parties, public and private, which is adequate to carry out the purposes of this title and is consistent with the policy declared in section 303 of this title.

(2) The state has:

(A) coordinated its program with local, areawide, and interstate plans applicable to areas within the coastal zone existing on January 1 of the year in which the state's management program is submitted to the Secretary, which plans have been developed by a local government, an areawide agency designated pursuant to regulations established under section 204 of the Demonstration Cities and Metropolitan Development Act of 1966, a regional agency, or an interstate agency; and

(B) established an effective mechanism for continuing consultation and coordination between the management agency designated pursuant to paragraph (5) of this subsection and with local governments, interstate agencies, regional agencies, and areawide agencies within the coastal zone to assure the full participation of such local governments and agencies in carrying out the purposes of this title.

(3) The state has held public hearings in the development of the management program.

(4) The management program and any changes thereto have been reviewed and approved by the Governor.

(5) The Governor of the state has designated a single agency to receive and administer the grants for implementing the management program required under paragraph (1) of this subsection.

(6) The state is organized to implement the management program

required under paragraph (1) of this subsection.

(7) The state has the authorities necessary to implement the program, including the authority required under subsection (d) of this section.

(8) The management program provides for adequate consideration of the national interest involved in the siting of facilities necessary to meet requirements which are other than local in nature.

(9) The management program makes provision for procedures whereby specific areas may be designated for the purpose of preserving or restoring them for their conservation, recreational, ecological, or esthetic values.

(d) Prior to granting approval of the management program, the Secretary shall find that the state, acting through its chosen agency or agencies, including local governments, areawide agencies designated under section 204 of the Demonstration Cities and Metropolitan Development Act of 1966, regional agencies, or interstate agencies, has authority for the management of the coastal zone in accordance with the management program. Such authority shall include power—

(1) to administer land and water use regulations, control development in order to ensure compliance with the management program, and to resolve conflicts among competing uses; and

(2) to acquire fee simple and less than fee simple interests in lands, waters, and other property through condemnation or other means when necessary to achieve conformance with the management program.

(e) Prior to granting approval, the Secretary shall also find that the program provides:

(1) for any one or a combination of the following general techniques for control of land and water uses within the coastal zone;

(A) State establishment of criteria and standards for local implementation, subject to administrative review and enforcement of compliance;

(B) Direct state land and water use planning and regulation; or

(C) State administrative review for consistency with the management program of all development plans, projects, or land and water use regulations, including exceptions and variances thereto, proposed by any state or local authority or private developer, with power to approve or disapprove after public notice and an opportunity for hearings.

(2) for a method of assuring that local land and water use regulations within the coastal zone do not unreasonably restrict or exclude land and water uses of regional benefit.

(f) With the approval of the Secretary, a state may allocate to a

local government, an areawide agency designated under section 204 of the Demonstration Cities and Metropolitan Development Act of 1966, a regional agency, or an interstate agency, a portion of the grant under this section for the purpose of carrying out the provisions of this section: *Provided*, That such allocation shall not relieve the state of the responsibility for ensuring that any funds so allocated are applied in furtherance of such state's approved management program.

(g) The state shall be authorized to amend the management program. The modification shall be in accordance with the procedures required under subsection (c) of this section. Any amendment or modification of the program must be approved by the Secretary before additional administrative grants are made to the state under the program as amended.

(h) At the discretion of the state and with the approval of the Secretary, a management program may be developed and adopted in segments so that immediate attention may be devoted to those areas within the coastal zone which most urgently need management programs: *Provided*, That the state adequately provides for the ultimate coordination of the various segments of the management program into a single unified program and that the unified program will be completed as soon as is reasonably practicable.

INTERAGENCY COORDINATION AND COOPERATION

SEC. 307. (a) In carrying out his functions and responsibilities under this title, the Secretary shall consult with, cooperate with, and, to the maximum extent practicable, coordinate his activities with other interested Federal agencies.

(b) The Secretary shall not approve the management program submitted by a state pursuant to section 306 unless the views of Federal agencies principally affected by such program have been adequately considered. In case of serious disagreement between any Federal agency and the state in the development of the program the Secretary, in cooperation with the Executive Office of the President, shall seek to mediate the differences.

(c) (1) Each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs.

(2) Any Federal agency which shall undertake any development project in the coastal zone of a state shall insure that the project is, to the maximum extent practicable, consistent with approved state management programs.

(3) After final approval by the Secretary of a state's management program, any applicant for a required Federal license or permit to

conduct an activity affecting land or water uses in the coastal zone of that state shall provide in the application to the licensing or permitting agency a certification that the proposed activity complies with the state's approved program and that such activity will be conducted in a manner consistent with the program. At the same time, the applicant shall furnish to the state or its designated agency a copy of the certification, with all necessary information and data. Each coastal state shall establish procedures for public notice in the case of all such certifications and, to the extent it deems appropriate, procedures for public hearings in connection therewith. At the earliest practicable time, the state or its designated agency shall notify the Federal agency concerned that the state concurs with or objects to the applicant's certification. If the state or its designated agency fails to furnish the required notification within six months after receipt of its copy of the applicant's certification, the state's concurrence with the certification shall be conclusively presumed. No license or permit shall be granted by the Federal agency until the state or its designated agency has concurred with the applicant's certification or until, by the state's failure to act, the concurrence is conclusively presumed, unless the Secretary, on his own initiative or upon appeal by the applicant, finds, after providing a reasonable opportunity for detailed comments from the Federal agency involved and from the state, that the activity is consistent with the objectives of this title or is otherwise necessary in the interest of national security.

(d) State and local governments submitting applications for Federal assistance under other Federal programs affecting the coastal zone shall indicate the views of the appropriate state or local agency as to the relationship of such activities to the approved management program for the coastal zone. Such applications shall be submitted and coordinated in accordance with the provisions of title IV of the Intergovernmental Coordination Act of 1968 (82 Stat. 1098). Federal agencies shall not approve proposed projects that are inconsistent with a coastal state's management program, except upon a finding by the Secretary that such project is consistent with the purposes of this title or necessary in the interest of national security.

(e) Nothing in this title shall be construed—

(1) to diminish either Federal or state jurisdiction, responsibility, or rights in the field of planning, development, or control of water resources, submerged lands, or navigable waters; nor to displace, supersede, limit, or modify any interstate compact or the jurisdiction or responsibility of any legally established joint or common agency of two or more states or of two or more states and the Federal Government; nor to limit the authority of Congress to authorize and fund projects;

(2) as superseding, modifying, or repealing existing laws applicable to the various Federal agencies; nor to affect the jurisdiction, powers, or prerogatives of the International Joint Commission, United States and Canada, the Permanent Engineering Board, and the United States operating entity or entities established pursuant to the Columbia River Basin Treaty, signed at Washington, January 17, 1961, or the International Boundary and Water Commission, United States and Mexico.

(f) Notwithstanding any other provision of this title, nothing in this title shall in any way affect any requirement (1) established by the Federal Water Pollution Control Act, as amended, or the Clean Air Act, as amended, or (2) established by the Federal Government or by any state or local government pursuant to such Acts. Such requirements shall be incorporated in any program developed pursuant to this title and shall be the water pollution control and air pollution control requirements applicable to such program.

(g) When any state's coastal zone management program, submitted for approval or proposed for modification pursuant to section 306 of this title, includes requirements as to shorelands which also would be subject to any Federally supported national land use program which may be hereafter enacted, the Secretary, prior to approving such program, shall obtain the concurrence of the Secretary of the Interior, or such other Federal official as may be designated to administer the national land use program, with respect to that portion of the coastal zone management program affecting such inland areas.

PUBLIC HEARINGS

SEC. 308. All public hearings required under this title must be announced at least thirty days prior to the hearing date. At the time of the announcement, all agency materials pertinent to the hearings, including documents, studies, and other data, must be made available to the public for review and study. As similar materials are subsequently developed, they shall be made available to the public as they become available to the agency.

REVIEW OF PERFORMANCE

SEC. 309. (a) The Secretary shall conduct a continuing review of the management programs of the coastal states and of the performance of each state.

(b) The Secretary shall have the authority to terminate any financial assistance extended under section 306 and to withdraw any unexpended portion of such assistance if (1) he determines that the state is failing to adhere to and is not justified in deviating from the program approved by the Secretary; and (2) the state has been given

notice of the proposed termination and withdrawal and given an opportunity to present evidence of adherence or justification for altering its program.

RECORDS

SEC. 310. (a) Each recipient of a grant under this title shall keep such records as the Secretary shall prescribe, including records which fully disclose the amount and disposition of the funds received under the grant, the total cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit.

(b) The Secretary and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records of the recipient of the grant that are pertinent to the determination that funds granted are used in accordance with this title.

ADVISORY COMMITTEE

SEC. 311. (a) The Secretary is authorized and directed to establish a Coastal Zone Management Advisory Committee to advise, consult with, and make recommendations to the Secretary on matters of policy concerning the coastal zone. Such committee shall be composed of not more than fifteen persons designated by the Secretary and shall perform such functions and operate in such a manner as the Secretary may direct. The Secretary shall insure that the committee membership as a group possesses a broad range of experience and knowledge relating to problems involving management, use, conservation, protection, and development of coastal zone resources.

(b) Members of the committee who are not regular full-time employees of the United States, while serving on the business of the committee, including traveltime, may receive compensation at rates not exceeding \$100 per diem; and while so serving away from their homes or regular places of business may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code, for individuals in the Government service employed intermittently.

ESTUARINE SANCTUARIES

SEC. 312. The Secretary, in accordance with rules and regulations promulgated by him, is authorized to make available to a coastal state grants of up to 50 per centum of the costs of acquisition, development, and operation of estuarine sanctuaries for the purpose of creating natural field laboratories to gather data and make studies of the

natural and human processes occurring within the estuaries of the coastal zone. The Federal share of the cost of each such sanctuary shall not exceed \$2,000,000. No Federal funds received pursuant to section 305 or section 306 shall be used for the purpose of this section.

ANNUAL REPORT

SEC. 313. (a) The Secretary shall prepare and submit to the President for transmittal to the Congress not later than November 1 of each year a report on the administration of this title for the preceding fiscal year. The report shall include but not be restricted to (1) an identification of the state programs approved pursuant to this title during the preceding Federal fiscal year and a description of those programs; (2) a listing of the states participating in the provisions of this title and a description of the status of each state's programs and its accomplishments during the preceding Federal fiscal year; (3) an itemization of the allocation of funds to the various coastal states and a breakdown of the major projects and areas on which these funds were expended; (4) an identification of any state programs which have been reviewed and disapproved or with respect to which grants have been terminated under this title, and a statement of the reasons for such action; (5) a listing of all activities and projects which, pursuant to the provisions of subsection (c) or subsection (d) of section 307, are not consistent with an applicable approved state management program; (6) a summary of the regulations issued by the Secretary or in effect during the preceding Federal fiscal year; (7) a summary of a coordinated national strategy and program for the Nation's coastal zone including identification and discussion of Federal, regional, state, and local responsibilities and functions therein; (8) a summary of outstanding problems arising in the administration of this title in order of priority; and (9) such other information as may be appropriate.

(b) The report required by subsection (a) shall contain such recommendations for additional legislation as the Secretary deems necessary to achieve the objectives of this title and enhance its effective operation.

RULES AND REGULATIONS

SEC. 314. The Secretary shall develop and promulgate, pursuant to section 553 of title 5, United States Code, after notice and opportunity for full participation by relevant Federal agencies, state agencies, local governments, regional organizations, port authorities, and other interested parties, both public and private, such rules and regulations as may be necessary to carry out the provisions of this title.

AUTHORIZATION OF APPROPRIATIONS

Sec. 315. (a) There are authorized to be appropriated—

(1) the sum of \$9,000,000 for the fiscal year ending June 30, 1973, and for each of the fiscal years 1974 through 1977 for grants under section 305, to remain available until expended;

(2) such sums, not to exceed \$30,000,000, for the fiscal year ending June 30, 1974, and for each of the fiscal years 1975 through 1977, as may be necessary, for grants under section 306 to remain available until expended; and

(3) such sums, not to exceed \$6,000,000 for the fiscal year ending June 30, 1974, as may be necessary, for grants under section 312, to remain available until expended.

(b) There are also authorized to be appropriated such sums, not to exceed \$3,000,000, for fiscal year 1973 and for each of the four succeeding fiscal years, as may be necessary for administrative expenses incident to the administration of this title.

Approved October 27, 1972.

1.33a(1) SENATE COMMITTEE ON COMMERCE

S. REP. No. 92-753, 92d Cong., 2d Sess. (1972)

NATIONAL COASTAL ZONE MANAGEMENT ACT OF 1972

APRIL 19, 1972.—Ordered to be printed

Mr. HOLLINGS, from the Committee on Commerce,
submitted the following

R E P O R T

Together with

INDIVIDUAL VIEWS

[To accompany S. 3507]

The Committee on Commerce, having considered various bills to establish a national policy and develop a national program for the

management, beneficial use, protection, and development of the land and water resources of the Nation's coastal zone, and for other purposes, reports favorably on original bill and recommends that the bill (S. 3507) do pass.

PURPOSE

S. 3507 has as its main purpose the encouragement and assistance of States in preparing and implementing management programs to preserve, protect, develop and whenever possible restore the resources of the coastal zone of the United States. The bill authorizes Federal grants-in-aid to coastal states to develop coastal zone management programs. Additionally, it authorizes grants to help coastal states implement these management programs once approved, and States would be aided in the acquisition and operation of estuarine sanctuaries. Through the system of providing grants-in-aid, the States are provided financial incentives to undertake the responsibility for setting up management programs in the coastal zone. There is no attempt to diminish state authority through federal preemption. The intent of this legislation is to enhance state authority by encouraging and assisting the states to assume planning and regulatory powers over their coastal zones.

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ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF THE ADMINISTRATOR,
Washington, D.C., June 1, 1971.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your request for our agency's comments on S. 582 and S. 638, bills to provide for a national program of assistance to the States in coastal zone management programs.

These bills would authorize the Secretary of Commerce to award grants to coastal States for the development of management plans and programs for the land and water resources of the coastal zone. Such grants would not exceed 66⅔% of the planning costs (S. 582) or 50% of such costs (S. 638). If the Secretary found that a plan was consistent with the purposes of the Act to balance development and protection of the natural environment; that provision for public notice and hearings on the plan and program had been made; that the plan and program had been reviewed and approved by the Governor; that a single agency would administer and implement the management plan and program; and that the State had the necessary author-

ity to implement the program, including controls over public and private development, he would be authorized to make annual grants for the costs of administering the program, with the same maximum percentages as planning grants. S. 582 also requires minimum grants of at least one percent of costs.

With the Secretary's approval, States would be authorized to develop plans in segments so as to focus attention on problem areas, and to revise plans to meet changed conditions. Grants could be terminated if the Secretary determined that a State was failing to implement its plan and program.

Additional provisions would require the Secretary, before approving programs, to consult with Federal agencies principally involved. Federal agencies conducting or supporting activities in the coastal zone would be required to "seek to make such activities consistent with the approved State management plan and program for the area." Federal development activities in the coastal zone would be prohibited

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if the coastal State deemed such activities inconsistent with a management plan unless the Secretary found such project consistent with the objectives of the bill, or in cases where the Secretary of Defense determines that the project is necessary in the interests of national security. Applicants for Federal licenses or permits to conduct any activity in the coastal zone would be required to obtain a certification from the appropriate State agency that the proposed activity was consistent with the coastal zone management plan and program.

The Secretary would be required to submit an annual report to the President for transmittal to the Congress on the administration of the Act.

S. 582 would also authorize the establishment of "estuarine sanctuaries" for the purpose of studies of natural and human processes occurring within the coastal zone, and would provide for grants by the Secretary of up to 50% of the costs of acquisition, development, and operation of such sanctuaries.

We recommend that these bills not be enacted, and that the Congress instead give favorable consideration to S. 992, the Administration's proposed "National Land Use Policy Act of 1971."

The "National Estuarine Pollution Study," which was developed for the Secretary of the Interior by the Federal Water Quality Administration, now a component of EPA, concluded that urbanization and industrialization, combined with unplanned development in the estuarine zone, have resulted in severe damage to the estuarine ecosystem. In addition, the "National Estuary Study," developed for the

Secretary by the Fish and Wildlife Service, identified the need for a new thrust on the side of natural and aesthetic values in the Nation's estuarine areas. Clearly, we need to ensure that environmental values are adequately protected in such areas. In this connection, however, we are aware that land-use planning can affect all areas, not simply estuarine areas, and that adequate planning for preservation of estuarine and coastal areas can only be effective if the full range of alternatives to development in such areas can be considered. In other words, estuarine and coastal zone planning must be considered within the larger context of land-use planning State-wide.

S. 992 would authorize the Secretary of the Interior to make grants of up to 50% of cost to assist the States in developing and managing land use programs. Programs would be required to include methods for inventorying and exercising control over the use of land within areas of critical environmental concern, including coastal zones and estuaries. States would also be required to develop a system of controls or regulations to ensure compliance with applicable environmental standards and implementation plans.

Accordingly, we favor the approach embodied in S. 992, which incorporates provisions for the protection of the coastal and estuarine areas into its more comprehensive scheme. At the same time, we recognize that the coastal zone is an area of special concern, where prompt and effective action is required. Heavy pressures for further development, coupled with the fragility of coastal and estuarine areas, make it imperative that we move immediately to protect these areas. The system authorized by S. 992 will permit a high priority for coastal zone planning within its larger context of land use planning and programs. We therefore urge prompt Congressional approval of S. 992.

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The Office of Management and Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely,

WILLIAM D. RUCKELSHAUS,
Administrator.

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FEDERAL MARITIME COMMISSION,
OFFICE OF THE CHAIRMAN,
Washington, D.C., May 13, 1970.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Federal Maritime Commission with respect to S. 3183, a bill.

To amend the Federal Water Pollution Control Act to provide for the establishment of a national policy and comprehensive national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's estuarine and coastal zone.

S. 3183 would establish a national policy which declares a national interest in the effective management, beneficial use, protection and development of the land and water resources of the Nation's estuarine and coastal zones.

The bill is based on a three year comprehensive study of the effects of pollution in estuaries and estuarine zones of the United States on fish and wildlife, on fishing, recreation, water supply, water power, by the Department of the Interior as required by section 5 (g) of the Federal Water Pollution Control Act¹. It encourages the development by coastal States, of comprehensive management programs for the land and water resources of the coastal zones by authorizing grants of Federal funds up to 50% of the costs of the programs. The use of other Federal funds to match the grants provided by S. 3183, is prohibited, and various safeguards are established to permit the Secretary of the Interior to assure, as a condition to the continuation of grants, that the States are adhering to the programs as approved by the Secretary.

Although the Federal Maritime Commission has no statutory functions or responsibilities which would be affected by the provisions of S. 3183, we are deeply concerned with the mounting environmental problems daily menacing the peoples of this nation. The programs contemplated in this bill appear designed to provide effective measures to combat some of these problems in the estuarine and coastal zones of the United States.

The Commission favors its enactment.

The Bureau of the Budget has advised that there would be no objec-

tion to the submission of this letter from the standpoint of the Administration's program.

Sincerely,

HELEN DELICH BENTLEY,
Chairman.

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1.33a(2) HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES

H. R. REP. No. 92-1049, 92d Cong., 2d Sess. (1972)

COASTAL ZONE MANAGEMENT

MAY 5, 1972.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. GARMATZ, from the Committee on Merchant Marine and Fisheries, submitted the following

R E P O R T

[To accompany H.R. 14146]

The Committee on Merchant Marine and Fisheries, to whom was referred the bill (H.R. 14146) To establish a national policy and develop a national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's coastal zone, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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Section 307. *Interagency Coordination and Cooperation.*

* * * * *

Subsection (e) emphasizes that whatever coordinating procedures are required by this section in order to carry out the purposes of this title, there is nothing in those requirements which shall be construed

to diminish either federal or state jurisdiction, responsibility, or rights in the field of planning, development, or control of water resources and navigable waters. Nor is anything in the coordinating mechanism intended to displace, supersede, limit, or modify any duly constituted interstate compact or the jurisdiction of any legally established joint or common agency of two or more states or of two or more states and the Federal Government, nor to limit the authority of the Congress to authorize and fund projects.

In addition, the subsection specifically provides that the coordinating requirements of this section shall not be construed as superseding, modifying, or repealing existing laws applicable to the various federal agencies. Those laws continue to apply, and the specific requirements as to their implementation must be taken into account in the

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development of the states' programs. The laws referred to would include, among others, the Federal Water Pollution Control Act, the Clean Air Act, the Solid Waste Disposal Act, the Refuse Act of 1899, and the Fish and Wildlife Coordination Act.

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ENVIRONMENTAL PROTECTION AGENCY,
Washington, D.C., June 23, 1971.

HON. EDWARD A. GARMATZ,
Chairman, Committee on Merchant Marine and Fisheries, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your request for the comments of the Environmental Protection Agency on H.R. 2492, H.R. 2493, H.R. 3615, and H.R. 6605, bills relating to protection of coastal and estuarine areas.

H.R. 2492

H.R. 2492 would amend the Marine Resources and Engineering Development Act to authorize the Administrator of the National Oceanic and Atmospheric Administration to make grants to "coastal authorities" established by States and having a broad interest in the development of coastal areas. Such grants would be authorized to pay up to 50% of the costs of operation of such an authority for the first two years of its existence. Further grants at the 50% level would be authorized upon the submission and approval of a proposal for long-range planning with respect to coastal and estuarine area management, or for the implementation of such a plan. In evaluating such proposals, the NOAA Administrator would be required to consider the extent to which they identified important areas, fostered multiple uses and provided methods for conflict resolution with respect to such uses,

established machinery such as zoning, easements or land acquisition to ensure compliance with plans, provided for public participation and coordination with other agencies and organizations and fostered research on shoreline and estuarine resources. \$5,000,000 annually would be authorized for operation and planning grants.

The Administrator of NOAA would also be authorized to enter into agreements to underwrite loans or bond issues, and to pay for a five-year period up to 25% of amortization charges or loan interests, with respect to such loans or issues, for the purpose of land acquisition, water development, or restoration projects in connection with the implementation of an approved plan. Two million dollars (\$2,000,000) per year would be authorized for this purpose.

Grant funds would be allocated among coastal States according to regulations based on the populations of such States, the size of the coastal or estuarine areas, and the respective financial needs of the States.

H.R. 2493

This bill would authorize the Secretary of Commerce to award grants to coastal States for the development of management plans and programs for the land and water resources of the coastal zone. Such grants would not exceed 66⅔% of the planning costs. If the Secretary found that a plan was consistent with implementation plans under the Clean Air Act, the Federal Water Pollution Control Act, and the Solid Waste Disposal Act of 1965; that provision for public notice

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and hearings on the plan and program had been made; that the plan and program had been reviewed and approved by the Governor; that a single agency would administer and implement the management plan and program; that the State had the necessary authority to implement the program, including controls over public and private development; and that the program would carry out the purposes of the bill, he would be authorized to make annual grants for the costs of administering the program, with the same maximum percentages as planning grants.

With the Secretary's approval, States would be authorized to develop plans in segments so as to focus attention on problem areas, and to revise plans to meet changed conditions. Grants could be terminated if the Secretary determined that a State was failing to implement its plan and program.

Additional provisions would require the Secretary, before approving programs, to consult with Federal agencies principally involved. Federal agencies conducting or supporting activities in the coastal

zone would be required to "seek to make such activities consistent with the approved State management plan and program for the area." Federal development activities in the coastal zone would be prohibited if the coastal State deemed such activities inconsistent with a management plan unless the Secretary found such project consistent with the objectives of the bill, or in cases where the Secretary of Defense determined that the project was necessary in the interests of national security. Applicants for Federal licenses or permits to conduct any activity in the coastal zone would be required to obtain a certification from the appropriate State agency that the proposed activity was consistent with the coastal zone management plan and program.

The Secretary would be required to submit an annual report to the President for transmittal to the Congress on the administration of the Act.

H.R. 2493 would also authorize the establishment of "estuarine sanctuaries" for the purpose of studies of natural and human processes occurring within the coastal zone, and would provide for grants by the Secretary of up to 50% of the costs of acquisition, development, and operation of such sanctuaries.

H.R. 3615

⚡ This bill is derived from S. 3183, the Administration's proposed coastal zone management bill introduced in the 91st Congress.

H.R. 3615 would authorize the Secretary of the Interior to make program development grants to the coastal States to assist in developing comprehensive management programs for their coastal zones. Grants would be limited to 50 per cent of the State's cost of developing the program (to a maximum limit of \$1,000,000 per year for each coastal State). Other Federal funds could not be used to match such grants. The initial and subsequent grants would be, respectively, conditioned on a demonstration that the funds would be used to develop a comprehensive management program consistent with the requirement of section 202 (d) (3) of the bill, and on a finding that the coastal

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State was adequately and expeditiously developing such a program. Upon completion of the development of the program the coastal State would be required to submit it to the Secretary for review.

Operating grants up to 50 per cent of costs of administering the program (to a maximum limit of \$1,000,000 per year for each coastal State) would be authorized by section 202 (d) (1) if the State's program were approved by the Secretary. Operating grants would be allotted to the States on the basis of regulations developed by the Sec-

retary, taking into account the amount and nature of the coastline and area covered by the management plan, population, and other relevant factors. No grant funds could be used for the acquisition of real property.

Before approving a State's comprehensive management program, the Secretary would be required to find that the Governor had designated a single agency to receive and administer grants for implementing its management plan; that the management plan had been reviewed and approved by the Governor; that the coastal State was organized to implement the management plan; that the agency or agencies responsible for implementing the management plan had the necessary regulatory authority; that the coastal State had developed and adopted a coastal zone management plan, and that it had provided for adequate public notice and hearings in the development of its management plan.

Each coastal State's management plan would be required to: identify the area covered by the management plan; identify and recognize the national, State, and local interests in the preservation, use, and development of the coastal zone; contain a feasible land and water use plan reasonably reflecting short-term and long-term public and private requirements for use of the coastal zone; describe the coastal State's current and planned programs for the management of its coastal zone; identify and describe the means for coordinating the plan with Federal, State, and local plans for use, conservation, and management of the coastal zone, including State, interstate, and regional comprehensive planning; reflect the State's procedures for review of State, local, and private projects in the coastal zone for consistency with the plan and for advising whether Federal and federally assisted projects are consistent with the plan; describe the State's procedures for modification and changes of the management plan; indicate that the plan was developed in cooperation with relevant Federal agencies, State agencies, local governments, and all other interests; describe the procedures for regular review and updating of the plan; contain adequate provisions for disseminating information concerning the plan and subsequent modifications or changes; and provide for conducting, fostering, or utilizing relevant research.

The Governor of a coastal State would be authorized, with the Secretary's approval, to allocate portions of a program development grant or operating grant to an interstate agency if such agency had authority to perform the functions required of a coastal State under the bill.

Section 202 (e) would require the Secretary to review the management program and performance of the coastal States and would authorize him to terminate and withdraw financial assistance, after notice

and opportunity to present evidence, where a coastal State unjustifiably failed to adhere to the program approved by the Secretary.

Section 202 (g) would direct all Federal agencies conducting or supporting activities in coastal areas to make such activities consistent with the approved plan for the area, and would require such agencies to refrain from approving proposed projects inconsistent with the plan without a finding that the proposals, on balance, were sound.

The Secretary would be required to develop a comprehensive management plan for the resources of the coastal zone beyond the territorial sea. Such plans would provide for the exploitation of living marine resources, mineral resources, and fossil fuels.

H.R. 6605

H.R. 6605 would create a National Coastline Conservation Commission, consisting of two representatives from each coastal State, one representative from each interested executive department, and five representatives from the public at large, who would be appointed by the President with the advice and consent of the Senate. The Commission would be required to prepare a comprehensive study of all factors significantly affecting the present and future status of the coastal-marine zone, including all relevant natural and physical characteristics, all non-economic human activities and needs, all industrial, economic and commercial needs, existing legislation and regulations, and geological and demographic factors affecting the coastal zone. The Commission would be further required to consider the powers necessary for balanced conservation and development of the coastal zone, and which agency or agencies would be appropriate to exercise such powers.

After the preparation of the comprehensive study, the Commission would be required to prepare a comprehensive, coordinated and enforceable plan and management program for the conservation and development of the coastal zone. Before any part of plan could be adopted, the Commission would be required to hold public hearings in all areas affected by the plan, and general public hearings on the plan itself. Such plans would set forth the results of the comprehensive study, recommended policies for the coastal zone, powers consistent with those policies, recommended agencies to carry out the plan, and legislative and budgetary actions necessary.

While completing the plan and management program, the Commission would be authorized to comment upon and seek to influence proposed actions in the coastal-marine zone.

The Commission would be required to file an annual report with the President and the Congress no later than December 31 of each year.

H.R. 2492, H.R. 2493, and H.R. 3615 are essentially similar in that

they would establish a program of grants to the States for the purpose of developing management and conservation programs for the coastal zone. H.R. 6605, however, calls for a study of these areas, and would eventually result in recommendations for further action, including legislation, which would be necessary to enforce the recommended conservation measures.

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EPA believes that the time for studies of the coastal zone is past. Two major studies have already been completed of these areas which document in detail the actions which would be required to protect them. The "National Estuarine Pollution Study," which was developed for the Secretary of the Interior by the Federal Water Quality Administration, now a component of EPA, concluded that urbanization and industrialization, combined with unplanned development in the estuarine zone, have resulted in severe damage to the estuarine ecosystem. In addition, the "National Estuary Study," developed for the Secretary by the Fish and Wildlife Service, identified the need for a new thrust on the side of natural and aesthetic values in the Nation's estuarine areas. Clearly, we need to ensure that environmental values are adequately protected in such areas. In this connection, however, we are aware that land-use planning can affect all areas, not simply estuarine areas, and that adequate planning for preservation of estuarine and coastal areas can only be effective if the full range of alternatives to development in such areas can be considered. In other words, estuarine and coastal planning must be considered within the larger context of land-use planning State-wide.

Accordingly, EPA does not recommend the enactment of legislation which would deal only with development and other activities in the coastal zone. Controls are needed over all aspects of land use which can affect delicate or endangered areas of environmental concern. Such controls would be provided by H.R. 4332, the Administration's proposed "National Land Use Policy Act of 1971."

H.R. 4332 would authorize the Secretary of the Interior to make grants of up to 50% of cost to assist the States in developing and managing land use programs. Programs would be required to include methods for inventorying and exercising control over the use of land within areas of critical environmental concern, including coastal zones and estuaries. States would also be required to develop a system of controls of regulations to ensure compliance with applicable environmental standards and implementation plans.

EPA favors the approach embodied in H.R. 4332, which incorporates provisions for the protection of the coastal and estuarine areas into its more comprehensive scheme. At the same time, we recognize

that the coastal zone is an area of special concern, where prompt and effective action is required. Heavy pressures for further development, coupled with the fragility of coastal and estuarine areas, make it imperative that we move immediately to protect these areas. The system authorized by H.R. 4332 will permit a high priority for coastal zone planning within its larger context of land use planning and programs. We therefore urge prompt Congressional approval of H.R. 4332, and recommend that the bills discussed previously not be enacted.

The Office of Management and Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely,

WILLIAM D. RUCKELSHAUS,
Administrator.

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1.33a(3) COMMITTEE OF CONFERENCE

H. R. REP. No. 92-1544, 92d Cong., 2d Sess. (1972)

COASTAL ZONE MANAGEMENT ACT OF 1972

OCTOBER 5, 1972.—Ordered to be printed

Mr. GARMATZ, from the committee of conference,
submitted the following

CONFERENCE REPORT

[To accompany S. 3507]

The committee of conference on the disagreeing votes of the two Houses on the amendment of the House to the bill (S. 3507), to establish a national policy and develop a national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's coastal zones, and for other purposes, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

[p. 1]

TITLE III—MANAGEMENT OF THE COASTAL ZONE

* * * * *
INTERAGENCY COORDINATION AND COOPERATION

SEC. 307.

* * * * *

(f) Notwithstanding any other provision of this title, nothing in this title shall in any way affect any requirement (1) established by the Federal Water Pollution Control Act, as amended, or the Clean Air Act, as amended, or (2) established by the Federal Government or by any state or local government pursuant to such Acts. Such requirements shall be incorporated in any program developed pursuant to this

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title and shall be the water pollution control and air pollution control requirements applicable to such program.

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JOINT EXPLANATORY STATEMENT OF THE
COMMITTEE OF CONFERENCE

The Conferees adopted the Senate provisions making it clear that water and air pollution control requirements established by Federal Water Pollution Control Act, as amended, or the Clean Air Act, as amended, shall be included as a part of the state coastal zone program. Finally, the Conferees adopted language making it clear that the Secretary of the Interior or such other Secretary or Federal official as may be designated in national land use legislation, must concur in any state coastal zone program requirements relating to land use, before those requirements may be approved by the Secretary.

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1.33a(4) CONGRESSIONAL RECORD, VOL. 118 (1972):

133a(4) (a) April 25: Considered and passed Senate, pp. S6654-S6673

NATIONAL COASTAL ZONE MANAGEMENT ACT OF 1972

The Senate continued with the consideration of the bill (S. 3507) to establish a national policy and develop a national program for the management, beneficial use, protection, and develop-

ment of the land and water resources of the Nation's coastal zones, and for other purposes.

Mr. ROBERT C. BYRD. Mr. President, I suggest the absence of a quorum.

The ACTING PRESIDENT pro tem-

pore. The clerk will call the roll.

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The second assistant legislative clerk proceeded to call the roll.

Mr. ROBERT C. BYRD. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The ACTING PRESIDENT pro tempore. Without objection, it is so ordered. What is the pleasure of the Senate?

Mr. HOLLINGS. Mr. President, I ask that the Senate proceed with the consideration of S. 3507.

The ACTING PRESIDENT pro tempore. That bill has been laid before the Senate, and is the pending business.

Mr. EAGLETON. Mr. President, a parliamentary inquiry.

The ACTING PRESIDENT pro tempore. The Senator will state it.

Mr. EAGLETON. If at a later time, prior to offering my amendment, I should desire to move that this bill be referred to the Committee on Public Works, would I have the right to make such a motion, if I do not do so at this particular time?

The ACTING PRESIDENT pro tempore. Such a motion may be made at any time prior to the vote on the bill.

Mr. EAGLETON. I thank the Chair.

PRIVILEGE OF THE FLOOR

Mr. HOLLINGS. Mr. President, I ask unanimous consent that two members of my staff, Mary Jo Manning and John Hussey, be granted the privilege of the floor during the consideration of this measure.

The ACTING PRESIDENT pro tempore. Without objection, it is so ordered.

Mr. HOLLINGS. Mr. President, it is with a great deal of pleasure that the Committee on Commerce recommends unanimously the approval of S. 3507, the National Coastal Zone Management Act of 1972. This bill will provide the Federal assistance necessary to help States and local governments plan and operate coastal zone management pro-

grams. The aim is to allow the wise and orderly development and growth within this critical area so as to protect the vital waters of our coastlines and Great Lakes.

This bill has been before the Senate for 2 years, first introduced by Senator WARREN G. MAGNUSON of Washington. I might say that it was the wisdom and leadership of the distinguished chairman of the Committee on Commerce which gave impetus to the creation of this concept. During the 89th Congress, there was created the National Commission on Marine Science, Engineering, and Resources. This blue ribbon panel of experts—often described as the Stratton Commission—produced the landmark report known as "Our Nation and the Sea." Part of this overall report was the section on "Management of the Coastal Zone."

Senator MAGNUSON introduced the bill, S. 2802, which incorporated the recommendations of the Commission. Subsequently, the Committee on Commerce has conducted 11 days of hearings over the space of 2 years on the various coastal zone proposals. The Subcommittee on Oceans and Atmosphere, which I am privileged to chair, has compiled a remarkable record of testimony in favor of coastal zone management. And last September, the committee ordered its bill, S. 582, reported to the floor. However, during the last year, many Members of the Senate as well as the administration have become convinced that the United States needs a broad-based policy of land use management. There were some who felt that certain provisions within S. 582 were in conflict with the proposed land use policy legislation now pending before the Committee on Interior and Insular Affairs. Additionally, it was felt that many municipalities in coastal States have done an outstanding job of area management, and that S. 582 did not give them the opportunity to participate fully in management programs. Finally, there was concern about con-

licts between existing Federal, State, and local matters within the coastal zone. Was too much authority being exercised by the Secretary of Commerce without the opportunity for full hearings and mediation for all parties involved?

Mr. President, these were substantial concerns, and the Committee on Commerce recognized that S. 582 did contain several shortcomings as a result of developments which altered some of the circumstances under which the bill was drawn.

Therefore, on March 14, at my request, S. 582 was recommitted to the Committee on Commerce. For the past month, we have worked over the entire bill in order to accommodate it to present needs and circumstances. This, in brief, is what we have done:

First. The committee has created a bill which will dovetail with the proposed land use legislation. Our definition of the geographic boundaries of the coastal zone itself has been tightened.

Second. We have attempted to make full provision for cooperation and coordination between States, local governments, areawide agencies, and interstate agencies. All of these factions must work together in both the planning and the managing phase of the program. Additionally, States can delegate to local governments some or all of the responsibility under this act.

Third. Finally, we have created a National Coastal Resources Board to handle disputes within the management program area. The board can coordinate programs of various Federal agencies. It can mediate differences between any Federal agency and a coastal State at the development stage of a program. And finally, the board can provide a forum for appeals by any areawide planning entity or unit of local government from any decision or action of the Secretary or the management agency of the State or local area.

Having done this, Mr. President, the

Committee on Commerce, on April 11, unanimously ordered that an original bill be reported to the floor. This bill is S. 3507, which is before the Senate today.

So what is the program we propose? Essentially, it is this: A means to avoid crisis in the coastal areas of our Nation. We know the States have the will to avoid this crisis of growth and the subsequent despoilation of our valuable coastal waters. But at present, neither the States nor the local government have the financial means to tackle this difficult job. S. 3507 solves this problem by providing Federal grants-in-aid to create and operate management programs within the coastal zone.

The bill I propose today is aimed at saving the waters of our coasts and the land whose use has a direct, significant, and adverse impact upon that water. We all know that the coastal water and our delicate estuaries are the breeding grounds of life in the sea. Yet we use the land of the coastal-zone with little or no concern for how this use will affect the water. For the most part, everyone is complaining about the situation, but few are doing anything about it. S. 3507 does something about it. In other words, we are talking about providing orderly, sound growth in a narrow strip of land and water of our coastal States, Great Lakes, States, and our territories. The management program authority may extend inland only so far as to allow control over the use of that land which, as I have said, directly affects the water. So it can be seen that we do not envision huge blocks of inland territory being carved into management program areas. The coastal zone bill would extend coverage basically to beaches, salt marshes, sounds, harbors, bays, and lagoons, and the adjacent lands—but not territory so large as to encroach upon land use management. The waters of this zone, again, are our primary target of concern. In disputed cases, these waters are those which contain a measurable

tidal influence.

In the United States today, we are facing a population explosion—and it is being felt with the most impact in the coastal States and in coastal municipalities. The rate of increase for coastal areas is more rapid than for inland areas, and this press of population has led to extensive degradation of our estuaries and marshlands. From 1922 through 1954, more than 25 percent of the salt marshes of this country were destroyed by fill, dikes, drainage, or by construction of walls. From 1954 to 1964, the destruction has continued at an even more rapid pace. Approximately 10 percent has been lost to development.

We know that the land area available for expanding populations will not change. There are only 88,600 miles of shoreline on our Atlantic, Pacific, and Arctic coastlines, and another 11,000 miles along the Great Lakes. Already, 53 percent of our population live within 50 miles of the coast. The overwhelming testimony was that by the year 2000, it may well be 80 percent, or 225 million citizens.

I referred earlier to the Stratton Commission. That group's report, "Our Nation and the Sea," calls the coast the most valuable geographic feature of the United States—the most biologically productive region of all. America looks to the coastlines not only for recreation, but for resources as well. The report makes an urgent plea for adequate management of the coastal zone now, before it is too late.

We hope we have created, in S. 3507, an answer to this plea for help. We know that the mechanism this bill envisions may not be perfect, but nothing is per-

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fect. It may not solve every problem—but few Government solutions can handle everything. It may not make everybody happy—because there are a lot of folks who do not care about the result of rapid development. All they

want is a profit. This kind of thinking can no longer be tolerated in America—if America wants any kind of a decent environment for its citizens in the decade ahead. The coastal zone bill will help us build and preserve that kind of America—a place where those of us who support this measure today can take some pride in the years ahead. I urge all my colleagues to join in voting for the bill, for good government, for progressive government, and for protection of our most vital resources in S. 3507.

Mr. President, I ask unanimous consent that the names of the cosponsors of the pending bill be shown in the RECORD here.

The PRESIDING OFFICER (Mr. STEVENSON). Without objection, it is so ordered.

LIST OF COSPONSORS

Senator Ernest F. Hollings.
 Senator Warren G. Magnuson.
 Senator Lloyd Bentsen.
 Senator Clifford P. Case.
 Senator Marlow W. Cook.
 Senator Sam J. Ervin.
 Senator David Gambrell.
 Senator Edward J. Gurney.
 Senator Philip A. Hart.
 Senator Vance Hartke.
 Senator Hubert H. Humphrey.
 Senator Daniel Inouye.
 Senator B. Everett Jordan.
 Senator Gale W. McGee.
 Senator George McGovern.
 Senator Thomas J. McIntyre.
 Senator Joseph M. Montoya.
 Senator Bob Packwood.
 Senator John O. Pastore.
 Senator Abraham Ribicoff.
 Senator William B. Spong.
 Senator Ted Stevens.
 Senator Harrison A. Williams.
 Senator Alan Cranston.
 Senator John V. Tunney.
 Senator J. Glenn Beall.

Mr. HOLLINGS. Mr. President, I yield to the distinguished ranking minority member of the committee, the Senator from Alaska (Mr. STEVENS).

Senator STEVENS has been of invaluable help. He starts with a primary interest in the matter, because the coastline of Alaska comprises practically half the coastline of the United States, and

he obviously has a firsthand knowledge as well. He joined me in all these hearings of the Commerce Subcommittee on Oceans and Atmosphere. He is a member of the Committee on Interior and Insular Affairs. He has served in the Department of the Interior, in the executive branch of Government. He has worked with me in trying to reconcile differences and concerns not only with the administration, but also with the Committee on Interior and Insular Affairs, the Committee on Public Works, and other public concerns.

I am glad to yield to Senator STEVENS.

Mr. STEVENS. Mr. President, as a member of the Committee on Commerce and as the ranking minority member of the Subcommittee on Oceans and Atmosphere of that Committee, I would like to commend my distinguished friend and colleague from South Carolina (Mr. HOLLINGS), the chairman of our subcommittee, for his leadership on this legislation. Over the past two Congresses he has conducted many days of hearings and worked through many executive sessions to see this bill become a reality. With successful consideration here today and with the action that appears imminent in the House, I feel confident that we will soon have a law to provide the necessary Federal leadership in this area.

Yet, even though we have been without a congressionally mandated program, the needs of our coastal zones have not been unnoticed. The 1969 Report of the Commission on Marine Science, Engineering, and Resources, entitled "Our National and the Sea"—the so-called "Stratton Commission Report"—discussed at length the special values of our coastal areas and the need for a proper program of coastal zone management:

In that report is the following comment:

Rapidly intensifying use of coastal areas already has outrun the capabilities of local governments to plan their orderly develop-

ment and to resolve conflicts. The division of responsibilities among the several levels of government is unclear, and the knowledge and procedures for formulating sound decisions are lacking.

The key to more effective use of our coastal land is the introduction of a management system permitting conscious and informed choices among development alternatives, providing for proper planning, and encouraging recognition of the long-term importance of maintaining the quality of this productive region in order to ensure both its enjoyment and the sound utilization of its resources. The benefits and the problems of achieving rational management are apparent. The present Federal, State, and local machinery is inadequate. Something must be done.

It was in response to this void in adequate machinery that the Committee on Commerce began, during the 91st Congress, to consider legislation which would help to protect and manage our biologically productive and commercially invaluable coastal areas. I am pleased to recognize the contributions of the present administration in this area, and note that much of the bill we consider here today is patterned after the bill, S. 3183, introduced at the request of the administration during the 91st Congress. This administration proposal was developed as a result of the National Estuarine Study by the Department of the Interior, performed pursuant to Public Law 90-454, also reported by the Committee on Commerce.

Despite the administration's prior recommendations in this area, however, I should note, in fairness, that it does not support separate legislation for the coastal zone such as that contained in the bill, S. 3507. However, this does not reflect any change in the administration's position over the need for effective programs. Rather, it has chosen a broader approach with its proposal for a national land use policy as contained in the bill, S. 992. In this connection, on May 5, 1971, the Honorable Russell Train, Chairman of the Council on Environmental Quality—and former Under Secretary of the Interior—appeared before the subcommittee and stated in part the following:

Since the development of the coastal zone legislation the administration has moved forward to consider the broader realm of land use generally, including the coastal zone. And the legislation which the President submitted to the Congress on the 8th of February as part of his environmental message calls for a new, very innovative national land use policy which includes and embraces the coastal zone as part of a broader approach to what the administration sees as a very high priority national need; namely, more effective land use as it affects environmental quality all across the country, both in the coastal zone and within the interior portions of the United States.

Notwithstanding this valid observation concerning the needs of the interior portions of our country, the needs of our coastal zones are such that to delay passage of the National Coastal Zone Management Act of 1972 to await enactment of a more inclusive bill would be unwise at best. It is in the coastal zone that the need for effective control has been most clearly demonstrated. It is in the coastal zone that one can readily recognize the resource of our lands is limited, that it is facing a host of competing demands, that development has been disorderly and in many cases tragic, and that unless management programs are developed, the demands of burgeoning populations and sprawling urban systems will completely choke them off. It is of more than passing interest to me to note that the State of Alaska lays claim to a coastline which is equal to more than half of that boasted by what we call the "Lower 48", and that the passage of such legislation at this point in our development is of the utmost importance.

The need for Federal financial assistance, as well as Federal requirements for cooperation at all levels and the establishment of criteria for the development of adequate management plans, has been demonstrated by the relative inability of most States and localities to proceed without it. As stated by Mr. John Asplund, chairman of the Greater Anchorage Area Bor-

ough, Anchorage, Alaska, when he appeared before the subcommittee on May 6, 1971, on behalf of the National Association of Counties:

We at the county level know that we have made many mistakes and allowed economic and other factors to override the requirements for more logical coastal management. But, the State and Federal Governments must also assume part of the blame for not taking a greater interest in coastline reservation, for not providing the necessary broad guidance, and for not providing either financial or technical support. The time, we believe, has come to correct these past failures and take a positive approach toward coastline management and preservation.

I, too, join the distinguished chairman of the committee, the Senator from South Carolina (Mr. HOLLINGS) in believing that the time has come. S. 3507 moves toward this goal by providing the financial assistance necessary for the development and implementation of coastal zone management programs. It furnishes to States and localities the guidance and

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criteria necessary for them to manage these areas wisely. It is my hope that the Congress will recognize the adequacy of its response and the need which it promises to fulfill, and grant it favorable consideration.

Mr. President, at an appropriate time, I should like to discuss with the chairman of the subcommittee an amendment which would insure that where there are no statewide programs and plans consistent with this act, if a local political subdivision of a State with areawide powers does have a workable plan, the Secretary of Commerce will be able to cooperate with that areawide government. But I leave it to the Senator from South Carolina to determine when it would be an appropriate time to discuss this amendment which I have suggested.

I thank the chairman and will assist in any way I can in connection with this matter.

Mr. HOLLINGS. Is that the amend-

ment relative to the matter of the Secretary's having the authority to go ahead should a particular area of a State itself default in actually promulgating a plan authorizing the Secretary to work with the local government or political subdivision and approve one submitted by it—is that the amendment?

Mr. STEVENS. Yes; that is the intent of the amendment. I have provided the chairman of the subcommittee with a copy of it. It would add a subsection "i"—let me check first, to make sure.

Mr. HOLLINGS. Could we not go on later with that amendment, if the distinguished Senator will permit it, as the Senator from Virginia has concern and the Senator from Missouri also has concern about active consideration at this time of this particular bill. I think perhaps we should go into their concerns first, and then when we began to call up amendments—we are not in a rush here this morning—we can call it up.

Mr. STEVENS. I will be happy to cooperate in every way I can. I just wanted to call the attention of the chairman to the fact that I hope we can consider the concept which would give the local political subdivision with areawide powers, the power to proceed with plans already made if the State has no plan.

Mr. SPONG. Mr. President, the objective of the proposed National Coastal Zone Management Act is to achieve a partnership between man and nature in which man's varied needs are in harmony with nature's processes and resources.

Specifically, the bill now pending would encourage the States to develop programs to protect their coastal resources by authorizing Federal assistance for the preparation and implementation of management programs. At the outset of my remarks, I would emphasize the assertion in the committee report on this measure that—

There is no attempt to diminish state authority through federal preemption. The intent of this legislation is to enhance state authority by encouraging and assisting the states to assume planning and regulatory powers over their coastal zone.

Mr. President, that is as it should be—although the success of coastal zone management programs will be dependent on the cooperation of Federal, State, regional, and local agencies. I wish to commend the distinguished chairman of our Subcommittee on Oceans and Atmosphere for initiating the effort to have the bill recommitted.

Reconsideration of the measure resulted in two definite improvements. First, the inland scope of the coastal zone has been changed so as to limit the legislation to the area of greatest environmental concern. Second, the measure now requires broader participation of local governments, interstate, and regional groups in the preparation and operation of management programs.

A review of the testimony clearly demonstrates the need for this legislation. Much more than esthetics is involved in the protection and preservation of our coastal and estuarine waters and marshlands. The many varied types of natural vegetation which are found in the coastal zone provide a constant food source for fish and fowl alike.

It is estimated that three-quarters of our commercial seafoods—fish, clams, oysters, shrimp, crabs, and lobsters—are nurtured in our coastal areas. In addition, these waters and shorelands provide shelter and food for birds and wildlife, and act as a buffer against storms and other natural disasters.

It is in our own economic interest to protect these areas from the ever-increasing pressures of development and misuse. It has been estimated that in the period 1922 through 1954 more than one-fourth of the country's salt marshes were destroyed by filling, diking, or other forms of development. From 1954 to 1964 an additional 10 per-

cent of the remaining salt marshes between Maine and Delaware was destroyed.

In Chesapeake Bay, an area of immediate concern to me, shoreline erosion caused by development has directly affected waterborne commerce, farmers, and fishermen. Deposits of silt have reduced water depths 2.5 feet over a 32-square-mile area at the north end of the bay. Roughly one-half of the oyster grounds in the upper bay have been destroyed or shifted downstream by sedimentation.

In order to encourage the coastal States to protect shorelands and estuarine waters, the bill authorizes the Secretary to make grants of up to two-thirds of the cost of developing management programs. The measure provides that management programs must specify the boundaries of the coastal zone, identify the permissible land and water uses within the zone so as to preclude uses having an adverse impact, and specify how control will be exerted over land and water uses within the coastal zone.

When a management program has been developed and approved, the bill authorizes grants of two-thirds of the cost of administering the program.

Finally, the bill authorizes grants of up to 50 percent of the cost of acquisition, development, and operation of estuarine sanctuaries. These provisions contemplate the creation of field laboratories for the collection of data and the study of natural processes occurring in estuaries. Such research should be of material assistance in establishing a rational basis for the intelligent management of coastal and estuarine zones.

Mr. President, I would be remiss if I failed to thank the committee, and especially the distinguished Senator from South Carolina (Mr. HOLLINGS) for accepting the suggestions I offered during the committee's consideration of the bill to require State certification of activities requiring a Federal license or permit.

This provision parallels a requirement in the Federal Water Pollution Control Act that applicants needing a Federal license or permit must obtain a certificate from the State water pollution control agency that there is reasonable assurance that the activity in question will not violate applicable water quality standards. It seems entirely reasonable to have a comparable provision in this legislation to guard against development that is inconsistent with a coastal zone management program.

It has been a pleasure to have been actively involved in the development of this bill. Its enactment would serve to protect and restore the vast resources of the coastal zone, an objective that is deserving of the highest national priority.

Mr. President, I again commend the Senator from South Carolina (Mr. HOLLINGS) not only for working initially on this bill, but also for having it, recommended and for bringing it back to the floor today in which I consider to be a much better form than when the bill was initially introduced.

Mr. BOGGS. Mr. President, I wish to express my support for S. 3507, the National Coastal Zone Management Act of 1972. This legislation provides significant benefits for every coastal State. It offers these States an opportunity to develop a legal framework "to preserve, protect, develop, and, where possible, to restore the resources of the Nation's coastal zone for this and succeeding generations."

The Committee on Public Works, on which I have the honor to serve, authorized a study of pollution in the estuarine areas at the time the committee reported the Clean Water Restoration Act of 1966. The Department of the Interior conducted an exhaustive 3-year examination of this question. In 1969 it submitted its three-volume report, "The National Estuarine Pollution Study," together with proposed legislation.

It was my honor in the 91st Congress to introduce S. 3183, which was the recommended legislation that grew out of that study. S. 3183 was originally referred to the Committee on Public Works. In an effort to give the Committee on Commerce the opportunity to consider the Interior Department's proposal in concert with the other important coastal zone proposals, we recommended that S. 3183 be re-referred to the Committee on Commerce.

S. 3183 contained important features to enable the coastal States to give greater attention to the management of their coastal and estuarine zones.

S. 3183 sought to accomplish two goals. First, it declared that there is a national interest in the effective management and protection of the coastal and estuarine zones. The bill set out a 'national

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policy to encourage and assist the coastal States to exercise effectively their responsibilities over the Nation's estuarine and coastal zones through development and implementation of comprehensive management programs to achieve effective use of the coastal zone through a balance between development and protection of the natural environment."

Second, the bill sets up a system of matching grants to assist State agencies in achieving more effective management of the coastal and estuarine zone. The legislation authorizes development and operating grants for coastal zone management programs. This would have fostered rational and effective management of our precious coastal and estuarine zone area, encouraging State permit authority in the estuarine areas and conformity between local zoning and the State management plan.

While no Senate action was taken during the 91st Congress on this legislation, the distinguished Senator from South Carolina (Mr. HOLLINGS), last

year introduced new legislation incorporating many of the provisions of S. 3183, as well as other coastal zone bills before his subcommittee. The new legislation was S. 582.

I was pleased and honored to cosponsor that bill, which also contained many provisions similar to the legislation considered today. As a sponsor of S. 3183, I would like to discuss these differences, which are actually quite minor in view of the significance of the overall legislation.

This new legislation offers several changes from S. 3183, which I introduced in the 91st Congress. First, it raises the Federal contribution to 66½ percent in the form of a grant, instead of the 50 percent in S. 3183. And the new bill sets no dollar limit on grants, other than a maximum grant of 10 percent of the funds appropriated to any one State.

New features of this legislation, of course, are the creation of the National Coastal Resources Board, to be headed by the Vice President, and authority to purchase estuarine sanctuaries as national field laboratories.

Also, this bill requires review of any Federal permit that would be undertaken in an area covered by an approved coastal zone management plan so that the permit will be carried out "in a manner consistent with the State's approved management program."

In its declaration of policy, this legislation seeks "to preserve, protect, develop, and where possible to restore the resources of the Nation's coastal zone for this and succeeding generations." May I point out that such a goal has largely been achieved in my own State. I am proud of that accomplishment.

In an effort to meet this challenge of our coastal zones' needs, Gov. Russell W. Peterson and the Delaware Legislature wrote legislation that established strict controls over development along the coastal zone of the entire State.

This was the Delaware Coastal Zone Act of 1971. This law has been hailed by many conservation groups as among the most significant steps toward environmental excellence ever taken by a State.

Largely as a result of this legislation, Governor Peterson of Delaware was recently honored as 1971 conservationist of the year by the National Wildlife Federation. This distinguished award was made to the Governor for his "outstanding contributions to the wise use and management of the Nation's natural resources."

This great honor is one that Governor Peterson richly deserved, for he has demonstrated tremendous knowledge and understanding of the environmental challenge our Nation faces.

The Saturday Review magazine recently carried an extensive interview on this subject with Governor Peterson. I think the interview is a most interesting one and very timely, particularly in view of the Senate's consideration of this legislation today. Therefore, Mr. President, I ask unanimous consent that the text of the interview, "Showdown on Delaware Bay," be printed at the conclusion of my remarks.

Mr. President, I wish to close my remarks by reiterating my support for S. 3507. It is important legislation. It is legislation that is necessary if our Nation is to utilize our coastal and estuarine areas in the best possible manner.

There being no objection, the text of the interview was ordered to be printed in the RECORD, as follows:

* * * * *

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Mr. HOLLINGS. Mr. President, pending the arrival of the distinguished Senator from Alaska in the Chamber in connection with his amendment, I wish to insert in the RECORD a few comments relative to the concerns that were expressed by members of other jurisdictional committees, specifically

the Committee on Banking, Housing, and Urban Affairs, the Committee on Public Works, and the Committee on Interior and Insular Affairs.

With respect to matters of municipalities and regional development, the overall approach of this particular bill is conformance with the land use bill submitted by the administration and sponsored by the distinguished Senator from Washington (Mr. JACKSON). We have tried our very best to dovetail, should the land use bill be enacted by this Congress, so that the coastal zone bill would be hand in glove with it.

Additionally, with respect to the urban spiral in housing, we have not tried to preempt the committee having jurisdiction in that regard. As a former member of the Committee on Banking, Housing, and Urban Affairs I assure my colleagues that this bill would give appropriate recognition to our housing and community development needs, as well as the needs of our coastal zones.

I believe the legislative history of the measure clearly indicates we intend that the Coastal Zone Act be administered in a way to reflect the concerns of HUD and other public agencies which have planning and development missions.

The statutory language indicates that the bill aims to protect our critical coastal marine areas, and would restrict its jurisdiction inland. The report accompanying the bill specifically states that the coastal zone—Extends inland only to the extent necessary to allow the management program to control shorelands whose use have a direct and significant impact upon the coastal water.

In any event, I would anticipate that the officials carrying out this act would work cooperatively with other officials of Federal, State, and local governments in expanding social opportunities and in enhancing the quality of life.

The fact is that the bill was encompassed in S. 582. Pending the hearing

last year, and also reported with approval by the Committee on Commerce, it stayed

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on the calendar for some time. It was felt that the definition of "coastal zone" went too far inland.

We thought we had reconciled the concern with the 7-mile limitation. I had to agree this went into too many things. It was a matter of interest to the Committee on Banking, Housing, and Urban Affairs. I had a discussion with the distinguished chairman, the Senator from Alabama (Mr. SPARKMAN) on the point. The bill is designed not to have any conflict there.

The cities themselves approved, in a general sense, the particular measure in the original hearings. The mayor of the city of Newport Beach, Calif., came forward and said it was not permissive for participation and did not encompass in its approach the use of local governments. So we went back through the bill and included in every respect the terminology "local government" so that wherever possible there be no misunderstanding.

On page 9, section 305, subsection (g) it is now stated:

(g) With the approval of the Secretary the coastal State may allocate to a local government, . . .

On page 11, under subsection 306:

"(1) The coastal State has developed and adopted a management program for its coastal zone in accordance with rules and regulations promulgated by the Secretary, which shall be in accordance with the objectives of this Act, after notice, and with the opportunity of full participation by relevant Federal agencies, coastal State agencies, local governments, regional organizations, port authorities, and other interested parties, public and private, which is adequate to carry out the purposes of this title.

Again we included the reference to local governments.

On page 12, section 306, subsection (d), at about line 20, it is stated:

(d) Prior to granting approval of the management program, the Secretary shall find that the coastal State, acting through its

chosen agency or agencies (including local governments), . . .

So, in fact, as stated—and this would later become law—the city government can be the entity designated by the Governor himself as the coastal zone management agency.

In addition to that, Mr. President, we provided certain flexibility in the bill with respect to whether or not it could be a State group, a local group, or some already established group, to act as the coastal authority. We had testimony with respect to the State of New York that the New York Port Authority was probably the best agency within the State of New York; it had complete authority with respect to coastal zone problems, development, pollution, the Corps of Engineers, water quality, navigation, and almost everything else; and it could be that it would be the State-designated agency.

Mr. President, at this time I yield to the Senator from Rhode Island.

Mr. PELL. Mr. President, I thank the distinguished Senator from South Carolina for yielding.

At this point I send to the desk an amendment on behalf of the Senator from Massachusetts (Mr. KENNEDY), for himself, the Senator from Wisconsin (Mr. NELSON), the Senator from New Hampshire (Mr. MCINTYRE) the Senator from New Jersey (Mr. WILLIAMS), the Senator from South Carolina (Mr. HOLLINGS) and myself.

The PRESIDING OFFICER. The amendment will be stated.

The legislative clerk proceeded to read the amendment.

Mr. PELL. Mr. President, I ask unanimous consent that further reading of the amendment be dispensed with.

The PRESIDING OFFICER. Without objection, it is so ordered; and, without objection, the amendment will be printed in the RECORD.

The amendment, ordered to be printed in the RECORD, is as follows:

On page 26, after line 19, insert the following:

Sec. 316. (c) The Administrator of the National Oceanic and Atmospheric Administration of the Department of Commerce, after consultation with the Secretary of the Interior, shall enter into appropriate arrangements with the National Academy of Sciences to undertake a full investigation of the environmental hazards attendant on offshore oil drilling on the Atlantic Outer Continental Shelf. Such study should take into consideration the recreational, marine resources, ecological, esthetic, and research values which might be imparted by the proposed drilling, as well as alternatives to such drilling in meeting the Nation's energy needs. A report shall be made to the Congress, to the Administrator, and to the Secretary by July 1, 1973.

There are authorized to be appropriated for the fiscal year in which this Act is enacted and for the next fiscal year thereafter such sums as may be necessary to carry out this section, but the sums appropriated may not exceed \$500,000.

Mr. PELL. Mr. President, this amendment authorizes a study by the National Academy of Sciences as to the risks of offshore oil drilling on the outer Continental Shelf.

The Administrator of NOAA, after consultation with the Secretary of the Interior, would be authorized to make arrangements with the National Academy for the study with a due date back for a report of July 1, 1973.

The cost is \$500,000; and it does not call for a moratorium, it calls for a study.

Mr. HOLLINGS. Mr. President, I heard the distinguished Senator from Massachusetts at one time urge that the National Oceanic and Atmospheric Administration conduct a study. This is a NOAA bill. I understand the Senator has consulted with other Senators and they agree that NOAA should arrange with the National Academy of Sciences for this study.

Mr. PELL. This would be the thinking of those who press the amendment; yes.

Mr. HOLLINGS. I say to the Senator from Rhode Island I would like to go along with the amendment. I think we would, if given a little time for Senators who are members of the Commit-

tee on Interior and Insular Affairs to consider it. I think some of the Senator's cosponsors are members, but I have just been informed that members have not considered it specifically. If the Senator will complete his remarks I believe I can more intelligently comment, and if need be, we can request a quorum and see if the matter can be worked out.

Mr. PELL. Absolutely. I realize that the committee did not take any action on this matter earlier, since it had closed the hearings on the bill, but I share, and so do the other cosponsors, the concern of the Senator from Massachusetts (Mr. KENNEDY) that an independent study of the potential risks of offshore oil drilling on the Atlantic Continental Shelf should be available to the Congress.

The National Academy of Sciences is a prestigious and competent organization which will enable the Congress to consider the proposals for offshore oil drilling with full knowledge of the potential risks involved.

The study would take into consideration the recreational, marine resources, ecological, esthetic, and research values which might be impaired by the proposed drilling, as well as alternatives to such drilling.

The magnitude of the possible effects of offshore oil drilling cannot be underestimated. For that reason, it is essential that we have the results of independent analyses of the potential impact of such drilling before it is begun.

While a few of us here would also like to see a moratorium, this is not what we are pressing for at this time. We are pressing the idea of this study, and we hope that our friends on the Committee on Interior and Insular Affairs may also accept this idea as perhaps a middle ground for the moment.

I would ask unanimous consent that the statement by Senator KENNEDY, and correspondence from east coast Governors and knowledgeable scientists, be

included in the RECORD at this time. Senator KENNEDY originally introduced this amendment in December and the revised version is being introduced today to correspond to the bill S. 3507 reported by the Commerce Committee.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

* * * * *

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Mr. PELL. Mr. President, I ask unanimous consent that I be permitted to modify the amendment I have offered to

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the Senate in two regards: First, to delete the phrase "as well as alternatives to such drilling in meeting the Nation's energy needs," which appears in section (c), the penultimate paragraph.

The PRESIDING OFFICER. The Senator has the right to modify his amendment without unanimous consent.

Mr. PELL. I thank the Chair. I so modify the amendment, and in addition I modify it by adding the phrase "after consultation with the Secretary of the Interior and with the Administrator of the Environmental Protection Agency."

I hope that with these modifications, this amendment, offered in behalf of a group of Senators including, incidentally, the Senator from Delaware (Mr. Boggs), who has asked that his name be added as a cosponsor—

The PRESIDING OFFICER. If the Senator will send his modifications to the desk, the amendment will be so modified.

The amendment, as modified, is as follows:

On page 26, after line 19, insert the following:

Sec. 316. (c) The Administrator of the National Oceanic and Atmospheric Administration of the Department of Commerce, after consultation with the Secretary of the Interior and the Administrator of the Environ-

mental Protection Agency shall enter into appropriate arrangements with the National Academy of Sciences to undertake a full investigation of the environmental hazards attendant on offshore oil drilling on the Atlantic Outer Continental Shelf. Such study should take into consideration the recreational, marine resources, ecological, esthetic, and research values which might be impaired by the proposed drilling. A report shall be made to the Congress, to the Administrator, and to the Secretary by July 1, 1973.

(d) There are authorized to be appropriated for the fiscal year in which this Act is enacted and for the next fiscal year thereafter such sums as may be necessary to carry out this section, but the sums appropriated may not exceed \$500,000.

Mr. PELL. I hope the amendment as so modified will be acceptable to the manager of the bill and to my fellow Senators.

Mr. BOGGS. Mr. President, will the Senator yield briefly?

Mr. PELL. I yield to the Senator from Delaware.

Mr. BOGGS. As the Senator has so kindly pointed out, I have asked to be listed as a cosponsor of the amendment, and I have a brief statement at this time in support of the amendment.

Mr. President, I wish to support the amendment offered in behalf of the distinguished Senator from Massachusetts (Mr. KENNEDY). I would point out that it follows very closely the lines of S. 2892, which I introduced on November 22, 1971. That bill is cosponsored by Senators ROTH, BEALL, BROOKE, BUCKLEY, CASE, MUSKIE, and PELL.

S. 2892 authorized a detailed environmental study by three agencies, each with great expertise in matters relating to offshore oil drilling and its potential environmental effects.

The agencies involved would be the Interior Department, the National Oceanic and Atmospheric Administration, and the Environmental Protection Agency. I believe such a three-agency study would be effective and utilize the best resources of the Federal Government.

In addition, my bill would also declare a moratorium on oceanic mineral

exploration for the period of the study, which is up to 2 years, as well as for a period of 1 year after submission of the study to the Congress. Such an extra 1-year moratorium would assure the public sufficient time to evaluate the study and seek possible legislative changes, if such might be necessary.

While Senator KENNEDY's amendment is somewhat different from my bill, the intent of the two provisions appears to me to be identical.

Thus, I wish to express my support for the Senator's amendment and express my belief that it is needed to protect our valuable coastal areas.

Mr. STEVENS. Mr. President, will the Senator yield?

Mr. PELL. I yield.

Mr. STEVENS. Mr. President, I am not going to belabor this issue, but it does seem to me that the impact of the amendment is to add to the total framework of the laws that we have already passed for environmental protection.

We passed a National Environmental Protection Act, and we set up an elaborate procedure—and Alaskans know just how elaborate that procedure is—for anyone who wants to propose to develop the energy resources of this country.

As I understand, the amendment says "which might be impaired by the proposed drilling."

I do not know that anyone has proposed to drill. To my knowledge, no portion of American industry has to date said, "We want to drill here on the Eastern Shore." But I think the time has come when some people had better start looking at their hole card. They have said we cannot build our Alaska pipeline; they have said they cannot drill on the Louisiana offshore lands; and now we have an independent study of the Atlantic Outer Continental Shelf, which is not even covered by this bill. This bill covers the territorial seas; it does not cover the Outer Continental Shelf. But this says someone has proposed that they ought to ex-

amine the feasibility of the Outer Continental Shelf of the Atlantic Coast to determine whether there is any energy there.

I can understand the fears that have come about as a result of the accidents off of California, and the fears of the people in Louisiana; but somewhere they have got to make up their minds that we have to find energy, American energy to meet American needs. This seems to me to be going in the wrong direction, because it adds to the functions of the Administrator of the EPA, it adds to the Council on Environmental Quality, it adds to the National Oceanic and Atmospheric Administration, and it adds to the existing duties of the Secretary of the Interior, and presumes every one of them are prejudiced. I cannot buy that at all. I cannot buy that they are prejudiced.

If there is some way, I say respectfully to the Senator from Rhode Island, that we can incorporate this into the framework of the National Academy of Sciences so that they can conduct an investigation of the total potential of the Outer Continental Shelf in the Atlantic, and not just look at the hazards attendant to the drilling, I will not object. I think they ought to be looking into the total concept of the Outer Continental Shelf. This is a negative thing, as far as I can see. I say that most respectfully to the Senator from Rhode Island.

Mr. PELL. Mr. President, if the Senator will yield there, I thought it was the wish of the Senator from Alaska and those who share his views that we delete the phrase in the amendment "as well as alternatives to such drilling in meeting the Nation's energy needs," because the original amendment which I offered did just what the Senator has suggested. It was wider in scope, however. I thought it was disagreeable to him. If he would prefer that we widen it, I would withdraw my modification.

Mr. STEVENS. I thank the Senator

for his suggestion. However, that is not my point. It was suggested, I believe, by members of the Interior and Insular Affairs Committee. I understand what they are saying, because if we get into those alternatives, this study is not going to be conducted solely off the Atlantic coast but also off the Pacific coast, off the gulf coast, and everywhere else.

I am saying that if a Senator wants the National Academy of Sciences to undertake the investigation of the environment, including the environmental problems related to the concept of offshore drilling on the Outer Continental Shelf, I should think the National Academy of Sciences also ought to be in the position of telling us if there is any way to mitigate the hazards that might come about, and if there is any way to drill safely in the Atlantic Outer Continental Shelf. Why should we adopt an amendment which presumes that it could not be done without creating a hazard to the Atlantic Outer Continental Shelf?

I know that there are problems in connection with drilling offshore. Every time I travel home, I fly over platforms in the Cook Inlet. Those platforms are pumping oil to be sent to the industrial establishment of this country, basically. If we pump oil from our Cook Inlet, which is full of salmon, and we have taken the attendant risks of energy production for the good of the Nation, then I think the people on the Atlantic coast have to look at this, also. Where is the oil going to come from? They have to look at it from the positive point of view of whether we can get oil out of the Atlantic Outer Continental Shelf safely. Are there methods by which we can extract it without creating unwarranted hazards to the people on the Atlantic coast?

This assumes that someone should make a full investigation of the environmental hazards attendant to this study. What about the positive side? Does the Senator not think that the

National Academy of Sciences could say what could be done to overcome the hazards?

Mr. PELL. If the Senator from Alaska would like to modify the amendment by inserting that phrase, it would be acceptable, or he may prefer the amendment as originally submitted.

Last Friday, in Boston, I had the honor of addressing a thousand people

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interested in the marine and fishing industry, fishery resources, from all over the country. Those on the Atlantic coast had very real worries about the impact of offshore oil drilling, and it was brought up time and again in the course of the discussion.

The amendment simply proposes a study by an independent group. Such a study could do a great deal to help settle the fears in the minds of many people in my part of the country.

Mr. STEVENS. I appreciate that concern. My State is the richest State in terms of fishery resources. We have the constant problem in terms of difficulties in developing other resources at the same time we examine the energy resources off shore.

The courts have said that this Nation cannot develop the Louisiana offshore leases at this time. The California development is stalled. At the present time we have been stalled in the development of Alaska's oil and gas resources. Yet, we have declining energy resources throughout the interior of the United States.

Naturally, anyone in the position of looking at this energy deficit—which is not just creeping but which is overcoming us almost at the speed of a rocket—is looking at the Atlantic Outer Continental Shelf and saying, "Is it possible that there are oil and gas resources that could be recovered without undue risk to the United States?" If the Senator wants to study it from the positive point of view, in terms of whether or not oil and gas resources

are there and can be recovered safely, I am in agreement.

Mr. PELL. I assure the Senator from Alaska that we, too, have needs for power in the Northeast. We find ourselves crucified by the oil import quota system now, which prevents us from purchasing inexpensive foreign fuel oil. We have a stake in trying to get cheap power. We have the most expensive power in the country because of the crucifixion of our part of the country on the cross of oil import quotas.

I hope that, just as the Senator from Alaska wanted a study concerning his area, the Senator from Alaska could agree, as a matter of comity, that this study be made for our part of the country.

Mr. STEVENS. I assure the Senator that I do not have any objection if he wants to have a study made. I think the National Academy of Sciences should be directed also to include in its study recommendations as to how to overcome such hazards, if they find there are any.

Mr. PELL. Such a modification of the amendment would be acceptable to the proponents of the amendment, if the Senator would care to offer it.

Mr. STEVENS. I suggest to the Senator from Rhode Island that he add to the end of the first sentence the words "and shall include recommendations to eliminate such environmental hazards, if any." That would meet my objection.

Mr. PELL. That modification would be acceptable to us, if the Senator would care to offer it.

Mr. STEVENS. I offer such a modification.

Mr. PELL. I can modify the amendment, and I modify it accordingly.

The PRESIDING OFFICER. The Senator has the right to modify the amendment.

Mr. STEVENS. I send the modification to the desk.

I say to the Senator from Rhode

Island that, as far as the import quota is concerned, we are most aware of the concern of the east coast about the import quotas and their effect on the east coast.

I point out to the Senator from Rhode Island that if we could proceed with our Alaska pipeline and add 3 million barrels a day to the supply of American oil reaching American markets, it would automatically displace 3 million barrels a day that presently are going into the markets on the west coast and in the Midwest, and under the present import system there would be an additional supply of oil so far as the east coast is concerned. But I am becoming most concerned that the people who look at each segment of the country, whether it be Louisiana, California, or the Atlantic Outer Continental Shelf, just look at their own backyard and say, "Do not drill here, but give us some energy and give it to us quickly." We have an energy shortage, while at the same time we try to develop the oil shale reserves of Colorado and Wyoming, and we cannot do it due to environmental concerns. We cannot even build a pipeline across the State of Alaska.

We have been waiting for 2 years.

I think it is time that we started questioning the addition of more environmental barriers to the decision-making process of where the oil and gas supplies for our country are going to come from.

I am not going to oppose the amendment, and I appreciate his courtesy in modifying it to meet my objection. I say to the Senator from Rhode Island, respectfully, that even without this amendment, the Administrator of the Environmental Protection Agency would have studied offshore drilling. The Council on Environmental Quality would have studied offshore drilling. The Secretary of Interior would have had to have an environmental impact hearing, a total hearing—and the thousand people to whom the Senator re-

ferred could express their views. But someone would have to make a decision on a proposed project. There is no proposed project at the present time, and the National Academy of Sciences is going to be investigating the potential without anyone being willing to commit himself and say, "If we are going to do it, this is the way we want to do it."

I thank the Senator from Rhode Island for his courtesy.

The PRESIDING OFFICER. Does the Senator from Rhode Island desire the modification of the amendment stated?

Mr. PELL. Yes. I ask that my amendment be modified in line with the suggestion of the Senator from Alaska.

The amendment, as further modified, reads as follows:

On page 26, after line 19, insert the following:

Sec. 316. (c) The Administrator of the National Oceanic and Atmospheric Administration of the Department of Commerce, after consultation with the Secretary of the Interior and the Administrator of the Environmental Protection Agency, shall enter into appropriate arrangements with the National Academy of Sciences to undertake a full investigation of the environmental hazards attendant on offshore oil drilling on the Atlantic Outer Continental Shelf. Such study should take into consideration the recreational, marine resources, ecological, esthetic, and research values which might be impaired by the proposed drilling and shall include recommendations to eliminate such environmental hazards, if any. A report shall be made to the Congress, to the Administrator, and to the Secretary by July 1, 1973.

There are authorized to be appropriated for the fiscal year in which this Act is enacted and for the next fiscal year thereafter such sums as may be necessary to carry out this section, but the sums appropriated may not exceed \$500,000.

Mr. HOLLINGS. Mr. President, I would support the amendment as modified.

While the matter of the study by the National Academy of Sciences is a new approach, the matter of study generally, relative to oil exploration on the Continental Shelf, is not new. This subject came up with respect to sanc-

tuaries and oil pollution in the National Water Quality Control Act which is in conference. We are talking about a half-million-dollar study. The Committee on Interior and Insular Affairs expended \$400,000 to \$500,000 in doing that. It made its own study and held its own hearings at that particular time. The Secretary of the Interior reported in the press that he had no intention to grant any lease rights within the next 2-year period pending his study and intimating at that time a private study. Whatever the results would be, they would be submitted to Congress, particularly to the Senate by the Committee on Interior and Insular Affairs. If the study by the National Academy of Sciences arranged by the National Oceanic and Atmospheric Administration of the Department of Commerce in conjunction with the Interior Department and the Environmental Protection Agency would be of help, I would support it. It would certainly give more support and more credibility to the ultimate proposals on this all-important score and, therefore, I would go along with the amendment, with those comments.

Mr. MOSS. Mr. President, will the Senator from South Carolina yield?

Mr. HOLLINGS. I yield.

Mr. MOSS. Mr. President, I would be pleased to support the amendment. When the Senator from Rhode Island (Mr. PELL) was discussing the original wording it was necessary, I thought, to point out that the line included therein, which called upon the study to suggest alternatives to such drilling in meeting the necessary energy needs, was duplicative of work already being done in the National Fuels and Energy Study being conducted by the Committee on Interior and Insular Affairs pursuant to Senate Resolution 45. Moreover, since the State coastal zone management programs relate only to the territorial sea, we should, therefore, be very careful of a study which extends beyond the territorial sea to en-

compass the Continental Shelf. I agree that the amendment, as modified, and the additional language which has since been added, merely asks for recommendations as to how to preserve the environmental quality of the coastal zone and the nearby ocean areas. I have no objection to that. Everyone else seems to be in the act studying the environment, so it would be fine to have this study made by the National Academy of Sciences.

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Mr. HOLLINGS. Mr. President, I move adoption of the amendment.

The PRESIDING OFFICER. The question is on agreeing to the amendment.

The amendment was agreed to.

Mr. ROBERT C. BYRD. May I ask the distinguished manager of the bill whether it is his intention to ask for the yeas and nays on final passage of the bill?

Mr. HOLLINGS. Mr. President, I ask for the yeas and nays just on final passage.

The yeas and nays were ordered.

Mr. BOGGS. Mr. President, the bill, S. 3507, represents the fruits of a cooperative effort involving the Commerce and Public Works Committees. I think the members of the committees and the respective staffs are to be complimented for working together in bringing this matter to the Senate.

Upon giving S. 3507 its final review, the Committee on Public Works has recommended three very short, but important, amendments to keep the coastal zone bill in harmony with other pollution control legislation which had its origin in the Public Works Committee. These amendments have been discussed with the staff of the Commerce Committee and Senator HOLLINGS and it is my understanding they are acceptable.

I think it is appropriate to give a brief description of each of these amendments and their purpose.

As stated in S. 3507 the purpose of

the coastal zone management plan is primarily to regulate land and water uses in the interests of environmental quality. Pursuant to the Federal Water Pollution Control Act, the States, working together with the Federal Government, develop and implement programs necessary to achieve water quality objectives. In order to avoid confusion it is necessary to define water uses in the context of S. 3507 so that the program which will be developed by the Secretary of Commerce and State agencies will in no way conflict or overlap with the program administered by the Environmental Protection Agency in concert with State governments. The amendment proposed would define "water use" to make it clear that the coastal zone management bill in no way alters the requirements established pursuant to the Federal Water Pollution Control Act but rather that such requirements are incorporated into the coastal zone program. The scope of the Federal Water Pollution Control Act and the Coastal Zone Management Act are therefore defined and made compatible and complementary.

Another amendment is also necessary to make clear the relationship of the Coastal Zone Management Act and other environmental protection acts, specifically the Federal Water Pollution Control Act and the Clean Air Act. It is essential to avoid ambiguity on the question whether the Coastal Zone Management Act can, in any way, be interpreted as superseding or otherwise affecting requirements established pursuant to the Federal air and water pollution control acts.

In both the Clean Air Act and the Federal Water Pollution Control Act authority is granted for effluent and emission controls and land use regulations necessary to control air and water pollution. These measures must be adhered to and enforced. Taken together, the amendments that we offer would achieve this result.

The bill, S. 3507, would establish a Federal Board to assist in coordinating the activities of various agencies of the Federal Government in meeting the objectives of coastal zone management. Perhaps through oversight the Administrator of the Environmental Protection Agency is not made a member of that Board. The third amendment, which I offer for the Public Works Committee, would add statutory membership for the Administrator of the Environmental Protection Agency.

In our judgment, it is absolutely essential that the Administrator of the Environmental Protection Agency, the primary official for environmental quality in the executive branch, be included in any activity dealing with environmental quality, especially environmental quality relating to land and water use. Among other things, this addition would make meaningful the preservation of authority under the Clean Air Act and the Federal Water Pollution Control Act as proposed in the other amendments. At the same time it would result in close coordination in implementing the objectives of pollution control and the objectives of the Coastal Zone Management Act.

Mr. President, I send the three technical amendments to the desk and ask that their reading be dispensed with.

The PRESIDING OFFICER (Mr. EAGLETON). Without objection, it is so ordered; and the amendments will be printed in the Record at this point.

The texts of the three amendments are as follows:

On page 24 between lines 17 and 18 insert the following new subsection:

"(e) Notwithstanding any other provision of this Act nothing in this Act shall in any way affect any requirement (1) established by the Federal Water Pollution Control Act, as amended, or the Clean Air Act, as amended, or (2) established by the Federal government or by any State or local government pursuant to such Acts. Such requirements shall be incorporated in any program developed pursuant to this Act and shall be the water pollution control and air pollution

control requirements applicable to such program.

On page 17 between lines 22 and 23 insert the following new paragraph:

"(10) The Administrator of the Environmental Protection Agency.

On page 7 between lines 6 and 7 insert the following new subsection:

"(h) 'water use' means activities which are conducted in or on the water; but does not mean or include the establishment of any water quality standard or criteria or the regulation of the discharge or runoff of water pollutants except as such standards or criteria or regulations shall be incorporated in any program as provided by Sec. 314(e).

Mr. BOGGS. Mr. President, I understand that these amendments will be accepted by the distinguished floor manager of the bill.

Mr. HOLLINGS. Mr. President, substantially, the three amendments include on the one hand the Administrator of the Environmental Protection Agency on the National Coastal Resources Board, and then spells out that, notwithstanding any other provision of the act, the provisions of the Water Pollution Control Act or the Clean Air Act shall govern. We are not trying in this particular measure to set any standards. As the third amendment says, we are not trying to spell out any criteria or regulations as encompassed in this one act. In fact, we have tried to protect the Federal Water Pollution Control Act as we have it now in conference. It is a tenuous thing to try to touch on coastal zones and on the matter of water use and then say in the development of coastal zones that they not be given any consideration. We think water use should be considered, among other things, and we do not think we should try, and do not try, to preempt in any manner or means the provisions of either the Federal Water Pollution Control Act or the Clean Air Act which we are supporting in conference with the House. Therefore, I would be glad to accept the amendments.

Mr. BAKER. I would like to have the understanding of the floor manager of the bill as to the intent of these

amendments because this is the only opportunity we will have to make any legislative history and elaborate upon congressional intent.

I wonder whether the Senator from South Carolina would agree with me that the amendment which provides, and I quote in part:

"Such requirement shall be incorporated in any program developed pursuant to this Act and shall be the water pollution control and air pollution control requirements applicable to such program" means "the" water pollution and air pollution control requirements, including State and local requirements pursuant to the Federal Clean Air and Water Acts to the exclusion of any other requirements? What I am saying is that the word "the" as used in "and shall be the water pollution control and air pollution control requirements," the word "the" for our purposes of emphasis, would be underscored to mean exclusive of any other pollution control program; is that not correct?

Mr. HOLLINGS. That is my understanding. That is perfectly clear. That is the intent of the bill.

Mr. BAKER. I thank the manager of the bill. That is a helpful addition to the legislative history. I am happy to support the amendments as offered by the distinguished Senator from Delaware (Mr. Boggs).

Mr. STEVENS. Mr. President, I want to make certain I understand correctly the answer of the Senator from South Carolina to the Senator from Tennessee (Mr. BAKER).

Do I understand correctly that the effect of the amendments offered on behalf of the Public Works Committee will be

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such that the State and the local government which presents a plan to the Secretary pursuant to our Coastal Zone Management Act would refer to the standards of criteria and regulations that are in effect at that time under the

Federal Water Pollution Control Act or the Clean Air Act? Is that the understanding of the Senator from Tennessee?

Mr. HOLLINGS. Including any other amendments made to the substance of the legislation, the Water Pollution Control Act or the Clean Air Act. In other words, this is not a pollution control or clean air control measure. This is a coastal zone management bill. I think—if we could conceive of both measures, in the development of the coastal zones regulations for air and water pollution—that they are both concerns of both measures. But where they could be, I cannot imagine in this bill there could be a conflict with the substance of the Water Pollution Control or Air Pollution Control Acts. They would govern, and some programs approved by the governor and amended, from time to time by the governors and the Department of Commerce for coastal zone management have got to conform to the Water Pollution Control and the Clean Air Acts.

Mr. STEVENS. Mr. President, I understand the comment of my good friend, the Senator from South Carolina. In the event a State or local government intends to increase these standards—and we have testimony that some desire to do this—and they present a plan which is more stringent than the controls and criteria contained in either of these two acts, then I am assuming that we are providing in the amendment that it must be at least equivalent to the criteria established in the two acts. Is that correct?

Mr. HOLLINGS. The basic Water Pollution Control Act permits that as of now.

Mr. BAKER. Mr. President, if the Senator from South Carolina would yield, the Senator from Alaska made reference to my previous comment.

Mr. HOLLINGS. I yield to the distinguished Senator from Tennessee.

Mr. BAKER. Mr. President, I think that the amendment from which I read

in part does provide that the effect would be to include any future amendments to the Federal Water Pollution Control Act or the Clean Air Act.

As a matter of fact, I will read the first clause from subsection (e) of the third amendment:

Notwithstanding any other provision of this Act, nothing in this Act shall in any way affect any requirement (1) established by the Federal Water Pollution Control Act, as amended, or the Clean Air Act, as amended....

I think clearly this language is intended to include any future amendment, including S. 2770, the 1972 amendments to the Federal Water Pollution Control Act, which is now in conference. I think, from my vantage point and from my understanding of it, the answer to the question put by the Senator from Alaska as to whether a local jurisdiction, State, or local agency might require standards in excess of those spelled out in the act, is yes; it is clearly provided for under the Federal Water Pollution Control Act and the Federal Clean Air Act. The amendment would provide that such more stringent standards or requirements would be made a part of the coastal zone management program.

So, not independently, nor by reason of this amendment, but by reason of authority already in the Federal water and air pollution acts, local authorities could require standards in excess of Federal criteria.

The important thrust of these amendments, as I understand them, and as I understand the Senator from South Carolina to express his sense of that understanding, is to make sure that regulatory requirements under the air and water acts are the ones included in the coastal zone program under this act and not some other separately established requirement.

Mr. HOLLINGS. The Senator is correct.

Mr. STEVENS. Mr. President, I understand the Senator from Tennessee.

However, I want to make certain that the Water Control and Clean Air Act requirements contained in this plan may exceed the requirements set out under the two Federal laws.

Mr. BAKER. Mr. President, my answer is yes, that authority is in both of those acts. This does not change it but incorporates it into this coastal zone program.

Mr. HOLLINGS. So long as it does not increase the authority of the Federal Government.

Mr. STEVENS. I thank the Senator.

Mr. BAKER. Mr. President, I serve on three committees of the Congress which have important jurisdiction over areas of environmental quality; the Committee on Public Works, the Committee on Commerce, and the Joint Committee on Atomic Energy. As a result of my experience in these committees I have a growing concern with the lack of coherence and integration of the environmental quality laws and the regulations. It is my belief that we are rapidly approaching the time when we must look at the environmental protection laws Congress has enacted in their totality, and perhaps integrate all of the laws and regulations that presently exist into a more coherent body of procedural and substantive law.

In the interim Congress should not act to further confuse the scope of environmental laws and regulations, especially by enacting mandates to different agencies of the government to perform the same or parallel activities.

The bill S. 3507, coastal zone management, without the amendments recommended by Senator Boggs, would have this effect. In the Federal Water Pollution Control Act, especially as it would be amended by S. 2770, the Congress has enacted an elaborate scheme for the control of water pollution and the achievement of water quality. Good government dictates that this must be the vehicle for the regulation of water quality. We should not enact additional statutes directing other

agencies of Federal and State Governments to perform overlapping and possibly conflicting tasks through an elaborate scheme of their own.

In addition to causing confusion and waste, such action would operate at great disadvantage to those who seek to comply with the law. In addition to increasing procedural costs, such action would create a climate of uncertainty which ultimately leads to poor performance. The public expects more from its government.

I therefore support these amendments.

The PRESIDING OFFICER. The question is on agreeing to the amendments en bloc of the Senator from Delaware.

The amendments were agreed to.

Mr. BOGGS. Mr. President, I send to the desk an amendment and ask that it be reported.

The PRESIDING OFFICER. The amendment will be reported.

The assistant legislative clerk proceeded to state the amendment.

Mr. BOGGS. Mr. President, I ask unanimous consent that further reading of the amendment be dispensed with.

The PRESIDING OFFICER. Without objection, it is so ordered; and the amendment will be printed in the RECORD.

The amendment reads as follows:

On page 24, after line 17, add a new subsection (e):

"(e) (1) That Congress finds that consideration is being given to the construction beyond the territorial sea off the coast of the United States of ship docking, electric generating, and other facilities. Since adjacent coastal States might be adversely affected by pollution from such facilities, it is hereby established as Federal policy to require approval of any States which may be so affected before any such facilities are constructed.

(2) Notwithstanding any other provision of this Act, no Federal department or agency shall construct, or license, or lease, or approve in any way the construction of any facility of any kind beyond the territorial sea off the coast of the United States until (1) such department or agency has filed with the Administrator of the Environmental

Protection Agency, a complete report with respect to the proposed facility; (2) the Administrator has forwarded such report to the Governor of each adjacent coastal State which might be adversely affected by pollution from such facility; and (3) each such Governor has filed an approval of such proposal with the Administrator. Any Governor who does not, within ninety (90) days after receiving a report pursuant to this subsection, file an approval or disapproval of the proposal in such report shall be considered for the purpose of this subsection to have approved such proposal."

Mr. BOGGS. Mr. President, I am offering an amendment that will assure our coastal States a meaningful role in the location and design of any offshore oil transfer station that might be constructed to serve the so-called "super-tankers."

The amendment would add a new subsection (e) on page 24 of the bill. The new subsection would be at the end of section 314, "Interagency Coordination and Cooperation."

A number of Federal, State, and other studies are currently underway to evaluate the need and potential sites for one or more major bulk cargo transfer stations. Such stations will be needed if the United States is to receive the economies of scale offered by super-tankers,

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whether transporting oil or other bulk commodities.

Present harbors, I am told, cannot handle such vessels because the channels simply cannot be dredged to a sufficient depth. The solution may involve offshore terminals, where the supertankers could pump their cargo into storage tanks. From those tanks the oil could be piped ashore in underwater pipelines, or transferred to barges or smaller tankers.

The Maritime Administration, through a contract with Soros Associates, is in the process of evaluating the feasibility of such offshore terminals, as well as possible sites for such terminals. This study, I understand, is to be made public in a month or two.

At the same time, the Army Corps of Engineers is undertaking, under Senate resolution, similar studies, one of which covers the coast from Maine to Virginia.

In any case, it is expected that the Federal studies may recommend sites outside the 3-mile territorial limit of the United States. Such sites, of course, would place these facilities in the contiguous zone, or in international waters on the Continental Shelf. If that were so, of course, the facility would be outside the jurisdiction of the neighboring States.

Yet, the coastal zones of these neighboring States could be severely and adversely affected by pollution that might come from such an offshore facility.

While such a pollution discharge would be subject to the cleanup provisions of the existing Federal Water Pollution Control Act, this might be insufficient protection for the coastal States. Rather than protecting a State and its coastal zone subsequent to a discharge, I believe it is important that the affected States play a meaningful role in the plan to construct such a facility.

And such a facility will be of mammoth proportions. It will, of course, cover many acres of the ocean. It may permanently affect tidal currents and the quality of fisheries within the coastal zone of the State.

The amendment I am offering today would require that any Federal agency constructing, leasing, or issuing a permit for the construction of such facilities must obtain the concurrence of the Governor or Governors of the States that would be potentially affected by such a facility.

The amendment would require the Administrator of the Environmental Protection Agency to study such facilities and report on such facilities to any State that is potentially affected adversely.

For example, a State would be affected adversely if such a facility might

discharge pollutants that enter the waters of the State. Or the State might be affected adversely if the facility could be seen from the coastal area or the waters of the State and damage recreational values.

In either case, the Governor must affirmatively concur in the construction of the facility within 90 days of the EPA report to him. The Governor may report adversely. If he does, the facility could not be built, licensed, leased, or permitted. If the Governor did not report back within 90 days, it would be assumed that he concurred in the facility.

Mr. President, I hope that the distinguished chairman, the floor manager of the bill, might consider accepting the amendment.

Mr. HOLLINGS. Mr. President, in response to the thrust of the particular amendment and the leadership on this point given by the distinguished Senator from Delaware, I would personally think this is a good amendment.

Mr. President, you can read it and see that, but I meet myself coming around the corner. We started out this morning with last minute concerns by my colleagues that we might infringe on an area of jurisdiction of the Committee on Public Works. I assured everyone in my discussion that we were trying to finally and once and for all establish a coastal zone management program to give financial assistance to the States in the development of these programs, and that is all this bill pertains to; that we were restricting it, in other words, to the territorial sea.

The amendment of our distinguished friend from Delaware goes beyond the territorial sea and goes into what we agreed on and compromised on awhile ago. It goes beyond any territorial sea to construction of any facility on the ocean floor, into what we call a contiguous zone from the 3-mile limit to the 12-mile limit.

This amendment provides the Governor would have a veto over such

matters. I do not think the Senate wants to go that far. The amendment comes without public hearing and full consideration, which we have not had the benefit of.

While I had discussed earlier this morning with the distinguished Presiding Officer that the Committee on Public Works have a chance to hear this matter, I believe the Committee on Interior and Insular Affairs and the Committee on Commerce should have an opportunity to go into the matter before it is ruled on.

Therefore, Mr. President, I would have to oppose the amendment.

Mr. MOSS. Mr. President, will the Senator yield?

Mr. HOLLINGS. I yield.

Mr. MOSS. Mr. President, I would point out that the Committee on Interior and Insular Affairs is very deeply concerned with this matter and is making a study of it now. In fact, this very afternoon, starting at 2 p.m., we are having public hearings dealing with deepwater harbors and tankers. The matter is therefore in process.

Therefore, I hope very much the Senator from Delaware will not press his amendment but permit us to go through the legislative process and report a bill to the floor dealing with this matter, based on hearings, at which time he well might wish to modify or suggest amendments. It would be germane at that time, rather than now, as this bill attempts to deal with the Territorial Sea, not the Outer Continental Shelf.

Mr. BOGGS. Mr. President, will the chairman yield further?

Mr. HOLLINGS. I yield to the Senator from Delaware.

Mr. BOGGS. Mr. President, I appreciate the very kind and generous remarks of the distinguished chairman of the subcommittee and the manager of the bill, and also the remarks of the distinguished Senator from Utah (Mr. Moss), who is chairman of the hearings just referred to. I am happy that these hearings and studies are continuing. I

believe and hope they will shed full light on this important subject so that the Senate can give the fullest consideration in light of these hearings and further studies.

Mr. President, with the chairman's permission, I ask unanimous consent to withdraw the amendment.

The PRESIDING OFFICER. The Senator has the right to withdraw his amendment. The amendment is withdrawn.

Mr. BOGGS. Mr. President, I thank the distinguished chairman, the Senator from South Carolina (Mr. HOLLINGS), and the Senator from Utah (Mr. Moss).

Mr. MOSS. If the Senator from Delaware is available, we would like to ask him to come and participate in the hearings.

Mr. BOGGS. I thank the Senator.

Mr. HOLLINGS. Mr. President, to complete the record on this particular score, when I talked in terms of jurisdiction, I talk not in terms of exclusivity in that any one committee was concerned with the problems of offshore development and related ocean pollution. The Commerce Committee also is deeply concerned. The fact is that yesterday the Maritime Administrator, before the Committee on Appropriations, in trying to pursue the administration's ship construction measures and develop a maritime policy, was talking about construction of supertankers. When we originally talked about the bill, it was 30 ships a year for 10 years, some 300 vessels. Now, rather than 40,000 and 50,000 tonners we are going to 200,000 and 400,000 tonners and rather than 30 ships a year for 10 years we will have 60 or 70 supertankers, and where are they going to dock when they have in excess of an 80-foot draft? They could not come in on the east coast or the Gulf of Mexico. So we in the Commerce Committee and Appropriations Committee were talking about what the Senator from Idaho is discussing, the development of offshore landing facilities.

The Senator from Alaska has been pointing out this morning that we will need such development for nuclear powerplant siting, for offshore loading, both coal and oil, and other supertankers. Of course, the FAA is considering this approach in the development of offshore airports.

Mr. President, I am ready to vote.

The PRESIDING OFFICER. The bill is open to further amendment.

Mr. STEVENS. Mr. President, I have an amendment at the desk. First, I wish to note what the Senator has said.

Coming from a State which hopes to be filling some of these supertankers to send American oil to foreign markets, we want to make certain that the desires of the Senator from Delaware are fulfilled, and that there is absolute safety in any one of these terminals offshore. We

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would be the first to lose if someone made a mistake and did not require absolute safety in those facilities. I assure the Senator I will work with him to make certain the role of the State in supervising this construction and eliminating any hazards or esthetic barriers to the development that will be needed is taken care of.

Mr. BOGGS. Mr. President, I especially thank my good friend, the Senator from Alaska. I know and value his interest in these matters and I appreciate the remarks that he just made. It is reassuring to the people of our State and to all concerned.

While I am on my feet I take this opportunity to compliment my good friend, the distinguished chairman of the subcommittee and the manager of the bill, (Mr. HOLLINGS) the Senator from Alaska (Mr. STEVENS), and other members of the committee for the fine job they have done in the past several months in studying and bringing forth this legislation. They have done a fine job and they and the fine members of the staff are to be congratulated.

Mr. STEVENS. Mr. President, I call

up my amendment, which is at the desk.

The PRESIDING OFFICER. The amendment will be stated.

The assistant legislative clerk read as follows:

On page 10 between lines 6 and 7 and on page 15, between lines 12 and 13, insert the following:

(i) The Secretary is authorized to make management program development or administrative grants to a political subdivision of a State with areawide powers, if the Secretary finds that the State has not developed a management program required by section 306 of this title, provided that if the State completes such a program the authority of this subsection shall terminate with regard to any political subdivision of such State.

Mr. STEVENS. Mr. President, I did not make the usual request to stop the reading of the amendment, because it is short and addresses a point that was raised by the chairman of the largest political subdivision of my State, which is the Greater Anchorage Borough, which completed a plan that would set up this program. The State has not done so.

In an area such as ours, with a coastline equal to more than half of that of the continental United States, it will take time, and this will assure the political subdivision of my State, which prepared such a plan, that they could receive financial assistance from the Secretary until the State completes its plan. I have discussed this matter with the distinguished chairman of the committee and he has stated he will be able to accept the amendment so that the Greater Anchorage Borough plan may proceed under this act.

Mr. HOLLINGS. Mr. President, I join with the Senator from Alaska on this amendment. The committee is glad to accept this particular amendment because it strengthens the bill and fills the gap pointed out by the Senator from Alaska, where we just do not want to move forward with development, and we do not want to tie our hands so that progress cannot be made, particularly for an important State like Alaska, which has the biggest coastal area and

is more directly concerned than any of the several States.

So I move the adoption of the amendment.

Mr. STEVENS. I thank the Senator.

The PRESIDING OFFICER. The question is on agreeing to the amendment of the Senator from Alaska.

The amendment was agreed to.

Mr. HOLLINGS. Mr. President, I think there is only one remaining amendment, by my distinguished colleague from the State of Virginia (Mr. SPONG), who has been very active on the Subcommittee on oceans and atmosphere and has worked on the coastal zone issue. We visited the Virginia Marine Sciences Center and got many of our ideas firsthand there, not only for the need, but the proper approach for the Federal Government to employ and profit from the experience to date in his native State.

I think we have one more amendment that he will offer, and after that we will be prepared to vote on final passage.

Mr. SPONG. Mr. President, I thank the distinguished Senator from South Carolina.

Shortly before the Commerce Committee voted to report this bill, it occurred to me that the measure might have a prejudicial effect upon the matter of United States against Maine, et al. The United States in this case is seeking a determination of rights in all the lands and natural resources of the bed of the Atlantic Ocean more than three geographical miles from the coastline. The Federal action, against the 13 Atlantic coastal States, is in the nature of a suit to quiet title.

I have requested the views of Virginia Attorney General Andrew P. Miller on this matter, and have received three suggested amendments from him which I intend to offer. I hope the distinguished Senator from South Carolina will find it possible to accept the amendments, the sole purpose of which is to assure that the bill will have no

prejudicial effect upon the litigation.

I might say to the Senate and to the Senator from South Carolina that the staffs of the Commerce Committee and of the Committee on Interior and Insular Affairs reviewed these amendments.

The PRESIDING OFFICER. Does the Senator wish to send his amendments to the desk?

Mr. SPONG. I send the amendments to the desk.

The PRESIDING OFFICER. The clerk will please read the amendments of the Senator from Virginia.

The assistant legislative clerk read the amendments, as follows:

On page 5, line 14, insert the following: strike "United States territorial seas," and insert the following: "legally recognized territorial seas of the respective coastal states, but shall not extend beyond the limits of State jurisdiction as established by the Submerged Lands Act of May 22, 1953, and the Outer Continental Shelf Act of 1953."

On page 23, line 20, insert the following: a comma after "resources" and insert the following: "submerged lands"

On page 23, line 17, insert the following: strike "section" and insert the following: "Act"

The PRESIDING OFFICER. Does the Senator from Virginia desire to have the amendments considered en bloc?

Mr. SPONG. Mr. President, I ask unanimous consent that the amendments be considered en bloc.

The PRESIDING OFFICER. Without objection, the amendments will be considered en bloc.

Mr. HOLLINGS. Mr. President, I support the amendments. We have been trying to reconcile the amendments so that we would not interfere with any legal contention of any of the several States at the present time involved in court procedures. At the same time we wanted to make certain that Federal jurisdiction was unimpaired beyond the 3-mile limit in the territorial sea. If we do not go beyond that, I think these amendments take care of it.

Mr. BOGGS. Mr. President, will the Senator yield?

Mr. HOLLINGS. I yield.

Mr. BOGGS. Mr. President, I wish to express my support for the amendment offered by the distinguished Senator from Virginia (Mr. SPONG). This amendment will insure that this legislation in no way prejudices the present consideration by the courts of a case involving State rights over the seabed. I believe this amendment is important, and I commend the Senator for this amendment.

Mr. SPONG. I thank the Senator from Delaware.

Mr. MOSS. Mr. President, will the Senator yield?

Mr. SPONG. I yield.

Mr. MOSS. I simply wish to say that the amendment offered by the Senator from Virginia is very acceptable from the viewpoint of the Interior and Insular Affairs Committee in relation to the National Fuels and Energy Study which our committee has undertaken. This makes clear that this bill focuses on the territorial sea or the area that is within State jurisdiction, and preserves the Federal jurisdiction beyond, which is not to be considered or disturbed by the bill at this time. If we want to do something about that later, we will have another bill and another opportunity.

I am, therefore, very happy to support the amendment offered by the Senator from Virginia.

Mr. SPONG. Mr. President, I am very pleased that the Senator from Utah has made this expression. Members of the Interior and Insular Affairs and the Public Works Committees, the Senator from Delaware and the Senator from South Carolina, have agreed to accept the amendment.

The PRESIDING OFFICER. The question is on adopting, en bloc, the amendments of the Senator from Virginia.

The amendments were agreed to en bloc.

Mr. HOLLINGS. Mr. President, if there are no other amendments to be offered, I have one final amendment to offer, which I send to the desk and ask that it be read.

The PRESIDING OFFICER. The amendment will be read.

The assistant legislative clerk read the amendment, as follows:

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On page 2, line 6, insert the following: Strike the word "National" and insert "Magnuson."

Mr. HOLLINGS. Mr. President, on line 2, page 6, we entitle the bill the "National Coastal Zone Management Act of 1972." The intent of this amendment, of course, is to call it the "Magnuson Coastal Zone Management Act of 1972." All of our colleagues have been personally indebted to the contributions made by many Senators, including the Senator from Delaware, in the coastal zone management bill some 3 years ago, on which we had hearings. The Senator from Alaska has given outstanding leadership to this particular measure. The senior Senator from New Hampshire (Mr. CORTON) has been very helpful. But in going over the record of the past 12 years, the reason this bill, as controversial as it is in nature, has gone through the floor so smoothly this morning has been due to the leadership of the distinguished Senator from Washington (Mr. MAGNUSON). Some 12 years ago he started in this particular field. It was under his leadership, in the mid-1960's, that he introduced legislation instituting the Commission on Marine Sciences, Engineering, and Resources, resulting in the Stratton Commission report. It was under his leadership that the temporary Oceanographic Subcommittee was established and the Oceans and Atmosphere Subcommittee was instituted as a standing subcommittee under his Committee on Commerce, and through the past 2½ years now, we have had hearings and different discussions with

respect to moving forward in this particular field. It was the Senator from Washington who gave us the leadership, spreading oil on troubled waters, and we finally got a bill. I wish to mention his role as chairman of the Subcommittee on Health Appropriations, which encompassed hearing some 427 witnesses. I do not see how an individual chairman can listen that long and not abolish the whole Department, but he has given leadership there.

He had an executive session this morning. He had other witnesses scheduled. Rather than try to be here, after he had worked out this language, he went forward with those witnesses.

I think this body would like to recognize his leadership in this field, and I hope my colleagues will join in supporting the amendment.

Mr. BOGGS. Mr. President, will the Senator yield?

Mr. HOLLINGS. I yield.

Mr. BOGGS. I hasten to join in this amendment. I am privileged to serve on the Appropriations Subcommittee the Senator referred to, under the leadership of the Senator from Washington (Mr. MAGNUSON). I think the Senator's remarks have been most appropriate. I wish to join in those comments.

Mr. STEVENS. Mr. President, will the Senator yield?

Mr. HOLLINGS. I yield.

Mr. STEVENS. I, too, join the chairman of the subcommittee on this amendment. Those of us who know our neighbor to the south, the Senator from Washington, well realize how the chairmen of the subcommittee and the full Commerce Committee worked. An article I recently read said, "What Maggie wants, Maggie gets." "Maggie" has been a big help in this area. He has pursued for many, many years his great interest in our State. He was once referred to as the Senator from Alaska, as the senior Members of this body will recall, because we had no Senator, then, and he took care of the territory of Alaska as well as the State

of Washington, and has done it well. Thus I think it is fitting testimony that the subcommittee chairman has made this suggestion.

Mr. HOLLINGS. Mr. President, I move the adoption of the amendment.

The PRESIDING OFFICER. The question is on agreeing to the amendment of the Senator from South Carolina (Mr. HOLLINGS).

The amendment was agreed to.

Mr. TUNNEY. Mr. President, I am pleased to both cosponsor and vote for the passage of S. 3507, the National Coastal Zone Management Act of 1972.

The ocean front is the single most valuable natural resource in California. The bulk of the State's population is concentrated within a few miles of the sea, and its impact upon the people's way of life is great. But the California coastline is shrinking rapidly as demand for its values increases and as public access to attractive frontage decreases. Undeveloped shoreline, including bays, estuaries, and salt water marshes, can no longer be regarded as ordinary real estate subject to residential or commercial-industrial development.

In California, coastal and seaward areas must be protected for present and future generations. The ecologically rich kelp forests, for example, which grow from 100 to 1,000 feet off shore must be protected. Kelp was once prevalent along the entire California coast, but sewage, pesticides, industrial wastes and thermal pollution have greatly reduced this forest to a mere 18 square miles. For scientific, economic and ecological reasons, as well as scenic and recreational considerations, this remarkable oxygen producing plant must be allowed to make a comeback.

Only prompt and bold action can protect the quality of one of the world's most spectacular shorelines from further deterioration.

S. 3507 is an important first step in that it encourages and assists the vari-

ous States in preparing and implementing management programs to preserve, protect, develop, and restore the resources of the coastal zone of the United States. This bill authorizes Federal grants-in-aid of up to 66% percent to coastal States to develop coastal zone management programs. In addition S. 3507 authorizes grants to help coastal States implement these management programs, once approved by the Secretary of Commerce, and States would be aided for up to 50 percent of the costs in the acquisition and operation of estuarine sanctuaries.

In fiscal year 1973 the bill authorizes \$12 million for management program development grants, not to exceed \$50 million for administrative grants and \$6 million for estuarine sanctuaries grants.

Dr. Joel Hedgpeth of Oregon State University makes the following very tragic comment with regard to the acquisition and preservation of estuarine sanctuaries in California.

In southern California, for example, there is nothing left. In northern California, Tomales Bay, which might not fit some definitions, is an ideal candidate because of the 10 years of study that has been carried out there and the circumstances that one entire shore (almost) is within control of the Point Reyes National Seashore. There are some interesting lagoons in northern California, just north of Eureka.

Clearly we are already too late. We must act quickly to begin to save what is left of our coastline and to attempt to restore past despoiliation.

Recently the Institute of Governmental Studies at the University of California at Berkeley published a book entitled "California's Disappearing Coast: A Legislative Challenge" by Gilbert E. Bailey and Paul S. Thayer.

The book summarizes the condition of California's coastline as follows:

Today—a quarter of the 1,000 mile coastline—from the Mexican border to Santa Barbara—is already largely occupied by cities, suburbs, industries, military bases, power plants, sewage discharge pipes, tract homes and high-rise blockades of buildings

interposed between the coast and the people. From Monterey to coastal areas north of San Francisco the story is much the same. Beaches are posted because of contamination and fish catches are seized because of mercury and DDT poisoning.

Some reaches of the coast, from Morro Bay north to Monterey and Marin County to the Oregon border, are still relatively untouched....

But much of this is private ranchland, and at the moment there is absolutely no assurance it will escape the fate of other private ranchland that, for example, could be found in the Santa Clara Valley 25 years ago.

The authors conclude by saying that—

There is no coordinated public regulation of this priceless stretch of land and sea.

For the past several years the California Legislature has been wrestling with the problem of enacting an effective piece of legislation to preserve and protect the California coastline.

The report quotes California Assembly Speaker Bob Moretti as saying that the best planning available would be worthless without money to finance the agencies involved, but more importantly, to purchase coastal land for public use.

S. 3507—if implemented in a tough manner and if adequate funds are appropriated—could assist California to extricate itself from its coastal quagmire.

It is my hope that Federal legislation such as S. 3507 with its hope of Federal financial assistance will act as a catalyst and encourage the California Legislature to come up with effective legislation to deal with the "disappearing California coastline."

Mr. TOWER. Mr. President, I am very pleased today to join in supporting S. 3507, of which I am a cosponsor. The passage of this bill will bring to fruition many years of work by a great many people. After several years of study, Senator HOLLINGS last year introduced S. 582 as a comprehensive proposal to deal with

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the problems manifest in the coastal

zone. About that same time, I introduced S. 638, dealing with the same subject. I have been concerned for some time with the unique problems of pollution and land use in the coastal zone and believe that we will now be able to begin to work to correct them. This new bill, S. 3507, takes into consideration the best aspects of S. 582 and S. 638, along with some ideas that were developed by the Subcommittee on Oceans and Atmosphere in the hearings that they held. I wish at this time to congratulate the members and the staff of that subcommittee, both past and present, for their fine work on this bill and the outstanding cooperation that has been shown to me and my staff as we were working with them.

Mr. President, the heart of this bill will be the encouragement of the coastal States to survey the needs and problems of their coastal zones and assistance to them in establishing comprehensive programs for dealing with those recognized needs and problems. In my State of Texas, nearly 40 percent of all our citizens live in the area 50 miles from the Gulf of Mexico.

In addition, a great deal of our industrial and commercial activity takes place in the same area. In the Nation as a whole, an even greater percentage of activity takes place in the coastal zone. The situation everywhere is becoming more acute. Pollution and land use problems are proliferating as the coastal zone becomes more congested. This bill is an attempt by the Government to assist the States in correcting pollution, and planning for the best use of limited land and water resources.

The emphasis in this bill is on cooperation with the States, not coercion by the Federal Government. During the hearings on this subject, there was detected an acute awareness by the States of the problems of the coastal zone. Indeed, Texas has in many respects led the way toward categorizing the different uses of land in the coastal zone and in pinpointing likely problem areas. I

believe that it is safe to say that we in Texas will probably lead the way in devising and carrying out our coastal zone plan. What the States have needed for so long are the resources to act to resolve the evident problems of their coastal zones. We are today providing that assistance. Under the terms of the bill, up to 66⅔ percent of the cost of devising and then carrying out the plans will be borne by the Federal Government. The major responsibility for drawing up the plans, marshalling the necessary personnel, and then carrying out the plans would fall to the State governments. This is a somewhat unique approach by the Federal Government in relying on the States to solve this problem rather than simply federalizing the area and creating a new bureaucracy to deal with it. I believe that the States will prove that they can handle this program and will make it work.

Mr. President, I look forward to early enactment of this bill to aid the coastal States and in so doing to aid the entire Nation. We in the Congress have located a real need for action and have acted upon that need. The unique problems of coastal pollution and the varied competing land uses will undoubtedly be faced up to by the State governments and the local governments—the units that are best prepared by their locale to deal with them. I know that all of us involved in this effort will keep in close contact with the developments in the coastal zone and stand ready to make adjustments and provide more assistance if that seems necessary. I urge the Senate to give this bill its overwhelming support.

The PRESIDING OFFICER. The bill is open to further amendment. If there be no further amendment to be proposed, the question is on the engrossment and third reading of the bill.

The bill was ordered to be engrossed for a third reading, and was read the third time.

The PRESIDING OFFICER (Mr.

EAGLETON). The bill having been read the third time, the question is, Shall it pass? On this question the yeas and nays have been ordered, and the clerk will call the roll.

The second assistant legislative clerk called the roll.

Mr. ROBERT C. BYRD. I announce that the Senator from Indiana (Mr. BAYH), the Senator from Florida (Mr. CHILES), the Senator from Mississippi (Mr. EASTLAND), the Senator from Oklahoma (Mr. HARRIS), the Senator from Michigan (Mr. HART), the Senator from Indiana (Mr. HARTKE), the Senator from Iowa (Mr. HUGHES), the Senator from Minnesota (Mr. HUMPHREY), the Senator from Washington (Mr. JACKSON), the Senator from North Carolina (Mr. JORDAN), the Senator from Arkansas (Mr. MCCLELLAN), the Senator from Wyoming (Mr. MCGEE), the Senator from South Dakota (Mr. MCGOVERN), the Senator from Maine (Mr. MUSKIE), the Senator from Rhode Island (Mr. PASTORE), the Senator from Alabama (Mr. SPARKMAN), the Senator from Mississippi (Mr. STENNIS), and the Senator from New Jersey (Mr. WILLIAMS) are necessarily absent.

I also announce that the Senator from Montana (Mr. MANSFIELD), and the Senator from Massachusetts (Mr. KENNEDY) are absent on official business.

I further announce that, if present and voting, the Senator from Florida (Mr. CHILES), the Senator from Indiana (Mr. HARTKE), the Senator from Minnesota (Mr. HUMPHREY), the Senator from Washington (Mr. JACKSON), the Senator from Massachusetts (Mr. KENNEDY), the Senator from Wyoming (Mr.

MCGEE), the Senator from South Dakota (Mr. MCGOVERN), the Senator from Rhode Island (Mr. PASTORE), and the Senator from New Jersey (Mr. WILLIAMS) would each vote "yea."

Mr. GRIFFIN. I announce that the Senator from Oklahoma (Mr. BELL-MON), the Senator from Tennessee (Mr. BROCK), the Senator from Massachusetts (Mr. BROOKE), the Senator from New Hampshire (Mr. CORTON), and the Senator from Kansas (Mr. DOLE) are necessarily absent.

The Senator from Oregon (Mr. HATFIELD) is absent because of death in his family.

The Senator from Maryland (Mr. MATHIAS) and the Senator from Delaware (Mr. ROTH) are absent on official business.

The Senator from Pennsylvania (Mr. SCOTT) is absent by leave of the Senate on official business.

The Senator from South Dakota (Mr. MUNDT) is absent because of illness.

The Senator from Arizona (Mr. GOLDWATER) and the Senator from New York (Mr. JAVITS) are detained on official business.

If present and voting, the Senator from Tennessee (Mr. BROCK) the Senator from Massachusetts (Mr. BROOKE), the Senator from Oregon (Mr. HATFIELD), the Senator from New York (Mr. JAVITS), and the Senator from Delaware (Mr. ROTH) would each vote "yea."

The result was announced—yeas, 68, nays 0, as follows:

* * * * *

[p. S6672]

1.33a(4)(b) Aug. 2: Considered and passed House, amended in lieu of H.R. 14146

[No Relevant Discussion on Pertinent Section]

1.33a(4)(c) Oct. 12: House and Senate agreed to conference report

[No Relevant Discussion on Pertinent Section]

Executive Orders

**2.1 E.O. 11490, ASSIGNING OF EMERGENCY
PREPAREDNESS FUNCTIONS TO FEDERAL AGENCIES
AND DEPARTMENTS**

October 30, 1969, 34 Fed. Reg. 17567

EXECUTIVE ORDER 11490, AS AMENDED

Oct. 28, 1969, 34 F.R. 17567, as amended by Ex. Ord. No. 11522, Apr. 6, 1970,
35 F.R. 5659; Ex. Ord. No. 11556, Sept. 4, 1970, 35 F.R. 14193

**ASSIGNMENT OF EMERGENCY PREPAREDNESS FUNCTIONS TO FED-
ERAL AGENCIES AND DEPARTMENTS**

WHEREAS our national security is dependent upon our ability to assure continuity of government, at every level, in any national emergency type situation that might conceivably confront the nation; and

WHEREAS effective national preparedness planning to meet such an emergency, including a massive nuclear attack, is essential to our national survival; and

WHEREAS effective national preparedness planning requires the identification of functions that would have to be performed during such an emergency, the assignment of responsibility for developing plans for performing these functions, and the assignment of responsibility for developing the capability to implement those plans; and

WHEREAS the Congress has directed the development of such national emergency preparedness plans and has provided funds for the accomplishment thereof; and

WHEREAS this national emergency preparedness planning activity has been an established program of the United States Government for more than twenty years:

NOW, THEREFORE, by virtue of the authority vested in me as President of the United States, and pursuant to Reorganization Plan No. 1 of 1958 (72 Stat. 1799) [set out as a note under section 2271 of this Appendix], the National Security Act of 1947, as amended [section 401 *et seq.* of Title 50, War and National Defense], the Defense Production Act of 1950, as amended [section 2061 *et seq.* of this Appendix], and the Federal Civil Defense Act, as amended [section 2211 *et seq.* of this Appendix], it is hereby ordered as follows—

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Part 1—Purpose and Scope

Section 101. Purpose. This order consolidates the assignment of emergency preparedness functions to various departments and agencies heretofore contained in the 21 Executive orders and 2 Defense Mobilization orders listed in Section 3015 of this order. Assignments have been adjusted to conform to changes in organization which have occurred subsequent to the issuance of those Executive orders and Defense Mobilization orders.

Sec. 102. Scope. (a) This order is concerned with the emergency national planning and preparedness functions of the several departments and agencies of the Federal Government which complement the military readiness planning responsibilities of the Department of Defense; together, these measures provide the basic foundation for our overall national preparedness posture, and are fundamental to our ability to survive.

(b) The departments and agencies of the Federal Government are hereby severally charged with the duty of assuring the continuity of the Federal Government in any national emergency type situation that might confront the nation. To this end, each department and agency with essential functions, whether expressly iden-

tified in this order or not, shall develop such plans and take such actions, including but not limited to those specified in this order, as may be necessary to assure that it will be able to perform its essential functions, and continue as a viable part of the Federal Government, during any emergency that might conceivably occur. These include plans for maintaining the continuity of essential functions of the department or agency at the seat of government and elsewhere, through programs concerned with: (1) succession to office; (2) predelegation of emergency authority; (3) safekeeping of essential records; (4) emergency relocation sites supported by communications and required services; (5) emergency action steps; (6) alternate headquarters or command facilities; and (7) protection of Government resources, facilities, and personnel. The continuity of Government activities undertaken by the departments and agencies shall be in accordance with guidance provided by, and subject to evaluation by, the Director of the Office of Emergency Preparedness.

(c) In addition to the activities indicated above, the heads of departments and agencies described in Parts 2 through 29 of this order shall: (1) prepare national emergency plans, develop preparedness programs, and attain an appropriate state of readiness with respect to the functions assigned to them in this order for all conditions of national emergency; (2) give appropriate consideration to emergency preparedness factors in the conduct of the regular functions of their agencies, particularly those functions considered essential in time of emergency, and (3) be prepared to implement, in the event of an emergency, all appropriate plans developed under this order.

Sec. 103. Presidential Assistance. The director of the Office of Emergency Preparedness, in accordance with the provisions of Executive Order No. 11051 of September 27, 1962 [set out as a note under section 2271 of this Appendix], shall advise and assist the President in determining national preparedness goals and policies for the performance of functions under this order and in coordinating the performance of such functions with the total national preparedness program.

Sec. 104. General and Specific Functions. The functions assigned by Part 30, General Provisions, apply to all departments and agencies having emergency preparedness responsibilities. Specific functions are assigned to departments and agencies covered in Parts 2 through 29.

Sec. 105. Construction. The purpose and legal effect of the assignments contained in this order do not constitute authority to implement the emergency plans prepared pursuant to this order. Plans so developed may be effectuated only in the event that authority for such effectuation is provided by a law enacted by the Congress or by an order or directive issued by the President pursuant to statutes or the Constitution of the United States.

Part 2—Department of State

Section 201. Functions. The Secretary of State shall prepare national emergency plans and develop preparedness programs to permit modification or expansion of the activities of the Department of State and agencies, boards, and commissions under his jurisdiction in order to meet all conditions of national emergency, including attack upon the United States. The Secretary of State shall provide to all other departments and agencies overall foreign policy direction, coordination, and supervision in the formulation and execution of those emergency preparedness activities which have foreign policy implications, affect foreign relations, or depend directly or indirectly, on the policies and capabilities of the Department of State. The Secretary of State shall develop policies, plans, and procedures for carrying out his responsibilities in the conduct of the foreign relations of the United States under conditions of national emergency, including, but not limited to (1) the formulation and implementation, in consultation with the Department of Defense and other appropriate agencies, and the negotiation of contingency and post-emergency plans with our allies and of the intergovernmental agreements and arrangements required by such plans; (2) formulation, negotiation, and execution of policy affecting the relationships of the United States with neutral States; (3) formulation and execution of political strategy toward hostile or enemy States, including the definition of war objectives and the political means for achieving those objectives; (4) maintenance of diplomatic and consular representation abroad; (5) reporting and advising on conditions overseas which bear upon the national emergency; (6) carrying out or proposing economic measures with respect to other nations, including coordination with the export control functions of the Secretary of Commerce; (7) mutual assistance activities such as ascertaining requirements of the civilian economies of other nations, making recommendations to domestic resource agencies for meeting such requirements, and determining the availability of and making arrangements for obtaining foreign resources required by the United States; (8) pro-

viding foreign assistance, including continuous supervision and general direction of authorized economic and military assistance programs, and determination of the value thereof; (9) protection or evacuation of American citizens and nationals abroad and safeguarding their property; (10) protection and/or control of international organization and foreign diplomatic, consular, and other official personnel and property, or other assets, in the United States; (11) documentary control of persons seeking to enter or leave the United States; and (12) regulation and control of exports of items on the munitions list.

Part 3—Department of the Treasury

Section 301. Functions. The Secretary of the Treasury shall develop policies, plans, and procedures for the performance of emergency functions with respect to (1) stabilization aspects of the monetary, credit, and financial system; (2) stabilization of the dollar in relation to foreign currencies; (3) collection of revenue; (4) regulation of financial institutions; (5) supervision of the Federal depository system; (6) direction of transactions in government securities; (7) tax and debt policies; (8) participation in bilateral and multilateral financial arrangements with foreign governments; (9) regulation of foreign assets in the United States and of foreign financial dealings (in consultation with the Secretaries of State and Commerce); (10) development of procedures for the manufacture and/or issuance and redemption of securities, stamps, coins, and currency; (11) development of systems for the issuance and payment of Treasury checks; (12) maintenance of the central government accounting and financial reporting system; (13) administration of customs laws, tax laws, and laws on control of alcohol, alcoholic beverages, tobacco, and firearms; (14) suppression of counterfeiting and forgery of government securities, stamps, coins, and currency; (15) protection of the President and the Vice President and other designated persons; (16) granting of loans (including participation in or guarantees of loans) for the expansion of capacity, the development of technological processes, or the production of essential material; and (17) to the extent that such functions have not been transferred to the Secretary of Transportation, enforcement of marine inspection and navigation laws.

Sec. 302. Financial Coordination. The Secretary shall assume the initiative in developing plans for implementation of national policy on sharing war losses and for the coordination of emergency monetary, credit, and Federal benefit payment programs of those

departments and agencies which have responsibilities dependent on the policies or capabilities of the Department.

Part 4—Department of Defense

Section 401. Functions. In addition to the civil defense functions assigned to the Secretary of Defense by Executive Order No. 10952 [set out as a note under section 2271 of this Appendix], the Secretary of Defense shall perform the following emergency preparedness functions:

(1) Provide specific strategic guidance as required for emergency preparedness planning and programing, including, for example, guidance regarding such factors as accessibility of foreign sources of supply and estimated shipping loss discounts and aircraft losses in the event of war.

(2) Develop and furnish quantitative and time-phased military requirements for selected end-items, consistent with defined military concepts, and supporting requirements for materials, components, production facilities, production equipment, petroleum, natural gas, solid fuels, electric power, food, transportation, and other services needed to carry out specified Department of Defense current and mobilization procurement, construction, research and development, and production programs. The items and supporting resources to be included in such requirements, the periods to be covered, and the dates for their submission to the appropriate resource agency will be determined by mutual agreement between the Secretary of Defense and the head of the appropriate resource agency.

(3) Advise and assist the Office of Emergency Preparedness in developing a national system of production urgencies.

(4) Advise and assist the Office of Emergency Preparedness in developing a system, in conjunction with the Department of State, for the international allocation of critical materials and products among the United States and the various foreign claimants in the event of an emergency, including an attack on the United States.

(5) Plan for and administer priorities and allocations authority delegated to the Department of Defense. Authorize procurement and production schedules and make allotments of controlled materials pursuant to program determinations of the Office of Emergency Preparedness.

(6) Assist the Department of Commerce and other appropriate agencies in the development of the production and distribution controls plans for use in any period of emergency.

(7) Develop with industry, plans for the procurement and pro-

duction of selected military equipment and supplies needed to fulfill emergency requirements, making maximum use of plants in dispersed locations, and, where essential and appropriate, providing for alternative sources of supply in order to minimize the effects of enemy attack.

(8) Develop with industry, plans and programs for minimizing the effect of attack damage to plants producing major items of military equipment and supply.

(9) Recommend to the Office of Emergency Preparedness measures for overcoming potential deficiencies in production capacity to produce selected military supplies and equipment needed to fulfill emergency requirements, when necessary measures cannot be effected by the Department of Defense.

(10) Furnish information and recommendations, when requested by the Office of Emergency Preparedness, for purposes of processing applications for defense loans under Title III of the Defense Production Act of 1950, as amended (sections 2091-2094 of this Appendix).

(11) Furnish advice and assistance on the utilization of strategic and critical materials in defense production, including changes that occur from time to time.

(12) Analyze problems that may arise in maintaining an adequate mobilization production base in military-product industries and take necessary actions to overcome these problems within the limits of the authority and funds available to the Department of Defense.

(13) Assist the Secretary of Commerce with respect to the identification and evaluation of facilities important to the national defense.

(14) Advise and assist the Office of Emergency Preparedness in the development and review of standards for the strategic location and physical security of industries, services, government, and other activities for which continuing operation is essential to national security, and exercise physical security cognizance over the facilities assigned to him for such purpose.

(15) Develop and operate damage assessment systems and assist the Office of Emergency Preparedness and other departments and agencies in their responsibilities as stated in Section 3002(2); participate with the Office of Emergency Preparedness in the preparation of estimates of potential damage from enemy attack.

(16) Advise and assist the Office of Emergency Preparedness in the development of over-all manpower policies to be instituted in the event of an emergency, including an attack on the United

States, including the provision of information relating to the size and composition of the Armed Forces.

(17) Advise on existing communications facilities and furnish military requirements for commercial communications facilities and services in planning for and in event of an emergency, including an attack on the United States.

(18) Furnish military requirements for all forms of transportation and transportation facilities in planning for and in the event of emergency, including an attack upon the United States.

(19) Assist the Office of Emergency Preparedness in preparation of legislative programs and plans for coordinating nonmilitary support of emergency preparedness programs.

(20) Develop plans and procedures for the Department of Defense utilization of nonindustrial facilities in the event of an emergency in order to reduce requirements for new construction and to provide facilities in a minimum period of time.

(21) Advise and assist the Office of Emergency Preparedness in (1) determining what key foreign facilities and operating rights thereto are important to the security of the United States, and (2) obtaining through appropriate channels protection against sabotage.

(22) Develop plans and procedures to carry out Department of Defense responsibilities stated in the National Censorship Agreement between the Department of Defense and the Office of Emergency Preparedness.

(23) Advise and assist the Department of State in planning for the evacuation of dependents from overseas areas, United States teachers and administrators in the overseas dependents schools, and such other United States citizens as may be working in United States schools overseas.

(24) Develop plans for implementation of approved Department of State/Department of Defense policies and procedures for the protection and evacuation of United States citizens and certain designated aliens abroad.

(25) Develop plans and procedures for the provision of logistical support to members of foreign forces, their employees and dependents as may be present in the United States under the terms of bilateral or multilateral agreements which authorize such support in the event of a national emergency.

(26) Develop with the Department of Transportation and Federal Communications Commission plans and programs for the control of air traffic, civil and military, during an emergency.

(27) Develop with the Federal Communications Commission

and the Office of Telecommunications Policy (35 F.R. 6421) plans and programs for the emergency control of all devices capable of emitting electromagnetic radiation.

Part 5—Department of Justice

Section 501. Functions. The Attorney General shall perform the following emergency preparedness functions:

(1) **Emergency documents and measures.** Provide advice, as appropriate, with respect to any emergency directive or procedure prepared by a department or agency as a part of its emergency preparedness function.

(2) **Industry support.** As appropriate, review the legal procedures developed by the Federal agencies concerned to be instituted if it becomes necessary for the Government to institute extraordinary measures with respect to vital production facilities, public facilities, communications systems, transportation systems, or other facility, system, or service essential to national survival.

(3) **Judicial and legislative liaison.** In cooperation with the Office of Emergency Preparedness, maintain liaison with Federal courts and with the Congress so there will be mutual understanding of Federal emergency plans involving law enforcement and the exercise of legal powers during emergencies of various magnitudes.

(4) **Legal advice.** Develop emergency plans for providing legal advice to the President, the Cabinet, and the heads of Executive departments and agencies wherever they may be located in an emergency, and provide emergency procedures for the review as to form and legality of Presidential proclamations, Executive orders, directives, regulations, and documents, and of other documents requiring approval by the President or by the Attorney General which may be issued by authorized officers after an armed attack.

(5) **Alien control and control of entry and departure.** Develop emergency plans for the control of alien enemies and other aliens within the United States and, in consultation with the Department of State and Department of the Treasury, develop emergency plans for the control of persons attempting to enter or leave the United States. These plans shall specifically include provisions for the following:

(a) The location, restraint, or custody of alien enemies.

(b) Temporary detention of alien enemies and other persons attempting to enter the United States pending determination of their admissibility.

(c) Apprehension of deserting alien crewmen and stowaways.

(d) Investigation and control of aliens admitted as contract laborers.

(e) Control of persons entering or departing from the United States at designated ports of entry.

(f) Increased surveillance of the borders to preclude prohibited crossings by persons.

(6) **Alien property.** Develop emergency plans, in consultation with the Department of State, for the seizure and administration of property of alien enemies under provisions of the Trading with the Enemy Act [section 1 et seq. of this Appendix].

(7) **Security standards.** In consultation with the Department of Defense and with other executive agencies, to the extent appropriate, prepare plans for adjustment of security standards governing the employment of Federal personnel and Federal contractors in an emergency.

(8) **Drug Control.** Develop emergency plans and procedures for the administration of laws governing the import, manufacture, and distribution of narcotics. Consult with and render all possible aid and assistance to the Office of Emergency Preparedness, the Department of Health, Education, and Welfare, and the General Services Administration in the allocation, distribution, and, if necessary, the replenishment of Government stockpiles of narcotic drugs.

Sec. 502. Civil Defense Functions. In consonance with national civil defense programs developed by the Department of Defense, the Attorney General shall:

(1) **Local law enforcement.** Upon request, consult with and assist the Department of Defense to plan, develop, and distribute materials for use in the instruction and training of law enforcement personnel for civil defense emergency operations; develop and carry out a national plan for civil defense instruction and training for enforcement officers, designed to utilize to the maximum extent practicable the resources and facilities of existing Federal, State, and local police schools, academies, and other appropriate institutions of learning; and assist the States in preparing for the conduct of intrastate and interstate law enforcement operations to meet the extraordinary needs that would exist for emergency police services under conditions of attack or imminent attack.

(2) **Penal and correctional institutions.** Develop emergency plans and procedures for the custody and protection of prisoners

and the use of Federal penal and correctional institutional resources, when available, for cooperation with local authorities in connection with mass feeding and housing, for the storage of standby emergency equipment, for the emergency use of prison hospitals and laboratory facilities, for the continued availability of prison-industry products, and, in coordination with the Department of Labor, for the development of Federal prisoner skills to appropriately augment the total supply of manpower, advise States and their political subdivisions regarding the use of State and local prisons, jails, and prisoners for the purpose of relieving local situations and conditions arising from a state of emergency.

(3) **Identification and location of persons.** Develop emergency plans and procedures for the use of the facilities and personnel of the Department of Justice in assisting the Department of Health, Education, and Welfare with the development of plans and procedures for the identification of the dead and the reuniting of families during a civil defense emergency.

Part 6—Post Office Department

Section 601. Functions. The Postmaster General shall prepare plans and programs for emergency mail service and shall cooperate with indicated Federal agencies, in accordance with existing agreements or directives, in the following national emergency programs:

(1) **Registering of persons.** Assist the Department of Health, Education, and Welfare in planning a national program and developing technical guidance for States, and directing Post Office activities concerned with registering persons and families for the purpose of receiving and answering welfare inquiries and reuniting families in civil defense emergencies. The program shall include procurement, transportation, storage, and distribution of safety notification and emergency change of address cards in quantities and localities jointly determined by the Department of Defense and the Post Office Department.

(2) **Other emergency programs.** (a) Censorship of international mails. (Department of Defense; Department of the Treasury; Office of Emergency Preparedness)

(b) Provision for emergency mail service to Federal agencies at both regular and emergency sites. (General Services Administration)

(c) Emergency registration of Federal employees. (Civil Service Commission)

(d) Emergency leasing of space for Federal agencies. (General Services Administration)

(e) Registration of enemy aliens. (Department of Justice)

Part 7—Department of the Interior

Section 701. Résumé of Responsibilities. The Secretary of the Interior shall prepare national emergency plans and develop preparedness programs covering (1) electric power; (2) petroleum and gas; (3) solid fuels; (4) minerals; and (5) water, as defined in Section 702 of this part.

Sec. 702. Definitions. As used in this part:

(1) "Electric power" means all forms of electric power and energy, including the generation, transmission, distribution, and utilization thereof.

(2) "Petroleum" means crude oil and synthetic liquid fuel, their products, and associated hydrocarbons, including pipelines for their movement and facilities specially designed for their storage.

(3) "Gas" means natural gas (including helium) and manufactured gas, including pipelines for their movement and facilities specially designed for their storage.

(4) "Solid fuels" means all forms of anthracite, bituminous, sub-bituminous, and lignitic coals, coke, and coal chemicals produced in the coke-making process.

(5) "Minerals" means all raw materials of mineral origin (except petroleum, gas, solid fuels, and source materials as defined in the Atomic Energy Act of 1954, as amended) [section 2011 *et seq.* of Title 42, The Public Health and Welfare] obtained by mining and like operations and processed through the stages specified and at the facilities designated in an agreement between the Secretary of the Interior and the Secretary of Commerce as being within the emergency preparedness responsibilities of the Secretary of the Interior.

(6) "Water" means water from all sources except water after its withdrawal into a community system, or an emergency system for treatment, storage, and distribution for public use.

Sec. 703. Resource functions. With respect to the resources defined in Section 702, the Secretary of the Interior shall:

(1) **Minerals development.** Develop programs and encourage the exploration, development, and mining of strategic and critical minerals for emergency purposes.

(2) **Production.** Provide guidance and leadership to assigned industries in the development of plans and programs to insure the

continuity of production in the event of an attack, and cooperate with the Department of Commerce in the identification and evaluation of essential facilities.

(3) **Water.** Develop plans with respect to water, including plans for the treatment and disposal, after use, of water after its withdrawal into a community system or an emergency system for treatment, storage, and distribution for public use. In developing any plans relating to water for use on farms and in food facilities, assure that those plans are in consonance with plans and programs of the Department of Agriculture.

(4) **Electric power and natural gas.** In preparedness planning for electric power and natural gas, the Federal Power Commission shall assist the Secretary of the Interior as set forth in Section 1901 of this order.

Part 8—Department of Agriculture

Section 801. Résumé of Responsibilities. The Secretary of Agriculture shall prepare national emergency plans and develop preparedness programs covering: (1) food resources, farm equipment, fertilizer, and food resource facilities as defined below; (2) lands under the jurisdiction of the Secretary of Agriculture; (3) rural fire control; (4) defense against biological and chemical warfare and radiological fallout pertaining to agricultural activities; and (5) rural defense information and education.

Sec. 802. Definitions. As used in this part:

(1) "Food resources" means all commodities and products, simple, mixed, or compound, or complements to such commodities or products, that are capable of being eaten or drunk, by either human beings or animals, irrespective of other uses to which such commodities or products may be put, at all stages of processing from the raw commodity to the products thereof in vendible form for human or animal consumption. For the purposes of this order, the term "food resources" shall also include all starches, sugars, vegetable and animal fats and oils, cotton, tobacco, wool, mohair, hemp, flax fiber, and naval stores, but shall not include any such material after it loses its identity as an agricultural commodity or agricultural product.

(2) "Farm equipment" means machinery, equipment, and repair parts manufactured primarily for use on farms in connection with the production or preparation for market or use of "food resources".

(3) "Fertilizer" means any product or combination of products for plant nutrition in form for distribution to the users thereof.

(4) "Food resource facilities" means plants, machinery, vehicles (including on farm), and other facilities (including farm housing) for the production, processing, distribution, and storage (including cold storage) of food resources, and for domestic distribution of farm equipment and fertilizer.

Sec. 803. Functions. With respect to food resources, food resource facilities, lands under the jurisdiction of the Secretary, farm equipment, and fertilizer, the Secretary of Agriculture shall:

(1) **Production, processing, storage, and distribution.** Develop plans for priorities, allocations, and distribution control systems and related plans, including control of use of facilities designed to provide adequate and continuing production, processing, storage, and distribution of essential food resources in an emergency, and to provide for the domestic distribution of farm equipment and fertilizer.

(2) **Stockpiles.** In addition to the food stockpile functions identified in Executive Order No. 10958 [set out as a note under section 2271 of this Appendix], take all possible measures in the administration of Commodity Credit Corporation inventories of food resources to assure the availability of such inventories when and where needed in an emergency. The Secretary shall also develop plans and procedures for the proper utilization of agricultural items stockpiled for survival purposes.

(3) **Land management.** Develop plans and direct activities for the emergency protection, management, and utilization of the lands, resources, and installations under the jurisdiction of the Secretary of Agriculture and assist in the development of plans for the emergency operation, production, and processing of forest products in cooperation with other Federal, State, and private agencies.

Sec. 804. Civil Defense Functions. In consonance with national civil defense programs developed by the Department of Defense, the Secretary of Agriculture shall:

(1) **Rural fire defense.** In cooperation with Federal, State, and local agencies, develop plans for a national program and direct activities relating to the prevention and control of fires in the rural areas of the United States caused by the effects of enemy attack.

(2) **Biological, chemical, and radiological warfare defense.** Develop plans for a national program, direct Federal activities, and furnish technical guidance to State and local authorities concerning (a) diagnosis and strengthening of defensive barriers and

control or eradication of diseases, pests, or chemicals introduced as agents of biological or chemical warfare against animals, crops, or products thereof; (b) protective measures, treatment, and handling of livestock, including poultry, agricultural commodities on farms or ranches, agricultural lands, forest lands, and water for agricultural purposes, any of which have been exposed to or affected by radiation. Plans shall be developed for a national program and direction of Federal activities to assure the safety and wholesomeness and to minimize losses from biological and chemical warfare, radiological effects, and other emergency hazards of livestock, meat and meat products, poultry and poultry products in establishments under the continuous inspection of the Department of Agriculture, and agricultural commodities and products owned by the Commodity Credit Corporation or by the Department of Agriculture.

(3) **Defense information and education.** Conduct a defense information and education program in support of the Department's emergency responsibilities.

Part 9—Department of Commerce

Section 901. Résumé of Responsibilities. The Secretary of Commerce shall prepare national emergency plans and develop preparedness programs covering:

(1) The production and distribution of all materials, the use of all production facilities (except those owned by, controlled by, or under the jurisdiction of the Department of Defense or the Atomic Energy Commission), the control of all construction materials, and the furnishing of basic industrial services except those involving the following:

(a) Production and distribution of and use of facilities for petroleum, solid fuels, gas, electric power, and water;

(b) Production, processing, distribution, and storage of food resources and the use of food resource facilities for such production, processing, distribution, and storage;

(c) Domestic distribution of farm equipment and fertilizer;

(d) Use of communications services and facilities, housing and lodging facilities, and health, education, and welfare facilities;

(e) Production, and related distribution, of minerals as defined in Subsection 702(5), and source materials as defined in the Atomic Energy Act of 1954, as amended [section 2011 et seq. of Title 42, The Public Health and Welfare]; and the construction and use of facilities designated as within the responsibilities of the Secretary of the Interior:

(f) Distribution of items in the supply systems of, or controlled by, the Department of Defense and the Atomic Energy Commission;

(g) Construction, use and management of civil aviation facilities; and

(h) Construction and use of highways, streets, and appurtenant structures.

(2) Federal emergency operational control responsibilities with respect to ocean shipping, ports, and port facilities, except those owned by, controlled by, or under the jurisdiction of the Department of Defense, and except those responsibilities of the Department of the Treasury with respect to the entrance and clearance of vessels. The following definitions apply to this part:

(a) "Ocean shipping" includes all overseas, coastwise, intercoastal, and Great Lakes shipping except that solely engaged in the transportation of passengers and cargo between United States ports on the Great Lakes.

(b) "Port" or "port area" includes any zone contiguous to or associated in the traffic network of an ocean or Great Lakes port, or outport location, including beach loading sites, within which facilities exist for transshipment of persons and property between domestic carriers and carriers engaged in coastal, intercoastal, and overseas transportation.

(c) "Port facilities" includes all port facilities, port equipment including harbor craft, and port services normally used in accomplishing the transfer or interchange of cargo and passengers between ocean-going vessels and other media of transportation, or in connection therewith (including the Great Lakes).

(3) Scientific and technological services and functions, essential to emergency preparedness plans, programs, and operations of the Federal departments and agencies, in which the Department of Commerce has the capability, including but not limited to:

(a) Meteorological and related services;

(b) Preparation, reproduction, and distribution of nautical and aeronautical charts, geodetic, hydrographic, and oceanographic data, and allied services for nonmilitary purposes;

(c) Standards of measurement and supporting services; and,

(d) Research, development, testing, evaluation, application, and associated services and activities in the various fields and disciplines of science and technology in which the Department has special competence.

(4) Collection, compilation, and reporting of census informa-

tion and the provision of statistical and related services, as required, for emergency planning and operations.

(5) Regulation and control of exports and imports, under the jurisdiction of the Department of Commerce, in support of national security, foreign policy, and economic stabilization objectives.

(6) Regulation and control of transfers of capital to, and reinvestment of earnings of, affiliated foreign nationals pursuant to authority conferred by Executive Order No. 11387 of January 1, 1968 [set out as a note under section 95a of Title 12, Banks and Banking].

Sec. 902. Production Functions. Within the areas designated in section 901 (1) hereof, the Secretary of Commerce shall:

(1) **Priorities and allocations.** Develop control systems for priorities, allocation, production, and distribution, including provisions for other Federal departments and agencies, as appropriate, to serve as allotting agents for materials and other resources made available under such systems for designated programs and the construction and operation of facilities assigned to them.

(2) **New construction.** Develop procedures by which new production facility construction proposals will be reviewed for appropriate location in light of such area factors as locational security, availability of labor, water, power, housing, and other support requirements.

(3) **Industry evaluation.** Identify and evaluate the national security essentiality of those products and services, and their producing or supporting facilities, which are of exceptional importance to mobilization readiness, national defense, or post-attack survival and recovery.

(4) **Production capability.** Analyze potential effects of attack on actual production capability, taking into account the entire production complex, including shortages of resources, and conduct studies as a basis for recommending pre-attack measures that would strengthen capabilities for post-attack production.

(5) **Loans for plant modernization.** Develop plans, in coordination with the Small Business Administration, for providing emergency assistance to essential small business establishments through direct loans or participation loans for the financing of production facilities and equipment.

Sec. 903. Maritime Functions. Within the areas designated in section 901 (2) of this part, the Secretary of Commerce shall develop plans and procedures in consonance with international treat-

ies, under coordinating authority of the Secretary of Transportation and in cooperation with other appropriate Federal agencies and the States and their political subdivisions, to provide for Federal operational control of ocean ports and shipping, including:

(1) **Shipping allocation.** Allocation of specific ocean shipping to meet the national requirements, including those for military, foreign assistance, emergency procurement programs, and those essential to the civilian economy.

(2) **Ship acquisition.** Provision of ships for ocean shipping by purchase, charter, or requisition, by breakout from the national defense reserve fleet, and by construction.

(3) **Operations.** Operation of ocean shipping, directly or indirectly.

(4) **Traffic control.** Provisions for the control of passengers and cargo through port areas to assure an orderly and continuous flow of such traffic.

(5) **Traffic priority.** Administration of priorities for the movement of passengers and cargo through port areas.

(6) **Port allocation.** Allocation of specific ports and port facilities to meet the needs of the Nation and our allies.

(7) **Support activities.** Performance of supporting activities needed to carry out the above-described functions, such as: ascertaining national support requirements for ocean shipping, including those for support of military and other Federal programs and those essential to the civil economy; maintenance, repair, and arming of ships; recruiting, training, and assigning of officers and seamen; procurement, warehousing, and issuance of ships' stores, supplies, equipment, and spare parts; supervision of stevedoring and bunkering; management of terminals, shipyards, repair, and other facilities; and provision, maintenance, and restoration of port facilities.

Sec. 904. Census Functions. Within the area designated in section 901 (4) hereof, the Secretary of Commerce shall:

(1) Provide for the collection and reporting of census information on the status of human and economic resources, including population, housing, agriculture, manufacture, mineral industries, business, transportation, foreign trade, construction, and governments, as required for emergency planning purposes.

(2) Plan, create, and maintain a capability for the conduct of post-attack surveys to provide information on the status of surviving populations and resources as required for the programs of the Office of Emergency Preparedness.

(3) Provide for and maintain the ability to make estimates of attack effects on industry, population, and other resources for use within the Department of Commerce.

Sec. 905. Civil Defense Functions. In consonance with national civil defense programs developed by the Department of Defense, the Secretary of Commerce shall:

(1) **Weather functions.** Prepare and issue currently, as well as in an emergency, forecasts and estimates of areas likely to be covered by radiological fallout in event of attack and make this information available to Federal, State, and local authorities for public dissemination.

(2) **Geodetic, hydrographic, and oceanographic data.** Provide geodetic, hydrographic, and oceanographic data and services to the Department of Defense and other governmental agencies, as appropriate.

Part 10—Department of Labor

Section 1001. Résumé of Responsibilities. The Secretary of Labor shall have primary responsibility for preparing national emergency plans and developing preparedness programs covering civilian manpower mobilization, more effective utilization of limited manpower resources, including specialized personnel, wage and salary stabilization, worker incentives and protection, manpower resources and requirements, skill development and training, research, labor-management relations, and critical occupations.

Sec. 1002. Functions. The Secretary of Labor shall:

(1) **Civilian manpower mobilization.** Develop plans and issue guidance designed to utilize to the maximum extent civilian manpower to resources, such plans and guidance to be developed with the active participation and assistance of the States and local political subdivisions thereof, and of other organizations and agencies concerned with the mobilization of the people of the United States. Such plans shall include, but not necessarily be limited to:

(a) **Manpower management.** Recruitment, selection and referral, training, employment stabilization (including appeals procedures), proper utilization, and determination of the skill categories critical to meeting the labor requirements of defense and essential civilian activities;

(b) **Priorities.** Procedures for translating survival and production urgencies into manpower priorities to be used as guides for allocating available workers; and

(c) **Improving mobilization base.** Programs for more effective utilization of limited manpower resources, and, in cooperation with other appropriate agencies, programs for recruitment, training, allocation, and utilization of persons possessing specialized competence or aptitude in acquiring such competence.

(2) **Wage and salary stabilization.** Develop plans and procedures for wage and salary stabilization and for the national and field organization necessary for the administration of such a program in an emergency, including investigation, compliance, and appeals procedures; statistical studies of wages, salaries, and prices for policy decisions and to assist operating stabilization agencies to carry out their functions.

(3) **Worker incentives and protection.** Develop plans and procedures for wage and salary compensation and death and disability compensation for authorized civil defense workers and, as appropriate, measures for unemployment payments, re-employment rights, and occupational safety, and other protection and incentives for the civilian labor force during an emergency.

(4) **Skill development and training.** Initiate current action programs to overcome or offset present or anticipated manpower deficiencies, including those identified as a result of resource and requirements studies.

(5) **Labor-management relations.** Develop, after consultation with the Department of Commerce, the Department of Transportation, the Department of Defense, the National Labor Relations Board, the Federal Mediation and Conciliation Service, the National Mediation Board, and other appropriate agencies and groups, including representatives of labor and management, plans and procedures, including organization plans for the maintenance of effective labor-management relations during a national emergency.

Part 11—Department of Health, Education, and Welfare

Section 1101. Résumé of Responsibilities. In addition to the medical stockpile functions identified in Executive Order No. 10958 [set out as a note under section 2271 of this Appendix], the Secretary of Health, Education, and Welfare shall prepare national emergency plans and develop preparedness programs covering health services, civilian health manpower, health resources, welfare services, social security benefits, credit union operations, and educational programs as defined below.

Sec. 1102. Definitions. As used in this part:

(1) "Emergency health services" means medical and dental care

for the civilian population in all of their specialties and adjunct therapeutic fields, and the planning, provision, and operation of first aid stations, hospitals, and clinics; preventive health services, including detection, identification and control of communicable diseases, their vectors, and other public health hazards, inspection and control of purity and safety of food, drugs, and biologicals; vital statistics services; rehabilitation and related services for disabled survivors; preventive and curative care related to human exposure to radiological, chemical, and biological warfare agents; sanitary aspects of disposal of the dead; food and milk sanitation; community solid waste disposal; emergency public water supply; and the determination of the health significance of water pollution and the provision of other services pertaining to health aspects of water use and water-borne wastes as set forth in an agreement between the Secretary of Health, Education, and Welfare and the Secretary of the Interior, approved by the President, pursuant to Reorganization Plan No. 2 of 1966 [set out by the Appendix to Title 5, Government Organization and Employees], which plan placed upon the Secretary of the Interior responsibilities for the prevention and control of water pollution. It shall be understood that health services for the purposes of this order, however, do not encompass the following areas for which the Department of Agriculture has responsibility: plant and animal diseases and pest prevention, control, and eradication, wholesomeness of meat and meat products, and poultry and poultry products in establishments under continuous inspection service by the Department of Agriculture, veterinary biologicals, agricultural commodities and products owned by the Commodity Credit Corporation or the Secretary of Agriculture, livestock, agricultural commodities stored or harvestable on farms and ranches, agricultural lands and water, and registration of pesticides.

(2) "Health manpower" means physicians (including osteopaths); dentists; sanitary engineers; registered professional nurses; and such other occupations as may be included in the List of Health Manpower Occupations issued for the purposes of this part by the Director of the Office of Emergency Preparedness after agreement by the Secretary of Labor and the Secretary of Health, Education, and Welfare.

(3) "Health resources" means manpower, material, and facilities required to prevent the impairment of, improve, and restore the physical and mental health conditions of the civilian population.

(4) "Emergency welfare services" means feeding; clothing;

lodging in private and congregate facilities; registration; locating and reuniting families; care of unaccompanied children, the aged, the handicapped, and other groups needing specialized care or services; necessary financial or other assistance; counseling and referral services to families and individuals; aid to welfare institutions under national emergency or post-attack conditions; and all other feasible welfare aid and services to people in need during a civil defense emergency. Such measures include organization, direction, and provision of services to be instituted before attack, in the event of strategic or tactical evacuation, and after attack in the event of evacuation or of refuge in shelters.

(5) "Social security benefits" means the determination of entitlement and the payment of monthly insurance benefits to those eligible, such as workers who have retired because of age or disability and to their dependent wives and children, and to the eligible survivors of deceased workers. It also includes determinations of eligibility and payments made on behalf of eligible individuals to hospitals, home health agencies, extended care facilities, physicians, and other providers of medical services.

(6) "Credit union operations" means the functions of any credit union, chartered either by a State or the Federal Government, in stimulating systematic savings by members, the investment and protection of those savings, providing loans for credit union members at reasonable rates, and encouraging sound credit and thrift practices among credit union members.

(7) "Education" or "training" means the organized process of learning by study and instruction primarily through public and private systems.

Sec. 1103. Health Functions. With respect to emergency health services, as defined above, and in consonance with national civil defense plans, programs, and operation of the Department of Defense under Executive Order No. 10952 [set out as a note under section 2271 of this Appendix], the Secretary of Health, Education, and Welfare shall:

(1) **Professional training.** Develop and direct a nationwide program to train health manpower both in professional and technical occupational content and in civil defense knowledge and skills. Develop and distribute health education material for inclusion in the curricula of schools, colleges, professional schools, government schools, and other educational facilities throughout the United States. Develop and distribute civil defense information relative to

health services to States, voluntary agencies, and professional groups.

(2) **Emergency public water supply.** Prepare plans to assure the provision of usable water supplies for human consumption and other essential community uses in an emergency. This shall include inventorying existing community water supplies, planning for other alternative sources of water for emergency uses, setting standards relating to human consumption, and planning community distribution. In carrying on these activities, the Department shall have primary responsibility but will make maximum use of the resources and competence of State and local authorities, the Department of the Interior, and other Federal agencies.

(3) **Radiation.** Develop and coordinate programs of radiation measurement and assessment as may be necessary to carry out the responsibilities involved in the provision of emergency health services.

(4) **Biological and chemical warfare.** Develop and coordinate programs for the prevention, detection, and identification of human exposure to chemical and biological warfare agents as may be necessary to carry out the responsibilities involved in the provision of emergency health services, including the provision of guidance and consultation to Federal, State, and local authorities on measures for minimizing the effects of biological or chemical warfare.

(5) **Food, drugs, and biologicals.** Plan and direct national programs for the maintenance of purity and safety in the manufacture and distribution of food, drugs, and biologicals in an emergency.

(6) **Disabled survivors.** Prepare national plans for emergency operations of vocational rehabilitation and related agencies, and for measures and resources necessary to rehabilitate and make available for employment those disabled persons among the surviving population.

Sec. 1104. Welfare Functions. With respect to emergency welfare services as defined above, and in consonance with national civil defense plans, programs, and operations of the Department of Defense under Executive Order No. 10952 [set out as a note under section 2271 of this Appendix], the Secretary of Health, Education, and Welfare shall:

(1) **Federal support.** Cooperate in the development of Federal support procedures, through joint planning with other departments and agencies, including but not limited to the Post Office Department, the Department of Labor, and the Selective Service

System, the Department of Housing and Urban Development, and resource agencies, including the Department of Agriculture, the Department of the Interior, and the Department of Commerce, for logistic support of State and community welfare services in an emergency.

(2) **Emergency welfare training.** Develop and direct a nationwide program to train emergency welfare manpower for the execution of the functions set forth in this part, develop welfare educational materials, including self-help program materials for use with welfare organizations and professional schools, and develop and distribute civil defense information relative to emergency welfare services to States, voluntary agencies, and professional groups.

(3) **Financial aid.** Develop plans and procedures for financial assistance to individuals injured or in want as a result of enemy attack and for welfare institutions in need of such assistance in an emergency.

(4) **Non-combatant evacuees to the Continental United States.** Develop plans and procedures for assistance, at ports of entry to U. S. personnel evacuated from overseas areas, their onward movement to final destination, and follow-up assistance after arrival at final destination.

Sec. 1105. Social Security Functions. With respect to social security, the Secretary of Health, Education, and Welfare shall:

(1) **Social security benefits.** Develop plans for the continuation or restoration of benefit payments to those on the insurance rolls as soon as possible after a direct attack upon the United States, and prepare plans for the acceptance and disposition of current claims for social security benefits.

(2) **Health insurance.** Develop plans for the payment of health insurance claims for reimbursement for items or services provided by hospitals, physicians, and other providers of medical services submitted by or on behalf of individuals who are eligible under the Medicare program [section 1395 et seq. of Title 42, The Public Health and Welfare].

Sec. 1106. Credit Union Functions. With respect to credit union functions, the Secretary of Health, Education, and Welfare shall:

(1) **Credit union operations.** Provide instructions to all State and Federally chartered credit unions for the development of emergency plans to be put into effect as soon as possible after an attack upon the United States in order to guarantee continuity of credit union operations.

(2) **Economic stabilization.** Provide guidance to credit unions that will contribute to stabilization of the Nation's economy by helping to establish and maintain a sound economic base for combating inflation, maintaining confidence in public and private financial institutions, and promoting thrift.

Sec. 1107. Education Functions. With respect to education, the Secretary of Health, Education, and Welfare shall:

(1) **Program guidance.** Develop plans and issue guidance for the continued function of educational systems under all conditions of national emergency. Although extraordinary circumstances may require the temporary suspension of education, plans should provide for its earliest possible resumption.

(2) **Educational adjustment.** Plan to assist civilian educational institutions, both public and private, to adjust to demands laid upon them by a large expansion of government activities during any type of emergency. This includes advice and assistance to schools, colleges, universities, and other educational institutions whose facilities may be temporarily needed for Federal, State, or local government programs in an emergency or whose faculties and student bodies may be affected by the demands of a sudden or long-standing emergency.

(3) **Post-attack recovery.** Develop plans for the rapid restoration and resumption of education at all levels after an attack. This includes assistance to educators and educational institutions to locate and use surviving facilities, equipment, supplies, books, and educational personnel. Particular emphasis shall be given to the role of educational institutions and educational leadership in reviving education and training in skills needed for post-attack recovery.

(4) **Civil defense education.** In consonance with national civil defense plans, programs, and operations of the Department of Defense, develop and issue instructional materials to assist schools, colleges, and other educational institutions to incorporate emergency protective measures and civil defense concepts into their programs. This includes assistance to various levels of education to develop an understanding of the role of the individual, family, and community for civil defense in the nuclear age.

Part 12—Department of Housing and Urban Development

Section 1201. Résumé of Responsibilities. The Secretary of Housing and Urban Development shall prepare national emergency plans and develop preparedness programs covering all aspects of housing, community facilities related to housing, and

urban development (except that housing assets under the jurisdiction and control of the Department of Defense, other than those leased for terms not in excess of one year, shall be and remain the responsibility of the Department of Defense).

Sec. 1202. Definition. As used in this part:

(1) "Emergency housing" means any and all types of accommodations used as dwellings in an emergency.

(2) "Community facilities related to housing" means installations necessary to furnish water, sewer, electric, and gas services between the housing unit or project and the nearest practical source or servicing point.

(3) "Urban development" means the building or restoration of urban community, suburban, and metropolitan areas (except transportation facilities).

Sec. 1203. Housing and Community Facilities Functions. The Secretary of Housing and Urban Development shall:

(1) **New housing.** Develop plans for the emergency construction and management of new housing and the community facilities related thereto to the extent that it is determined that it may be necessary to provide for such construction and management with public funds and through direct Federal action, and to the extent that such construction of new housing may have to be provided through Federal financial or credit assistance.

(2) **Community facilities.** Develop plans to restore community facilities related to housing affected by an emergency through the repair of damage, the construction of new facilities, and the use of alternate or back-up facilities.

Sec. 1204. Urban Development Functions. The Secretary of Housing and Urban Development shall:

(1) **Regional cooperation.** Encourage regional emergency planning and cooperation among State and local governments with respect to problems of housing and metropolitan development.

(2) **Vulnerability and redevelopment.** In cooperation with the Office of Emergency Preparedness, develop criteria and provide guidance for the design and location of housing and community facilities related to housing to minimize the risk of loss under various emergency situations. Develop criteria for determining which areas should be redeveloped in the event of loss or severe damage resulting from emergencies.

Sec. 1205. Civil Defense Functions. In consonance with national civil defense plans, programs, and operations of the Department

of Defense under Executive Order No. 10952 [set out as a note under section 2271 of this Appendix], the Secretary of Housing and Urban Development shall:

(1) **Transitional activities.** Develop plans for the orderly transfer of people from fallout shelters and from billets to temporary or permanent housing, including advice and guidance for State and local government agencies in the administration thereof. These plans shall be coordinated with national plans and guidance for emergency welfare services of the Department of Health, Education, and Welfare.

(2) **Temporary housing.** Develop plans for the emergency repair and restoration for use of damaged housing, for the construction and management of emergency housing units and the community facilities related thereto, for the emergency use of tents and trailers, and for the emergency conversion for dwelling use of non-residential structures, such activities to be financed with public funds through direct Federal action or through financial or credit assistance.

(3) **Shelter.** In conformity with national shelter policy, assist in the development of plans to encourage the construction of shelters for both old and new housing, and develop administrative procedures to encourage the use of low-cost design and construction techniques to maximize protection in connection with national programs.

Part 13—Department of Transportation

Section 1301. Résumé of Responsibilities. The Secretary of Transportation, in carrying out his responsibilities to exercise leadership in transportation matters affecting the national defense and those involving national or regional transportation emergencies, shall prepare emergency plans and develop preparedness programs covering:

(1) Preparation and promulgation of over-all national policies, plans, and procedures related to providing civil transportation of all forms—air, ground, water, and pipelines, including public storage and warehousing (except storage of petroleum and gas and agricultural food resources including cold storage): Provided that plans for the movement of petroleum and natural gas through pipelines shall be the responsibility of the Secretary of the Interior except to the extent that such plans are a part of functions vested in the Secretary of Transportation by law;

(2) Movement of passengers and materials of all types by all forms of civil transportation;

(3) Determination of the proper apportionment and allocation

for control of the total civil transportation capacity, or any portion thereof, to meet over-all essential civil and military needs;

(4) Determination and identification of the transportation resources available and required to meet all degrees of national emergencies and regional transportation emergencies;

(5) Assistance to the various States, the local political subdivisions thereof, and non-governmental organizations and systems engaged in transportation activities in the preparation of emergency plans;

(6) Rehabilitation and recovery of the Nation's transportation systems; and

(7) Provisions for port security and safety, for aids to maritime navigation, and for search and rescue and law enforcement over, upon, and under the navigable waters of the United States and the high seas.

Sec. 1302. Transportation Planning and Coordination Functions.

In carrying out the provisions of Section 1301, the Secretary of Transportation, with assistance and support of other Federal, State and local governmental agencies, and the transport industries, as appropriate, shall:

(1) Obtain, assemble, analyze, and evaluate data on current and projected emergency requirements of all claimants for all forms of civil transportation to meet the needs of the military and of the civil economy, and on current and projected civil transportation resources—of all forms—available to the United States to move passengers or materials in an emergency.

(2) Develop plans and procedures to provide—under emergency conditions—for the collection and analysis of passenger and cargo movement demands as they relate to the capabilities of the various forms of transport, including the periodic assessment of over-all transport resources available to meet emergency requirements.

(3) Conduct a continuing analysis of transportation requirements and capabilities in relation to economic projections for the purpose of initiating actions and/or recommending incentive and/or regulatory programs designed to stimulate government and industry improvement of the structure of the transportation system for use in an emergency.

(4) Develop systems for the control of the movement of passengers and cargo by all forms of transportation, except for those resources owned by, controlled by, or under the jurisdiction of the Department of Defense, including allocation of resources and assignment of priorities, and develop policies, standards, and procedures for emergency enforcement of these controls.

Sec. 1303. Departmental Emergency Transportation Preparedness. Except for those resources owned by, controlled by, or under the jurisdiction of the Department of Defense, the Secretary of Transportation shall prepare emergency operational plans and programs for, and develop a capability to carry out, the transportation operating responsibilities assigned to the Department, including but not limited to:

(1) Allocating air carrier civil air transportation capacity and equipment to meet civil and military requirements.

(2) Emergency management, including construction, reconstruction, and maintenance of the Nation's civil airports, civil aviation operating facilities, civil aviation services, and civil aircraft (other than air carrier aircraft), except manufacturing facilities.

(3) Emergency management of all Federal, State, city, local, and other highways, roads, streets, bridges, tunnels, and appurtenant structures, including:

(a) The adaptation, development, construction, reconstruction, and maintenance of the Nation's highway and street systems to meet emergency requirements;

(b) The protection of the traveling public by assisting State and local authorities in informing them of the dangers of travel through hazardous areas; and

(c) The regulation of highway traffic in an emergency through a national program in cooperation with all Federal, State, and local governmental units or other agencies concerned.

(4) Emergency plans for urban mass transportation, including:

(a) Providing guidance to urban communities in their emergency mass transportation planning efforts, either directly or through State, regional, or metropolitan agencies;

(b) Coordinating all such emergency planning with the Department of Housing and Urban Development to assure compatibility with emergency plans for all other aspects of urban development;

(c) Maintaining an inventory of urban mass transportation systems.

(5) Maritime safety and law enforcement over, upon, and under the high seas and water, subject to the jurisdiction of the United States, in the following specific programs:

(a) Safeguarding vessels, harbors, ports, and waterfront facilities from destruction, loss or injury, accidents, or other causes of a similar nature.

(b) Safe passage over, upon and under the high seas and United States waters through effective and reliable systems of aids to navigation and ocean stations.

(c) Waterborne access to ice-bound locations in furtherance of national economic, scientific, defense, and consumer needs.

(d) Protection of lives, property, natural resources, and national interests through enforcement of Federal law and timely assistance.

(e) Safety of life and property through regulation of commercial vessels, their officers and crew, and administration of maritime safety law.

(f) Knowledge of the sea, its boundaries, and its resources through collection and analysis of data in support of the national interest.

(g) Operational readiness for essential wartime functions.

(6) Planning for the emergency management and operation of the Alaska Railroad, and for the continuity of railroad and petroleum pipeline safety programs.

(7) Planning for the emergency operation and maintenance of the United States-controlled sections of the Saint Lawrence Seaway.

Part 14—Atomic Energy Commission

Section 1401. Functions. The Atomic Energy Commission shall prepare national emergency plans and develop preparedness programs for the continuing conduct of atomic energy activities of the Federal Government. These plans and programs shall be designed to develop a state of readiness in these areas with respect to all conditions of national emergency, including attack upon the United States and, consistent with applicable provisions of the Atomic Energy Act of 1954, as amended [section 2011 et seq. of Title 42, The Public Health and Welfare], shall be closely coordinated with the Department of Defense and the Office of Emergency Preparedness. The Atomic Energy Commission shall:

(1) Production. Continue or resume in an emergency essential

(a) manufacture, development, and control of nuclear weapons and equipment, except to the extent that the control over such weapons and equipment shall have been transferred to the Department of Defense; (b) development and technology related to reactors; (c) process development and production of feed material, special nuclear materials, and other special products; (d) related raw materials procurement, processing, and development; and (e) repair, maintenance, and construction related to the above.

(2) Regulation. Continue or resume in an emergency (a) controlling the possession, use, transfer, import, and export of atomic materials and facilities; and (b) ordering the operation or suspension of licensed facilities, and recapturing from licensees, where

necessary, special nuclear materials whether related to military support or civilian activities.

(3) **Public health and safety.** Shut down, where required, in anticipation of an imminent enemy attack on the United States, and maintain under surveillance, all Commission-owned facilities which could otherwise constitute a significant hazard to public health and safety, and insure the development of appropriate emergency plans for nuclear reactors and other nuclear activities licensed by the Commission whether privately-owned or Government-owned.

(4) **Scientific, technical, and public atomic energy information.** Organize, reproduce, and disseminate appropriate public atomic energy information and scientific and technical reports and data relating to nuclear science research, development, engineering, applications, and effects to interested Government agencies, the scientific and technical communities, and approved, friendly, and co-operating foreign nations.

(5) **International atomic energy affairs.** Maintain, in consultation with the Department of State, essential liaison with foreign nations with respect to activities of mutual interest involving atomic energy.

(6) **Health services.** Assist the Department of Health, Education, and Welfare, consistent with the above requirements, in integrating into civilian health programs in an emergency the Commission's remaining health manpower and facilities not required for the performance of the Commission's essential emergency functions.

(7) **Priorities and allocations.** Plan for the administration of any priorities and allocations authority delegated to the Atomic Energy Commission. Authorize procurement and production schedules and make allotments of controlled materials pursuant to program determinations of the Office of Emergency Preparedness.

Part 15—Civil Aeronautics Board

Section 1501. Definitions. As used in this part:

(1) "War Air Service Program" (hereinafter referred to as WASP) means the program designed to provide for the maintenance of essential civil air routes and services, and to provide for the distribution and redistribution of air carrier aircraft among civil air transport carriers after withdrawal of aircraft allocated to the Civil Reserve Air Fleet.

(2) "Civil Reserve Air Fleet" (hereinafter referred to as CRAF) means those air carrier aircraft allocated by the Secretary

of Transportation to the Department of Defense to meet essential military needs in the event of an emergency.

Sec. 1502. Functions. The Civil Aeronautics Board, under the coordinating authority of the Secretary of Transportation, shall:

(1) **Distribution of aircraft.** Develop plans and be prepared to carry out such distribution and redistribution of all air carrier civil aircraft allocated by the Secretary of Transportation among the civil air transport carriers as may be necessary to assure the maintenance of essential civil routes and services under WASP operations after the CRAF requirements have been met.

(2) **Economic regulations.** Develop plans covering route authorizations and operations, tariffs, rates, and fares charged the public, mail rates, government compensation and subsidy, and accounting and contracting procedures essential to WASP operations.

(3) **Operational controls and priorities.** Develop plans and procedures for the administration of operational controls and priorities of passenger and cargo movements in connection with the utilization of air carrier aircraft for WASP purposes in an emergency.

(4) **Investigation.** Maintain the capability to investigate violations of emergency economic regulations affecting air carrier operations.

(5) **Contracting.** Prepare to perform as a contracting agency, if such an agency is necessary, in connection with distribution and redistribution of aircraft for WASP.

Part 16—Export-Import Bank of the United States

Section 1601. Functions. (a) Under guidance of the Secretary of the Treasury, the Export-Import Bank shall develop plans for the utilization of the resources of the Bank, or other resources made available to the Bank, in expansion of productive capacity abroad for essential materials, foreign barter arrangements, acquisition of emergency imports, and in support of the domestic economy, or any other plans designed to strengthen the relative position of the Nation and its allies.

(b) In carrying out the guidance functions described above, the Secretary of the Treasury shall consult with the Secretary of State and the Secretary of Commerce as appropriate.

Part 17—Federal Bank Supervisory Agencies

Section 1701. Financial Plans and Programs. The Board of Governors of the Federal Reserve System, the Comptroller of the Currency, the Federal Home Loan Bank Board, the Farm Credit Administration, and the Federal Deposit Insurance Corporation shall participate with the Office of Emergency Preparedness, the

Department of the Treasury, and other agencies in the formulation of emergency financial and stabilization policies. The heads of such agencies shall, as appropriate, develop emergency plans, programs, and regulations, in consonance with national emergency financial and stabilization plans and policies, to cope with potential economic effects of mobilization or an attack, including, but not limited to, the following:

(1) **Money and credit.** Provision and regulation of money and credit in accordance with the needs of the economy, including the acquisition, decentralization, and distribution of emergency supplies of currency; the collection of cash items and non-cash items; and the conduct of fiscal agency and foreign operations.

(2) **Financial institutions.** Provision for the continued or resumed operation of banking, savings and loan, and farm credit institutions, including measures for the re-creation of evidence of assets or liabilities destroyed or inaccessible.

(3) **Liquidity.** Provision of liquidity necessary to the continued or resumed operation of banking, savings and loan, credit unions, and farm credit institutions, including those damaged or destroyed by enemy action.

(4) **Cash withdrawals and credit transfers.** Regulation of the withdrawal of currency and the transfer of credits including deposit and share account balances.

(5) **Insurance.** Provision for the assumption and discharge of liability pertaining to insured deposits and insured savings accounts or withdrawable shares in banking and savings and loan institutions destroyed or made insolvent.

Sec. 1702. Sharing of war losses. Heads of agencies shall, as appropriate, participate with the Office of Emergency Preparedness and the Department of the Treasury in the development of policies, plans, and procedures for implementation of national policy on sharing war losses.

Part 18—Federal Communications Commission

Section 1801. Definitions. As used in this part:

(1) "Common carrier" means any person subject to Commission regulation engaged in providing, for use by the public, for hire, interstate or foreign communications facilities or services by wire or radio; but a person engaged in radio broadcasting shall not, insofar as such person is so engaged, be deemed a common carrier.

(2) "Broadcast facilities" means those stations licensed by the Commission for the dissemination of radio communications in-

tended to be received by the public directly or by the intermediary of relay stations.

(3) "Safety and special radio services" includes those non-broadcast and non-common carrier services which are licensed by the Commission under the generic designation "safety and special radio services" pursuant to the Commission's Rules and Regulations.

Sec. 1802. Functions. The Federal Communications Commission shall develop policies, plans, and procedures, in consonance with national telecommunications plans and policies developed pursuant to Executive Order No. 10705 [set out as a note under section 606 of Title 47, Telegraphs, Telephones, and Radiotelegraphs], Executive Order No. 11556 [set out as a note under section 305 of Title 47, Telegraphs, Telephones, and Radiotelegraphs], Executive Order No. 11051 [set out as a note under section 2271 of this Appendix], the Presidential Memorandum of August 21, 1963, "Establishment of the National Communications System", and other appropriate authority, covering:

(1) **Common carrier service.** (a) Extension, discontinuance, or reduction of common carrier facilities or services, and issuance of appropriate authorizations for such facilities, services, and personnel in an emergency; and control of all rates, charges, practices, classifications, and regulations for service to Government and non-Government users during an emergency, in consonance with overall national economic stabilization policies.

(b) Development and administration of priority systems for public correspondence and for the use and resumption of leased inter-city private line service in an emergency.

(c) Use of common carrier facilities and services to overseas points to meet vital needs in an emergency.

(2) **Broadcasting service.** Construction, activation, or deactivation of broadcasting facilities and services, the continuation or suspension of broadcasting services and facilities, and issuance of appropriate authorizations for such facilities, services, and personnel in an emergency.

(3) **Safety and special radio services.** Authorization, operation, and use of safety and special radio services, facilities, and personnel in the national interest in an emergency.

(4) **Radio frequency assignment.** Assignment of radio frequencies, and their use by, Commission licensees in an emergency.

(5) **Electromagnetic radiation.** Closing of any radio station or any device capable of emitting electromagnetic radiation or suspension or amending any rules or regulations applicable thereto

in any emergency, except for those belonging to, or operated by, any department or agency of the United States Government.

(6) Investigation and enforcement. Investigation of violations of pertinent law and regulations in an emergency, and development of procedures designated to initiate, recommend, or otherwise bring about appropriate enforcement actions required in the interest of national security.

Part 19—Federal Power Commission

Section 1901. Functions. The Federal Power Commission shall assist the Department of the Interior in conformity with Part 7, in the preparation of national emergency plans and the development of preparedness programs for electric power and natural gas in the areas as set forth in the Memorandum of Agreement dated August 9, 1962, between the Secretary of the Interior and the Chairman of the Federal Power Commission.

Part 20—General Services Administration

Section 2001. Résumé of Responsibilities. The Administrator of General Services shall prepare national emergency plans and develop preparedness programs designed to permit modification or expansion of the activities of the General Services Administration under the Federal Property and Administrative Services Act of 1949, as amended [see short title note under section 471 of Title 40, Public Buildings, Property, and Works] and other statutes prescribing the duties and responsibilities of the Administrator. These plans and programs shall include, but not be limited to: (1) operation, maintenance, and protection of Federal buildings and their sites; construction, alteration, and repair of public buildings; and acquisition, utilization, and disposal of real and personal properties; (2) public utilities service management for Federal agencies; (3) telecommunications to meet the essential requirements of civilian activities of executive departments and agencies; (4) transportation management to meet the traffic service requirements of civilian activities of Federal agencies; (5) records management; (6) Emergency Federal Register; (7) Government-wide supply support; (8) service to survival items stockpiles; (9) national industrial reserve; (10) guidance and consultation to Government agencies regarding facilities protection measures; (11) administration of assigned functions under the Defense Production Act [section 2061 et seq. of this Appendix]; and (12) administration and operation of the stockpile of strategic and critical materials in accordance with policies and guidance furnished by the Office of Emergency Preparedness.

Sec. 2002. Functions. The Administrator of General Services shall:

(1) **Public buildings.** Develop emergency plans and procedures for the operation, maintenance, and protection of both existing and new Federally-owned and Federally-occupied buildings, and construction, alteration, and repair of public buildings. Develop emergency operating procedures for the control, acquisition, assignment, and priority of occupancy of real property by the Federal Government and by State and local governments to the extent they may be performing functions as agents of the Federal Government.

(2) **Public utility service management.** Develop emergency operational plans and procedures for the claimancy, procurement, and use of public utility services for emergency activities of executive agencies of the Government.

(3) **Communications.** Plan for and provide, operate, and maintain appropriate telecommunications facilities designed to meet the essential requirements of Federal civilian departments and agencies during an emergency within the framework of the National Communications System. Plans and programs of the Administrator shall be in consonance with national telecommunications policies, plans, and programs developed pursuant to Executive Order No. 10705 [set out as a note under section 606 of Title 47, Telegraphs, Telephones, and Radiotelegraphs], Executive Order No. 11556 [set out as a note under section 305 of Title 47, Telegraphs, Telephones, and Radiotelegraphs], Executive Order No. 11051 [set out as a note under section 2271 of this Appendix], and the Presidential Memorandum of August 21, 1963, "Establishment of the National Communications System," or other appropriate authority.

(4) **Transportation.** Develop plans and procedures for providing: (a) general transportation and traffic management services to civilian activities of Federal agencies in connection with movement of property and supplies, including the claimancy, contracting, routing, and accounting of Government shipments by commercial transportation in time of emergency; and (b) motor vehicle service to meet the administrative needs of Federal agencies, including dispatch and scheduled Government motor service at and between headquarters, field offices, relocation sites, and other installations of the Federal and State governments.

(5) **Records.** Provide instructions and advice on appraisal, selection, preservation, arrangement, reference, reproduction, storage, and salvage of essential records needed for the operation of the

Federal Government after attack, on an emergency basis, including a decentralized system.

(6) Federal Register. Develop emergency procedures for providing and making available, on a decentralized basis, a Federal Register of Presidential Proclamations and Executive Orders, Federal administrative regulations, Federal emergency notices and actions, and Acts of Congress during a national emergency.

(7) Government-wide procurement and supply. Prepare plans and procedures for the coordination and/or operation of Government-wide supply programs to meet the requirements of Federal agencies under emergency conditions, including the development of policies, methods, and procedures for emergency procurement and for emergency requisitioning of private property when authorized by law and competent authority; identification of essential civil agency supply items under the Federal catalog system; development of emergency Federal specifications and standards; determination of sources of supply; procurement of personal property and nonpersonal services; furnishing appropriate inspection and contract administration services; and establishment, coordination, and/or operation of emergency storage and distribution facilities.

(8) Survival item stockpiles. Assist the Department of Health, Education, and Welfare, insofar as civil defense medical stockpile items under its jurisdiction are concerned, and the Department of Defense, insofar as survival items under its jurisdiction are concerned, in formulating plans and programs for service activity support relating to stockpiling of such supplies and equipment. The Administrator shall arrange for the procurement, storage, maintenance, inspection, survey, withdrawal, and disposal of supplies and equipment in accordance with the provisions of inter-agency agreements with the departments concerned.

(9) National industrial reserve and machine tool program. Develop plans for the custody of the industrial plants and production equipment in the national industrial reserve and assist the Department of Defense, in collaboration with the Department of Commerce, in the development of plans and procedures for the disposition, emergency reactivation, and utilization of the plants and equipment of this reserve in the custody of the Administrator.

(10) Excess and surplus real and personal property. Develop plans and emergency operating procedures for the utilization of excess and surplus real and personal property by Federal Government agencies with emergency assignments or by State and local governmental units as directed, including review of the property holdings of Federal agencies which do not possess emergency

functions to determine the availability of property for emergency use, and including the disposal of real and personal property and the rehabilitation of personal property.

(11) **Facilities protection and building and shelter manager service.** In accordance with the guidance from the Department of Defense, promote, with respect to Federal buildings and installations, a Government-wide program (a) to stimulate protection, preparedness, and control in emergencies in order to minimize the effects of overt or covert attack, including dispersal of facilities; and (b) to establish shelter manager organizations, including safety and service personnel, shelter manager service, first aid, police, and evacuation service.

Sec. 2003. Defense Production. The Administrator of General Services shall assist the Office of Emergency Preparedness in the formulation of plans and programs relating to the certification of procurement programs, subsidy payments, and plant improvement programs provided for by the Defense Production Act of 1950, as amended [section 2061 et seq. of this Appendix].

Sec. 2004. Strategic and Critical Materials Stockpiles. The Administrator of General Services shall assist the Office of Emergency Preparedness in formulating plans, programs, and reports relating to the stockpiling of strategic and critical materials. Within these plans and programs, the Administrator shall provide for the procurement (for this purpose, procurement includes upgrading, rotation, and beneficiation), storage, security, maintenance, inspection, withdrawal, and disposal of materials, supplies, and equipment.

Part 21—Interstate Commerce Commission

Section 2101. Résumé of Responsibilities. The Chairman of the Interstate Commerce Commission, under the coordinating authority of the Secretary of Transportation, shall prepare national emergency plans and develop preparedness programs covering railroad utilization, reduction of vulnerability, maintenance, restoration, and operation in an emergency (other than for the Alaska Railroad—see Section 1303(6)); motor carrier utilization, reduction of vulnerability, and operation in an emergency; inland waterway utilization of equipment and shipping, reduction of vulnerability, and operation in an emergency; and also provide guidance and consultation to domestic surface transportation and storage industries, as defined below, regarding emergency preparedness

measures, and to States regarding development of their transportation plans in assigned areas.

Sec. 2102. Definitions. As used in this part:

(1) "Domestic surface transportation and storage" means rail, motor, and inland water transportation facilities and services and public storage;

(2) "Public storage" includes warehouses and other places which are used for the storage of property belonging to persons other than the persons having the ownership or control of such premises;

(3) "Inland water transportation" includes shipping on all inland waterways and Great Lakes shipping engaged solely in the transportation of passengers or cargo between United States ports on the Great Lakes;

(4) Specifically excluded, for the purposes of this part, are pipelines, petroleum and gas storage, agricultural food resources storage, including the cold storage of food resources, the St. Lawrence Seaway, ocean ports and Great Lakes ports and port facilities, highways, streets, roads, bridges, and related appurtenances, maintenance of inland waterways, and any transportation owned by or pre-allocated to the military.

Sec. 2103. Transportation Functions. The Interstate Commerce Commission shall:

(1) **Operational control.** Develop plans with appropriate private transportation and storage organizations and associations for the coordination and direction of the use of domestic surface transportation and storage facilities for movement of passenger and freight traffic.

(2) **Emergency operations.** Develop and maintain necessary orders and regulations for the operation of domestic surface transport and storage industries in an emergency.

Part 22—National Aeronautics and Space Administration

Section 2201. Functions. The Administrator of the National Aeronautics and Space Administration shall:

(1) **Research and development.** Adapt and utilize the scientific and technological capability of the National Aeronautics and Space Administration, consistent with over-all requirements, to meet priority needs of the programs of the Federal Government in an emergency. This will include the direction and conduct of essential research and development activities relating to (a) aircraft, spacecraft, and launch vehicles, (b) associated instrumenta-

tion, guidance, control and payload, propulsion, and communications systems, (c) scientific phenomena affecting both manned and unmanned space flights, (d) the life sciences (biology, medicine, and psychology) as they apply to aeronautics and space, and (e) atmospheric and geophysical sciences.

(2) **Military support.** Provide direct assistance as requested by the Department of Defense and other agencies in support of the military effort. This may include (a) undertaking urgent projects to develop superior aircraft, spacecraft, launch vehicles, and weapons systems, (b) developing methods to counter novel or revolutionary enemy weapons systems, (c) providing technical advice and assistance on matters involving air and space activities, and (d) furnishing personnel and facilities to assist in emergency repairs of equipment deficiencies and for other essential purposes.

Part 23—National Science Foundation

Section 2301. Functions. The Director of the National Science Foundation shall:

(1) **Manpower functions.** Assist the Department of Labor in sustaining readiness for the mobilization of civilian manpower by: (a) maintaining the Foundation's register of scientific and technical personnel in such form and at such locations as will assure maximum usefulness in an emergency; (b) being prepared for rapid expansion of the Foundation's current operation as a central clearing house for information covering all scientific and technical personnel in the United States and its possessions; and (c) developing, in consultation with the Department of Labor, the Selective Service System, the Department of Defense, and the Office of Science and Technology, plans and procedures to assure the most effective distribution and utilization of the Nation's scientific and engineering manpower in an emergency.

(2) **Special functions.** (a) Provide leadership in developing, with the assistance of Federal and State agencies and appropriate nongovernmental organizations, the ability to mobilize scientists, in consonance with over-all civilian manpower mobilization programs, to perform or assist in performance of special tasks, including the identification of and defense against unconventional warfare; (b) advance the national radiological defense capability by including, in consultation with appropriate agencies, pertinent scientific information and radiological defense techniques in the Foundation's scientific institute program for science, mathematics, and engineering teachers; (c) assemble data on the location and

character of major scientific research facilities, including non-governmental as well as government facilities, and their normal inventories of types of equipment and instruments which would be useful in identification and analysis of hazards to human life in the aftermath of enemy attack; and (d) prepare to carry on necessary programs for basic research and for training of scientific manpower.

Part 24—Railroad Retirement Board

Section 2401. Functions. The Railroad Retirement Board shall:

(1) **Manpower functions.** Within the framework of the over-all manpower plans and programs of the Department of Labor, assist in the mobilization of civilian manpower in an emergency by developing plans for the recruitment and referral of that segment of the Nation's manpower resources subject to the Railroad Retirement and Railroad Unemployment Insurance Acts [sections 228a et seq. and 351 et seq. of Title 45, Railroads].

(2) **Benefit payments.** Develop plans for administering, under emergency conditions, the essential aspects of the Railroad Retirement Act and Railroad Unemployment Insurance Act [sections 228a et seq. and 351 et seq. of Title 45, Railroads] consistent with overall Federal plans for the continuation of benefit payments after an enemy attack.

Part 25—Securities and Exchange Commission

Section 2501. Functions. The Securities and Exchange Commission shall collaborate with the Secretary of the Treasury in the development of emergency financial control plans, programs, procedures, and regulations for:

(1) **Stock trading.** Temporary closure of security exchanges, suspension of redemption rights, and freezing of stock and bond prices, if required in the interest of maintaining economic controls.

(2) **Modified trading.** Development of plans designed to reestablish and maintain a stable and orderly market for securities when the situation permits under emergency conditions.

(3) **Protection of securities.** Provision of a national records system which will make it possible to establish current ownership of securities in the event major trading centers and depositories are destroyed.

(4) **Flow of capital.** The control of the formation and flow of private capital as it relates to new securities offerings or expansion of prior offerings for the purpose of establishing or reesta-

blishing industries in relation to the Nation's needs in or following a national emergency.

(5) **Flight of capital.** The prevention of the flight of capital outside this country, in coordination with the Secretary of Commerce, and the impounding of securities in the hands of enemy aliens.

Part 26—Small Business Administration

Section 2601. Functions. The Administrator of the Small Business Administration shall:

(1) **Prime contract authority.** Develop plans to administer a program for the acquisition of prime contracts by the Administration and, in turn, for negotiating or otherwise letting of subcontracts to capable small business concerns in an emergency.

(2) **Resource information.** Provide data on facilities, inventories, and potential production capacity of small business concerns to all interested agencies.

(3) **Procurement.** Develop plans to determine jointly with Federal procurement agencies, as appropriate, which defense contracts are to go to small business concerns and to certify to the productive and financial ability of small concerns to perform specific contracts, as required.

(4) **Loans for plant modernization.** Develop plans for providing emergency assistance to essential individual industrial establishments through direct loans or participation loans for the financing of production facilities and equipment.

(5) **Resource pools.** Develop plans for encouraging and approving small business defense production and research and development pools.

(6) **Financial assistance.** Develop plans to make loans, directly or in participation with private lending institutions, to small business concerns and to groups or pools of such concerns, to small business investment companies, and to State and local development companies to provide them with funds for lending to small business concerns, for defense and essential civilian purposes.

Part 27—Tennessee Valley Authority

Section 2701. Functions. The Board of Directors of the Tennessee Valley Authority shall:

(1) **Electric power.** Assist the Department of the Interior in the development of plans for the integration of the Tennessee Valley Authority power system into national emergency programs and prepare plans for the emergency management, operation, and maintenance of the system and for its essential expansion.

(2) **Waterways.** Assist the Interstate Commerce Commission, under the coordinating authority of the Secretary of Transportation, in the development of plans for integration and control of inland waterway transportation systems and, in cooperation with the Department of Defense and the Department of the Interior, prepare plans for the management, operation, and maintenance of the river control system in the Tennessee River and certain of its tributaries for navigation during an emergency.

(3) **Flood control.** Develop plans and maintain its river control operations for the prevention or control of floods caused by natural phenomena or overt and covert attack affecting the Tennessee River System and, in so doing, collaborate with the Department of Defense with respect to the control of water in the lower Ohio and Mississippi Rivers.

(4) **Emergency health services and sanitary water supplies.** Assist the Department of Health, Education, and Welfare in the development of plans and programs covering emergency health services, civilian health manpower, and health resources in the Tennessee Valley authority area and, in collaboration with the Department of the Interior and the Department of Health, Education, and Welfare, prepare plans for the management, operation, and maintenance of the Tennessee River System consistent with the needs for sanitary public water supplies, waste disposal, and vector control.

(5) **Coordination of water use.** Develop plans for determining or proposing priorities for the use of water by the Tennessee Valley Authority in the event of conflicting claims arising from the functions listed above.

(6) **Fertilizer.** Assist the Department of Agriculture in the development of plans for the distribution and claimancy of fertilizer; assist the Department of Commerce and the Department of Defense in the development of Tennessee Valley Authority production quotas and any essential expansion of production facilities, and prepare plans for the management, operation, and maintenance of its facilities for the manufacture of nitrogen and phosphorous fertilizers.

(7) **Munitions production.** Perform chemical research in munitions as requested by the Department of Defense, maintain standby munitions production facilities, and develop plans for converting and utilizing fertilizer facilities as required in support of the Department of Defense's munitions program.

(8) **Land management.** Develop plans for the maintenance,

management, and utilization of Tennessee Valley Authority-controlled lands in the interest of an emergency economy.

(9) **Food and forestry.** Assist the Department of Agriculture in the development of plans for the harvesting and processing of fish and game, and the Department of Commerce in the development of plans for the production and processing of forest products.

(10) **Coordination with Valley States.** Prepare plans and agreements with Tennessee Valley States, consistent with Federal programs, for appropriate integration of Tennessee Valley Authority and State plans for the use of available Tennessee Valley Authority resources.

Part 28—United States Civil Service Commission

Section 2801. Functions. The United States Civil Service Commission shall:

(1) **Personnel system.** Prepare plans for adjusting the Federal civilian personnel system to simplify administration and to meet emergency demands.

(2) **Utilization.** Develop policies and implementing procedures designed to assist Federal agencies in achieving the most effective utilization of the Federal Government's civilian manpower in an emergency.

(3) **Manpower policies.** As the representative of the Federal Government as an employer, participate, as appropriate, in the formulation of national and regional manpower policies as they affect Federal civilian personnel and establish implementing policies as necessary.

(4) **Manpower administration.** Prepare plans, in consonance with national manpower policies and programs, for the administration of emergency civilian manpower and employment policies within the executive branch of the Government, including the issuance and enforcement of regulations to implement such policies.

(5) **Wage and salary stabilization.** Participate, as appropriate, with the Office of Emergency Preparedness and the Department of Labor in the formulation of national and regional wage and salary stabilization policies as they affect Federal civilian personnel. Within the framework of such policies, prepare plans for the implementation of such policies and controls established for employees within the executive branch of the Government, including the issuance and enforcement of necessary regulations.

(6) **Assistance.** Develop plans for rendering personnel manage-

ment and staffing assistance to new and expanding Federal agencies.

(7) **Recruiting.** Develop plans for the coordination and control of civilian recruiting policies and practices by all Federal agencies in order to increase the effectiveness of the total recruitment efforts during an emergency and to prevent undesirable recruitment practices.

(8) **Reassignment.** Develop plans to facilitate the reassignment or transfer of Federal civilian employees, including the movement of employees from one agency or location to another agency or location, in order to meet the most urgent needs of the executive branch during an emergency.

(9) **Registration.** Develop plans and procedures for a nationwide system of post-attack registration of Federal employees to provide a means for locating and returning to duty those employees who become physically separated from their agencies after an enemy attack, and to provide for the maximum utilization of the skills of surviving employees.

(10) **Deferment.** Develop plans and procedures for a system to control Government requests for the selective service deferment of employees in the executive branch of the Federal Government and in the municipal government of the District of Columbia.

(11) **Investigation.** Prepare plans, in coordination with agencies having responsibilities in the personnel security field, for the conduct of national agency checks and inquiries, limited suitability investigations, and full field investigations under emergency conditions.

(12) **Salaries, wages, and benefits.** Develop plans for operating under emergency conditions the essential aspects of salary and wage systems and such benefit systems as the Federal Employees Retirement System, the Federal Employees Group Life Insurance Program, the Federal Employees and Retired Federal Employees Health Benefits Programs, and the Federal Employees Compensation Program.

(13) **Federal manpower mobilization.** Assist Federal agencies in establishing manpower plans to meet their own emergency manpower requirements; identify major or special manpower problems of individual Federal agencies and the Federal Government as a whole in mobilizing a civilian work force to meet essential emergency requirements; identify sources of emergency manpower supply for all agencies where manpower problems are indicated; and develop Government-wide plans for the use of surplus Federal civilian manpower.

(14) **Distribution of manpower.** Participate in the formulation of policies and decisions on the distribution of the nation's civilian manpower resources, obtain appropriate civilian manpower data from Federal agencies, and establish necessary implementing policies and procedures within the Executive Branch.

(15) **Training.** Develop, organize, and conduct, as appropriate, interagency training programs in emergency personnel management for Federal employees.

Part 28A—United States Information Agency

Section 2850. Functions. (a) The Director of the United States Information Agency shall prepare national emergency plans and develop preparedness programs for the continuation of essential emergency foreign information activities. These plans and programs shall be designed to develop a state of readiness which will permit continuing necessary activities under all conditions of national emergency including attack upon the United States.

(b) The Director shall (1) develop plans for the formulation and execution of foreign information programs utilizing the Agency's overseas posts and all media designed to promote an intelligent understanding abroad of the status of the emergency within the United States and the efforts, policies, activities, needs, and aims of the United States in dealing with the international situation then existing; (2) develop emergency plans and programs, and emergency organizational structures required thereby, as an integral part of the continuing activities of the United States Information Agency on the basis that it will have the responsibility of carrying on such programs during an emergency; (3) provide and maintain the capability necessary for simultaneous direct radio broadcasting in major world languages to all areas of the world and wireless teletype to all United States Embassies; (4) provide advice to the Executive Branch on foreign opinion, and its implications for United States policies, programs, and official statements; (5) maintain liaison with the information agencies of friendly nations for the purpose of relating the United States Government information programs and facilities to those of such nations; (6) participate in the development of policy with regard to the psychological aspects of defense and develop plans for assisting the appropriate agencies in the execution of psychological operations with special attention to overseas crises short of war; (7) maintain United States Information Service staffs abroad for the conduct of public information for all agencies of the Government, recognizing that in a theater of operations the United States

Information Agency would make available to the appropriate Commander all United States citizen personnel on the staff of the Agency, who agree to remain, to serve in support of psychological operations; and (8) lend appropriate support in psychological warfare to the military command in the theater or theaters of active military operations, and provide daily guidance and basic informational materials.

(c) The Director shall insure development of the appropriate plans necessary under this Part and issue emergency instructions required to implement all appropriate plans developed under this Part.

Part 29—Veterans Administration

Section 2901. Functions. The Administrator of Veterans Affairs shall develop policies, plans, and procedures for the performance of emergency functions with respect to the continuation or restoration of authorized programs of the Veterans Administration under all conditions of national emergency, including attack upon the United States. These include:

(1) The emergency conduct of inpatient and outpatient care and treatment in Veterans Administration medical facilities and participation with the Departments of Defense and Health, Education, and Welfare as provided for in interagency agreements.

(2) The emergency conduct of compensation, pension, rehabilitation, education, and insurance payments consistent with over-all Federal plans for the continuation of Federal benefit payments.

(3) The emergency performance of insurance and loan guaranty functions in accordance with indirect stabilization policies and controls designed to deal with various emergency conditions.

Part 30—General Provisions

Section 3001. Resource Management. In consonance with the national preparedness, security, and mobilization readiness plans, programs, and operations of the Office of Emergency Preparedness under Executive Order No. 11051 of September, 7, 1962 [set out as a note under section 2271 of this Appendix], and subject to the provisions of the preceding parts the head of each department and agency shall:

(1) **Priorities and allocations.** Develop systems for the emergency application of priorities and allocations to the production, distribution, and use of resources for which he has been assigned responsibility.

(2) **Requirements.** Assemble, develop as appropriate, and evalu-

ate requirements for assigned resources, taking into account estimated needs for military, atomic energy, civilian, and foreign purposes. Such evaluation shall take into consideration geographical distribution of requirements under emergency conditions.

(3) **Evaluation.** Assess assigned resources in order to estimate availability from all sources under an emergency situation, analyze resource availabilities in relation to estimated requirements, and develop appropriate recommendations and programs, including those necessary for the maintenance of an adequate mobilization base. Provide data and assistance before and after attack for national resource analysis purposes of the Office of Emergency Preparedness.

(5) **Claimancy.** Prepare plans to claim from the appropriate agency supporting materials, manpower, equipment, supplies, and services which would be needed to carry out assigned responsibilities and other essential functions of his department or agency, and cooperate with other agencies in developing programs to insure availability of such resources in an emergency.

Sec. 3002. Facilities protection and warfare effects monitoring and reporting. In consonance with the national preparedness, security, and mobilization readiness plans, programs, and operations of the Office of Emergency Preparedness under Executive Order No. 11051 [set out as a note under section 2271 of this Appendix], and with the national civil defense plans, programs, and operations of the Department of Defense under Executive Order No. 10952 [set out as a note under section 2271 of this Appendix], the head of each department and agency shall:

(1) **Facilities protection.** Provide facilities protection guidance material adapted to the needs of the facilities and services concerned and promote a national program to stimulate disaster preparedness and control in order to minimize the effects of overt or covert attack on facilities or other resources for which he has management responsibility. Guidance shall include, but not be limited to, organization and training of facility employees, personnel shelter, evacuation plans, records protection, continuity of management, emergency repair, dispersal of facilities, and mutual aid associations for an emergency.

(2) **Welfare effects monitoring and reporting.** Maintain a capability, both at national and field levels, to estimate the effects of attack on assigned resources and to collaborate with and provide data to the Office of Emergency Preparedness, the Department of Defense, and other agencies, as appropriate, in verifying and up-

dating estimates of resource status through exchanges of data and mutual assistance, and provide for the detection, identification, monitoring and reporting of such warfare effects at selected facilities under his operation or control.

(3) **Salvage and rehabilitation.** Develop plans for salvage, decontamination, and rehabilitation of facilities involving resources under his jurisdiction.

(4) **Shelter.** In conformity with national shelter policy, where authorized to engage in building construction, plan, design, and construct such buildings to protect the public to the maximum extent feasible against the hazards that could result from an attack upon the United States with nuclear weapons; and where empowered to extend Federal financial assistance, encourage recipients of such financial assistance to use standards for planning design and construction which will maximize protection for the public.

Sec. 3003. Critical skills and occupations. (a) The Secretaries of Defense, Commerce, and Labor shall carry out the mandate of the National Security Council, dated February 15, 1968, to "maintain a continuing surveillance over the Nation's manpower needs and identify any particular occupation or skill that may warrant qualifying for deferment on a uniform national basis." In addition, the Secretaries of Defense, Commerce, Labor, and Health, Education, and Welfare shall carry out the mandate of the National Security Council to "maintain a continuing surveillance over the Nation's manpower and education needs to identify any area of graduate study that may warrant qualifying for deferment in the national interest." In carrying out these functions, the Secretaries concerned shall consult with the National Science Foundation with respect to scientific manpower requirements.

(b) The Secretaries of Commerce and Labor shall maintain and issue, as necessary, lists of all essential activities and critical occupations that may be required for emergency preparedness purposes.

Sec. 3004. Research. Within the framework of research policies and objectives established by the Office of Emergency Preparedness, the head of each department and agency shall supervise or conduct research in areas directly concerned with carrying out emergency preparedness responsibilities, designate representatives for necessary ad hoc or task force groups, and provide advice and assistance to other agencies in planning for research in areas involving each agency's interest.

Sec. 3005. Stockpiles. The head of each department and agency, with appropriate emergency responsibilities, shall assist the Office of Emergency Preparedness in formulating and carrying out plans for stockpiling of strategic and critical materials, and survival items.

Sec. 3006. Direct Economic Controls. The head of each department and agency shall cooperate with the Office of Emergency Preparedness and the Federal financial agencies in the development of emergency preparedness measures involving emergency financial and credit measures, as well as price, rent, wage and salary stabilization, and consumer rationing programs.

Sec. 3007. Financial Aid. The head of each department and agency shall develop plans and procedures in cooperation with the Federal financial agencies for financial and credit assistance to those segments of the private sector for which he is responsible in the event such assistance is needed under emergency conditions.

Sec. 3008. Functional Guidance. The head of each department and agency in carrying out the functions assigned to him by this order, shall be guided by the following:

(1) **National program guidance.** In consonance with the national preparedness, security, and mobilization readiness plans, programs, and operations of the Office of Emergency Preparedness under Executive Order No. 11051 [set out as a note under section 2271 of this Appendix], and with the national civil defense plans, programs, and operations of the Department of Defense, technical guidance shall be provided to State and local governments and instrumentalities thereof, to the end that all planning concerned with functions assigned herein will be effectively coordinated. Relations with the appropriate segment of the private sector shall be maintained to foster mutual understanding of federal emergency plans.

(2) **Interagency coordination.** Emergency preparedness functions shall be coordinated by the head of the department or agency having primary responsibility with all other departments and agencies having supporting functions related thereto.

(3) **Emergency preparedness.** Emergency plans, programs, and an appropriate state of readiness, including organizational readiness, shall be developed as an integral part of the continuing activities of each department or agency on the basis that the department or agency will have the responsibility for carrying out such plans and programs during an emergency. The head of each department or agency shall be prepared to implement all appropri-

ate plans developed under this order. Modifications and temporary organizational changes, based on emergency conditions, shall be in accordance with policy determinations by the President.

(4) **Professional liaison.** Mutual understanding and support of emergency preparedness activities shall be fostered, and the National Defense Executive Reserve shall be promoted by maintaining relations with the appropriate non-governmental sectors.

Sec. 3009. Training. The head of each department and agency shall develop and direct training programs which incorporate emergency preparedness and civil defense training information programs necessary to insure the optimum operational effectiveness of assigned resources, systems, and facilities.

Sec. 3010. Emergency Public Information. In consonance with such emergency public information plans and central program decisions of the Office of Emergency Preparedness, and with plans, programs, and procedures established by the Department of Defense to provide continuity of programming for the Emergency Broadcast System, the head of each department and agency shall:

(1) Obtain and provide information as to the emergency functions or assignments of the individual department or agency for dissemination to the American people during the emergency, in accordance with arrangements made by the Office of Emergency Preparedness.

(2) Determine requirements and arrange for prerecordings to provide continuity of program service over the Emergency Broadcast System so that the American people can receive information, advice, and guidance pertaining to the implementation of the civil defense and emergency preparedness plans or assignments of each individual department or agency.

Sec. 3011. Emergency Actions. This order does not confer authority to put into effect any emergency plan, procedure, policy, program, or course of action prepared or developed pursuant to this order. Plans so developed may be effectuated only in the event that authority for such effectuation is provided by a law enacted by the Congress or by an order or directive issued by the President pursuant to statutes or the Constitution of the United States.

Sec. 3012. Redelegation. The head of each department and agency is hereby authorized to redelegate the functions assigned to him by this order, and to authorize successive redelegations to agencies or instrumentalities of the United States, and to officers and employees of the United States.

Sec. 3013. Transfer of Functions. Any emergency preparedness function under this order, or parts thereof, may be transferred from one department or agency to another with the consent of the heads of the organizations involved and with the concurrence of the Director of the Office of Emergency Preparedness. Any new emergency preparedness function may be assigned to the head of a department or agency by the Director of the Office of Emergency Preparedness by mutual consent.

Sec. 3014. Retention of Existing Authority. Except as provided in Section 3015, nothing in this order shall be deemed to derogate from any now existing assignment of functions to any department or agency or officer thereof made by statute, Executive order, or Presidential directives, including Memoranda.

Sec. 3015. Revoked Orders. The following are hereby revoked:

- (1) Defense Mobilization Order VI-2 of December 11, 1953.
- (2) Defense Mobilization Order I-12 of October 5, 1954.
- (3) Executive Order No. 10312 of December 10, 1951.
- (4) Executive Order No. 10346 of April 17, 1952.
- (5) Executive Order No. 10997 of February 16, 1962.
- (6) Executive Order No. 10998 of February 16, 1962.
- (7) Executive Order No. 10999 of February 16, 1962.
- (8) Executive Order No. 11000 of February 16, 1962.
- (9) Executive Order No. 11001 of February 16, 1962.
- (10) Executive Order No. 11002 of February 16, 1962.
- (11) Executive Order No. 11003 of February 16, 1962.
- (12) Executive Order No. 11004 of February 16, 1962.
- (13) Executive Order No. 11005 of February 16, 1962.
- (14) Executive Order No. 11087 of February 26, 1963.
- (15) Executive Order No. 11088 of February 26, 1963.
- (16) Executive Order No. 11089 of February 26, 1963.
- (17) Executive Order No. 11090 of February 26, 1963.
- (18) Executive Order No. 11091 of February 26, 1963.
- (19) Executive Order No. 11092 of February 26, 1963.
- (20) Executive Order No. 11093 of February 26, 1963.
- (21) Executive Order No. 11094 of February 26, 1963.
- (22) Executive Order No. 11095 of February 26, 1963.
- (23) Executive Order No. 11310 of October 11, 1966.

RICHARD NIXON

2.2 E.O. 11507, PREVENTION, CONTROL, AND ABATEMENT OF AIR AND WATER POLLUTION AT FEDERAL FACILITIES

February 4, 1970, 35 Fed. Reg. 2573

EXECUTIVE ORDER NO. 11507

Feb. 4, 1970, 35 F.R. 2573

PREVENTION, CONTROL, AND ABATEMENT OF AIR AND WATER POLLUTION AT FEDERAL FACILITIES

By virtue of the authority vested in me as President of the United States and in furtherance of the purpose and policy of the Clean Air Act, as amended (42 U.S.C. 1857) [section 1857 et seq. of this title], the Federal Water Pollution Control Act, as amended (33 U.S.C. 466) [section 466 et seq. of Title 33, Navigation and Navigable Waters], and the National Environmental Policy Act of 1969 (Public Law No. 91-190, approved January 1, 1970) [this chapter], it is ordered as follows:

Section 1. Policy. It is the intent of this order that the Federal Government in the design, operation, and maintenance of its facilities shall provide leadership in the nationwide effort to protect and enhance the quality of our air and water resources.

Sec. 2. Definitions. As used in this order:

(a) The term "respective Secretary" shall mean the Secretary of Health, Education, and Welfare in matters pertaining to air pollution control and the Secretary of the Interior in matters pertaining to water pollution control.

(b) The term "agencies" shall mean the departments, agencies, and establishments of the executive branch.

(c) The term "facilities" shall mean the buildings, installations, structures, public works, equipment, aircraft, vessels, and other vehicles and property, owned by or constructed or manufactured for the purpose of leasing to the Federal Government.

(d) The term "air and water quality standards" shall mean respectively the quality standards and related plans of implementation, including emission standards, adopted pursuant to the Clean Air Act, as amended, and the Federal Water Pollution Control Act, as amended, or as prescribed pursuant to section 4(b) of this order.

(e) The term "performance specifications" shall mean permissible limits of emissions, discharges, or other values applicable to a particular Federal facility that would, as a minimum, provide for conformance with air and water quality standards as defined herein.

(f) The term "United States" shall mean the fifty States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, and Guam.

Sec. 3. Responsibilities. (a) Heads of agencies shall, with regard to all facilities under their jurisdiction:

(1) Maintain review and surveillance to ensure that the standards set forth in section 4 of this order are met on a continuing basis.

(2) Direct particular attention to identifying potential air and water quality problems associated with the use and production of new materials and make provisions for their prevention and control.

(3) Consult with the respective Secretary concerning the best techniques and methods available for the protection and enhancement of air and water quality.

(4) Develop and publish procedures, within six months of the date of this order, to ensure that the facilities under their jurisdiction are in conformity with this order. In the preparation of such procedures there shall be timely and appropriate consultation with the respective Secretary.

(b) The respective Secretary shall provide leadership in implementing this order, including the provision of technical advice and assistance to the heads of agencies in connection with their duties and responsibilities under this order.

(c) The Council on Environmental quality shall maintain continuing review of the implementation of this order and shall, from time to time, report to the President thereon.

Sec. 4. Standards. (a) Heads of agencies shall ensure that all facilities under their jurisdiction are designed, operated, and maintained so as to meet the following requirements:

(1) Facilities shall conform to air and water quality standards as defined in section 2(d) of this order. In those cases where no such air or water quality standards are in force for a particular geographical area, Federal facilities in that area shall conform to the standards established pursuant to subsection (b) of this section. Federal facilities shall also conform to the performance specifications provided for in this order.

(2) Actions shall be taken to avoid or minimize wastes created through the complete cycle of operations of each facility.

(3) The use of municipal or regional waste collection or disposal systems shall be the preferred method of disposal of wastes from Federal facilities. Whenever use of such a system is not feasible or appropriate, the heads of agencies concerned shall take necessary measures for satisfactory disposal of such wastes, including:

(A) When appropriate, the installation and operation of their own waste treatment and disposal facilities in a manner consistent with this section.

(B) The provision of trained manpower, laboratory and other supporting facilities as appropriate to meet the requirements of this section.

(C) The establishment of requirements that operators of Federal pollution control facilities meet levels of proficiency consistent with the operator certification requirements of the State in which the facility is located. In the absence of such State requirements the respective Secretary may issue guidelines, pertaining to operator qualifications and performance, for the use of heads of agencies.

(4) The use, storage, and handling of all materials, including but not limited to, solid fuels, ashes, petroleum products, and other chemical and biological agents, shall be carried out so as to avoid or minimize the possibilities for water and air pollution. When appropriate, preventive measure shall be taken to entrap spillage or discharge or otherwise to prevent accidental pollution. Each agency, in consultation with the respective Secretary, shall establish appropriate emergency plans and procedures for dealing with accidental pollution.

(5) No waste shall be disposed of or discharged in such a manner as could result in the pollution of ground water which would endanger the health or welfare of the public.

(6) Discharges of radioactivity shall be in accordance with the applicable rules, regulations, or requirements of the Atomic Energy Commission and with the policies and guidance of the Federal Radiation Council as published in the FEDERAL REGISTER.

(b) In those cases where there are no air or water quality standards as defined in section 2(d) of this order in force for a particular geographic area or in those cases where more stringent requirements are deemed advisable for Federal facilities, the respective Secretary, in consultation with appropriate Federal, State, interstate, and local agencies, may issue regulations establishing air or water quality standards for the purpose of this order, including related schedules for implementation.

(c) The heads of agencies, in consultation with the respective Secretary, may from time to time identify facilities or uses thereof which are to be exempted, including temporary relief, from provisions of this order in the interest of national security or in extraordinary cases where it is in the national interest. Such exemptions shall be reviewed periodically by the respective Secretary and the heads of the agencies concerned. A report on exemptions

granted shall be submitted to the Council on Environmental Quality periodically.

Sec. 5. Procedures for abatement of air and water pollution at existing Federal facilities. (a) Actions necessary to meet the requirements of subsections (a) (1) and (b) of section 4 of this order pertaining to air and water pollution at existing facilities are to be completed or under way no later than December 31, 1972. In cases where an enforcement conference called pursuant to law or air and water quality standards require earlier actions, the earlier date shall be applicable.

(b) In order to ensure full compliance with the requirements of section 5(a) and to facilitate budgeting for necessary corrective and preventive measures, heads of agencies shall present to the Director of the Bureau of the Budget by June 30, 1970, a plan to provide for such improvements as may be necessary to meet the required date. Subsequent revisions needed to keep any such plan up-to-date shall be promptly submitted to the Director of the Bureau of the Budget.

(c) Heads of agencies shall notify the respective Secretary as to the performance specifications proposed for each facility to meet the requirements of subsections 4(a) (1) and (b) of this order. Where the respective Secretary finds that such performance specifications are not adequate to meet such requirements, he shall consult with the agency head and the latter shall thereupon develop adequate performance specifications.

(d) As may be found necessary, heads of agencies may submit requests to the Director of the Bureau of the Budget for extensions of time for a project beyond the time specified in section 5(a). The Director, in consultation with the respective Secretary, may approve such requests if the Director deems that such project is not technically feasible or immediately necessary to meet the requirements of subsections 4(a) and (b). Full justification as to the extraordinary circumstances necessitating any such extension shall be required.

(e) Heads of agencies shall not use for any other purpose any of the amounts appropriated and apportioned for corrective and preventive measures necessary to meet the requirements of subsection (a) for the fiscal year ending June 30, 1971, and for any subsequent fiscal year.

Sec. 6. Procedures for new Federal facilities. (a) Heads of agencies shall ensure that the requirements of section 4 of this order are considered at the earliest possible stage of planning for new facilities.

(b) A request for funds to defray the cost of designing and constructing new facilities in the United States shall be included in the annual budget estimates of an agency only if such request includes funds to defray the costs of such measures as may be necessary to assure that the new facility will meet the requirements of section 4 of this order.

(c) Heads of agencies shall notify the respective Secretary as to the performance specifications proposed for each facility when action is necessary to meet the requirements of subsections 4(a) (1) and (b) of this order. Where the respective Secretary finds that such performance specifications are not adequate to meet such requirements he shall consult with the agency head and the latter shall thereupon develop adequate performance specifications.

(d) Heads of agencies shall give due consideration to the quality of air and water resources when facilities are constructed or operated outside the United States.

Sec. 7. Procedures for Federal water resources projects. (a) All water resources projects of the Departments of Agriculture, the Interior, and the Army, the Tennessee Valley Authority, and the United States Section of the International Boundary and Water Commission shall be consistent with the requirements of section 4 of this order. In addition, all such projects shall be presented for the consideration of the Secretary of the Interior at the earliest feasible stage if they involve proposals or recommendations with respect to the authorization or construction of any Federal water resources project in the United States. The Secretary of the Interior shall review plans and supporting data for all such projects relating to water quality, and shall prepare a report to the head of the responsible agency describing the potential impact of the project on water quality, including recommendations concerning any changes or other measures with respect thereto which he considers to be necessary in connection with the design, construction, and operation of the project.

(b) The report of the Secretary of the Interior shall accompany at the earliest practicable stage any report proposing authorization or construction, or a request for funding, of such a water resource project. In any case in which the Secretary of the Interior fails to submit a report within 90 days after receipt of project plans, the head of the agency concerned may propose authorization, construction, or funding of the project without such an accompanying report. In such a case, the head of the agency concerned shall explicitly state in his request or report concerning

the project that the Secretary of the Interior has not reported on the potential impact of the project on water quality.

Sec. 8. Saving provisions. Except to the extent that they are inconsistent with this order, all outstanding rules, regulations, orders, delegations, or other forms of administrative action issued, made, or otherwise taken under the orders superseded by section 9 hereof or relating to the subject of this order shall remain in full force and effect until amended, modified, or terminated by proper authority.

Sec. 9. Orders superseded. Executive Order No. 11282 of May 26, 1966, and Executive Order No. 11288 of July 2, 1966, are hereby superseded.

RICHARD NIXON

2.3 E.O. 11514, PROTECTION AND ENHANCEMENT OF ENVIRONMENTAL QUALITY

March 5, 1970, 35 Fed. Reg. 4247

PROTECTION AND ENHANCEMENT OF ENVIRONMENT QUALITY

By virtue of the authority vested in me as President of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (Public Law No. 91-190, approved January 1, 1970), it is ordered as follows:

Section 1. Policy. The Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals. The Council on Environmental Quality, through the Chairman, shall advise and assist the President in leading this national effort.

Sec. 2. Responsibilities of Federal agencies. Consonant with Title I of the National Environmental Policy Act of 1969, hereafter referred to as the "Act", the heads of Federal agencies shall:

(a) Monitor, evaluate, and control on a continuing basis their agencies' activities so as to protect and enhance the quality of the environment. Such activities shall include those directed to controlling pollution and enhancing the environment and those designed to accomplish other program objectives which may affect the quality of the environment. Agencies shall develop programs and measures to protect and enhance environmental quality and shall assess progress in meeting the specific objectives of such activities. Heads of agencies shall consult with appropriate Federal, State and local agencies in carrying out their activities as they affect the quality of the environment.

(b) Develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact in order to obtain the views of interested parties. These procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action. Federal agencies shall also encourage State and local agencies to adopt similar procedures for informing the public concerning their activities affecting the quality of the environment.

(c) Insure that information regarding existing or potential environmental problems and control methods developed as part of research, development, demonstration, test, or evaluation activities is made available to Federal agencies, States, counties, municipalities, institutions, and other entities, as appropriate.

(d) Review their agencies' statutory authority, administrative regulations, policies, and procedures, including those relating to loans, grants, contracts, leases, licenses, or permits, in order to identify any deficiencies or inconsistencies therein which prohibit or limit full compliance with the purposes and provisions of the Act. A report on this review and the corrective actions taken or planned, including such measures to be proposed to the President as may be necessary to bring their authority and policies into conformance with the intent, purposes, and procedures of the Act, shall be provided to the Council on Environmental Quality not later than September 1, 1970.

(e) Engage in exchange of data and research results, and cooperate with agencies of other governments to foster the purposes of the Act.

(f) Proceed, in coordination with other agencies, with actions required by section 102 of the Act.

Sec. 3. Responsibilities of Council on Environmental Quality.
The Council on Environmental Quality shall:

(a) Evaluate existing and proposed policies and activities of the Federal Government directed to the control of pollution and the enhancement of the environment and to the accomplishment of other objectives which affect the quality of the environment. This shall include continuing review of procedures employed in the development and enforcement of Federal standards affecting environmental quality. Based upon such evaluations the Council shall, where appropriate, recommend to the President policies and programs to achieve more effective protection and enhancement of environmental quality and shall, where appropriate, seek resolution of significant environmental issues.

(b) Recommend to the President and to the agencies priorities among programs designed for the control of pollution and for enhancement of the environment.

(c) Determine the need for new policies and programs for dealing with environmental problems not being adequately addressed.

(d) Conduct, as it determines to be appropriate, public hearings or conferences on issues of environmental significance.

(e) Promote the development and use of indices and monitoring systems (1) to assess environmental conditions and trends, (2) to predict the environmental impact of proposed public and private actions, and (3) to determine the effectiveness of programs for protecting and enhancing environmental quality.

(f) Coordinate Federal programs related to environmental quality.

(g) Advise and assist the President and the agencies in achieving international cooperation for dealing with environmental problems, under the foreign policy guidance of the Secretary of State.

(h) Issue guidelines to Federal agencies for the preparation of detailed statements on proposals for legislation and other Federal actions affecting the environment, as required by section 102 (2) (C) of the Act.

(i) Issue such other instructions to agencies, and request such reports and other information from them, as may be required to carry out the Council's responsibilities under the Act.

(j) Assist the President in preparing the annual Environmental Quality Report provided for in section 201 of the Act.

(k) Foster investigations, studies, surveys, research, and analyses relating to (i) ecological systems and environmental quality, (ii) the impact of new and changing technologies thereon, and (iii) means of preventing or reducing adverse effects from such technologies.

Sec. 4. Amendments of E.O. 11472. Executive Order No. 11472 of May 29, 1969, including the heading thereof, is hereby amended:

(1) By substituting for the term "the Environmental Quality Council", wherever it occurs, the following: "the Cabinet Committee on the Environment".

(2) By substituting for the term "the Council", wherever it occurs, the following: "the Cabinet Committee".

(3) By inserting in subsection (f) of section 101, after "Budget," the following: "the Director of the Office of Science and Technology,".

(4) By substituting for subsection (g) of section 101 the following:

"(g) The Chairman of the Council on Environmental Quality (established by Public Law 91-190) shall assist the President in directing the affairs of the Cabinet Committee."

(5) By deleting subsection (c) of section 102.

(6) By substituting for "the Office of Science and Technology", in section 104, the following: "the Council on Environmental Quality (established by Public Law 91-190)".

(7) By substituting for "(hereinafter referred to as the 'Committee')", in section 201, the following: "(hereinafter referred to as the 'Citizens' Committee')".

(8) By substituting for the term "the Committee", wherever it occurs, the following: "the Citizens' Committee".

RICHARD NIXON

DELEGATING FUNCTIONS OF THE PRESIDENT UNDER THE
FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED

By virtue of the authority vested in me by the Federal Water Pollution Control Act (62 Stat. 1155, as amended, 33 U.S.C. 466 et seq.) as amended by the Water Quality Improvement Act of 1970 (Public Law 91-224, approved Apr. 3, 1970), hereinafter referred to as the Act, by section 301 of title 3 of the United States Code, and as President of the United States, it is ordered as follows:

Section 1. Delegations to the Secretary of the Interior. There is hereby delegated to the Secretary of the Interior responsibility and authority

(a) to carry out the provisions of subsection (1) (2) of section 5 of the Act, relating to the study and investigation of methods to control the release of pesticides into the environment, including the preparation of a report on such investigation for submission by the President to the Congress;

(b) in consultation with the Secretary of Transportation, to carry out the provisions of subsections (b) (2) and (b) (3) of section 11 of the Act, relating to the determination of those quantities of oil the discharge of which, at such times, locations, circumstances, and conditions, will be harmful to the public health or welfare of the United States and those which will not be harmful;

(c) to carry out the provisions of subsection (c) (2) (G) of section 11 of the Act, relating to identification of dispersants and other chemicals to be used;

(d) to carry out the provisions of subsection (e) of section 11 of the Act, relating to determinations of imminent and substantial threat because of actual or threatened discharge of oil, and relating to securing relief necessary to abate such actual or threatened discharges through court action;

(e) in consultation with the Secretary of Transportation, to carry out the provisions of subsections (j) (1) (C) of section 11 of the Act, relating to procedures, methods, and requirements for equipment to prevent discharges of oil from non-transportation-related onshore and offshore facilities;

(f) to carry out the provisions of subsection (a) (1) of section 12 of the Act, relating to the designation of hazardous substances, other than oil, which when discharged into or upon the navigable waters of the United States or adjoining shorelines or waters of

**2.4 E.O. 11548, DELEGATING FUNCTIONS OF THE
PRESIDENT UNDER THE FEDERAL WATER POLLUTION
CONTROL ACT, AS AMENDED**

July 20, 1970, 35 Fed. Reg. 11677

the contiguous zone, present an imminent and substantial danger to public health or welfare ;

(g) in consultation with the Secretary of Transportation, to carry out the provisions of subsection (a) (2) of section 12 of the Act, relating to the establishment of recommended methods for the removal of hazardous substances within the meaning of subsection (a) (1) of section 12 of the Act.

Sec. 2. Delegations to the Secretary of Transportation. There is hereby delegated to the Secretary of Transportation responsibility and authority

(a) in consultation with the Secretary of the Interior, to carry out the provisions of subsection (j) (1) (C) of section 11 of the Act, relating to procedures, methods and requirements for equipment to prevent discharges of oil from vessels and transportation-related onshore and offshore facilities ;

(b) to carry out the provisions of subsection (j) (1) (D) of section 11 of the Act, relating to the inspection of vessels carrying cargoes of oil and the inspection of such cargoes ;

(c) to administer the revolving fund established pursuant to subsection (k) of section 11 of the Act ;

(d) to carry out the provisions of subsection (m) of section 11 of the Act, relating to the boarding and inspection of vessels, the arrest of persons violating the said section 11, and the execution of warrants or other process ;

(e) in consultation with the Secretary of the Interior, to carry out the provisions of subsection (g) of section 12 of the Act, including the preparation of a report for submission by the President to the Congress.

Sec. 3. Delegations to the Federal Maritime Commission. (a) There is hereby delegated to the Federal Maritime Commission responsibility and authority

(1) to carry out the provisions of subsection (p) (1) of section 11 of the Act, relating to the issuance of regulations governing evidence of financial responsibility for vessels to meet liability to the United States ;

(2) to carry out the provisions of subsection (p) (2) of section 11 of the Act, relating to the administration of the said subsection (p).

(b) Without derogating from any action heretofore taken thereunder, the letter of the President to the Chairman of the Federal Maritime Commission dated June 2, 1970 (35 F.R. 8631), is hereby superseded.

Sec. 4. Delegation to the Council on Environmental Quality.

(a) There is hereby delegated to the Council on Environmental Quality the responsibility and authority to carry out the provisions of subsection (c) (2) of section 11 of the Act, providing for the preparation, publication, revision or amendment of a National Contingency Plan for the removal of oil (hereinafter referred to as the National Contingency Plan).

(b) Without derogating from any action heretofore taken thereunder, the letter of the President to the Chairman of the Council on Environmental Quality dated May 26, 1970 (35 F.R. 8423), is hereby superseded.

Sec. 5. Other delegations. (a) There is hereby delegated to the Secretary of the Interior and to the Secretary of Transportation, respectively, in and for the waters and areas assigned to each in section 306.2 of the National Contingency Plan (35 F.R. 8511) responsibility and authority

(1) to carry out the provisions of subsection (c) (1) of section 11 of the Act, relating to the removal of oil discharged into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the United States;

(2) to carry out the provisions of subsection (d) of section 11 of the Act, relating to the coordination and direction of removal or elimination of the threat of oil discharges, and the removal and destruction of vessels;

(3) to carry out the provisions of subsection (j) (1) (A) of section 11 of the Act, relating to methods and procedures for the removal of discharged oil;

(4) to carry out the provisions of subsection (j) (1) (B) of section 11 of the Act, relating to criteria for the development and implementation of local and regional oil removal contingency plans;

(5) to carry out the provisions of subsection (d) of section 12 of the Act, relating to the removal of discharged hazardous substances.

(b) The civil penalty authority of section 11(j) (2) of the Act shall be exercised by the Secretary of the Interior and the Secretary of Transportation for the enforcement of the respective regulations issued by each pursuant to delegations in this order.

Sec. 6. Agency To Receive Notices of Discharges of Oil or Hazardous Substances. The Coast Guard is hereby designated the "appropriate agency" for the purpose of receiving the notice of discharge of oil required by subsection (b) (4) of section 11 of the Act and for the purpose of receiving the notice of discharge of any

hazardous substance required by subsection (c) of section 12 of the Act. The Commandant of the Coast Guard shall issue regulations implementing this designation.

Sec. 7. Redelelegation authority. Secretaries of Departments and heads of agencies are hereby authorized to redelegate within their respective departments or agencies the responsibilities and authority delegated to them by this order, subject to the requirements of 3 U.S.C. 301.

Sec. 8. Regulations. Authority to carry out any of the foregoing responsibilities includes the authority to issue necessary implementing regulations.

Sec. 9. Reorganization Plan No. 3 of 1970. Upon the taking effect of Reorganization Plan No. 3 of 1970, the responsibility and authority conferred upon the Secretary of Interior by this order, including the authority conferred by reason of his designation in the National Contingency Plan, and including the responsibility to consult with other officers, shall vest in the Administrator of the Environmental Protection Agency: *Provided*, that the Administrator shall thereafter consult with the Secretary of the Interior regarding the responsibility and authority delegated by section 1(a) of this order and officers who by this order are required to consult with the Secretary of Interior shall consult with the Administrator of the Environmental Protection Agency.

RICHARD NIXON

ADMINISTRATION OF REFUSE ACT PERMIT PROGRAM

By virtue of the authority vested in me as President of the United States, and in furtherance of the purposes and policies of section 13 of the Act of March 3, 1899, c. 425, 30 Stat. 1152 (33 U.S.C. 407), the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et. seq), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-666c), and the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), it is hereby ordered as follows:

Section 1. Refuse Act permit program. The executive branch of the Federal Government shall implement a permit program under the aforesaid section 13 of the Act of March 3, 1899 (hereinafter referred to as "the Act") to regulate the discharge of pollutants and other refuse matter into the navigable waters of the United States or their tributaries and the placing of such matter upon their banks.

Sec. 2. Responsibilities of Federal agencies. (a) (1) The Secretary shall, after consultation with the Administrator respecting water quality matters, issue and amend, as appropriate, regulations, procedures, and instructions for receiving, processing, and evaluating applications for permits pursuant to the authority of the Act.

(2) The Secretary shall be responsible for granting, denying, conditioning, revoking, or suspending Refuse Act permits. In so doing:

(A) He shall accept findings, determinations, and interpretations which the Administrator shall make respecting applicable water quality standards and compliance with those standards in particular circumstances, including findings, determinations, and interpretations arising from the Administrator's review of State or interstate agency water quality certifications under section 21(b) of the Federal Water Pollution Control Act (84 Stat. 108). A permit shall be denied where the certification prescribed by section 21(b) of the Federal Water Pollution Control Act has been denied, or where issuance would be inconsistent with any finding, determination, or interpretation of the Administrator pertaining to applicable water quality standards and considerations.

(B) In addition, he shall consider factors, other than water quality, which are prescribed by or may be lawfully considered under the Act or other pertinent laws.

2.5 E.O. 11574, ADMINISTRATION OF THE REFUSE ACT PERMIT PROGRAM

December 23, 1970, 35 Fed. Reg. 19627

(3) The Secretary shall consult with the Secretary of the Interior, with the Secretary of Commerce, with the Administrator, and with the head of the agency exercising administration over the wildlife resources of any affected State, regarding effects on fish and wildlife which are not reflected in water quality considerations, where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modifies the stream or body of water into which the discharge is made.

(4) Where appropriate for a particular permit application, the Secretary shall perform such consultations respecting environmental amenities and values, other than those specifically referred to in paragraphs (2) and (3) above, as may be required by the National Environmental Policy Act of 1969.

(b) The Attorney General shall conduct the legal proceedings necessary to enforce the Act and permits issued pursuant to it.

Sec. 3. Coordination by Council on Environmental Quality.

(a) The Council on Environmental Quality shall coordinate the regulations, policies, and procedures of Federal agencies with respect to the Refuse Act permit program.

(b) The Council on Environmental Quality, after consultation with the Secretary, the Administrator, the Secretary of the Interior, the Secretary of Commerce, the Secretary of Agriculture, and the Attorney General, shall from time to time or as directed by the President advise the President respecting the implementation of the Refuse Act permit program, including recommendations regarding any measures which should be taken to improve its administration.

Sec. 4. Definitions. As used in this order, the word "Secretary" means the Secretary of the Army, and the word "Administrator" means the Administrator of the Environmental Protection Agency.

RICHARD NIXON

2.5a STATEMENT BY THE PRESIDENT ON SIGNING AN EXECUTIVE ORDER PROVIDING FOR THE ESTABLISHMENT OF A FEDERAL PERMIT PROGRAM TO REGULATE THE DISCHARGE OF WASTE INTO THE WATERS OF THE UNITED STATES, WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS

December 23, 1970, p. 1724

I have today directed the establishment of a Federal permit program covering facilities which discharge waste into navigable waters and their tributaries in the United States. This new program will enhance the ability of the Federal Government to enforce water quality standards and provide a major strengthening of our efforts to clean up our Nation's water.

Last February I transmitted to the Congress a comprehensive water pollution program, as part of my 37-point program designed to protect our environment. My proposals included legislative measures to make the establishment and enforcement of water quality standards more effective and expeditious. Unfortunately, no congressional action has been taken on my water pollution control proposals. I will continue to seek enactment of these proposals during the next session of the Congress.

In the meantime, I am directing the immediate initiation of a new, coordinated program of water quality enforcement under the Refuse Act of 1899, an act whose potential for water pollution control has only recently been recognized.

This law, which we have relied upon for many of our water pollution enforcement actions to date, prohibits the discharge of refuse matter, except that flowing from streets and sewers, into navigable waters or their tributaries without a permit from the Army Corps of Engineers. Through a more activist utilization of this act, we will be able to require industries to submit to State authorities and the Federal Government data concerning effluents which they plan to discharge into navigable waters. For those firms that are complying with water quality standards, the issuance of a permit, agreed upon by the Federal Government and the States, will assure all parties that standards are being met. To deal with those who are disregarding our pollution control laws, a swift and comprehensive enforcement mechanism is provided by this authority.

The most effective use of the Refuse Act will require close coordination between the Corps of Engineers and the Environmental Protection Agency as well as other Federal and State authorities. The Executive order I am signing today will ensure that such coordination is provided and that the program is initiated promptly.

As this order makes clear, the Environmental Protection Agency will make the necessary determinations on behalf of the Federal Government for all water quality aspects of this program.

The Refuse Act permit program makes maximum use of all existing provisions of law relating to water quality. It will apply to discharges both from new installations and from existing facilities. Implementation of the program will begin when proposed regulations, soon to be issued for comment, are promulgated. Permits for new discharges will be required immediately. For existing discharges, the deadline for filing applications will be July 1, 1971, to provide the States an opportunity to mobilize for this program. In the meantime, violators of water quality standards will not be exempt from prosecution under the Refuse Act.

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I wish to make clear that although the Refuse Act generally does not apply to municipal discharges, we will continue to vigorously employ other authorities for dealing with violations of water quality standards by municipalities. The Environmental Protection Agency recently put three large cities on notice that it will take legal action under the Federal Water Pollution Control Act if they do not take steps to correct water quality violations.

Implementation of a program of this magnitude will not be easy. It involves a number of Federal agencies, 50 States, and many thousands of industries. But we cannot afford to wait. We must move ahead to clean up our waters. I invite the help and cooperation of the States, private industry, and all citizens in making the Refuse Act permit program an effective tool to promote our water quality objectives.

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2.5b CONGRESSIONAL RECORD, VOL. 117 (1971)

Feb. 4: House Discussion of the 1899 Refuse Act Permit Program, pp. 1754-1763

THE REFUSE ACT PERMIT PROGRAM

The SPEAKER pro tempore. Under previous order of the House, the gentleman from Wisconsin, (Mr. REUSS), is recognized for 10 minutes.

Mr. REUSS. Mr. Speaker, I reported to the Members of this House on August 14, 1970 the "progressive step taken by the Corps of Engineers" in announcing a policy of full enforcement of the 1899

River and Harbor Act (30 Stat. 1151) and the "total abdication by the Department of Justice of its statutory duty 'to vigorously' enforce the act"—CONGRESSIONAL RECORD, volume 116, part 21, page 28935.

Today, I want to report the progress made by the executive branch in getting this program underway.

Following the corps' announcement of July 30, 1970, there began a series of

discussions between the Council on Environmental Quality, the Environmental Protection Agency, the Justice Department, and the corps over the program and the implementing regulations. These discussions culminated in the issuance of Executive Order 11574 by the President on December 23, 1970 (35 F.R. 19627) and proposed regulations by the corps on December 31, 1970 (35 F.R. 20005) and January 21, 1970 (36 F.R. 983).

I commend the President for his personal interest in directing that the corps and EPA get the program underway promptly. The program is based on the recommendations in the report issued on March 18, 1970, by the Committee on Government Operations (H. Rept. 91-917) and prepared by the Subcommittee on Conservation and Natural Resources, entitled "Our Waters and Wetlands: How the Corps of Engineers Can Help Prevent Their Destruction and Pollution." Congress, in Public Law 91-665 of January 8, 1971, appropriated \$2 million to the corps for this program.

When fully and properly implemented, this new program will significantly aid in reducing the pollution from industrial wastes discharged without adequate treatment into our Nation's waterways. I am concerned, however, about the adequacy of the regulations and accompanying material. I am most eager to see an effective program instituted. Our subcommittee has repeatedly urged this. We have been disappointed over its slow progress to date. We hope that in the next few weeks the corps and these other agencies will make appropriate changes in the proposed regulations and other documents consistent with existing law, that will eliminate the fears we have expressed to the Corps, EPA, and CEQ in the last few weeks.

I particularly hope that the revised Justice Department Guidelines on litigation under the 1899 Refuse Act will be revised even further to eliminate the requirement that, before a U.S. attorney

files "civil complaints, criminal information and the return of indictments in Refuse Act cases," he must first call Washington. If the U.S. attorney believes that a civil or criminal action, or both, should be instituted against a polluter, what possible reason is there for him to call Washington before he initiates it, unless it is to give Washington an opportunity to stop the U.S. attorney from filing the action on political or similar grounds?

I append the text of Executive Order 11574; the corps' regulations of December 31, 1970, and January 21, 1971; a corps-EPA memorandum of understanding of January 12, 1971; and an updated draft revision of the Justice Department guidelines.

I also append my letter of December 23, 1970, to Mr. Robert E. Jordan III, General Counsel of the Army, concerning the corps' regulations:

PROPOSED RULE MAKING
(Department of Defense)

DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS
[33 CFR Part 209]

Permits for discharges or deposits into navigable waters—proposed policy, practice, and procedure

Notice is hereby given that the regulations set forth in tentative form below are proposed by the Secretary of the Army (acting through the Corps of Engineers). The proposed regulation prescribes the policy, practice, and procedure to be followed by all Corps of Engineers installations and activities in connection with applications for permits authorizing discharges or deposits into navigable waters of the United States or into any tributary from which discharged matter shall float or be washed into a navigable water (33 U.S.C. 407).

Prior to the adoption of the proposed regulation consideration will be given to any comments, suggestions, or objections thereto which are submitted in writing to the Office of the Chief of Engineers, Washington, D.C. 20314, Attention: ENG CW—ON, within a period of 45 days from the date of publication of this notice in the *FEDERAL REGISTER*.

Dated: December 23, 1970.

F. P. KOISCH,
Major General, U.S. Army,
Director of Civil Works.

§209.131 Permits for discharges or deposits into navigable waters.

(a) *Purpose and scope.* This regulation prescribes the policy, practice, and procedure to be followed by all Corps of Engineers installations and activities in connection with applications for permits authorizing discharges or deposits into navigable waters of the United States or into any tributary from which discharged matter shall float or be washed into a navigable water.

(b) *Law and executive order authorizing permits.* (1) Section 13 of the Act approved March 3, 1899 (33 U.S.C. 407), hereafter referred to as the "Refuse Act," provides in part that it is unlawful "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 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."

(2) Executive Order No. 11574 (dated December 23, 1970) directs the implementation of a permit program under the authority of the Refuse Act and provides for the cooperation of affected Federal agencies in the administration of the program.

(c) *Related legislation.* (1) Section 21 (b) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.) (see particularly the Water Quality Improvement Act of 1970 (Public Law 91-224, 84 Stat. 108)), reflects the concern of the Congress with maintenance of applicable water quality standards and, subject to certain exceptions, requires any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities which may result in a discharge into the navigable waters of the United States to provide with his application an appropriate certification that there is reasonable assurance that such activity will be conducted in a manner which will not violate applicable water quality standards. Here-

after, section 21(b) will be referred to as a section of the Water Quality Improvement Act of 1970.

(2) The concern of the Congress with the need to encourage the productive and enjoyable harmony between man and his environment and the need to promote efforts which will prevent or eliminate damage to the environment was manifested in the enactment of the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347). Section 102 of that Act directs that:

"to the fullest extent possible: (1) The policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

* * * * *

"(B) Identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations * * *"

(3) The concern of the Congress with the conservation and improvement of fish and wildlife resources is indicated in the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c), wherein consultation with the Department of the Interior is required regarding activities affecting the course, depth, or modification of a navigable waterway.

(d) *General policy.* (1) Except as otherwise provided in the Refuse Act (33 U.S.C. 407), all discharges or deposits into navigable waters of the United States or tributaries thereof are, in the absence of an appropriate Department of the Army permit, unlawful. The fact that official objection may not have yet been raised with respect to past or continuing discharges or deposits should not be interpreted as authority to discharge or deposit in the absence of an appropriate permit, and will not preclude the institution of legal proceedings in appropriate cases for violation of the provisions of the Refuse Act. Similarly, the mere filing of an application requesting permission to discharge or deposit into navigable waters or tributaries thereof will not preclude legal action in appropriate cases for Refuse Act violations.

(2) The decision as to whether a permit authorizing a discharge or deposit will or will not be issued under the Refuse Act will be based on an evaluation of the impact of the discharge or deposit on (i) anchorage and navigation, (ii) water quality standards, which under the provisions of the Federal Water Pollution Control Act, were established "to protect the public health or welfare, enhance the quality of water and serve

the purposes" of that Act, with consideration of "their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses," and (iii) in cases where the Fish and Wildlife Coordination Act is applicable (where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modified the stream or body of water into which the discharge is made), the impact of the proposed discharge or deposit on fish and wildlife resources which are not directly related to water quality standards.

(3) Although the Refuse Act vests in the Secretary of the Army authority to determine whether or not a permit should or should not issue, it is recognized that responsibility for water quality improvement lies primarily with the States and, at the Federal level, with the Environmental Protection Agency (EPA). Accordingly, EPA shall advise the Corps with respect to the meaning, content, and application of water quality standards applicable to a proposed discharge or deposit and as to the impact which the proposed discharge or deposit may or is likely to have on applicable water quality standards and related water quality considerations. Specifically, Regional Representatives of EPA will determine and advise District Engineers with respect to the following:

(i) The meaning and content of water quality standards which, under the provisions of the Federal Water Pollution Control Act, were established "to protect the public health or welfare, enhance the quality of water and serve the purposes" of that Act, with consideration of "their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.":

(ii) The application of water quality standards to the proposed discharge or deposit, including the impact of the proposed discharge or deposit on such water quality standards and related water quality considerations;

(iii) The permit conditions required to comply with water quality standards;

(iv) The permit conditions required to carry out the purposes of the Federal Water Pollution Control Act where no water quality standards are applicable;

(v) The interstate water quality effect of the proposed discharge or deposit.

(4) In any case where a District Engineer of the Corps has received notice that a State or other certifying agency has denied a certification prescribed by section 21(b) of the Federal Water Pollution Control Act or, except as provided in subparagraph (6) of this paragraph, where a Regional Representative has recommended that a permit be denied

because its issuance would be inconsistent with his determination or interpretation with respect to applicable water quality standards and related water quality considerations, the District Engineer, within 30 days of receipt of such notice, shall deny the permit and provide notice of such denial to the Regional Representative of EPA.

(5) In the absence of any objection by the Regional Representative to the issuance of a permit for a proposed discharge or deposit, District Engineers may take action denying a permit only if:

(i) Anchorage and navigation will be impaired; or

(ii) Where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modifies the stream or body of water into which the discharge is made, and after the consultations required by the Fish and Wildlife Coordination Act, the District Engineer determines that the proposed discharge or deposit will have a significant adverse impact on fish or wildlife resources.

(6) In any case where the District Engineer believes that following the advice of the Regional Representative with respect to the issuance or denial of a permit would not be consistent with the purposes of the Refuse Act permit program, he shall, within 10 days of receiving such advice, forward the matter through channels to the Secretary of the Army to provide the Secretary with the opportunity to consult with the Administrator. Such consultation shall take place within 30 days of the date on which the Secretary receives the file from the District Engineer. Following such consultation, the Secretary shall accept the findings, determinations, and conclusions of the Administrator as to water quality standards and related water quality considerations and shall promptly forward the case to the District Engineer with instructions as to its disposition.

(7) No permit will be issued in cases where the applicant, pursuant to 21(b)(1) of the Water Quality Improvement Act of 1970, is required to obtain a State or other appropriate certification that the discharge or deposit would not violate applicable water quality standards and such certification was denied. No permit will be issued for discharges or deposits of harmful quantities of oil, as defined in section 11 of the Federal Water Pollution Control Act since primary permit and enforcement authority for all oil discharges is contained in that Act.

(e) *Authority to issue permits.* The Refuse Act provides that, "the Secretary of the Army, whenever in the judgment of the Chief of Engineers that anchorage and navigation will not be injured thereby, may permit the deposit of any material * * * in navigable waters, within the limits to be de-

fined and under conditions to be prescribed by him * * *." The Chief of Engineers, in the exercise of his judgment under the Act, has made the general determination that anchorage and navigation will not be injured when the discharge or deposit permitted will cause no significant displacement of water or reduction in the navigable capacity of a waterway. Except as otherwise provided in this regulation, the Secretary of the Army has authorized the Chief of Engineers and his authorized representatives to issue per-

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mits allowing discharges or deposits into navigable waters or tributaries thereof, if evaluation leads to the conclusion that (1), as determined by the Chief of Engineers, anchorage and navigation will not be injured thereby, and (2) issuance of a permit will not be inconsistent with the policy guidance prescribed in paragraph (d) of this section. Accordingly, within these limitations, District Engineers are authorized, except in cases which are to be referred to higher authority for decision (see paragraphs (d) (6) and (i) (7) of this section), to issue permits or to deny permit applications for discharges or deposits covered by the Refuse Act.

(f) *Relationship to other corps permits.* (1) Operators of facilities constructed in navigable waters under a valid construction permit issued pursuant to section 10 of the Rivers and Harbors Act approved March 3, 1899 (33 U.S.C. 403) must apply for and receive a new permit under the Refuse Act (33 U.S.C. 407) in order to lawfully discharge into or place deposits in navigable waters or tributaries thereof.

(2) Any person wishing to undertake work in navigable waters which may also result in a discharge or deposit into such navigable waters or tributaries thereof must apply for a permit under section 403 for such work and for a permit under section 407 to cover any proposed discharge or deposit. However, if the work proposed to be undertaken in navigable waters is limited to the construction of a minor outfall structure from which the proposed discharge or deposit will flow, District Engineers may, in their discretion and within the guidance provided in ER 1145-2-303, require a single permit application under this regulation (ER 1145-2-321). If a single permit is issued authorizing both work in navigable waters and a discharge or deposit, the permit should cite both sections 403 and 407 as authority for its issuance.

(g) *Information required with an application.* (1) An applicant for a permit involving a discharge or deposit in navigable waters or tributaries thereof must file the required form with the District Engineer. Until the required form is printed and made available to District Offices, applicants should provide

a letter requesting that the permit be issued. The letter must bear the address of the applicant and the date, identify the waterway involved and the precise location of the proposed discharge or deposit and contain a statement as to whether the facility from which the proposed discharge or deposit will originate is within the corporate limits of a municipality. The applicant must also furnish information which will fully identify the character of the discharge or deposit and monitoring devices and procedures which will be used. Such information shall include, but need not be limited to, data pertaining to chemical content, water temperature differentials, toxins, sewage, amount and frequency of discharge or deposit and the type and quantity of solids involved, if any. If the discharge or deposit will include solids of any type, applicants must (i) identify the proposed method of instrumentation to determine the effect of the disposition of solids on the waterway, and (ii) either assume responsibility for the periodic removal of such solids by dredging or agree to reimburse the United States for costs associated with such dredging.

(2) An application submitted by a corporation must be signed by the principal executive officer of that corporation or by an official of the rank of corporate vice president or above who reports directly to such principal executive officer and who has been designated by the principal executive officer to make such applications on behalf of the corporation. In the case of a partnership or a sole proprietorship, the application must be signed by a general partner or the proprietor. Each application must contain a certification by the person signing the application that he is familiar with the information provided and that to the best of his knowledge and belief such information is complete and accurate.

(h) *State certification.* (1) Section 21(b) (1) of the Water Quality Improvement Act of 1970 provides that "Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters of the United States, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate, that there is reasonable assurance, as determined by the State or interstate agency that such activity will be conducted in a manner which will not violate applicable water quality standards * * *. No license or permit shall be granted until the certification required by

this section has been obtained or has been waived" (as provided in a portion of section 21(b)(1) not quoted here). In cases where certification is required and no express notice of waiver has been received from the certifying agency, District Engineers should, as a general rule, provide the certifying agency with a full year within which to take action before determining that a waiver has occurred. If, however, special circumstances (as identified by either the District Engineer or the Regional Representative) require that action on a permit application under the Refuse Act be taken within a more limited period of time, the District Engineer shall determine a reasonable lesser period of time, advise the certifying agency of the need for action by a particular date, and that if certification is not received by the date established that it will be considered that the requirement for certification has been waived. Sections 21(b)(7) and (b)(8) of the Act identify circumstances in which permits of limited duration may issue without the certification required by section 21(b)(1). See paragraph (n) of this section.

(2) In cases involving discharges or deposits from facilities the construction of which was not lawfully commenced prior to April 3, 1970, certification pursuant to 21(b)(1) is required. District Engineers may accept, but not fully process, any permit application until the applicant has provided the required certification. When persons who will eventually require a Department of the Army permit seek State or other certification they shall (i) provide the appropriate certifying agency with the information on the discharge or deposit required by paragraph (g)(1) of this section, and (ii) file a copy of the certification application with the District Engineer. These steps will facilitate the processing of any formal application which may later be filed with the District Engineer and will enable the District Engineer to determine if the certification required is being waived by inaction on the part of the certifying authority.

(3) In cases involving a discharge or deposit from a facility, the actual construction of which was lawfully commenced prior to April 3, 1970, it will be the policy of the Corps of Engineers to accept but not to fully process any permit application until the applicant or the State has provided a letter from the State describing the impact of the proposed discharge or deposit and indicating the view of the State on the desirability of granting a permit. If such a letter is not provided within 1 year or within such lesser reasonable period of time as the District Engineer may have determined this requirement shall be waived.

(i) *Processing of permit application.* (1) When an application for a permit is received,

care should be taken to assure that the applicant has provided all of the information required by this regulation. Copies of applications received and all other information received relating thereto will be promptly forwarded by the District Engineer to the Regional Representative of EPA.

(2) If all of the required information has been provided but the applicant has failed to provide, as appropriate, the required certification or other letter discussed in paragraph (h) of the section, the applicant should be advised that no action will be taken on his application until the required certification or letter is provided or until a year or such lesser reasonable period of time as the District Engineer may have determined shall have expired and that his application will be processed only to the extent of sending a copy of the application to the Regional Representative of EPA.

(3) When all of the required information has been provided and the applicant has also provided, as appropriate, the required certification or letter discussed in paragraph (h) of this section, together with assurances that the character of the discharge or deposit was fully described to the State agency prior to the issuance of the certification or letter, the applicant shall be advised that his application is in order and that it will be processed as expeditiously as possible.

(4) When the application is found to be in order the District Engineer shall promptly forward a complete copy of the application or such additional information as has not already been furnished to the Regional Representative of EPA. The Regional Representative of EPA will be asked to review the application and to (i) advise the District Engineer within 30 days whether the proposed discharge or deposit may affect the quality of waters of another State (as required by section 21(b)(2) of the Water Quality Improvement Act of 1970), and (ii) provide the other information identified in paragraph (d)(3) of this section within 45 days. If, however, additional time beyond said 45 days (or any extension thereof) is required to respond, the Regional Representative shall notify the District Engineer and shall advise him as to the additional period of time which will be required to provide such information. In cases where a Regional Representative does not provide such information and advice to a District Engineer within the time period specified herein (including any extensions of time required by the Regional Representative) the advice furnished by a State or other certifying authority shall be considered by the District Engineer to be the advice of the Regional Representative. In the event that the Regional Representative determines that the proposed discharge or deposit may affect the

quality of the waters of any other State and so notifies the District Engineer, the matter should be reported to the Chief of Engineers, Attention: ENGGC-K. In such cases, special procedures are provided for in section 21(b) (2) of the Water Quality Improvement Act of 1970.

(5) At approximately the same time a completed copy of the permit application is furnished to the Regional Representative of EPA, a public notice, as described in paragraph (j) of this section, will be issued. Notice will also be sent to all parties known or believed to be interested in the application, including the appropriate Regional Director of the Department of the Interior, the National Oceanic and Atmospheric Administration of the Department of Commerce, navigation interests, State, county, or municipal authorities, adjacent property owners, the heads of State agencies having responsibility for water quality improvement and wildlife resources, and conservation organizations. Copies of the notice will be posted in post offices and other public places in the vicinity of the site of the proposed discharge or deposit. A copy of every notice issued will be

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sent to the Chief of Engineers, Attention: ENGCW-ON.

(6) If notice of the permit application evokes substantial public interest a public hearing may be held. Policy with respect to the holding and conduct of public hearings is discussed in paragraph (k) of this section.

(7) In the absence of objection by the Regional Representative of EPA or, in the cases involving the Fish and Wildlife Coordination Act, by the Regional Director of the Department of the Interior or the National Oceanic and Atmospheric Administration of the Department of Commerce, District Engineers may, consistent with the policy guidance contained in paragraph (d) of this section and, after considering all of the information developed with respect to the permit application, including written or oral information presented in response to a public notice or at a public hearing, issue a permit, with or without conditions. In the event that the District Engineer determines that issuance of the permit with or without conditions, is appropriate but there is objection to the issuance of the proposed permit by the Regional Representative of EPA or, in cases involving the Fish and Wildlife Coordination Act, by the Regional Director of the Department of the Interior or the National Oceanic and Atmospheric Administration of the Department of Commerce, the matter must be forwarded to higher authority for decision. Every effort should be made to restore differences at the District Engineer level before

referring the matter to higher authority. In the event that differences cannot be resolved, District and Division Engineers will forward the application, copies of the public notice and addresses to whom sent, the comments of State and Federal agencies, a copy of the transcript of any public hearing held, a narrative report and recommendations to the Chief of Engineers, Attention: ENGCW-ON. In any case referred to the Secretary of the Army pursuant to paragraph (d) (6) of this section, consultation with the Administrator shall take place within 30 days of the date on which the Secretary receives the file from the District Engineer. Following such consultation, the Secretary shall accept the findings, determinations, and conclusions of the Administrator as to water quality standards and related water quality considerations and shall promptly forward the case to the District Engineer with instructions as to its disposition.

(j) *Public notice.* (1) As required by paragraph (1) (5) of this section a public notice will be issued after a permit application is determined to be in proper order. In cases where the permit applied for pertains to a discharge or deposit and does not involve construction or other work in navigable waters, the notice shall (i) state the name and address of the applicant, (ii) identify the waterway involved and provide a sketch showing the location of the proposed discharge or deposit, (iii) fully identify the character of the discharge, (iv) include any other information which may assist interested parties in evaluating the likely impact of the proposed discharge or deposit, if any, (v) provide 30 days within which interested parties may express their views concerning the permit application. All public notices involving a proposed discharge or deposit shall contain the following statement:

"The decision as to whether a permit authorizing a discharge or deposit will or will not be issued under the Refuse Act will be based on an evaluation of the impact of the discharge or deposit on (1) anchorage and navigation, (2) water quality standards and related water quality considerations as determined by State authorities and the Environmental Protection Agency, and (3) in cases where the Fish and Wildlife Coordination Act is applicable (where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modifies the stream or body of water into which the discharge is made), the impact of the proposed discharge or deposit on fish and wildlife resources."

(2) Comments received from interested parties within the period provided for in the public notice will be retained and will be considered in determining whether the permit applied for should be issued.

(3) When a response to a public notice has been received from a Member of Congress, either in behalf of a constituent or himself, the Division or District Engineer will inform the Member of Congress of the final action taken on the application.

(4) When objections to the issuance of a permit are received in response to a public notice, the Division or District Engineer will furnish the applicant with copies of the objections and afford him the opportunity to rebut or resolve the objections.

(k) *Public hearings.* (1) It is the policy of the Corps of Engineers to conduct the civil works program in an atmosphere of public understanding, trust, and mutual cooperation and in a manner responsive to the public interest. To this end, a public hearing may be helpful and will be held in connection with an application for a permit involving a discharge or deposit in navigable waters or tributaries thereof whenever, in the opinion of the District Engineer such a hearing is advisable. In considering whether or not a public hearing is advisable, consideration will be given to the degree of interest by the public in the permit application, requests by responsible Federal, State, or local authorities, including Members of the Congress, that a hearing be held, and the likelihood that information will be presented at the hearing that will be of assistance in determining whether the permit applied for should be issued. In this connection, a public hearing will not generally be held if there has been a prior hearing (local, State, or Federal) addressing the proposed discharge unless it clearly appears likely that the holding of a new hearing may result in the presentation of significant new information concerning the impact of the proposed discharge or deposit. The need for a hearing will be reported to the Division Engineer and his concurrence obtained. In certain circumstances a public hearing may be mandatory (see subparagraph (4) of this paragraph).

(2) The success of a public hearing depends upon the degree to which all interests are aware of the hearing and understand the issues involved. The following steps will be taken for each hearing:

(i) A public notice will be prepared and issued in clear, concise, objective style, stating the purpose of the hearing; details of time and place; description of the application involved; and identification of the proposed discharge or deposit. Care will be exercised to avoid creating any impression that the Corps is an advocate or adversary in the matter.

(ii) The Public Notice will be issued sufficiently in advance of the hearing, generally not less than 30 days, to allow time for interested persons to prepare for the hearing. It will be distributed to addressees on compiled lists and will include all known parties

directly affected, all governmental entities concerned, all general public news media within the geographical area, appropriate specialized news media for reaching interested groups and organizations, and directly to the principal officers of such groups and organizations, including national offices of nationwide organizations.

(iii) As appropriate, supplementary informational matter, fact sheets, or more detailed news releases, will be distributed to the general or specialized news media, or other groups and interests involved.

(iv) Notification will be given to interested members of the Congress and Governors of the States involved.

(3) The hearing will be conducted in a manner that permits open and full advocacy on all sides of any issues involved. A transcript of the hearing, together with copies of relevant documents, will become a part of the permit application assembly.

(4) In addition to the hearings which may be required by the policy specified in the preceding paragraphs, hearings are required under sections 21(b)(2) and 21(b)(4) of the Water Quality Improvement Act of 1970 when (i) a State, other than the State of origin, objects to the issuance of a permit and requests a hearing on its objections or (ii) the Secretary of the Army proposes to suspend a Department of the Army permit upon notification by the certifying authority that applicable water quality standards will be violated. When a hearing is required pursuant to the Water Quality Improvement Act of 1970 the matter should be reported to the Chief of Engineers, Attention: ENGGC-K. The Chief of Engineers will provide additional guidance with respect to holding of such hearings.

(5) In any case, when a District Engineer intends to schedule a public hearing he shall notify the Regional Representative of EPA not less than 10 days in advance of the deadline for filing of comments by the Regional Representative upon the permit application so that the Regional Representative will be able to defer such comments until after the public hearing has been held.

(1) *Environmental impact statement.* (1) Section 102(2)(c) of the National Environmental Policy Act of 1969 requires all Federal agencies, with respect to major Federal actions significantly affecting the quality of the human environment, to submit to the Council on Environmental Quality a detailed statement on

(i) The environmental impact of the proposed action,

(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented.

(iii) Alternatives to the proposed action,

(iv) The relationship between local short-term uses of man's environment and the

maintenance and enhancement of long-term productivity, and

(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

(2) Section 102(2)(c) statements will not be required in permit cases where it is likely that the proposed discharge will not have any significant environmental impact. Moreover, the Council on Environmental Quality has advised that such statements will not be required where the only impact of proposed discharge or deposit will be on water quality and related considerations. However, such statements may be required in connection with proposed discharges or deposits which may have a substantial environmental impact unrelated to water quality. In cases in which a section 102(2)(c) statement may be required, the report of the District Engineer accompanying any case referred to higher authority (see paragraphs (d)(3) and (i)(7) of this section) will contain a separate section addressing the environmental impact of the proposed discharge or deposit, if any, and, if issuance of a permit is recommended, a draft section 102(2)(c) statement should be attached.

(m) *Publicity.* District Engineers will, in consultation with Regional Representatives, establish and maintain a program to assure that potential applicants for permits are informed of the requirements of this regulation and of the steps required to obtain permits for discharges into navigable waters. Whenever the District Engineer becomes aware of plans being developed by either private or public entities who will require permits in order to implement the plans a letter will be sent to the potential permittee ad-

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vising him of statutory requirements and the need to apply for a permit under this regulation.

(n) *Duration of permits issued.* (1) In cases where appropriate certification has been received indicating that there is reasonable assurance that the proposed discharge or deposit will not violate applicable water quality standards and issuance is otherwise proper, no permit may be issued which authorizes a discharge or deposit for more than 5 years without providing for revalidation of such permit.

(2) In cases involving a facility, the construction of which was lawfully undertaken prior to April 3, 1970, and it appears after evaluation that issuance of a permit would be appropriate although certification has not been provided, a permit may be issued provided (i) that the permit will expire on April 2, 1973, and (ii) that it is conditioned so as to require annual demonstration by the permittee that the discharge or deposit is in

compliance with State water quality implementation schedules.

(i) Require compliance with applicable water quality standards, including implementing schedules adopted in connection with such standards;

(ii) include provisions incorporating into the permit changes in water quality standards subsequent to the date of the permit, and requiring compliance with such changed standards;

(iii) Provide for possible suspension or revocation in the event that the permittee breaches any condition of the permit;

(iv) Provide for possible suspension, modification or revocation if subsequent to the issuance of a permit it is discovered that the discharge or deposit contains hazardous materials which may pose a danger to health or safety.

(2) Permits shall also be subject to conditions as determined by EPA to be necessary for purposes of insuring compliance with water quality standards or the purposes of the Federal Water Pollution Control Act. Such conditions may include but are not necessarily limited to:

(i) Requirements for periodic demonstrations of compliance with water quality criteria, established implementation schedules or prescribed levels of treatment;

(ii) Site and sampling accessibility;

(iii) Requirements for periodic reports as to the nature and quantity of discharges or deposits.

[F.R. Doc. 70-17584; Filed, Dec. 30, 1970; 8:48 a.m.]

PROPOSED RULE MAKING

(Department of Defense)

DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS

[33 CFR Part 209]

Permits for discharges or deposits into navigable waters—proposed policy, practice and procedure

Proposed regulations prescribing the policy, practice and procedure to be followed by all Corps of Engineers' installations and activities in connection with applications for permits authorizing discharges or deposits into navigable waters of the United States or into any tributary from which discharged matter shall float or be washed into a navigable water (33 U.S.C. 407) were published in the *FEDERAL REGISTER* of December 31, 1970 (35 F.R. 20005). Public comment on the proposed regulations was invited within a period of 45 days from December 31, 1970.

The proposed Memorandum of Understanding set forth below relates to the proposed regulations and to Executive Order 11574 which deals with the administration of the

Refuse Act Permit Program (35 F.R. 19627). If executed, the proposed Memorandum of Understanding will be an additional paragraph to the proposed regulations 33 CFR 209.131 (p).

Comments, suggestions, or objections to the proposed Memorandum of Understanding should be submitted in writing to the Office of Chief of Engineers, Washington, D.C. 20314, Attention: ENGCW-ON, within 30 days of publication of this notice in the FEDERAL REGISTER.

Dated: January 18, 1971.

F. P. Koisch,
Major General, U.S. Army,
Director of Civil Works.

§209.131 Permits for discharges or deposits into navigable waters.

* * * * *

(p) Memorandum of understanding between the Administrator of the Environmental Protection Agency and the Secretary of the Army.

"PERMIT PROGRAM

"MEMORANDUM OF UNDERSTANDING BETWEEN THE ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY AND THE SECRETARY OF THE ARMY

"In recognition of the responsibilities of the Secretary of the Army under section 13 of the Act of March 3, 1899, "the Refuse Act," (33 U.S.C. 407) relating to the control of discharges and deposits in navigable waters of the United States and tributaries thereof, and the interrelationship of those responsibilities with the responsibilities of the Administrator of the Environmental Protection Agency under the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.) in recognition of our joint responsibilities under Executive Order No. 11574 (dated December 23, 1970) we hereby adopt the following policies and procedures:

"POLICIES

"1. It is our policy that there shall be full coordination and cooperation between our respective organizations on the above responsibilities at all organizational levels, and it is our view that maximum efforts in the discharge of those responsibilities, including the resolution of differing views, must be undertaken at the earliest practicable time and at the field organizational unit most directly concerned. Accordingly, District Engineers of the U.S. Army Corps of Engineers (hereinafter "the Corps") shall coordinate the review of applications for permits under the Refuse Act of discharges or deposits into navigable waters of the United States or tributaries thereof with Regional Repre-

sentatives designated by the Environmental Protection Agency (hereinafter "EPA").

"2. EPA shall advise the Corps with respect to the meaning, content and application of water quality standards applicable to a proposed discharge or deposit and as to the impact which the proposed discharge or deposit may or is likely to have on water quality standards and related water quality considerations. The Corps shall accept such advice on matters pertaining to water quality standards and related water quality considerations as conclusive and no permit shall be issued which is inconsistent with any finding, determination or interpretation of a Regional Representative with respect to such standards or considerations.

"3. In acting upon applications for permits, the Corps shall be responsible for considering the impact which the proposed discharge or deposit may have on navigation and anchorage and, in cases where the Fish and Wildlife Coordination Act is applicable, on fish and wildlife resources.

"PROCEDURES

"1. Applicants for permits pursuant to section 13 of the Rivers and Harbors Act of 1899 shall be required by District Engineers to supply data identified by EPA and the Department of the Army. A uniform format for supplying such data will be developed by the Corps and EPA.

"2. District Engineers shall provide Regional Representatives of EPA at the earliest practicable time with copies of an applicant's request for a permit request for certification from a State pursuant to section 21(b) of the Federal Water Pollution Control Act, or other requests for State approval and State or interstate agency certifications or other actions relating to such permit applications.

"3. In reaching determinations as to compliance with water quality standards, including determinations and interpretations arising from its review of State or interstate agency water quality certifications under section 21(b) of the Federal Water Pollution Control Act, Regional Representatives of EPA will determine and advise District Engineers with respect to the following:

"(i) The meaning and content of water quality standards, which under the provisions of the Federal Water Pollution Control Act, were established 'to protect the public health and welfare, enhance the quality of water and serve the purposes' of that Act, with consideration of 'their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.'

"(ii) The application of water quality standards to the proposed discharge or deposit, including the impact of the proposed discharge or deposit on such water quality

standards and related water quality considerations;

"(iii) The permit conditions required to comply with water quality standards;

"(iv) The permit conditions required to carry out the purposes of the Federal Water Pollution Control Act where no water quality standards are applicable;

"(v) The interstate water quality effect of the proposed discharge or deposit.

"4. Regional Representatives of EPA shall provide advice as to the effect, if any, of the proposed discharge or deposit on the quality of the waters of any other State not later than 30 days after receipt of copies of both the completed permit application and the State certification or other State action from the District Engineer. The other information and advice identified above shall be provided not later than 45 days after such receipt. If, however, additional time is required to respond, the Regional Representative shall so notify the District Engineer and shall advise him as to the additional period of time which will be required to provide a report. In cases where a Regional Representative does not provide such information and advice to a District Engineer within the time periods specified herein (including any extensions of time requested by the Regional Representative), the advice furnished by a State or other certifying authority shall be considered by the District Engineer to be the advice of the Regional Representative.

"5. In any case, where a District Engineer of the Corps has received notice that a State or other certifying agency has denied a certification prescribed by section 21(b) of the Federal Water Pollution Control Act, or, except as provided in a subsection G below, where a Regional Representative has recommended that a permit be denied because its issuance would be inconsistent with his determination or interpretation with respect to applicable water quality standards and related water quality considerations the District Engineer, within 30 days of receipt of such notice, shall deny the permit and provide notice of such denial to the Regional Representative of EPA.

"6. In the absence of any objection by the Regional Representative to the issuance of a permit for a proposed discharge or deposit, District Engineers may take action denying a permit only if:

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"(i) anchorage and navigation will be impaired; or

"(ii) the discharge for which a permit is sought impounds, diverts deepens the channel, or otherwise control or similarly modifies the stream or body of water into which the discharge is made, and, after the consultations required by the Fish and Wildlife

Coordination Act, the District Engineer determines that the proposed discharge or deposit will have significant adverse impact on fish or wildlife resources.

"7. In any case where the District Engineer believes that following the advice of the Regional Representative with respect to the issuance or denial of a permit would not be consistent with the purposes of the Refuge Act permit program, he shall, within 10 days of receiving such advice, forward the matter through channels to the Secretary of the Army to provide the Secretary with the opportunity to consult with the Administrator. Such consultation shall take place within 30 days of the date on which the Secretary receives the file from the District Engineer. Following such consultation, the Secretary shall accept the findings, determinations, and conclusions of the Administrator as to water quality standards and related water quality considerations and shall promptly forward the case to the District Engineer with instructions as to its disposition.

"8. No permit will be issued in cases where the applicant, pursuant to 21(b)(1) of the Water Quality Improvement Act of 1970, is required to obtain a State or other appropriate certification that the discharge or deposit would not violate applicable water quality standards and such certification was denied.

"REGULATIONS

"The Department of the Army shall consult with EPA before promulgating regulations pursuant to the Refuse Act which relate to the subject of this memorandum of understanding. In no case will such regulations be issued unless at least 30 days prior to issuance, they shall have been forwarded to EPA for comment or unless prior to that time the Department of the Army and EPA have reached agreement. EPA shall consult with the Department of the Army prior to the issuance of guidelines, policies or procedures relating to the subject of this memorandum of understanding. In no event shall such guidelines, policies or procedures be issued prior to 30 days from the date they were forwarded to the Department of the Army for comment unless prior to that time the Department of the Army and EPA have reached agreement. In no event shall regulations, guidelines, policies or procedures which are inconsistent with the provisions of this memorandum of understanding be published or issued.

"PERMIT CONDITIONS

"1. Every permit issued shall:

"(i) Require compliance with applicable water quality standards, including implementing schedule adopted in connection with such standards;

"(ii) Include provisions incorporating into the permit changes in water quality standards subsequent to the date of the permit, and requiring compliance with such changed standards;

"(iii) Provide for possible suspension or revocation in the event that the permittee breaches any condition of the permit;

"(iv) Provide for possible suspension, modification or revocation if, subsequent to the issuance of a permit, it is discovered that the discharge or deposit contains hazardous materials which may pose a danger to health or safety.

"2. Permits shall also be subject to conditions, as determined by EPA, to be necessary for purposes of insuring compliance with water quality standards or the purposes of the Federal Water Pollution Control Act. Such conditions may include, but are not necessarily limited to:

"(i) Requirements for periodic demonstrations of compliance with water quality criteria, established implementation schedules, or prescribed levels of treatment;

"(ii) Site and sampling accessibility.

"(iii) Requirements for periodic reports as to the nature and quantity of discharge or deposits.

"(3) Regional Representatives of EPA may also provide District Engineers with advice as to the duration for which permits should be issued. Relevant considerations shall include the nature of the discharge, basin plans, and changing treatment technology.

"TECHNICAL DATA

"EPA, in consultation with the Department of the Army, shall develop and make available analytical procedures, methods and criteria to be employed in identifying the meaning and application of water quality standards and pursuant to which EPA's determinations and interpretations respecting water quality standards will be made.

"AMENDMENT

"If, in the course of operations within this memorandum of understanding, either party finds its terms in need of modification, he may notify the other of the nature of the desired changes. In that event, the parties shall within 90 days negotiate such amendments as are considered mutually desirable.

"(Secretary of the Army)

"Administrator of the Environmental Protection Agency)"

[FR Doc. 71-884 Filed 1-20-71; 8:49 am]

[From the FEDERAL REGISTER, Dec. 23, 1970]

PRESIDENTIAL DOCUMENTS: TITLE 3—THE PRESIDENT

(Executive Order 11574)

ADMINISTRATION OF REFUSE ACT PERMIT PROGRAM

By virtue of the authority vested in me as President of the United States, and in furtherance of the purposes and policies of section 13 of the Act of March 3, 1899, c. 425, 30 Stat. 1152 (33 U.S.C. 407), the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-666c), and the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), it is hereby ordered as follows:

SECTION 1. *Refuse Act permit program.* The executive branch of the Federal Government shall implement a permit program under the aforesaid section 13 of the Act of March 3, 1899 (hereinafter referred to as "the Act") to regulate the discharge of pollutants and other refuse matter into the navigable waters of the United States or their tributaries and the placing of such matter upon their banks.

SEC. 2. *Responsibilities of Federal agencies.*

(a) (1) The Secretary shall, after consultation with the Administrator respecting water quality matters, issue and amend, as appropriate, regulations, procedures, and instructions for receiving, processing, and evaluating applications for permits pursuant to the authority of the Act.

(2) The Secretary shall be responsible for granting, denying, conditioning, revoking, or suspending Refuse Act permits. In so doing:

(A) He shall accept findings, determinations, and interpretations which the Administrator shall make respecting applicable water quality standards and compliance with those standards in particular circumstances, including findings, determinations, and interpretations arising from the Administrator's review of State or interstate agency water quality certifications under section 21(b) of the Federal Water Pollution Control Act (84 Stat. 108). A permit shall be denied where the certification prescribed by section 21(b) of the Federal Water Pollution Control Act has been denied, or where issuance would be inconsistent with any finding, determination, or interpretation of the Administrator pertaining to applicable water quality standards and considerations.

(B) In addition, he shall consider factors, other than water quality, which are prescribed by or may be lawfully considered under the Act or other pertinent laws.

(3) The Secretary shall consult with the Secretary of the Interior, with the Secretary of Commerce, with the Administrator, and with the head of the agency exercising ad-

ministration over the wildlife resources of any affected State, regarding effects on fish and wildlife which are not reflected in water quality considerations, where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modifies the stream or body of water into which the discharge is made.

(4) Where appropriate for a particular permit application, the Secretary shall perform such consultations respecting environmental amenities and values, other than those specifically referred to in paragraphs (2) and (3) above, as may be required by the National Environmental Policy Act of 1969.

(b) The Attorney General shall conduct the legal proceedings necessary to enforce the Act and permits issued pursuant to it.

Sec. 3. *Coordination by Council on Environmental Quality.* (a) The Council on Environmental Quality shall coordinate the regulations, policies, and procedures of Federal agencies with respect to the Refuse Act permit program.

(b) The Council on Environmental Quality, after consultation with the Secretary, the Administrator, the Secretary of the Interior, the Secretary of Commerce, the Secretary of Agriculture, and the Attorney General, shall from time to time or as directed by the President advise the President respecting the implementation of the Refuse Act permit program, including recommendations regarding any measures which should be taken to improve its administration.

Sec. 4. *Definitions.* As used in this order, the word "Secretary" means the Secretary of the Army, and the word "Administrator" means the Administrator of the Environmental Protection Agency.

RICHARD NIXON.

THE WHITE HOUSE, December 23, 1970.

MEMORANDUM OF UNDERSTANDING BETWEEN THE
ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY AND THE SECRETARY OF THE ARMY

The Administrator of the Environmental Protection Agency and the Secretary of the Army, recognizing the interrelationship between section 13, of the Act of March 3, 1899 (33 U.S.C. 407) (the "Refuse Act") administered by the Department of the Army and the statutory responsibilities of the Environmental Protection Agency under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 *et seq.*), and further recognizing their responsibilities under the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), and their responsibilities under Executive Order 11574 dated December 23, 1970, which directs the Federal Government to implement a permit program under the

Refuse Act to control the discharge of pollutants into navigable waters and their tributaries, have entered into this memorandum of understanding to delineate more fully the respective responsibilities of said Agency and Department for water pollution abatement and control, and to establish policies and procedures for interagency cooperation in the enforcement of the Refuse Act.

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I. RESPONSIBILITIES FOR WATER POLLUTION
ABATEMENT AND CONTROL

A. At the Federal level, the Environmental Protection Agency has primary responsibility, pursuant to the Federal Water Pollution Control Act, for the abatement and control of pollution of interstate and navigable waters of the United States.

B. The Department of the Army has primary responsibility for the enforcement of the Refuse Act.

C. Under Executive Order 11574, the Secretary is directed to develop regulations and procedures in consultation with the Administrator governing the issuance of discharge permits under the Refuse Act, and, in connection with the grant, denial, conditioning, revocation and suspension of such permits, to adopt determination and interpretations of the Administrator respecting water quality standards and compliance therewith.

D. The Department of the Army and the Environmental Protection Agency have in cooperation undertaken to implement the permit authority of the Refuse Act pursuant to a Memorandum of Understanding dated January , the terms of which are incorporated herein and made a part hereof.

II. THE REFUSE ACT

A. The Refuse Act, 33 U.S.C. 407, provides that:

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 the 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 same 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 officer 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, Mar. 3, 1899, c. 425.

B. Criminal sanctions may be imposed against persons or corporations found guilty of violating provisions of the Refuse Act. As prescribed in 33 U.S.C. 411, the penalty upon conviction is "a fine not exceeding \$2,500 nor less than \$500, or . . . imprisonment (in the case of a natural person) for not less than thirty days nor more than one year, or 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."

C. Civil proceedings may also be instituted to enjoin conduct which would violate provisions of the Refuse Act. *United States v. Republic Steel Corp.*, 362 U.S. 482 (1960) and *Wyandotte Transportation Co. v. United States*, 389 U.S. 191 (1967).

III. POLICY WITH RESPECT TO ENFORCEMENT OF REFUSE ACT

The policy of the Environmental Protection Agency and the Department of the Army is to utilize the Refuse Act and the authorities contained therein to the fullest extent possible and in a manner consistent with the provisions of the Federal Water Pollution Control Act to ensure compliance with applicable water quality standards and otherwise to carry out the purposes of the Federal Water Pollution Control Act. Persons wishing to discharge into or place deposits in navigable waters or tributaries thereof will be required to apply for and obtain a permit from the Department of the Army. Persons without an appropriate permit who discharge into navigable waters or tributaries thereof or who discharge into such waters in violation of the terms of a valid permit may be subjected to legal proceedings under the Refuse Act.

IV. INTER-AGENCY COOPERATION

A. In recognition of the expertise of the Department of the Army and the Corps of

Engineers in matters pertaining to the navigability of a waterway, it is agreed that the Department of the Army, acting through the Corps of Engineers, has primary Federal responsibility for identifying and investigating violations of the Refuse Act which have an adverse impact on the navigable capacity of a waterway. Whenever a District Engineer has reason to believe that a discharge has or may have occurred having an adverse impact on water quality, he shall so notify the appropriate Regional Representative of the Environmental Protection Agency and shall provide him with all information, including, if the discharger is the holder of a Refuse Act permit, a copy of said permit and all of the conditions attached thereto. The said Regional Representative shall make such investigation as he deems appropriate and shall advise the District Engineer in a timely manner whether in his opinion a violation of the Refuse Act having an adverse impact on water quality has or may have occurred. If the Regional Representative is of such opinion, he shall make a report to the District Engineer as to the following:

1. The nature and seriousness of the apparent violation (including, if the discharger is the holder of a Refuse Act permit, information as to the conditions of such permit which appear to have been violated).

2. The nature and seriousness of the impact on water quality.

3. The measures, if any, taken or being taken by the discharger to comply with applicable water quality standards or the conditions of a Refuse Act permit, if any.

4. The existence and adequacy of State or local pollution abatement proceedings.

5. The applicability of the Federal Water Pollution Control Act, whether any administrative or judicial proceedings are being taken or contemplated thereunder, and the status of any such proceedings.

6. His recommendations as to the action, if any, which should be taken under the Refuse Act and his reasons therefore. If the discharger is the holder of a Refuse Act permit, such recommended action may include in addition to or more of the remedies available thereunder, the suspension or revocation of the permit. A recommendation to suspend shall include a recommendation as to the period and conditions of the suspension.

B. In recognition of the expertise of the Environmental Protection Agency in matters pertaining to water quality, it is agreed that said Agency has primary Federal responsibility for identifying and investigating cases involving discharges into interstate or navigable waters which have an adverse impact on water quality. District Engineers shall assist Regional Representatives of the Environmental Protection Agency by providing them with such information as may become

available concerning known or suspected discharges which may adversely affect water quality (including, if the discharger is the holder of a Refuse Act permit, a copy of said permit and all of the conditions attached thereto), and, to the extent of available resources, shall assist in the conduct of investigations concerning such discharges. Regional Representatives shall be responsible for notifying District Engineers of known or suspected violations of the Refuse Act and for providing District Engineers with timely reports of investigations conducted. Whenever in the opinion of the Regional Representative a violation of the Refuse Act having an adverse impact on water quality has or may have occurred, such report shall include all of the same information and recommendations called for in sub-paragraphs 1 through 6 of Paragraph A with respect to reports submitted under that paragraph.

C. In connection with any remedial action recommended or taken pursuant to this memorandum of understanding, due regard shall be given to the provisions of section 21(b) of the Federal Water Pollution Control Act; and in particular the provisions of sections 21(b) (4); 21(b) (5) and 21(b) (9) (B) relating to the revocation on suspension of permits.

D. In any case in which a Refuse Act permit is suspended, if the District Engineer has reason to believe that the permittee has or may have violated the terms of the suspension, he shall notify the appropriate Regional Representative of the Environmental Protection Agency and provide him with all available information. The Regional Representative shall make such investigation as he deems appropriate and shall make a report to the District Engineer, such report to include, to the extent relevant, the information and recommendations called for in sub-paragraphs 1 through 6 of paragraph A with respect to reports submitted under that paragraph.

E. If upon review of all reports and information prepared pursuant to this memorandum of understanding and any other available evidence, it is determined by the District Engineer of the Corps or the Regional Representative of EPA to request legal proceedings under the Refuse Act, such District Engineer or Regional Representative shall, in consultation with each other, forward all available evidence and information, including recommendations, if any, of both the Regional Representative and the District Engineer, to the appropriate United States Attorney. A copy of any covering letter forwarding information and evidence to the appropriate United States Attorney should be mailed, together with a brief summary of the factual background of the case, to the Assistant Attorney General for Lands and

Natural Resources, Department of Justice, Washington, D.C. 20530.

DRAFT GUIDELINES FOR LITIGATION UNDER THE REFUSE ACT PERMIT PROGRAM

In view of (a) the signing by the President of the attached Executive Order 11574 which establishes a permit program under the Refuse Act to regulate the discharges of pollutants and other refuse matter into the navigable waters of the United States or their tributaries, (b) the signing of the attached Memorandum of Understanding between the Corps of Engineers and the Environmental Protection Agency with respect to the enforcement of the Refuse Act, and (c) the consolidation within the Land and Natural Resources Division pursuant to the attached order of criminal as well as civil responsibility for the administration of the Refuse Act, the Guidelines for Litigation Under the Refuse Act transmitted to the United States

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Attorneys on June 13, 1970 are hereby withdrawn and the following procedures are to be adhered to by all United States Attorneys:

1. United States Attorneys are authorized to initiate any action, either civil or criminal, referred to them for litigation by the District Engineer of the Corps of Engineers or the Regional Representative of the Environmental Protection Agency, pursuant to their Memorandum of Understanding.

2. All allegations of violations of the Refuse Act submitted to the United States Attorneys from sources other than the District Engineer of the Corps of Engineers or the Regional Representative of the Environmental Protection Agency shall be referred to the District Engineer of the Corps of Engineers and the Regional Representative of the Environmental Protection Agency, for investigation and recommendations, in accordance with the procedures set forth in the Memorandum of Understanding between the Corps of Engineers and the Environmental Protection Agency, as to whether or not legal action should be initiated.

3. The provisions of paragraphs 1 and 2 above shall not apply to actions under the Refuse Act against vessels, which actions shall continue to be handled in the manner set forth in Departmental Memorandums 374 and 376, dated June 3, 1964.

4. All requests for instructions and guidance relating to the enforcement of the Refuse Act, whether of a civil or criminal nature, or whether involving vessels or shore-based sources of pollution, shall be referred to the Pollution Control Section of the Land and Natural Resources Division, Washington, D.C. 20530 (202-739-2707).

5. No criminal or civil action under the

Refuse Act shall be dismissed or settled without the prior authorization of the Assistant Attorney General for the Land and Natural Resources Division.

6. Prior to the filing of civil complaints, criminal informations and the return of indictments in Refuse Act cases, the United States Attorney shall telephonically contact the Land and Natural Resources Division (202-739-2800).

7. The United States Attorneys shall supply the Pollution Control Section, Land and Natural Resources Division, copies of all pleadings, motions, memorandums, etc., filed in Refuse Act cases.

8. United States Attorneys shall, no later than the fifth day of each month, submit to the Pollution Control Section a report of Refuse Act activities for the previous month on a form to be provided by the Land and Natural Resources Division.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C. December 23, 1970.

Mr. ROBERT E. JORDAN III,
General Counsel, Department of the Army,
The Pentagon, Washington, D.C.

DEAR MR. JORDAN: Thank you for sending to us, on Monday afternoon, December 21, a copy of the proposed Corps of Engineers' regulation (ER 1145-2-321) entitled "Permits for Discharges or Deposits into Navigable Waters," to enforce section 13 of the River and Harbor Act of 1899 (33 U.S. Code 407) (the Refuse Act).

We have not yet received, and would appreciate receiving promptly, your reply to our letter of December 4, 1970, to you concerning this program.

We believe that the draft regulation is inadequate and, in some respects, inconsistent with existing law. Many of the provisions are ambiguous and appear to have been hastily written, despite the fact that the Corps has been considering this program for more than six months. We urge that this draft regulation be revised before it is published.

Our comments on some of the more significant deficiencies of the draft regulation are set forth below.

I

Section 1 of the draft states that the proposed regulation "prescribes the policy, practice, and procedure to be followed" by the Corps in carrying out the regulation. However, it does not indicate that the primary purpose of the regulation is to enforce the 1899 Refuse Act and to establish a procedure under which all refuse dischargers must apply for and obtain Corps' permits. As a matter of fact, there is no statement in the draft

telling all dischargers that they must apply for a Corps permit.

II

Our Subcommittee staff had understood, from discussions with your staff, that the Corps would (1) make the regulation effective upon final publication as to those who begin to discharge refuse thereafter, and (2) require existing dischargers to file applications by July 1, 1970. The draft does not cover either of these points.

We are most eager to see this program instituted. We have repeatedly urged the Corps to initiate it. We are disappointed over the slow progress in implementing the Corps' announcement that it would establish the program pursuant to our recommendations. We know that the Council on Environmental Quality has been attempting to "reconcile" the negative policy of the Justice Department with the more progressive policy of the Corps, both of which were announced in July of this year. Obviously, unless a date certain is established by the regulation as the deadline for violators of the 1899 Act to file permit applications with the Corps, the violators will have little incentive to comply with the law.

III

Section 3(a) of the draft restates the provisions of section 21(b) of the Federal Water Pollution Control Act concerning certification by State water pollution control agencies that the proposed discharge under the 1899 law "will be conducted in a manner which will not violate applicable water quality standards." This section of the draft also states that the applicant for a Corps permit must "provide with this application" the required certification.

This statement is not consistent with several provisions of section 8 of the draft which allow the District Engineer to process an application, at least in part, without the certification required by section 21(b) of the Federal Water Pollution Control Act.

On April 30, 1970, the Corps issued Circular 1145-2-18 which sets forth the procedures to be followed for obtaining certifications under section 21(b) in connection with permits under section 10 of the 1899 law. That circular appears to be adequate. Since the certificate provisions of section 21(b) are applicable to all permit requirements of the 1899 law, not just section 13 of that law, we know of no reason for making the procedural requirements for such certifications for section 13 permits different from those established for section 10 permits.

1. Please explain to us:

(a) Whether or not the Corps now construes Circular 1145-2-18 of April 30, 1970, as applying to applications for all permits

under the 1899 Act.

(b) If the Corps does construe the circular as applying to all such permit applications, why wouldn't it automatically apply to applications under section 13 of that law?

(c) The circular will, by its terms, expire on June 30, 1971. If you deem it inadequate in any way, why is it being, in effect, revised just for section 13 permits?

IV

Section 3(b) of the draft states that section 102 of Public Law 90-190 requires that "all agencies of the Federal Government shall—* * * (b) *identify and develop methods and procedures in consultation with the Council on Environmental Quality established by Title II of this Act, which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical consideration.* * * * (Italics supplied.)

We believe that the italic portion of the above quote should be deleted. The Corps has already identified and developed the "methods and procedures in consultation with" CEQ. This draft regulation, we understand, is the product of that "consultation." The importance of the quote to the regulation is contained in that portion which is not underlined. That is the statutory directive which is meaningful and which should apply to the consideration of each permit after the "methods and procedures" are developed.

V

Section 3(c) of the draft regulation states:

c. The concern of the Congress with the conservation and improvement of fish and wildlife resources is indicated in the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c), wherein consultation with the Department of the Interior is required regarding activities affecting the course, depth, or modification of a navigable waterway.

Section 4(b) of the draft also states as follows:

"b. The decision as to whether a permit authorizing a discharge or deposit will or will not be issued under the Refuse Act will be based on an evaluation of the impact of the discharge or deposit on . . . (3) in cases where the Fish and Wildlife Coordination Act is applicable (where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modifies the stream or body of water into which the discharge is made), the impact of the proposed discharge or deposit on fish and wildlife resources which are not directly related to water quality standards."

These statements are inaccurate paraphrases of section 2 of the Fish and Wildlife Coordination Act (16 U.S.C. Code 662) which

states, in part, as follows:

"Whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State wherein the impoundment, diversion, or other control facility is to be constructed . . ."

The latter act applies "whenever the waters . . . are to be . . . modified for any purpose whatever . . ." It is not restricted, as implied in your regulation, to cases where the activity affects only "the course depth, or modification of a navigable waterway" or where the modifying effected by the discharge is "similar" to impounding, diverting or deepening of the channel.

As in the case of the other statutes quoted in the draft, we believe that this statute should also be quoted and not paraphrased, especially when the paraphrase is inaccurate.

Furthermore, the draft regulation changes existing law by, in effect, limiting comment by the U.S. Fish and Wildlife Service (and also the National Oceanic and Atmospheric Administration) and the State fish and game agencies to "the impact of the proposed discharge or deposit on fish and wildlife resources *which are not directly related to water quality standards.*" (Italics supplied) The F & W Coordination Act contains no such limitation. Nothing in the Federal Water Pollution Control Act could be con-

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structed to compel or authorize such a limitation. Certainly, neither the Corps nor the CEQ is lawfully empowered to so limit those agencies' responsibilities and authority under the statute.

We requested that the above underlined quote be deleted from the draft regulation since it is contrary to law.

VI

Section 4(a) of the draft puts violators of the 1899 Refuse Act on notice that the Corps and the Justice Department may institute legal proceedings to enforce the law even though the violators may have filed an application for a permit. The section contains the following sentence:

The fact that official objection may not have yet been raised with respect to past or continuing discharges or deposits should not

be interpreted as authority to discharge or deposit in the absence of an appropriate permit, and will not preclude the institution of legal proceedings in appropriate cases for violation of the provisions of the Refuse Act.

We believe the sentence should be deleted. It is unnecessary. The Justice Department has on several occasions filed actions against discharges who violate section 13 of the 1899 law even though no "official objection" had been previously raised to such discharges or deposits. The Justice Department, rightfully so, has not inserted in any complaint filed under section 13 a disclaimer that the lack of such an objection "should not be interpreted as authority" to violate the law. Such a statement in the Corps regulation merely enables the raising of questions by those who object to the Corps requiring these violators to apply for permits.

Assistant Attorney General Shiro Kashiwa, in his prepared testimony of December 21, 1970, before Chairman Dingell's subcommittee on Fisheries & Wildlife Conservation, stated the following policy of the Justice Department:

We believe that this important policy statement should be included in the draft regulation, as it goes beyond the statement in the draft which merely provides that "the mere filing" of a permit application "will not preclude legal action in appropriate cases for Refuse Act violations." Mr. Kashiwa, with the approval of the Attorney General, states flatly that he will bring such "legal action" where toxic substances are present in an industrial discharge. The draft should put the applicant on notice of this positive statement.

VII

Section 4(c) recognizes that the Refuse Act vests in the Secretary of the Army discretion to determine whether a permit should or should not issue. However, sections 4(c) and 4(e) then proceed to drastically limit the Corps' authority to deny a permit, in the "absence of any objection by the Regional Representative" of the Environmental Protective Agency to only two grounds:

(i) That anchorage and navigation will be impaired, or (ii) that fish and wildlife resources are adversely affected.

This is an unwarranted limitation on the Corps authority that is not founded in the law.

The responsibility for administering the Refuse Act, and determining whether to issue a permit under the 1899 law is vested in the Secretary of the Army. In *Zabel v. Tabb* 430 F.2d 199 (1970), the Court of Appeals for the 5th Circuit said:

When the House Report (H.R. Report 91-917 of March 18, 1970) and the National Environmental Policy Act of 1969 are considered together with the Fish and Wildlife Coordina-

tion Act and its interpretations, there is no doubt that the Secretary can refuse on conservation grounds to grant a permit under the Rivers and Harbors Act.

The term "conservation grounds" certainly is much broader than just water quality and fish and wildlife. It encompasses aesthetics, recreation, flood damage prevention, water supply, and other matters.

Furthermore, the Corps' own existing regulations (ER 1145-2-303) provide that "no permit [under section 1, 10, and 14 of the 1899 law which are remarkably similar to section 13 of the 1899 law in regard to the scope of the Corps discretionary authority] shall be issued unless, in the judgment of the person authorized to make the decision (namely Corps personnel), issuance will be in the public interest." The term "public interest" is far more encompassing than water quality or fish and wildlife. It covers any matter which affects the needs and welfare of the people. It includes, for example, the need of the military to acquire a particular site for defense purposes.

Where a permit is applied for to discharge refuse from a proposed private facility to be constructed on that site, the Act clearly authorized the Corps to deny the permit if it determines the public interest requires giving priority to the defense need.

We request that section 4 of the draft be revised to recognize the Corps duty to administer the permit system on the basis of the "public interest" rather than to be limited to a purely ministerial role except in relation to anchorage, navigation and fish and wildlife considerations. Indeed, this could be done by merely amending section 2 of the Corps' present regulation (No. 1145-2-303) to provide that it shall also apply to applications for permits under section 13 of the Refuse Act as well as to those under sections 1, 10 and 14.

VIII

Section 4(g) of the draft states:

"No permit will be issued for discharges or deposits of harmful quantities of oil, as defined in section II of the Federal Water Pollution Control Act since primary permit and enforcement authority for all oil discharges is contained in that Act."

The term "harmful quantities" is defined not in section II of the FWPC Act, but in regulations issued by the Interior Department on September 11, 1970 (35 F.R. 14306).

Furthermore the above underlined quote erroneously implies that oil discharges are subject only to the FWQA Act and ignores the fact that the 1899 law also prohibits such discharges, whether in harmful quantities or not. We believe the underlined language should be deleted.

IX

Section 4(f) provides:

In any case where the District Engineer believes that following the advice of the Regional representative with respect to the issuance or denial of a permit would not be consistent with the purposes of the Refuse Act permit program, he shall . . . forward the matter . . . to the Secretary . . . (for consultation with EPA) the Secretary shall accept the findings, determinations, and conclusions of the Administrator (of EPA) as to water quality standards and related water quality considerations and shall promptly forward the case to the District Engineer with instructions as to its disposition.

There is no basis in any statute for this statement. The Corps should not be so bound by another agency's findings in a regulation where the law does not require it.

We agree that the Corps should not grant a permit where EPA objects on water quality grounds. But, at the same time, the Corps should also not be bound to issue such a permit if, on water quality grounds, the Fish and Wildlife Service, a State water pollution control agency or a fish and game agency, or even private citizens, demonstrate that EPA's evaluation of the water quality impact is inadequate. We note that the Corps' regulations do not thus limit it in the case of permits issued under Section 10 of the 1899 law.

We request that the above underlined quoted provision (i) be deleted, or (ii) be amended to provide that no permit shall be granted under any provision of the 1899 law if EPA objects on water quality grounds.

Furthermore, we think that the term "and related water quality considerations" is unduly vague and ambiguous. It should be deleted, or clarified.

X

Section 6(b) of the draft uses the term "minor outfall structure" and authorizes the District Engineer to abstain from requiring a section 13 permit in the case of such structures.

Please explain to us:

(a) What is a "minor outfall structure;" and

(b) Why discharges from such structures should be exempted.

XI

In our letter of December 4, 1970, to you, we asked:

Please state whether or not applicants for permits under this program will be required to demonstrate affirmatively that it is not feasible and prudent to dispose of their wastes into a municipal treatment system or by some method other than directly into a waterway.

Section 7 of the draft does not require the

applicant to so demonstrate. We believe it should. We consider that this section is deficient unless such a requirement is added.

Furthermore, neither section 7 nor any other provision of the regulations tells the applicant how many copies of the application he must file. It says that he need file only "a form" or "a letter." Yet section 9 directs the District Engineer to send "copies of applications received" to EPA. This will mean that the Corps will have to make copies of each application with all its attachments for EPA (and others) at considerable cost in personnel time and funds, if your estimate of 40,000 dischargers is reasonably accurate. This cost should not be borne by the Government. The draft should be amended to require the applicant and attachments needed for review of his application by all interested agencies.

XII

Section 21(b) of the FWPC Act waives for three years a certification for a facility whose construction was "lawfully commenced" before April 3, 1970. The regulation does not define whether a facility constructed before April 3, 1970, on land (i.e., without an outfall requiring a section 10 permit) which deposits or discharges refuse material into a waterway in violation of section 13, or a facility with an outfall constructed in violation of section 10, would be a facility constructed without lawful authority and therefore subject to the certification requirements of section 21(b) (1) of the FWPC Act.

XIII

Section 9 of the draft requires the Corps to forward copies of applications to EPA promptly after receipt of them. No other agency is mentioned to receive such copies immediately. The regulation thus disregards the statutory mandate of the Fish and Wildlife Coordination Act that the Corps "first shall consult" with the Fish and Wildlife Service and the State fish and game agency when a Federal permit or license is applied for that would affect navigable waters. We believe that those agencies, particularly in view of the statutory directive which EPA lacks, should get copies of the application as soon as EPA, and the regulation should so provide.

XIV

The public notice and hearing provisions of the proposed regulation (sections 10 and 11) differ substantially from the public notice and hearing provisions of existing Corps regulations (ER 1145-2-303). We believe they should not so differ.

First, section 10 of the proposed regulation states that the notice shall contain a

statement limiting the Corps' authority to grant or deny permits. We have already objected above to such limitations set forth in the regulation, and our comments apply here too.

Second, the regulation provides that, in the case of section 13 permit applications, if objections are raised the applicant will be given an "opportunity to rebut or resolve" them. * * *

a. It is the policy of the Corps of Engineers to conduct the civil works program in an atmosphere of public understanding, trust, and mutual cooperation and in a manner responsive to the public interest. To this end, a public hearing *may be helpful* and will be held in connection with an application for a permit involving a discharge or deposit in navigable waters or tributaries thereof *when- ever, in the opinion of the District Engineer such a hearing is advisable*. In considering whether or not a public hearing is advisable, consideration will be given to the degree of interest by the public in the permit application, requests by responsible Federal, State or local authorities, including Members of the Congress, that a hearing be held, and the likelihood that information will be presented at the hearing that will be of assistance in determining whether the permit applied for should be issued. *In this connection, a public hearing will not generally be held if there has been a prior hearing (local, State or Federal) addressing the proposed discharge unless it clearly appears likely that the holding of a new hearing may result in the presentation of significant new information concerning the impact of the proposed discharge or deposit.* (Italic supplied.)

The present Corps' regulations provide:

b. It is the policy of the Corps of Engineers to conduct the civil works program in an atmosphere of public understanding, trust, and mutual cooperation and in a manner responsive to the public interest. To this end, public hearings *are helpful and will be held in connection with applications for permits involving navigable waters of the United States whenever there appears to be sufficient public interest to justify the holding of a public hearing or when responsible Federal, State or local authorities, including Members of the Congress, request that a hearing be held and it is likely that information will be presented at the hearing that will be of assistance in determining whether the permit applied for should be issued.*

Clearly there are significant differences between the two provisions underlined above. The present regulation which was adopted pursuant to recommendation of this committee in our report (H. Report 91-917, March 18, 1970), is far better than that in the proposed regulation. We believe the proposed provisions is not in the public interest and there-

fore inadequate.

We believe that section 2 of the present Corps regulation (No. 1145-2-303) be amended to make it also applicable to the issuance of permits under section 13 of the 1899 law.

xv

Section 15 governing permit conditions is inadequate. It provides that permits shall "be subject to conditions as determined by EPA to be necessary for purposes of insuring compliance with water quality standards" or the purposes of the FWPCA Act. In short this provides that any water quality condition imposed by a State agency or any other Federal agency cannot be included in the permit unless included as one of those "determined by EPA to be necessary." This provision, in effect, transfers to EPA a function of the Corps under the Refuse Act, without authorization by Congress either through legislation or a Reorganization Plan, and is therefore an unlawful restriction upon the Corps' authority. We note that the 1967, Interior-Army Memorandum of Understanding, authorizing consultation with the Fish and Wildlife Service, left the final decision with the Corps. See our Committee's report entitled "The Pursuit for Landfill in Hunting Creek: A Debacle in Conservation", pp. 40 et seq (H. Report 91-113, March 24, 1969). We know of no legislation since then authorizing EPA to exercise this function of the Corps. We request that it be deleted.

The proposed regulation does not require the following special condition now required by the Corps regulation 1145-2-303:

For use in connection with permits for cooling water intake and outfall structures, outfall sewers from industrial and other plants and similar work.

A. That in approving this permit reliance has been placed on information and data provided by the permittee concerning the nature of the effluent and the frequency of discharges. (Here identify the nature of the effluent or discharge approved, including, if applicable, limitations with respect to chemical content, water temperature differentials, toxin, sewage, type and quantity of solids, amount and frequency of discharge.)

Permittee may not discharge any liquids or solids other than or at levels in excess of those approved herein unless a modification of this permit is approved by the Secretary of the Army or his authorized representative.

B. The permittee shall maintain adequate records of the nature and frequency of discharges and shall from time to time furnish such additional data concerning discharges as the District Engineer may require.

We see no reason for omitting these requirements with respect to section 13 permits

as well as for permits under sections 1, 10, and 14 of the 1899 law.

XVI

Section 7 of the proposed regulation does not provide that all of the information required to be filed thereunder shall be fully available to governmental agencies and the public, without limitation. Similarly, no such provision is contained in the proposed regulation in connection with records of the nature and frequency of discharges which the permittee will, as we recommend, be required to maintain and provide to the Corps. We believe that a notice, similar to the one used by EPA in its industrial wastes inventory (See our Committee report H. Rept. 91-1717, Dec. 10, 1970, pp. 24-33, copy enclosed), should be included in the regulation to make it clear to everyone that such information and records will be made available to other Federal agencies, to State, interstate, and local water pollution control agencies and to the public.

XVII

Section 12 of the proposed regulation states that CEQ "has advised that section 102(C) statements will not be required where the only impact of proposed discharge or discharges will be on water quality and related considerations." We know of no basis in

Public Law 91-190 or the CEQ interim guidelines for this statement.

(a) Please explain to us (i) who will make this judgment, and (ii) will it be made before or after all comments are received and a public hearing (if any) held on the application.

(b) What is included in the term "related considerations?"

XVIII

The proposed regulation contains a heading "Memorandum of Understanding," but no such memorandum is found in the draft provided to us. Please provide to us a copy of that memorandum.

We have tried to set forth some of the more glaring deficiencies and inadequacies of the proposed regulation. There are others, which we have not had time to identify them.

We request that the proposed regulation be revised to meet these objections. Our staff will be pleased to work with yours in this matter.

We would appreciate your views on each of the foregoing objections.

Sincerely,

HENRY S. REUSS,

Chairman, Conservation and Natural Resource.

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2.5c CONGRESSIONAL RECORD, VOL. 117 (1971)

Feb. 4: Senate discussion of the 1899 Refuse Act, pp. 1673; 1679-1684

THE 1899 REFUSE ACT

Mr. BOGGS. Mr. President, considerable public interest has been expressed in the administration's Refuse Act permit program and the documents to implement the program.

I believe that all relevant documents are now available and I ask unanimous consent to insert these documents in the RECORD. I also ask unanimous consent to include in the RECORD the remarks on the Refuse Act program by the General Counsel of the Council on Environmental Quality, Mr. Timothy Atkeson. His comments were presented to the American Bar Association—American Law Institute meeting held last week at the Smithsonian. Also, I ask unanimous consent to include in the RECORD a summary statement of the Environmental Protection Agency on the

Refuse Act filed today with the Subcommittee on Air and Water Pollution.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

[p. 1673]

STATE CERTIFICATION OF ACTIVITIES REQUIRING A FEDERAL LICENSE OR PERMIT—NOTICE OF PROPOSED RULE MAKING

(Environmental Protection Agency [18 CFR Part 615])

Notice is hereby given that the Administrator, Environmental Protection Agency, pursuant to the authority in sec. 103, 84 Stat. 91, proposes the addition of a new Part 615 to Title 18, Chapter V of the Code of the Federal Regulations, as set forth below.

The Federal Water Pollution Control Act vests certain authorities in the Secretary of the Interior. On December 2, 1970, those authorities were transferred to the Administrator, Environmental Protection Agency, by Reorganization Plan No. 3 of 1970.

Section 21(b) of the Federal Water Pollution Control Act, 33 U.S.C. 1171(b), requires any applicant for a Federal license or permit to conduct any activity, including, but not limited to, the construction or operation of facilities which may result in any discharge into the navigable waters of the United States, to obtain a certification from the State in which the discharge originates, or, if appropriate, from the interstate agency having jurisdiction or, under certain circumstances, from the Administrator, that there is reasonable assurance that such activity will be conducted in a manner which will not violate applicable water quality standards. In any case where actual construction of a facility from which a discharge is made has been lawfully commenced before April 3, 1970, no certification is required for the issuance of a license or permit after April 3, 1970, except that any such license or permit shall terminate on April 3, 1973, unless a certification is submitted to the licensing or permitting agency prior to April 3, 1973. Where any license or permit application was pending on April 3, 1970, and such license or permit is issued before April 3, 1971, no certification is required for one year following the issuance of such license or permit, except that any such license or permit shall terminate at the end of one year unless a certification is submitted to the licensing or permitting agency prior to that time.

The proposed Subpart A would provide definitions of general applicability for the regulations and would provide for the uniform content and form of certification.

The proposed Subpart B would establish procedures for determination by the Administrator whether a discharge which will result from an activity for which certification is required by Section 21(b) may affect the quality of the waters of any State other than the State in which the discharge originates.

The proposed Subpart C would establish procedures for obtaining certifications from the Administrator in certain cases where standards have been promulgated by the Administrator, and in cases where no State or Interstate agency has authority to certify that there is reasonable assurance that an activity requiring a Federal license or permit and which may result in a discharge into navigable waters will be conducted in a manner which will not violate applicable water quality standards.

The proposed Subpart D would provide for consultation between the Administrator and Federal licensing and permitting agencies with respect to the meaning, content and application of water quality standards and related matters.

A form suitable for use by certifying agencies is being prepared and will be published in the *Federal Register* in the immediate

future.

Interested persons may submit, in triplicate, written data or arguments in regard to the proposed regulations to the Administrator, Environmental Protection Agency, Washington, D.C. 20460. All relevant material received not later than 30 days after publication of this notice will be considered.

Authority: The provisions contained in this Part 615 are issued pursuant to section 21(b) and (c) of the Federal Water Pollution Control Act (P.L. 91-224), Section 103, 84 Stat. 91; 33 U.S.C.A. 1171(b) (1970); and Reorganization Plan No. 3 of 1970.

SUBPART A—GENERAL

615.1 Definitions

As used in this Part, the following terms shall have the meanings indicated below:

(a) "License or permit" means any license or permit, including leases for livestock grazing or oil, mineral, or other exploitation, granted by an agency of the Federal government to conduct any activity which may result in any discharge into the navigable waters of the United States.

(b) "Licensing or permitting agency" means any agency of the Federal government to which application is made for a license or permit.

(c) "Administrator" means the Administrator, Environmental Protection Agency.

(d) "Certifying agency" means the person or agency designated by the Governor of a State to certify compliance with applicable water quality standards. If an interstate agency has sole authority to so certify, such

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interstate agency shall be the certifying agency. Where a Governor's designee and an interstate agency have concurrent authority to certify, the Governor's designee shall be the certifying agency. Where water quality standards have been promulgated by the Administrator pursuant to section 10(c)(2) of the Act, or where no State or interstate agency has authority to certify, the Administrator shall be the certifying agency.

(e) "Act" means the Federal Water Pollution Control Act, 33 U.S.C.A. 1151 *et seq.*

(f) "Discharge" means any direct or indirect addition of matter to receiving waters.

(g) "Water quality standards" means standards established pursuant to section 10(c) of the Act, and State-adopted water quality standards for navigable waters which are not interstate waters.

615.2 Form of Certification

A certification made by a certifying agency shall include the following:

- (a) the name and address of the applicant;
- (b) A description of the facility or activity, and of any discharge into navigable

waters which may result from the conduct of any activity including, but not limited to, the construction or operation of the facility, including the biological, chemical, thermal and other characteristics of the discharge, and the location or locations at which such discharge may enter navigable waters;

(c) A description of the function and operation of equipment or facilities to treat wastes or other effluents which may be discharged, including specification of the degree of treatment expected to be attained;

(d) The date or dates on which the activity will begin and end, if known, and the date or dates on which the discharge will take place;

(e) A statement of the probable effects of the discharge on the quality of the receiving water;

(f) An identification of applicable water quality standards;

(g) A statement of the probable effects of the discharge on the quality of waters of a State other than the State in which the discharge occurs or will occur;

(h) A statement that there is reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards;

(i) A statement of the conditions applicable to the discharge, reliance upon which provided the basis for the statement described in subsection (h); and

(j) Such other information as the certifying agency may determine is appropriate.

SUBPART B—DETERMINATION OF EFFECT ON OTHER STATES

615.11 *Notification*

Upon receipt of an application for a license or permit and a certification, the licensing or permitting agency shall immediately notify the Administrator of such application and certification.

615.12 *Copies of documents*

Immediately after certification has been granted, an applicant shall provide the Administrator with three copies of (i) the application for a license or permit, (ii) the application for certification, and (iii) any certification received or notification that certification has been waived. The applicant may provide the Administrator with copies of the applications as soon as the applications are made to the relevant State, interstate, or Federal agencies.

615.13 *Review by Administrator and notification*

The Administrator shall review the applications and certification, provided in accordance with section 615.12, and if the Administrator determines there is reason to believe that a discharge may affect the quality of the waters of any State or States other

than the State in which the discharge occurs, the Administrator shall, no later than 30 days of the date of notice of application and certification from the licensing or permitting agency provided in section 615.11, so notify each affected State, the licensing or permitting agency, and the applicant.

615.14 *Forwarding to affected State*

The Administrator shall forward to each affected State a copy of the material provided in accordance with section 615.12.

615.15 *Hearing on objection of affected State*

When a licensing or permitting agency holds a public hearing on the objection of an affected State, such objection shall be forwarded to the Administrator by the licensing or permitting agency, and the Administrator shall at such hearing submit his evaluation with respect to such objection and his recommendations as to whether and under what conditions the license or permit should be issued.

615.16 *Waiver*

If the certification requirement with respect to an application for a license or permit is waived due to the failure or refusal of a State or interstate agency to act on a request for certification within a reasonable time as determined by the licensing or permitting agency (which period shall not exceed one year) after receipt of such request, the Administrator shall consider such waiver as a substitute for a certification and, as appropriate, shall conduct the review, provide the notices, and perform the other functions identified in sections 615.13, 615.14, and 615.15. The notices required by section 615.13 shall be provided not later than 30 days after the date on which the waiver becomes effective.

SUBPART C—CERTIFICATION BY THE ADMINISTRATOR

615.21 *When Administrator certifies*

Certification by the Administrator that the discharge resulting from an activity requiring a license or permit will not violate applicable water quality standards will be required where:

(a) Standards have been promulgated by the Administrator pursuant to section 10(c) (2) of the Act; or

(b) Water quality standards have been established, but no State or interstate agency has authority to give such a certification.

615.22 *Applications*

An applicant for certification from the Administrator shall submit to the Administrator a complete description of the discharge involved in the activity for which certification is sought, with a request for certification signed by the applicant. Such description shall include the following:

(a) The name and address of the applicant;

(b) A description of the facility or activity, and of any discharge into navigable waters which may result from the conduct of any activity including, but not limited to, the construction or operation of the facility, including the biological, chemical, thermal and other characteristics of the discharge, and the location or locations at which such discharge may enter navigable waters;

(c) A description of the function and operation of equipment or facilities to treat wastes or other effluents which may be discharged, including specification of the degree of treatment expected to be attained;

(d) The date or dates on which the activity will begin and end, if known, and the date or dates on which the discharge will take place;

(e) A statement of the probable effects of the discharge on the quality of the receiving water;

(f) An identification of applicable water quality standards, together with a statement as to whether, in the applicant's opinion, discharge resulting from the activity will or will not violate applicable water quality standards; and

(g) A statement of the probable effects of the discharge on the quality of waters of a State other than the State in which the discharge occurs or will occur.

615.23 Notice and hearing

The Administrator will provide public notice of each request for certification by publication in the *Federal Register*, and may provide such notice in a newspaper of general circulation in the area in which the activity is proposed to be conducted and by such other means as the Administrator deems appropriate. Interested parties shall be provided an opportunity to comment on such request as the Administrator deems appropriate. All interested and affected parties will be given reasonable opportunity to present evidence and testimony at a public hearing on the question whether to grant or deny certification if the Administrator determines that such a hearing is necessary or appropriate.

615.24 Certification

If, after considering the complete description, the record of a hearing, if any, held pursuant to section 615.23, and such other information and data as the Administrator deems relevant, the Administrator determines that there is reasonable assurance that the proposed activity will not result in a violation of applicable water quality standards, he shall so certify. If the Administrator determines that no water quality standards are applicable to the waters which might be affected by the proposed activity, he shall so

notify the applicant and the licensing or permitting agency in writing and shall provide the licensing or permitting agency with advice, suggestions and recommendations with respect to conditions to be incorporated in any license or permit to achieve compliance with the purposes of this Act. In such case, no certification shall be required.

615.25 Adoption of new water quality standards

(a) In any case where:

(i) a license or permit was issued without certification due to the absence of applicable water quality standards; and

(ii) water quality standards applicable to the waters into which the licensed or permitted activity may discharge are subsequently established; and

(iii) the Administrator is the certifying agency because:

(i) no State or interstate agency has authority to certify; or

(2) such new standards were promulgated by the Administrator pursuant to section 10(c) (2) of the Act; and

(iv) the Administrator determines that such uncertified activity is violating water quality standards;

then the Administrator shall notify the licensee or permittee of such violation, including his recommendations as to actions necessary for compliance. If the licensee or permittee fails within six months of the date of such notice to take action which in the opinion of the Administrator will result in compliance with applicable water quality standards, the Administrator shall notify the licensing or permitting agency that the licensee or permittee has failed, after reasonable notice, to comply with such standards and that suspension of the applicable license or permit is required by section 21(b) (9) (B) of the Act.

(b) Where a license or permit is suspended pursuant to subsection (a) of this section, and where the licensee or permittee subsequently takes action which in the Administrator's opinion will result in compliance with applicable water quality standards, the Administrator shall then notify the licensing or permitting agency that there is reasonable assurance that the licensed or permitted activity will comply with applicable water quality standards.

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615.26 Inspection of facility or activity before operation

Where any facility or activity has received certification pursuant to section 615.24 in connection with the issuance of a license or permit for construction, and where such facility or activity is not required to obtain an operating license or permit, the Administra-

tor or his representative, prior to the initial operation of such facility or activity, shall be afforded the opportunity to inspect such facility or activity for the purpose of determining if the manner in which such facility or activity will be operated or conducted will violate applicable water quality standards.

615.27 Notification to licensing or permitting agency

If the Administrator, after an inspection pursuant to section 615.26, determines that operation of the proposed facility or activity will violate applicable water quality standards, he shall so notify the applicant and the licensing or permitting agency, including his recommendations as to remedial measures necessary to bring the operation of the proposed facility into compliance with such standards.

615.28 Termination of suspension

Where a licensing or permitting agency, following a public hearing, suspends a license or permit after receiving the Administrator's notice and recommendation pursuant to section 615.27 of this Subpart, the applicant may submit evidence to the Administrator that the facility or activity or the operation or conduct thereof has been modified so as not to violate water quality standards. If the Administrator determines that water quality standards will not be violated, he shall so notify the licensing or permitting agency.

SUBPART D—CONSULTATIONS

615.30 Review and advice

The Administrator may and upon request shall provide licensing and permitting agencies with determinations, definitions and interpretations with respect to the meaning and content of water quality standards where they have been federally approved under Section 10 of the Act, and findings with respect to the application of all applicable water quality standards in particular cases and in specific circumstances relative to an activity for which a license or permit is sought. The Administrator shall also advise licensing and permitting agencies as to the status of compliance by dischargers with the conditions and requirements of applicable water quality standards. In cases where an activity for which a license or permit is sought will affect water quality, but for which there are no applicable water quality standards, the Administrator shall advise licensing or permitting agencies with respect to conditions of such license or permit to achieve compliance with the purposes of the Act.

THE REFUSE ACT PERMIT PROGRAM

(Remarks by Timothy Atkeson, general counsel, Council on Environmental Quality to ALI-ABA Seminar on Environmental Law,

Smithsonian Institution, January 28, 1971)

My assignment today is to lay out, in under half an hour, what you need to know about Federal water quality legislation. I think it is only fair to warn you that like some of the professors we all knew at college, I will begin at the beginning—with the Refuse Act of 1899, and that I have sufficient to say about my first topic that you may have to dig some of the other statutes and regulations out of the books on your own. But there are some mitigating considerations: First, the Refuse Act permit program launched by the President just before Christmas takes you through the full range of existing Federal statutory authority (Section 13 of the Act of March 3, 1899, better known as the Refuse Act (33 U.S.C. 407); the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.); the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-666c); and the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347). Secondly, the Refuse Act permit program highlights the critical issues of standards and enforcement in our Federal water quality program. And thirdly, the Refuse Act permit program was drawn up with acute awareness that additional statutory authority would be needed to have a satisfactory water quality program and my comments today will indicate some areas where we think Congressional action this Session is necessary.

First, let us go back to the Refuse Act itself—that sparking innovation in antipollution legislation of the McKinley Administration. From a technical point of view, to those of you interested in legislative drafting, I suggest you compare what was done here in one paragraph with the results of hundreds of paragraphs, sections and titles in more modern water quality legislation. In essence the Refuse Act says:

"a. It shall not be lawful to throw, discharge, or deposit . . . any refuse matter of any kind or description whatever (other than liquid sewage from municipal sources) into any navigable water of the U.S. or any tributary of any navigable water of the U.S.

"b. The Secretary of the Army, acting on the advice of the Corps of Engineers, may issue permits for such deposit, within limits to be defined and under conditions to be prescribed by him."

To this statutory language you must add the gloss of Supreme Court decisions in the 1960's (*U.S. v. Standard Oil Co.*, 384 U.S. 224 (1966); *U.S. v. Republic Steel Co.*, 362 U.S. 482 (1960)) to the effect that the Act serves anti-water pollution as well as navigation protection goals. The Refuse Act is backed up by misdemeanor fines of \$500-\$2,500 or imprisonment or from 30 days to a year and, most significantly, by the equity power of a Federal court to enjoin violation of the Act.

Next, to understand the Refuse Act permit program, you have to turn to Section 21(b) of the Federal Water Pollution Control Act, a provision inserted in the Act last April. This, in essence, says that any applicant for a Federal permit to conduct an activity resulting in a discharge into the navigable waters of the United States shall provide the permit issuing agency with a certificate from the appropriate State or interstate water pollution control agency that there is reasonable assurance, as determined by the State or interstate agency, that such activity will be conducted in a manner which will not violate applicable water quality standards. I should emphasize that Section 21(b) by its own terms applies to Federal permits both for existing facilities and for new facilities so that it could be applied to set water quality standards for a Refuse Act permit program covering both new and existing facilities.

Thirdly, you have to realize what a wide group of agencies play roles with respect to the Refuse Act and the Federal Water Pollution Control Act. The Army Corps of Engineers has, of course, the statutory responsibility for the Refuse Act, and the Department of Justice is assigned responsibility to conduct the necessary legal proceedings to enforce the Refuse Act. As a footnote, I will remind the few of you who don't know it already that the Refuse Act contains a provision to pay informers half of the fine imposed for information leading to conviction. It has been asserted that this entitles an informer to bring a *qui tam* action on his own for a Refuse Act violation if the U.S. District Attorney does not, but, to date, no court to my knowledge has espoused this view.

The Environmental Protection Agency has responsibility for administration of the Federal Water Pollution Control Act and Sections 21(b) and (c) assign EPA (which succeeded to the responsibilities of the Secretary of the Interior in this area by virtue of Reorganization Plan No. 3 of 1970) a number of specific responsibilities with respect to the water quality aspects of Federal permits: (a) under Section 21(b)(2) EPA must determine whether a discharge has a multistate effect in which case the other states affected are given a chance to intervene and protect their interests, (b) under Section 21(b)(9) (A) there is a provision that where the permit covers activity for which there are no applicable water quality standards, the Federal permit issuing authority shall impose a requirement that the permittee shall comply with the purposes of the Act. Under this, until there is a more satisfactory statutory provision, we plan that EPA will issue guidelines to Federal permit granting authorities including the Corps to regulate discharges of hazardous substances such as mercury where the applicable water quality

standards do not address the problem, and (c) under Section 21(c) EPA is given the responsibility to provide relevant information to the permit granting agency as to what the applicable water quality standards are and to comment on methods to comply with these standards. We contemplate that, pursuant to this responsibility, EPA will issue guidelines on how it construes the requirement in the present standard for treatment of industrial discharges in most States that they receive "secondary or equivalent treatment." In actual practice this will require the evolution of guidelines for the standard of the treatment of effluents from some 22 different industries.

You will note that I have spelled out primary roles for three Federal agencies with respect to the Refuse Act permit program—the Corps of Engineers, the Department of Justice and the Environmental Protection Agency. (I will not attempt to enumerate the State or interstate agencies which must review the applications and which play an important role.) There are three other Federal agencies to note: first, there is the Department of the Interior which must be consulted in certain circumstances under the Fish and Wildlife Coordination Act and which will share this responsibility for certain fishing grounds with the Department of Commerce to which the Bureau of Commercial Fisheries was transferred at the formation of the National Oceanic and Atmospheric Administration in Reorganization Plan No. 4 of last year. Finally there is our own Council on Environmental Quality in the Executive Office of the President. Under Executive Order 11514 implementing the National Environmental Policy Act the Council has been assigned to coordinate Federal programs related to environmental quality. You will note that in Executive Order 11574 the Council is assigned responsibility to coordinate the regulations, policies and procedures of Federal agencies with respect to the Refuse Act permit program.

At this point I have introduced you to the principal players with respect to the Refuse Act permit program in the Executive Branch. You are undoubtedly aware that at various points during last year, Interior, Justice and the Corps all attempted on their own to bring some coherent relationship between the Refuse Act and our Federal water quality legislation. Interior announced that it would seek prosecution under the Refuse Act of types of discharge not adequately covered by our Federal-State standards—notably thermal pollution from power plants and mercury discharges. Justice issued guidelines to U.S. district attorneys on when to bring Refuse Act prosecutions that were intended to draw a logical distinction between use of the summary processes of the Refuse Act and the more protracted enforcement procedures of

the Federal Water Pollution Control legislation. The result of these guidelines was instead a mistaken public impression that Justice was attempting to curb local initia-

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tive in use of the Act. Thereafter, without stating what relationship such a program would have to applicable water quality standards, Army announced in the late summer that it would initiate a Refuse Act permit program.

In the light of these events the need for a coordinated program was clear to all. We in the Council on Environmental Quality were concerned that such a program when launched should be legally well grounded, should relate the Refuse Act permits with water quality standards in the manner contemplated in Section 21(b) of the Federal Water Pollution Control Act, and should make the greatest impact on our national water quality problems consonant with the nature of the limits on Federal authority in the relevant legislation and the problem of applying the program to over 40,000 existing discharges without creating crippling uncertainty and delays. As the fall progressed and both Houses of Congress failed to take any action on the Administration's proposals to fill out the gaps in Federal authority (principally by an extension of jurisdiction over the waters for which the Federal Government must approve water quality standards from just interstate waters to all navigable waters and a new requirement that these Federally approved standards extend to effluent standards), we realized that any action on the Refuse Act permit program would have to start with admittedly deficient Federal water quality legislation. We also concluded that even without these improvements there were very considerable benefits that could be achieved by drawing together all our existing water quality authorities into one coherent permit program giving strong coordination from the President through the Council and starting the program before another year of debate slipped past us. The culmination of this effort was Executive Order 11574 signed by the President December 23—and published in the *Federal Register* Christmas Day—which initiated the Refuse Act permit program.

Like many Christmas presents, this program met at the outset with a mixed reception.

My purpose in spelling out all the background is to give you a basis for making your own evaluation.

There are four or five reasons for some questions at this early point about the program:

1. There has been a slowness and uncertainty up till now in the enforcement procedures under the Federal Water Pollution

Control legislation which has driven some to the view that we might as well forget its concepts of Federal and State responsibility and applicable water quality standards in favor of a Russian roulette enforcement of the Refuse Act to attack any discharge into navigable waters regardless of the Refuse Act's lack of water quality standards. It became harder to hold this latter view after passage of Section 21(b) of the Federal Water Pollution Control Act last April and with the formation of EPA, but I still occasionally encounter in its pristine form the theory that in 1899 Congress granted the Army Corps of Engineers full power to regulate the water quality aspects of any and all discharges into the navigable waters of the United States on any basis the Corps believes reasonable and that Congress' efforts to develop satisfactory water quality legislation since then have been a misplaced and irrelevant effort.

2. There has been an impression, perhaps because the flourish of a criminal statute by a district attorney always makes headlines, that sporadic prosecutions under the Refuse Act are a more potent enforcement tool than any systematic plan to use Federal permits to bring all discharges up to the mark. Somehow the mental picture of Federal agents by the dark of the moon and with muffled oars scooping up evidence from a single outfall will always catch the imagination more than thousands of data cards containing this and much more information supplied at regular intervals under a systematic, nationwide permit program. But I suggest that if we are serious about attaining clean water on some timetable we think less of enforcement as a "Fox strikes again" or "High Noon" game and more as a systematic, nationwide requirement that every discharger bring to the water quality authorities the full facts on his discharge, with provision for public availability of this information, and with regular monitoring and strong penalties and personal responsibility for false statements. (Just to give you a comparison in penalties, the Refuse Act provides for up to a year in jail and a fine of up to \$2,500. In contrast the penalty in Section 18 U.S.C. Sec. 1001 for false statements under the (Refuse Act) permit program will be up to five years in jail and \$10,000 in fines.)

3. Another reason for questions about the Refuse Act permit program has been that not all the components are yet visible to the public. In addition to the Executive Order and draft Corps of Engineers regulations (which have been put out for 45 days public comment in the expectation they can be improved), there will be EPA regulations covering EPA's role with respect to State certifications under Section 21(b) and (c) of the Federal Water Pollution Control Act, EPA's guidelines regulating hazardous discharges which are not covered by applicable

water quality standards and EPA guidelines interpreting for some 22 industries what is meant by "secondary or equivalent treatment," revised Justice Department guidelines on Refuse Act prosecutions by U.S. district attorneys, implementing agreements between the Corps of Engineers and EPA, and further clarification of the relationship of the Fish and Wildlife Coordination Act to the program. In short, the Executive Order which triggered this program is like the tip of the iceberg—not a bad image when we are discussing a water quality program. I am confident we will see the full outlines of the program within a few more weeks. Only then will it be fair to assess the program's potential impact.

4. A fourth reason for some of the questions about the program is that it involves the necessity of coordinated action by more than one agency. Some critics say "unleash the Corps of Engineers without interference by other agencies"; while others say nothing should be done until it can all be done by EPA. Our decision was to initiate the program now, using statutory authorities as we find them, drawing on the very substantial resources of the Corps but at the same time making clear within the Federal Government that only one agency decides water quality questions and that is EPA. We fully expect that in time arrangements for the administration of the program can be improved and the Council plans to make recommendations to the President in this respect. But we felt, particularly after last year's experience on our water quality legislative proposals that it would be wise to start the program now with admittedly imperfect legislative provisions, rather than wait another year for tidier legislative authority.

5. A fifth ground for questions in forming a judgment about the Refuse Act permit program is lack of a full picture as to how it fits into our legislative proposals. This question will also be resolved within a few weeks. At this time I think it is clear that we will again be supporting an expansion of Federal supervision of standards to all navigable waters and provision for limitations on effluents. With this authority the present distinctions that have to be made about State certifications for discharges into interstate as opposed to intrastate waters will disappear and the way will be clear for an overall upgrading of Federal-State water quality standards.

One label for this program that does not fit is that the permits will be "licenses to pollute." The permits will not be granted unless the discharge satisfies applicable water quality standards. Where intrastate waters are involved EPA can fill in gaps in the standards (as for hazardous discharges) and check the facts; where interstate waters are involved EPA can do this and issue guide-

lines on what constitutes secondary treatment of industrial wastes. No permit will be issued for any discharge that would not meet these standards. I do not believe that there has been decision by any court under the Refuse Act to date requiring a higher standard.

Despite the fact that the Refuse Act specifically provides that "it shall be the duty of district attorneys of the United States to vigorously prosecute all offenders" there have also been comments in the press that the permit program would put a damper on effective enforcement, the comments of the President, Mr. Train and Mr. Ruckelshaus to the contrary notwithstanding. Here I think the wisest course may be to let events speak for themselves, but just in case you have not pieced these events together, let me sum up the evidence:

Item. At the time the program was announced the President said that the phased implementation of the program would not be a moratorium on Refuse Act prosecutions and as a matter of fact new prosecutions under the Act have been going forward since the program was announced.

Item. At the time the program was announced Mr. Ruckelshaus indicated that a permit application filed by a suspected polluter would be given accelerated review and if denied would be followed by prompt referral to the district attorney for prosecution.

Item. The Justice Department Division assigned responsibility for the Refuse Act has just created a centralized pollution control operation with authority to give prompt policy guidance on both the civil and criminal aspects of Refuse Act enforcement.

Item. The Justice Department has under consideration revised guidelines for district attorneys which I believe you will find very flexible, very practical and quite satisfactory. Do not prejudge the Justice Department on this score before these guidelines are available.

To my friends here who have been working over the Corps of Engineers regulations with quite thoughtful and legitimate questions such as:

"Why don't you apply the 'public interest test' of the dredge and fill permit regulations to each and every one of these Refuse Act permit applications?"

"Why haven't you assured that regardless of what elements to protect fish and wildlife are contained in the applicable water quality standards considered by the State water quality authority and EPA that the Department of the Interior gets a full second review of the same elements under the Fish and Wildlife Coordination Act?", and

"Why, even though the State water quality authority has held hearings can't we have another round of Corps hearings on the same subject?"

I can only answer that we are trying to devise a program that has both a sound legal base and is workable in the context of decision on 40,000 plus existing discharges covering the entire range of U.S. industry and hundreds of millions of dollars in investment. We need a program that will produce water quality results—not fascinating legal arguments.

I find that, as I expected, my layout of Federal water quality legislation to you has not gotten much beyond legislation passed in 1899. But I am sure you will find the subject lively enough to do some digging

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on your own and I anticipate that this year will be one of considerable progress in this area. You yourself, in the light of the changes in prospect, should become an expert in short order.

Let me sum up for you five reasons why Chairman Train said on December 23, that the Refuse Act permit program is the single most important step to improve water quality that this country has yet taken:

1. For the first time we will have a mechanism to make all discharges into all navigable waters of the country come in to report the content of these discharges and make periodic follow up reports.

2. We plan to back up this new policy of requiring what has been called "Truth In Pollution" by public availability of this information, spot checks and enforcement of the substantial penalties for giving false statements to the Federal Government.

3. We have in the Refuse Act permit program and Section 21(b) of the Federal Water Pollution Control Act a mechanism for determining the standards applicable to all discharges into all our navigable waters. This is an action forcing process that will bring every State face to face with the hard question of what effluent rules to apply. Where the discharge is subject to a Federal-State standard, EPA will issue guidelines on these effluent standards.

4. All applications for the State certifications required must be accompanied by public notice and there will be public hearings on specific applications where appropriate.

5. This program will give EPA and the State water quality authorities great leverage to develop consistent water quality policies applicable to all Federal permits—including those of AEC for nuclear plants, FPC for hydro facilities and the Corps of Engineers for dredge and fill permits.

I greatly appreciate this chance to tell you something about the Council's thinking on this very important subject.

ANSWERS OF THE ENVIRONMENTAL PROTECTION AGENCY REGARDING THE REFUSE ACT PERMIT PROGRAM

(Filed with the Senate Subcommittee on Air and Water Pollution during an oversight hearing on the water pollution control program, February 4, 1971)

Q. Describe the Refuse Act permit program.

A. The President directed by Executive Order 11574 dated December 23, 1970 that a permit program be implemented pursuant to the Refuse Act of 1899, under which dischargers into navigable waters are obliged to obtain permits from the Army Corps of Engineers. At the present time there are in excess of 40,000 industrial dischargers into navigable waters to which the permit requirement applies. This permit authority of the Refuse Act has not been used to date. It does not apply to waste discharges from municipal sewers. Court decisions have made it clear that the authority of the Refuse Act may be addressed to environmental considerations as well as to navigational hazards.

The Corps will now require permits of all dischargers into navigable waters to which the permit requirement applies. The Corps will require as a condition of each permit that the discharger comply with applicable water quality standards. The State in which the discharge occurs will have an opportunity to certify whether the activity for which a permit is sought will result in a discharge in violation of applicable water quality standards. The Corps will also receive advice from EPA concerning applicable water quality standards in connection with permit applications. The advice of EPA in these cases will consist of an identification, clarification, complete definition, and interpretation of applicable water quality standards as necessary. Pursuant to Executive Order 11574, the Corps is obliged to accept the advice of EPA concerning water quality standards as conclusive. On the basis of State certification and EPA advice, the Corps will either issue, deny, or appropriately condition the permit. The Corps will be precluded from issuing a permit where State certification is denied.

Through this mechanism we will be able in a systematic and effective manner to implement water quality standards applicable to individual dischargers. The obligations and requirements necessary to meet such standards will be clearly spelled out in the permit conditions for the benefit of Federal and State regulatory authorities and for the dischargers. This Federal permit program gives us the opportunity to identify the specific obligations of a discharger and the remedial measures which must be taken before further pollution occurs. We need not wait

until the damage is done and then commence abatement actions on an ad hoc basis. We believe the permit program will overcome the problem of uncertainty with respect to the specific requirements of water quality standards as applied to particular industrial dischargers.

Q. What is the relationship of the Permit Program to section 21(b) of the Federal Water Pollution Control Act?

A. Under the provisions of section 21(b) the State certifies whether or not an activity for which a Federal license or permit is sought will result in a discharge which violates applicable water quality standards. In the context of the Permit Program the State will provide its assessment of the water quality standards and its determination with respect to an individual discharger seeking a Corps permit. At this stage, maximum effort will be made by EPA field personnel to work with and to advise the State agency with respect to the Federal assessment and interpretation of applicable water standards.

Pursuant to the Permit Program EPA will have an opportunity to advise the Corps with respect to the meaning and content of water quality standards as they apply to an individual permit applicant. As we view the two authorities, the provisions of section 21(b) provide the necessary link between the State and the Corps and the Permit Program provides the necessary link between the Corps and EPA. We see these two authorities as consistent and mutually supportive. We believe that, taken together, the provisions of section 21(b) and the Permit Program will give us the maximum assurance that water quality standards will be met by individual dischargers.

Q. What will be the role of EPA in the Permit Program?

A. EPA has the responsibility, in the case of each application for a permit, to advise the Corps with respect to the meaning and content of water quality standards as applied to the particular discharger seeking the permit. The Permit Program will also serve as an additional mechanism enabling EPA to work with State Water Pollution Control Agencies. Regional and field people of EPA will be instructed to work closely with the States and to advise State Water Pollution Control Agencies as to EPA interpretations and determinations with respect to water quality standards in individual cases. EPA will not issue or deny or suspend or revoke permits. However, we will advise the Corps with respect to water quality standards.

Q. Will EPA's role in the Permit Program be the same in the case of both interstate and intrastate waters?

A. EPA's role will be broader with respect to standards for interstate waters, which are developed by States subject to Federal approval, than with respect to standards for

intrastate waters, which under present law are entirely the responsibility of the States. In the case of standards for interstate waters, EPA will be providing the Corps with both factual determinations and interpretations of their meaning, content and application. In the case of standards for intrastate waters, EPA will provide factual determinations but will defer to the States with respect to interpretations of their meaning and application in particular circumstances.

Q. What will be the role of the Corps in the Permit Program?

A. The Corps has the statutory responsibility under the Refuse Act to issue or deny permits. In exercising that authority under the Permit Program, the Corps will address such factors other than water quality as may be lawfully considered under that Act. The Corps will have responsibility for the general administration of the Permit Program. But on all questions relating to water quality standards, it is clear that the determinations, findings and interpretations of EPA will be conclusive.

Q. What will the role of the States be in the permit program?

A. The States will have the central, most important role in the permit program. They will provide the Corps with their assessment of the water quality standards applicable to particular dischargers and their assessment of necessary conditions to be included in any permit so as to insure compliance with such standards. If a State denies the issuance of a certification to the effect that a particular discharge will be in compliance with water quality standards, the Corps will be precluded by section 21(b) of the Federal Water Pollution Control Act from issuing a permit with respect to such discharge.

Q. Will EPA have authority to override State certifications?

A. It is not EPA's purpose here to override State certifications. The primary function of EPA in this program is to advise the Corps of Engineers with respect to the meaning, content and application of water quality standards, in the interests of ensuring that permits issued by the Corps will contain whatever conditions may be necessary to achieve compliance with those standards. In most cases we expect our advice in this regard to be a "completion" of the State certification—a "fleshing out"—a more precise and complete definition of water quality standards components. In those cases where EPA's interpretation of Federal-State standards differs from the State's view, it is EPA's view which the Corps must accept. We believe these cases will be the small exception.

Q. Isn't this permit program inconsistent with the idea of EPA—a centralization of environmental authority in one agency?

A. No. We do not believe that the permit program is inconsistent with the idea of

EPA. Federal responsibility for environmental concerns, and for water quality standards compliance in particular, is not fragmented by the permit program. EPA will make the conclusive Federal decisions with respect to water quality standards. This responsibility is not to be shared with or delegated to the Corps or any other Federal agency.

Q. Doesn't the permit program weaken the effective use of the Refuse Act as an abatement tool?

A. No. The permit program does not weaken the abatement authority under the Refuse Act. Since all permits will contain as essential conditions the necessity of complying with applicable water quality standards and requirements as to hazardous substances, a violation of such standards will constitute a violation of the permit and subject the permittee to liabilities under the Refuse Act in addition to enforcement proceedings under the Federal Water Pollution Control Act.

Q. Describe the function of the so-called "base level of treatment" criteria.

A. This term refers to criteria which EPA is developing with respect to 22 major categories of industrial dischargers. Basically it is both a determination of the state-of-the-art of water pollution control in those

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industries, and an interpretation of what constitutes the equivalent of secondary treatment for industry. On the basis of this information, we will be able to specify requirements for meeting water quality standards, taking into account existing pollution control technology, with much more clarity and precision than we have been able to do to date.

Q. On what basis will a permit be issued prior to development of the base level of treatment criteria?

A. Prior to the development of the base level of treatment criteria we will use all of the information we presently have with respect to industrial pollution and remedial measures. However, where our information lacks precision, we will recommend to the Corps that permits be issued for limited durations and with general requirements subject to later definition and clarification.

Q. How many personnel will be required at the State and Federal level to implement the Permit Program?

A. The Corps of Engineers has recently received authorization for 200 positions for the Permit Program for FY 1971 and will request

an additional 200 positions for FY 1972. This compares with EPA's plans for 432 positions to be staffed by December 31, 1971.

Our staffing needs are predicated on (1) the anticipated receipt of approximately 41,000 permit applications by June 30, 1971; (2) the need to develop effluent criteria for the 22 major types of industry; (3) the requirement for extensive coordination with the Corps and the States.

Staffing requirements at the State level will vary considerably depending on the concentrations of water users in each State, the nature of the discharges, and the effectiveness of any programs already established in the States. Although we know the personnel needs will be large, we cannot at this time estimate the State staffing requirements. As regulations and agreements are being finalized, we will be meeting with the States and at that time the figures should become more evident.

Q. Has provision been made for recruiting the necessary personnel to carry out the program?

A. We have prepared and announced tentative personnel needs for each region, which includes a variety of professional, technical, administrative, and clerical positions. Efforts are being initiated now to publicize the possible vacancies and to tentatively commit the required personnel. Although we anticipate that in some areas of the country there will be difficulty in obtaining a sufficient number of highly qualified professionals, we believe that there will be sufficient technical administrative, and clerical support personnel available internally or through outside sources to meet our needs. Naturally, the more lead time we have to staff the program prior to its actual initiation, the better equipped we will be to process the application workload.

The PRESIDING OFFICER. Is there further morning business?

Mr. ALLEN. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The assistant legislative clerk proceeded to call the roll.

Mr. ALLEN. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

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2.6 E.O. 11575, ADMINISTRATION OF THE DISASTER RELIEF ACT OF 1970

December 31, 1970, 36 Fed. Reg. 37

PROVIDING FOR THE ADMINISTRATION OF THE DISASTER RELIEF ACT OF 1970

By virtue of the authority vested in me by the Disaster Relief Act of 1970, hereinafter referred to as the Act, and section 301 of title 3 of the United States Code, and as President of the United States, it is hereby ordered as follows:

Section 1. (a) The authorities vested in the President by section 102(1) of the Act to declare a major disaster, by section 251 of the Act to provide for the restoration of Federal facilities, and by section 253 of the Act to prescribe time limits for granting priorities for certain public facilities and certain public housing assistance are reserved to the President.

(b) Except as otherwise provided in subsections (a), (c), and (d) of this section, the Director of the Office of Emergency Preparedness is designated and empowered to exercise, without the approval, ratification, or other action of the President, all of the authority vested in the President by the Act.

(c) The Secretary of Defense is designated and empowered to exercise, without the approval, ratification, or other action of the President, all of the authority vested in the President by section 210 of the Act concerning the utilization and availability of the civil defense communications system for the purpose of disaster warnings.

(d) The Secretary of Agriculture is designated and empowered to exercise, without the approval, ratification, or other action of the President, all of the authority vested in the President by section 238 of the Act concerning food coupons and surplus commodities.

Sec. 2. The Director of the Office of Emergency Preparedness may delegate to assign to the head of any agency of the executive branch of the Government, subject to the consent of the agency head concerned in each case, any authority or function delegated or assigned to the Director by the provisions of this order. Any such head of agency may redelegate any authority or function so delegated or assigned to him by the Director to any officer or employee subordinate to such head of agency whose appointment is required to be made by and with the advice and consent of the Senate.

Sec. 3. Rules, regulations, procedures, and documents issued under the authority of the Act of September 30, 1950 (64 Stat. 1109) ; the Disaster Relief Act of 1966 (80 Stat. 1316) ; and the Disaster Relief Act of 1969 (83 Stat. 125) shall remain in effect for purposes of the Act unless otherwise modified, superseded, or revoked by the appropriate Federal official, and, unless inappropriate, all references in those rules, regulations, procedures, and documents or in any Executive order or other document to the Act of September 30, 1950, the Disaster Relief Act of 1966, or the Disaster Relief Act of 1969 shall be deemed to be references to the Act.

Sec. 4. In order to assure the most effective utilization of the personnel, equipment, supplies, facilities, and other resources of Federal agencies pursuant to the Act, agencies shall make and maintain suitable plans and preparations in anticipation of their responsibilities in the event of a major disaster. The Director of the Office of Emergency Preparedness shall coordinate, on behalf of the President, such plans and preparations.

Sec. 5. Executive Order No. 10427 of January 16, 1953, Executive Order No. 10737 of October 29, 1957, and Executive Order No. 11495 of November 18, 1969, are hereby revoked. Unless inappropriate, any reference to those Executive orders in any rule, regulation, procedure, document, or other Executive order, shall be deemed to be a reference to this Executive order.

RICHARD NIXON

2.7 E.O. 11578, OHIO RIVER BASIN COMMISSION

January 13, 1971, 36 Fed. Reg. 683

ESTABLISHMENT OF THE OHIO RIVER BASIN COMMISSION

WHEREAS the Water Resources Planning Act (79 Stat. 244, 42 U.S.C. 1962 *et seq.*) provides for the establishment of river basin water and related land resources commissions; and

WHEREAS the Governors of the States of the Ohio River drainage basin, excluding the Tennessee River drainage basin, and the Water Resources Council have requested, or concurred in, the establishment of such a commission:

NOW, THEREFORE, by virtue of the authority vested in me by section 201 of the Water Resources Planning Act (42 U.S.C. 1962b), and as President of the United States, it is ordered as follows:

Section 1. Ohio River Basin Commission. It is hereby declared that the Ohio River Basin Commission is established under the provisions of Title II of the Water Resources Planning Act (42 U.S.C. 1962b *et seq.*).

Sec. 2. Jurisdiction of the Commission. It is hereby determined that the jurisdiction of the Ohio River Basin Commission referred to in section 1 of this order shall attend to those portions of the States of Kentucky, Illinois, Indiana, Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia that are located within the Ohio River drainage basin, excluding the Tennessee River drainage basin.

Sec. 3. Membership of the Commission. It is hereby determined that, in accordance with section 202 of the Act (42 U.S.C. 1962b—1), the Commission shall consist of the following members:

(1) a Chairman to be appointed by the President,

(2) one member from each of the following Federal departments and agencies: Department of Agriculture, Department of the Army, Department of Commerce, Department of Health, Education, and Welfare, Department of Housing and Urban Development, Department of the Interior, Department of Transportation, Federal Power Commission, Atomic Energy Commission, and the Environmental Protection Agency, such member to be appointed by the head of the department or independent agency he represents,

(3) one member from each of the following States: Kentucky, Illinois, Indiana, Maryland, New York, North Carolina, Ohio,

Pennsylvania, Tennessee, and West Virginia, and a member from Virginia when authorized by the legislature of that State, and

(4) one member from each interstate agency created by interstate compact to which the consent of Congress had been given and whose jurisdiction extends to the waters of the area specified in section 2.

Sec. 4. Functions, Powers, and Duties. The Commission and its officers, members, and employees shall perform and exercise, with respect to the area specified in section 2 of this order, their respective functions, powers, and duties as set out in Title II of the Water Resources Planning Act.

Sec 5. Reporting to the President. The Chairman of the Commission shall report to the President through the Water Resources Council.

RICHARD NIXON

**2.8 E.O. 11613, MEMBERSHIP OF ENVIRONMENTAL
PROTECTION AGENCY ON THE ESTABLISHED RIVER
BASIN COMMISSIONS**

August 2, 1971, 36 Fed. Reg. 14299

**MEMBERSHIP OF ENVIRONMENT PROTECTION AGENCY
ON ESTABLISHED RIVER BASIN COMMISSIONS**

By virtue of the authority vested in me by section 202 of the Water Resources Planning Act (79 Stat. 247; 42 U.S.C. 1962 b—1) and as President of the United States, it is ordered as follows:

Section 1. Section 3(2) of each of the following-described Executive orders is amended by adding "Environmental Protection Agency," immediately after "Department of Transportation,"—

(1) Executive Order No. 11331 of March 6, 1967, establishing the Pacific Northwest River Basins Commissions;

(2) Executive Order No. 11345 of April 20, 1967, establishing the Great Lakes Basin Commission;

(3) Executive Order No. 11359 of June 20, 1967, establishing the Souris-Red-Rainy River Basins Commission; and

(4) Executive Order No. 11371 of September 6, 1967, establishing the New England River Basins Commission, as amended by Executive Order No. 11528 of April 24, 1970.

Sec. 2. The Administrator of the Environmental Protection Agency shall appoint a member to each river basin commission to serve as the representative of that Agency as soon as practicable after the date of issuance of this Order.

RICHARD NIXON

2.9 E.O. 11331, ESTABLISHMENT OF PACIFIC NORTHWEST RIVER BASINS COMMISSION

March 6, 1967, 32 Fed. Reg. 3875,
as amended by E.O. 11613, Aug. 2, 1971, 36 F.R. 14299

WHEREAS the Water Resources Planning Act (hereinafter referred to as the Act, 79 Stat. 244, 42 U.S.C. 1962 *et seq.*) authorizes the President to declare the establishment of a river basin water and related land resources commission when a request for such a commission is addressed in writing to the Water Resources Council (hereinafter referred to as the Council) by the Governor of a State within which all or part of the basin or basins concerned are located and when such a request is concurred in by the Council and by not less than one-half of the States within which portions of the basin or basins concerned are located, and in the event the Columbia River Basin is involved, by at least three of the four States of Idaho, Montana, Oregon, and Washington; and

WHEREAS the Council, by resolution adopted November 14, 1966, concurred in the requests of the Governors of the States of Oregon, Washington, Idaho, Montana, and Wyoming; and did itself request that the President declare the establishment of the Pacific Northwest River Basins Commission under the provisions of section 201 of the Act; and

WHEREAS the requests of the Governors of the States of Oregon, Washington, Idaho, Montana, and Wyoming, and the resolution of the Council of November 14, 1966, satisfy the formal requirements of section 201 of the Act; and

WHEREAS the Governors of the States of California, Nevada, and Utah have been consulted in regard to small headwater areas in these respective States that contribute small quantities of water to or use small quantities of water from the area of jurisdiction of the Commission; and

WHEREAS it appears that it would be in the public interest and in keeping with the intent of Congress to declare the establishment of such a Commission:

NOW, THEREFORE, by virtue of the authority vested in me by section 201 of the Act, and as President of the United States, it is ordered as follows:

SECTION 1. *Pacific Northwest River Basins Commission.* It is hereby declared that the Pacific Northwest River Basins Commission is established under the provisions of Title II of the Act.

SEC. 2. *Jurisdiction of the Commission.* It is hereby determined that the jurisdiction of the Pacific Northwest River Basins Com-

mission referred to in section 1 of this order (hereinafter referred to as the Commission) shall extend to the entire area of the State of Washington; the entire area of the State of Oregon, except that drained by the Klamath River system, the Smith River system, and that area draining into Goose Lake; and those portions of the States of Idaho, Montana, and Wyoming lying within the Columbia River drainage, in accordance with the requests of the Governors of Oregon, Washington, Idaho, Montana, and Wyoming, and in accordance with the resolution of the Council.

SEC. 3. *Membership of the Commission.* It is hereby determined that, in accordance with section 202 of the Act, the Commission shall consist of the following:

(1) a Chairman to be appointed by the President,

(2) one member from each of the following Federal departments and agencies: Department of Agriculture, Department of the Army, Department of Commerce, Department of Health, Education, and Welfare, Department of Housing and Urban Development, Department of the Interior, Department of Transportation, Environmental Protection Agency, and the Federal Power Commission, such member to be appointed by the head of each department or independent agency he represents,

(3) one member from each of the following States: Oregon, Washington, Idaho, Montana, and Wyoming,

(4) one member from each interstate agency created by an interstate compact to which the consent of Congress has been given and whose jurisdiction extends to the waters of the area specified in section 2, and

(5) the Chairman of the United States Entity for the Columbia River Treaty.

SEC. 4. *Functions to be performed.* The Commission and its Chairman, members, and employees are hereby, authorized to perform and exercise, with respect to the jurisdiction specified in section 2 of this order, the functions, powers, and duties of such a Commission and of such Chairman, members, and employees, respectively as set out in Title II of the Act.

SEC. 5. *Consultation with adjoining States.* The Commission is expected to provide for procedures for consultation with the States of California, Nevada, and Utah on any member which might affect the water and related land resources of the small headwater drainages in each of these States that drain into the area of juris-

diction or the Commission, and to give notice to these States of meetings of the Commission.

SEC. 6. *International Coordination.* The Chairman of the Commission is hereby authorized and directed to refer to the Council any matters under consideration by the Commission which relate to the areas of interest of jurisdiction of the International Joint Commission, United States and Canada. The Council shall consult on these matters as appropriate with the Department of State and the International Joint Commission through its United States Section for the purpose of enhancing international coordination.

SEC. 7. *Reporting to the President.* The Chairman of the Commission shall report to the President through the Council.

LYNDON B. JOHNSON

2.10 E.O. 11345, ESTABLISHMENT OF THE GREAT LAKES BASIN COMMISSION

April 20, 1967, 32 Fed. Reg. 6329, as amended by E.O. 11613,
Aug. 2, 1971, 36 F.R. 14299; E.O. 11646, Feb. 8, 1972, 37 F.R. 2925

WHEREAS the Water Resources Planning Act (hereinafter referred to as the Act, 79 Stat. 244, 42 U.S.C. 1962 *et seq.*) authorizes the President to declare the establishment of a river basin water and related land resources commission when a request for such a commission is addressed in writing to the Water Resources Council (hereinafter referred to as the Council) by the Governor of a State within which all or part of the basin or basins concerned are located and when such a request is concurred in by the Council and by not less than one-half of the States within which portions of the basin or basins concerned are located; and

WHEREAS the Council, by resolution adopted March 7, 1966, concurred in the requests of the Governors of the States of Indiana, Michigan, Minnesota, Ohio, and Wisconsin, which have been concurred in by the Governors of Illinois, New York, and Pennsylvania; and did itself request that the President declared the establishment of the Great Lakes Basin Commission under the provisions of section 201 of the Act; and

WHEREAS the requests of the Governors of the States of Indiana, Michigan, Minnesota, Ohio, and Wisconsin, and the resolution of the Council of March 7, 1966, together with written concurrences by the Governors of the States of Illinois, New York, and Pennsylvania, satisfy the formal requirements of section 201 of the Act; and

WHEREAS it appears that it would be in the public interest and in keeping with the intent of Congress to declare the establishment of such a Commission:

NOW THEREFORE, by virtue of the authority vested in me by section 201 of the Act, and as President of the United States, it is ordered as follows:

SECTION 1. *Great Lakes Basin Commission.* It is hereby declared that the Great Lakes Basin Commission is established under the provisions of Title II of the Act.

SEC. 2. *Jurisdiction of Commission.* It is hereby determined that the jurisdiction of the Great Lakes Basin Commission referred to in section 1 of this order (hereinafter referred to as the Commission) shall extend to those portions of the eight Great Lakes States of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin that are drained by the St. Lawrence River system, including the Great Lakes, their tributaries, and tributaries to

the St. Lawrence River which reach that river within the United States, in accordance with the requests of the Governors of Indiana, Michigan, Minnesota, Ohio, and Wisconsin, concurred in by the Governors of Illinois, New York, and Pennsylvania, and in accordance with the resolution of the Council.

SEC. 3. *Membership of the Commission.* It is hereby determined that, in accordance with section 202 of the Act, the Commission shall consist of the following:

(1) a Chairman to be appointed by the President,

(2) one member from each of the following Federal departments and agencies: Department of State, Department of Agriculture, Department of the Army, Department of Commerce, Department of Health, Education, and Welfare, Department of Housing and Urban Development, Department of the Interior, Department of Justice, Department of Transportation, Environmental Protection Agency, and the Federal Power Commission, such member to be appointed by the head of each department or independent agency he represents.

(3) one member from each of the following States: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin, and

(4) one member from each interstate agency created by an interstate compact to which the consent of Congress has been given and whose jurisdiction extends to the waters of the area specified in section 2.

SEC. 4. *Functions to be performed.* The Commission and its Chairman, members, and employees are hereby authorized to perform and exercise, with respect to the jurisdiction specified in section 2 of this order, the functions, powers, and duties of such a Commission and of such Chairman, members, and employees, respectively, as set out in Title II of the Act.

SEC. 5. *International coordination.* The Council and the Department of State shall consult as appropriate on matters under consideration by the Commission which relate to the areas of interest and jurisdiction of the International Joint Commission, United States and Canada, and the Great Lakes Fishery Commission.

SEC. 6. *Reporting to the President.* The Chairman of the Commission shall report to the President through the Council.

LYNDON B. JOHNSON

2.11 E.O. 11359, ESTABLISHMENT OF THE SOURIS-RED- RAINY RIVER BASIN COMMISSION

June 20, 1967, 32 Fed. Reg. 8851, as amended by E.O. 11613,
Aug. 2, 1971, 36 F.R. 14299; E.O. 11635, Dec. 9, 1971, 36 F.R. 23615

WHEREAS the Water Resources Planning Act (hereinafter referred to as the Act, 79 Stat. 244, 42 U.S.C. 1962 *et seq.*) authorizes the President to declare the establishment of a river basin water and related land resources commission when a request for such a commission is addressed in writing to the Water Resources Council (hereinafter referred to as the Council) by the Governor of a State within which all or part of the basin or basins concerned are located and when such a request is concurred in by the Council and by not less than one-half of the States within which portions of the basin or basins concerned are located; and

WHEREAS the Council, by resolution adopted December 28, 1966, concurred in the requests of the Governors of the States of Minnesota and North Dakota to which the Governor of South Dakota has given his concurrence, and did itself request that the President declare the establishment of the Souris-Red-Rainy River Basins Commission under the provisions of section 201 of the Act; and

WHEREAS the requests of the Governors of the States of Minnesota and North Dakota and the resolution of the Council of December 28, 1966, together with written concurrence by the Governor of South Dakota, satisfy the formal requirements of section 201 of the Act; and

WHEREAS the Governors of the States of Minnesota and North Dakota have agreed to, and the Governor of South Dakota has concurred in, conditions relating to consolidation and termination of this Commission; and

WHEREAS the Governor of the State of Montana has been consulted in regard to the small headwater area of the Souris River Basin in Montana that contributes a small quantity of water to the area of jurisdiction of the Commission; and

WHEREAS it appears that it would be in the public interest and in keeping with the intent of Congress to declare the establishment of such a Commission:

NOW, THEREFORE, by virtue of the authority vested in me by section 201 of the Act, and as President of the United States, it is ordered as follows:

SECTION 1. *Souris-Red-Rainy River Basins Commission.* It is hereby declared that the Souris-Red-Rainy River Basins Commission is established under the provisions of Title II of the Act.

SEC. 2. *Jurisdiction of the Commission.* It is hereby determined that the jurisdiction of the Souris-Red-Rainy River Basins Commission referred to in section 1 of this order (hereinafter referred to as the Commission) shall extend to those portions of the States of Minnesota, North Dakota, and South Dakota that are drained by the Souris-Red-Rainy Rivers system, in accordance with the requests of the Governors of Minnesota and North Dakota, concurred in by the Governors of South Dakota, and in accordance with the resolution of the Council.

SEC. 3. *Membership of the Commission.* It is hereby determined that, in accordance with section 202 of the Act the Commission shall consist of the following:

- (1) a Chairman to be appointed by the President,
- (2) one member from each of the following Federal departments and agencies: Department of Agriculture, Department of the Army, Department of Commerce, Department of Health, Education, and Welfare, Department of Housing and Urban Development, Department of the Interior, Department of Transportation, Environmental Protection Agency, and the Federal Power Commission, such member to be appointed by the head of each department or independent agency he represents,
- (3) one member from each of the following States: Minnesota, North Dakota, and South Dakota, and
- (4) one member from each interstate agency created by an interstate compact to which the consent of Congress has been given and whose jurisdiction extends to the waters of the area specified in section 2.

SEC. 4. *Functions to be performed.* The Commission and its Chairman, members, and employees are hereby authorized to perform and exercise, with respect to the jurisdiction specified in section 2 of this order, the functions, powers, and duties of such a Commission and of such Chairman, members, and employees, respectively, as set out in Title II of the Act.

SEC. 5. *Consultation with adjoining States.* The Commission is expected to provide for procedures for consultation with the State of Montana on any matter which might affect the water and related land resources of the small headwater drainage of the Souris River Basin in Montana, and to give notice to Montana of meetings of the Commission.

SEC. 6. *International coordination.* The Chairman of the Commission is hereby authorized and directed to refer to the Council any matters under consideration by the Commission which relate to the areas of interest or jurisdiction of the International Joint Commission, United States and Canada. The Council shall consult on these mat-

ters as appropriate with the Department of State and the International Joint Commission through its United States Section for the purpose of enhancing international coordination.

SEC. 7. Termination. The Commission shall terminate on June 30, 1973, unless, upon recommendation of both the Council and not less than one-half the number of member States, this order is extended.

SEC. 8. Reporting to the President. The Chairman of the Commission shall report to the President through the Council.

LYNDON B. JOHNSON

2.12 E.O. 11371, ESTABLISHMENT OF THE NEW ENGLAND RIVER BASINS COMMISSION

September 6, 1967, 32 Fed. Reg. 12903, as amended by E.O. 11528, Apr. 24, 1970, 35 F.R. 6695; E.O. 11613, Aug. 2, 1971, 36 F.R. 14299

WHEREAS the Water Resources Planning Act (hereinafter referred to as the Act, 79 Stat. 244, 42 U.S.C. 1962 *et seq.*) authorizes the President to declare the establishment of a river basin water and related land resources commission when a request for such a commission is addressed in writing to the Water Resources Council (hereinafter referred to as the Council) by the Governor of a State within which all or part of the basin or basins concerned are located and when such a request is concurred in by the Council and by not less than one-half of the States within which portions of the basin or basins concerned are located; and

WHEREAS the Council, by resolution adopted October 14, 1965, concurred in the request of the Governor of the State of Maine, as Chairman of the New England Governors' Conference, and did itself request that the President declare the establishment of the New England River Basins Commission under the provisions of section 201 of the Act; and

WHEREAS the request of the Governor of the State of Maine and the resolution of the Council of October 14, 1965, together with written concurrences by the Governors of the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, and New York, satisfy the formal requirements of section 201 of the Act; and

WHEREAS it appears that it would be in the public interest and in keeping with the intent of Congress to declare the establishment of such a Commission:

NOW, THEREFORE, by virtue of the authority vested in me by section 201 of the Act, and as President of the United States, it is ordered as follows:

SECTION 1. *New England River Basins Commission.* It is hereby declared that the New England River Basins Commission is established under the provisions of Title II of the Act.

SEC. 2. *Jurisdiction of Commission.* (a) It is hereby determined that the jurisdiction of the New England River Basins Commission referred to in section 1 of this order (hereinafter referred to as the Commission) shall extend to an area composed as follows:

- (1) The State of Maine,
- (2) The State of New Hampshire,
- (3) The State of Vermont, excluding that portion thereof which is within the drainage area of the Hudson River and excluding also that portion thereof which is within the drainage area of Lake Champlain,
- (4) The State of Massachusetts, excluding that portion thereof which is within the drainage area of the Hudson River,
- (5) The State of Connecticut,
- (6) The State of Rhode Island,
- (7) (i) That portion of the State of New York which is within the drainage area of the Housatonic River, and (ii) that portion of Long Island (excluding New York City) in the State of New York which is within the drainage area of Long Island Sound, and
- (8) Long Island Sound except the portion thereof which lies west of a line extended from the Connecticut-New York boundary at the northern shore of the Sound to the New York City-Nassau County boundary at the southern shore of the Sound.

(b) The determination set forth in subsection (a) of this section is made in accordance with the request of the Commission, and is concurred in by the Water Resources Council and by the Governors of the States within the jurisdiction of the Commission.

SEC. 3. *Membership of the Commission.* It is hereby determined, in accordance with section 202 of the Act [section 1962b—1 of this title], that the Commission shall consist of the following:

- (1) a Chairman to be appointed by the President,
- (2) one member from each of the following Federal departments and agencies: Department of Agriculture, Department of the Army, Department of Commerce, Department of Health, Education, and Welfare, Department of Housing and Urban Development, Department of the Interior, Department of Transportation, Environmental Protection Agency, Atomic Energy Commission, and Federal Power Commission, each such member to be appointed by the head of each department or independent agency he represents,
- (3) one member from each of the following States: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, and New York, and
- (4) one member from each interstate agency created by an inter-

state compact to which the consent of Congress has been given and whose jurisdiction extends to the waters of the area specified in section 2.

SEC. 4. *Functions to be performed.* The Commission and its Chairman, members, and employees are hereby authorized to perform and exercise, with respect to the jurisdiction specified in section 2 of this order, the functions, powers, and duties of such a Commission and of such Chairman, members, and employees, respectively, as set out in Title II of the Act.

SEC. 5. *International coordination.* The Chairman of the Commission is hereby authorized and directed to refer to the Council any matters under consideration by the Commission which relate to the areas of interest or jurisdiction of the International Joint Commission, United States and Canada. The Council shall consult on these matters as appropriate with the Department of State and the International Joint Commission through its United States Section for the purpose of enhancing international coordination.

SEC. 6. *Reporting to the President.* The Chairman of the Commission shall report to the President through the Council.

LYNDON B. JOHNSON

2.13 E.O. 11658, ESTABLISHMENT OF THE MISSOURI RIVER BASIN COMMISSION

March 22, 1972, 37 Fed. Reg. 6045

The Water Resources Planning Act (79 Stat. 244; 42 U.S.C. 1962 *et seq.*) provides for the establishment of river basin water and related land resources commissions. In conformity with the requirements of that act a majority of the Governors of the States of the Missouri River drainage basin, as defined in Section 2 of this order, and the Water Resources Council have requested, or concurred in, the establishment of such a Commission.

NOW, THEREFORE, by virtue of the authority vested in me by Section 201 of the Water Resources Planning Act (42 U.S.C. 1962b), and as President of the United States, it is ordered as follows:

SECTION 1. *Missouri River Basin Commission.* It is hereby declared that the Missouri River Basin Commission is established under the provisions of Title II of the Water Resources Planning Act (42 U.S.C. 1962b *et seq.*).

SEC. 2. *Jurisdiction of the Commission.* It is hereby determined that the jurisdiction of the Missouri River Basin Commission referred to in Section 1 of this order shall extend to the State of Nebraska and those portions of the States of Colorado, Iowa, Kansas, Minnesota,

Missouri, Montana, North Dakota, South Dakota, and Wyoming that are located within the Missouri River drainage basin, defined as the drainage basin of the Missouri River above a point immediately below the mouth of the Gasconade River.

SEC. 3. *Membership of the Commission.* It is hereby determined that, in accordance with Section 202 of the Act (42 U.S.C. 1962b-1), the Commission shall consist of the following members:

(1) a Chairman to be appointed by the President,

(2) one member from each of the following Federal departments and agencies: Department of Agriculture; Department of the Army; Department of Commerce; Department of Health, Education, and Welfare; Department of Housing and Urban Development; Department of the Interior; Department of Transportation; Federal Power Commission; Atomic Energy Commission; and the Environmental Protection Agency; such member to be appointed by the head of the department or independent agency he represents.

(3) one member from each of the following States: Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, and Wyoming.

(4) one member from each interstate agency created by an interstate compact to which the consent of the Congress has been given and whose jurisdiction extends to the waters of the area specified in Section 2.

SEC. 4. *Functions, Powers, and Duties.* The Commission and its officers, members, and employees shall perform and exercise, with respect to the

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area specified in Section 2 of this order, their respective functions, powers, and duties as set out in Title II of the Water Resources Planning Act.

SEC. 5. *International Coordination.* The Chairman of the Commission is hereby authorized and directed to refer to the Water Resources Council any matters under consideration by the Commission which relate to areas of interest or jurisdiction of the International Joint Commission, United States and Canada. The Council shall consult on these matters as appropriate with the Department of State and the International Joint Commission through its United States Section for the purpose of enhancing international coordination.

SEC. 6. *Reporting to the President.* The Chairman of the Commission shall report to the President through the Water Resources Council.

RICHARD NIXON

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2.14 E.O. 11659, ESTABLISHMENT OF THE UPPER MISSISSIPPI RIVER BASIN COMMISSION

March 22, 1972, 37 Fed. Reg. 6047

The Water Resources Planning Act (79 Stat. 244; 42 U.S.C. 1962 *et seq.*) provides for the establishment of river basin water and related land resources commissions. In conformity with the requirements of that act the Governors of the States of the Upper Mississippi River drainage basin, as defined in Section 2 of this order, and the Water Resources Council have requested, or concurred in, the establishment of such a Commission.

NOW, THEREFORE, by virtue of the authority vested in me by Section 201 of the Water Resources Planning Act (42 U.S.C. 1962b), and as President of the United States, it is ordered as follows:

SECTION 1. *Upper Mississippi River Basin Commission.* It is hereby declared that the Upper Mississippi River Basin Commission is established under the provisions of Title II of the Water Resources Planning Act (42 U.S.C. 1962b *et seq.*).

SEC. 2. *Jurisdiction of the Commission.* It is hereby determined that the jurisdiction of the Upper Mississippi River Basin Commission referred to in Section 1 of this order shall extend to those portions of the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin that are located within the Upper Mississippi River drainage basin, defined as the drainage basin of the Mississippi River above the mouth of the Ohio River, excluding the drainage basin of the Missouri River above a point immediately below the mouth of the Gasconade River.

SEC. 3. *Membership of the Commission.* It is hereby determined that, in accordance with Section 202 of the Act (42 U.S.C. 1962b-1), the Commission shall consist of the following members:

(1) a Chairman to be appointed by the President,

(2) one member from each of the following Federal departments and agencies: Department of Agriculture; Department of the Army; Department of Commerce; Department of Health, Education, and Welfare; Department of Housing and Urban Development; Department of the Interior; Department of Transportation; Federal Power Commission; Atomic Energy Commission; and the Environmental Protection Agency; such member to be appointed by the head of the department or independent agency he represents,

(3) one member from each of the following States: Illinois, Iowa, Minnesota, Missouri, and Wisconsin,

(4) one member from each interstate agency created by an interstate compact to which the consent of Congress has been given and whose jurisdiction extends to the waters of the area specified in

Section 2.

SEC. 4. *Functions, Powers, and Duties.* The Commission and its officers, members, and employees shall perform and exercise, with respect to the

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area specified in Section 2 of this order, their respective functions, powers, and duties as set out in Title II of the Water Resources Planning Act.

SEC. 5. *Consultation with Adjoining States.* The Commission is expected to provide for procedures for consultation with the States of Indiana, Michigan, and South Dakota on any matter which might affect the water and related land resources of the headwater drainages of the Mississippi River Basin in those States and to give notice to those States of meetings of the Commission.

SEC. 6. *Reporting to the President.* The Chairman of the Commission shall report to the President through the Water Resources Council.

RICHARD NIXON.

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Regulations

Regulations

[EPA's regulations are found in the Code of Federal Regulations (CFR), which is periodically updated by the Federal Register. For a complete listing of the pertinent regulations, see "Contents 3.1 through 3.21" on pages xxxiii-xxxiv.]

Guidelines and Reports

4.1 EPA ANNUAL REPORT ON NATIONAL REQUIREMENTS AND COSTS OF WATER POLLUTION CONTROL

As required by 33 U.S.C. §1175(a) as amended (1970)

4.1a Cost of Clean Water, Vol. I, Municipal Investment Needs, Vol. II, Cost Effectiveness and Clean Water, Environmental Protection Agency, March 1971

INTRODUCTION

The purpose of this volume is to report to the Congress the results of the cost estimates for municipal needs as of December 1970, based upon a survey made by the Water Quality Office, Environmental Protection Agency. The report also compares the results of the most recent survey with the January 1970 cost estimates for municipal waste treatment systems which were provided to the Congress last year.

The objectives of the December survey were to produce the best possible estimate of needs, using the most current and accurate information available at that point and time. Simultaneously with conducting the survey we also sought to identify the problems which existed and needed to be resolved in the evolving WQO system for needs assessment. This report describes in summary form, how this system has evolved over the past several years.

This volume of the report concerns itself with documentation of planned facilities for municipal waste handling as developed historically and most important through the December 1970 assessment. It describes the present needs assessment system, and the techniques utilized in the December 1970 analysis. The estimate is compared with the January 1970 estimate of \$10.2 billion, on a national and State-by-State basis.

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SUMMARY AND CONCLUSIONS

The Federal Water Quality Administration made three assessments in 1970. The first assessment was undertaken in January 1970 and was basically a compilation of information provided by States. The second assessment, in July 1970, was unique in that, for the first time, large scale contacts were made directly with the major cities

around the nation to ascertain estimates of their construction requirements. The December 1970 study was undertaken to obtain the most up-to-date data on construction needs necessary for the development of meaningful future authorization levels concomitant with the preparation of new legislation and followed the pattern of the July survey.

The December 1970 assessment yielded a total investment need of \$12.6 billion for municipal waste treatment facilities covering the period December 1970 through the end of Fiscal Year 1974. To provide a consistent time-frame for comparison of analysis made in January 1970 and December 1970, it was necessary to adjust for the construction supported by grants made between January and December which amounted to approximately \$1.9 billion.

The difference between the January 1970 and the December 1970 estimates is mostly accounted for by increased expenditures associated with Enforcement Conferences, upgrading of requirements in water quality implementation plans, changes in State legislation, and generally improved quality of the estimates. (The latter was particularly affected by the imposition of new policies, standards, and regulations and their effect upon individual States and cities; the refinement of cost estimates as projects proceed to the construction stage; the revision of estimates to take account of construction industry cost increases.)

The December 1970 estimate for municipal waste facilities needs is believed to be the best representation of national needs obtainable at this time. At the same time it must be recognized that municipal waste treatment investment needs are the results of a dynamic process of assessment and reassessment. In addition, many exogenous factors which are described elsewhere in this report operate to make this an elusive and rapidly changing value. However, the dynamic nature of investment means that we must accept a reasonable magnitude of this need at any point in time for policy decisions. Continual checking of progress made against investment goals as well as changes in this target itself must be monitored closely and any system of investment assistance must have the flexibility to adjust to these changes in circumstances.

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In addition, other analyses have indicated that proper cost-effectiveness considerations can serve to reduce investment needs by increasing the facility productivity. While inflation has been working to increase needs, cost-effectiveness improvements in planning and technology transfer can be expected to reduce costs. Because of the gains expected to be achieved by ongoing efforts in EPA, the total

needs estimate was reduced to \$12.0 billion from the assessment value of \$12.6 billion.

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THE NEEDS ASSESSMENT SYSTEM AND HOW IT HAS EVOLVED

THE PROBLEM

The problem of determining needs for sewage facilities and related costs has plagued program administrators for years. Not only is he faced with the dynamic nature of investment needs described earlier, exogenous factors act to change the need at the same time he is attempting to measure it. He is also faced with the problem of definition and interpretation of what is being measured and what costs are involved as well as the availability of appropriate data to resolve these questions to a high degree of certainty. At least three basic elements are involved in the technical assessment process.

A. Requirements for waste handling facilities

- Quantity of sewage
- Uses of receiving water: water supply, recreation, navigation, irrigation, etc.
- Degree of treatment required: secondary, advanced waste treatment, etc.

B. Costing factors

- Climate (choice of unit process)
- Regionalization (economies or diseconomies of scale) and interceptor/waste treatment plant cost ratio
- Dispersal of customers
- Soil properties
- Topography (gravity flow vs. pumping)
- "Ineligible" costs as collection sewers, trunk sewers, others
- Time schedule
- Existing urbanization
- Treatment technology

C. Aggregation

The method of obtaining projections of costs versus time for communities, and summing these for the nation.

PAST RELATED EFFORTS

The first major effort at consolidating case-by-case estimates into a national waste treatment cost estimate was the annual reports by the Conference of State Sanitary Engineers from 1959 to 1966.

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The Water Quality Office's "Cost of Clean Water" (1968) used information from a previous inventory of current urban facilities and a previous survey of present and anticipated urban needs to make a five-year projection of capital outlay for waste treatment.

The "Economics of Clean Water" (1970) derived its dollar estimate of national waste treatment needs from two sources: from an existing case-by-case inventory and from a statistical model approach. These two approaches yielded very similar cost estimates on a national aggregate basis.

The estimates contained in this current report are predominantly based on detailed case-by-case (locality-by-locality) assessment of present and planned construction of facilities for municipal waste management.

HISTORICAL PERSPECTIVE

The Water Quality Office needs assessment system has evolved over a 14-year period, a period marked by great changes in the national attitudes toward water quality control. In dealing with "the problem" on a national basis, a number of relevant events led to the present situation.

- 1956 Public Law 84-660, approved July 9, did not provide for a Federal survey of needs—determination of needs was considered a State responsibility.
- 1957 DWSPC, PHS program established "monthly reporting" of applications in the regional offices, applications reported by the State agencies as being under preparation in the communities, for short-term work estimates. This covered applications for funds only, not future needs.
- 1959 Conference of State Sanitary Engineers (CSSE) agreed to make annual survey of States to establish long-term needs.
- 1966 FWPCA "monthly report" was expanded to include under "applications in preparation" all identifiable needs for which an application had not been filed with the State agency. The time frame for the needs was not yet established.
- 1967 CSSE withdrew from survey after criticism by the Congress of that annual survey of States to establish long-term needs.
- 1968 State Program Plan (SPP) instructions were revised to require a listing of needs on a one-year basis and a five-year basis. FWQA experience has shown great variation in States' methodology in responding.
- 1969 FWQA began conversion of "monthly reports" to provide a continuous appraisal of treatment plant construction related to water quality standards.

- 1969 FWQA "monthly report" was revised to cover only applications in the Regional Offices, and needs on the SPP one-year and five-year lists for Fiscal Year 1970.
- 1969-
- 1970 WQO's "Cost of Clean Water" (1969) and "Economics of Clean Water" (1970) developed projected needs data using statistical techniques. These are described in detail in those reports.
- 1970 Monthly reports incorporated the SPP one-year and five-year lists for Fiscal Year 1971. Regulations now require River Basin and/or Regional Plans; this will have great impact on structuring long-range planning, and more valid estimates of long-range needs should result.

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1970 STUDIES

The first special assessment took place in January 1970, and was basically a State-oriented effort. States were contacted and requested to examine their list of projects and costs, which had been reported to the Federal Water Quality Administration in December 1969, to determine if they represented the appropriate construction needs at that time. In general, there was not sufficient time available for the States to reevaluate their December submissions and update them accordingly. In States such as the New England States, New York, Maryland, Indiana and Missouri, where major programs were initiated in the mid-60's, the information on needs was well defined. However in the other States assistance programs were either in the early stage of development (such as New Jersey, Michigan, etc.) or in the early stages of consideration. Estimates from these States did not include the kind of data needed for indepth analyses.

The assessment performed in July 1970 was different from previous studies in that, for the first time, large scale contacts were made directly with approximately 1,000 major cities throughout the nation to ascertain estimates of their construction plans. This interim estimate utilized updated information from contacts with States and municipalities, more recently submitted States needs lists, and approximations of other known needs prepared by the Federal Water Quality Administration Offices.

The need for the December 1970 assessment was based on the fact that the present Water Quality Office legislation, with its appropriation authorization, would expire at the end of Fiscal Year 1971. Accordingly, to effectively prepare new legislation and, more particularly, develop meaningful future authorization levels, it was necessary to have available the best possible up-to-date data on con-

struction needs. The approach selected was to reassess the construction costs for all communities whose proposed projects were estimated to cost \$5 million or more. Since the cost of these projects represented about $\frac{3}{4}$ of the total cost of all projects, it was believed that, by validating the cost of this block of projects, considerable reliability could be attributed to the resultant total figure (which includes data for approximately 9,000 projects identified in the WQO Pending Needs file).

ASSESSMENT OF NEEDS METHOD

The assessment method alluded to above (Needs Assessment System and How it Evolved) was used in each of the three studies made in 1970. The basis of the method is the case-by-case (locality-by-locality) documentations of facilities for municipal waste treatment.

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Results are incorporated in the Facilities Construction Program's "Pending" File and are updated monthly with new and revised project information received from the States.

As part of the perspective in "needs estimation," it is important to point out that the costs depend on the level of treatment required. Although State interstate water quality standards must be approved by the Federal government, each State has latitude in setting goals for intrastate waters and these goals greatly affect costs. Some States have not yet received approval of their interstate standards, and some do not have intrastate standards so investments approximated for them are not as firm as for others. Other States, as a result of national awareness of the environment, have reacted by upgrading both water quality criteria and implementation schedules. The difference between Water Quality Office's January and July estimates is, in a way, a measure of this increased response over a six-month period.

Additional information was gathered in the December assessment (with special emphasis on data for major cities) so that a more detailed analysis of the needs could be performed. In particular, estimates were obtained on the volume of industrial waste associated with the proposed construction, and on construction needed to comply with water quality standards and enforcement actions.

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RESULTS OF ASSESSMENT

The results are summarized on the lists attached:

Attachment A—Estimates of Backlog of Needs for Construction of Sewage Treatment Facilities (Estimates as of December 31, 1969)

Attachment B—Estimated Cost of Construction of Municipal Sewage Treatment for the Period December 1970 Through June 1974

Attachment C—Percent Industrial Waste to be Treated by Projects to be Initiated Through FY 1974 in Cities With Projects Costing \$5 Million or More

Attachment D—Portion of Cost of Construction of Sewage Treatment Facilities Through FY 1974, in Cities With Projects Costing \$5 Million or More Related to Industrial Waste (By Flow)

Attachment E—Estimated Cost of Construction Through FY 1974, According to Regulatory Requirements

DISCUSSION

As previously mentioned from an overall point of view the January 1970 figures were lower than the second two estimates. In fact, the \$10.2 billion projected in January would have been lower still had not some of the States, at FWQA urging, prepared revised estimates based on their own knowledge regarding shortcomings of their previously reported estimates.

The \$12.2 billion estimate obtained in July 1970 and projected through FY 1974 represented an assessment in which individual community estimates for the first time, were given detailed scrutiny. The \$12.2 billion figure was revised to \$12.6 billion on the basis of reassessments made in December 1970 chiefly from cities planning the construction of sewage treatment facilities costing \$5 million or more (in States without cities planning projects of this magnitude, the city having the largest cost under \$5 million was selected). A large part of the total increase was accounted for in one major city—Chicago.

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From an overall point of view there are some general factors which have had a pronounced effect on the quality and accuracy of the estimates of construction needs. These factors include:

1. Availability of more Federal and State funds. The combination of greatly increased levels of Federal appropriations and the establishment by more States of matching grant programs has changed the indebtedness requirements of many communities planning or required to construct waste treatment facilities. Debt ridden cities can be more responsive to meeting their needs in this area when their financial requirements are reduced from 70% to 25% of the eligible cost of construction. Communities have been more willing to define needs and develop concrete plans for moving ahead with construction programs.

2. Recognition of the need for better estimates. Just as the Federal government, in the course of providing abatement needs, recognizes

the necessity for reliable assessments in order to better manage the program from a financial point of view, so the States, which must borrow or appropriate funds to meet expected matching grant requirements, recognize a similar (if not greater) need for such accuracy. The combination of pressures from these two directions is helping to bring about the desired end—a more complete identification of the needs and a more accurate estimate of the associated costs.

3. Imposition of new policies, standards, and regulations and their effect upon individual States and cities. Federal and State water quality standards, enforcement proceedings, basin planning and regionalization requirements do not remain static nationwide, nor are the timeframes fixed or unalterable. As a result, construction plans and schedules must adjust to fit these changes, and almost without exception the changes result in significant cost increases. Thus the needs figure is a dynamic rather than static quantity.

4. Refinement of cost estimates as projects proceed to the construction stage. As a project proceeds from the conception to the construction stages, in addition to undergoing cost refinements, it may also undergo changes in scope as well as in plant capacity or levels of treatment. Clearly, such changes have an effect upon costs. Clearly, too, the larger the project, the greater may be the cost changes.

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5. Cost increases in the construction industry. For example, unprecedented cost increases in 1970, have resulted in an upward revision of the previous year's figures.

In the main, the above general reasons account for the cost changes during calendar year 1970 for the cities identified in the December 1970 assessment.

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COST EFFECTIVENESS AND INVESTMENT NEEDS

The December 1970, assessment indicated an investment need of \$12.6 billion. Consideration of the influence of better reviews to assure cost-effective projects, better planning of waste management systems and more rapid utilization of new technology in practical situations led to a reduction of this need estimate to \$12.0 billion in planning the Federal program.

Our evaluation has revealed that relatively minor adjustments in project features can yield equivalent waste treatment at a lower cost. A few examples drawn from actual situations will illustrate the potentials for better analysis of projects.

First, consider the case of three communities located sequentially along the same river, with Community A lying upstream of B and B

upstream of C. Communities B and C have adequate waste treatment facilities; indeed Community C has excess capacity in its treatment plant and Community B's facility, funded partially by a Federal grant was explicitly designed to handle the wastes of upstream Community A and approved on that basis. Subsequently Community A submitted a grant application to fund an interceptor sewer to convey its wastes to Community C's treatment plant, passing directly by the previously intended treatment point at Community B. Apparently there had been a local problem leading to a rift between A and B.

Analysis of this situation showed that this "falling out" would cost an additional \$1 million to be expended on a total project cost of \$5.2 million. Returning to the original regional system concept would show a saving of about 20% over reported needs.

A second case is even more simple in nature. A single community applying for a grant assumed a growth in per capital sewage flows $3\frac{1}{2}\%$ per year, whereas something on the order of $\frac{1}{2}\%$ would have been more relevant to the situation. The difficulty lay in the fact that the growth rate was only implicit in the application information requiring thorough analysis to detect it. The project cost, using a more reasonable rate of per capita sewage flow growth would be reduced from \$820,000 to about \$615,000 or a saving of some 25% in what would have been unused excess capacity. (See Volume II for a detailed discussion of the overcapacity problem.)

A third illustration hinges on the time phasing of a regional system development. Existing plans called for a series of local treatment plants to be constructed now and abandoned at a specified date in the

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future at which time a centralized waste transmission and treatment facility would be constructed. This might be a conclusion reached in a situation where future growth was thought to be necessary to development of a larger regional system to achieve economics of scale in transmission. More careful analysis of this situation revealed that a cost saving of 16% could be achieved by skipping over the local treatment phase and moving immediately to the regional system.

These are only a few of the many examples which could be cited to illustrate the point of investment need reduction by wider application of cost-effectiveness measures. Implementation of the July 2, 1970, regulations dealing with adequate planning on both a basin and utility system basis as well as the planning guidelines issued on January 29, 1971, are important steps toward achieving better utilization of the investment dollar. Design, operation and maintenance guidelines issued initially in September 1970, and to be supplemented by timely technical guidelines will serve to further enhance productivity of the

waste facility investment dollar. Continued efforts in this direction are underway in the Environmental Protection Agency as a realization of the significant effort that must be devoted to a major public policy problem of the 1970's—efficient investment of the greatly increased resources proposed to be invested in waste treatment facilities.

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GUIDELINES AND REPORTS

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ATTACHMENT A
Estimates of Backlog of Needs for
Construction of Sewage Treatment Facilities¹
[Estimates as of December 31, 1969]

*Need for
construction
funds in
\$1,000*

Totals	\$10,217,076
Alabama	35,000
Alaska	12,025
Arizona	86,000
Arkansas	32,052
California	651,843
Colorado	133,000
Connecticut	280,470
Delaware	28,000
Dist. of Columbia	355,000
Florida	200,000
Georgia	150,000
Hawaii	14,442
Idaho	493
Illinois	437,225
Indiana	152,585
Iowa	33,334
Kansas	61,000
Kentucky	62,598
Louisiana	140,000
Maine	140,924
Maryland	236,900
Massachusetts	438,045
Michigan	253,683
Minnesota	136,265
Mississippi	40,000
Missouri	390,000
Montana	13,455
Nebraska	62,000
Nevada	28,550
New Hampshire	138,000
New Jersey	880,000
New Mexico	9,913
New York	1,900,110
North Carolina	69,263
North Dakota	22,000
Ohio	432,507
Oklahoma	65,332
Oregon	135,000
Pennsylvania	432,000
Rhode Island	51,531
South Carolina	75,000
South Dakota	27,000
Tennessee	105,545
Texas	525,000
Utah	11,677
Vermont	70,000
Virginia	151,000
Washington	160,000
West Virginia	44,305
Wisconsin	243,714
Wyoming	12,000
Guam	6,156
Puerto Rico	28,884
Virgin Islands	15,350

¹ Information derived (1) from Pending Report (Dec. 31, 1969) prepared monthly by WQO from data continuously furnished by States to Regional Offices and (2) in States where full pending data lacking, from estimates obtained from States by telephone on January 28, 1970.

ATTACHMENT B
 Estimated Cost¹ of Construction of Municipal Sewage Treatment Works
 For the Period December 1970 through June 1974²
 [million dollars]

Totals	\$12,565.2
Alabama	27.0
Alaska	28.1
Arizona	51.0
Arkansas	42.0
California	737.5
Colorado	47.4
Connecticut	229.5
Delaware	62.0
Dist. of Columbia	347.2
Florida	444.2
Georgia	74.0
Hawaii	50.8
Idaho	14.5
Illinois	1,043.6
Indiana	174.8
Iowa	111.9
Kansas	52.7
Kentucky	117.0
Louisiana	132.7
Maine	157.4
Maryland	349.7
Massachusetts	422.6
Michigan	788.8
Minnesota	295.2
Mississippi	34.1
Missouri	268.2
Montana	31.4
Nebraska	49.0
Nevada	47.2
New Hampshire	137.8
New Jersey	1,308.7
New Mexico	19.6
New York	1,721.0
North Carolina	125.3
North Dakota	8.4
Ohio	733.5
Oklahoma	69.8
Oregon	78.6
Pennsylvania	616.4
Rhode Island	37.7
South Carolina	57.6
South Dakota	13.5
Tennessee	88.9
Texas	398.7
Utah	22.6
Vermont	38.0
Virginia	280.1
Washington	216.3
West Virginia	51.4
Wisconsin	190.8
Wyoming	1.7
Guam	9.7
Puerto Rico	93.0
Virgin Islands	14.6

¹ Based on 1970 dollars.

² Excluding Storm Water Overflow Facilities.

**ATTACHMENT C—PERCENT INDUSTRIAL WASTE TO BE TREATED BY PROJECTS TO BE INITIATED
THROUGH FY 1974 IN CITIES WITH PROJECTS COSTING \$5 MILLION OR MORE**

	0-30 percent	31-50 percent	51-70 percent	71-100 percent	Total projects
Totals	787	54	22	10	1873
Alabama	1	—	—	—	1
Alaska	7	—	—	—	7
Arizona	7	—	—	—	7
Arkansas	8	—	—	—	8
California	146	3	1	—	150
Colorado	5	—	—	—	5
Connecticut	11	2	1	—	14
Delaware	3	—	—	—	3
Dist. of Columbia	5	—	—	—	5
Florida	38	—	—	1	39
Georgia	1	2	—	—	3
Hawaii	6	—	—	—	6
Idaho	1	—	—	—	1
Illinois	25	17	1	1	44
Indiana	10	—	—	—	10
Iowa	5	4	2	1	12
Kansas	4	—	—	—	4
Kentucky	3	—	—	1	4
Louisiana	26	—	—	—	26
Maine	2	—	2	—	4
Maryland	50	—	—	—	50
Massachusetts	15	4	2	1	22
Michigan	21	3	2	—	26
Minnesota	19	—	—	—	19
Mississippi	1	—	—	—	1
Missouri	21	—	—	—	21
Montana	1	1	—	—	2
Nebraska	4	—	—	—	4
Nevada	7	—	—	—	7
New Hampshire	3	—	3	2	8
New Jersey	43	6	1	—	50
New Mexico	3	—	—	—	3
New York	47	2	1	1	51
North Carolina	5	2	3	—	10
North Dakota	1	—	—	—	1
Ohio	38	3	1	—	42
Oklahoma	11	—	—	—	11
Oregon	8	—	—	—	8
Pennsylvania	23	—	—	—	23
Rhode Island	2	—	—	—	2
South Carolina	4	—	—	—	4
South Dakota	—	—	1	—	1
Tennessee	2	—	—	—	2
Texas	71	—	—	—	71
Utah	2	—	—	—	2
Vermont	1	—	—	—	1
Virginia	37	2	—	—	39
Washington	7	—	—	1	8
West Virginia	1	—	—	—	1
Wisconsin	10	3	1	1	15
Wyoming	1	—	—	—	1
Guam	1	—	—	—	1
Puerto Rico	12	—	—	—	12
Virgin Islands	1	—	—	—	1

¹ Excludes 6 projects which provide storm overflow treatment only.

ATTACHMENT D.—PORTION OF COST OF CONSTRUCTION OF SEWAGE TREATMENT FACILITIES
THROUGH FY 1974 IN CITIES WITH PROJECTS COSTING \$5 MILLION OR MORE
RELATED TO INDUSTRIAL WASTE (BY FLOW)¹
[million dollars]

Total cost		Industrial share
Totals	9,302.9	1,629.5
Alabama	5.9	.6
Alaska	16.9	0
Arizona	19.2	.9
Arkansas	16.1	0
California	475.4	67.7
Colorado	43.5	0
Connecticut	175.7	38.3
Delaware	35.5	4.3
Dist. of Columbia	347.2	0
Florida	347.9	15.0
Georgia	33.1	8.4
Hawaii	27.8	2.3
Idaho	3.1	0
Illinois	914.6	316.7
Indiana	72.0	10.0
Iowa	80.4	37.1
Kansas	28.5	0
Kentucky	65.3	11.6
Louisiana	92.4	0
Maine	71.3	12.5
Maryland	287.9	1.6
Massachusetts	282.6	76.7
Michigan	584.8	117.1
Minnesota	238.2	50.1
Mississippi	6.0	1.1
Missouri	239.4	43.3
Montana	12.0	3.7
Nebraska	33.7	0
Nevada	38.8	1.8
New Hampshire	97.4	58.3
New Jersey	1,283.8	380.1
New Mexico	11.2	0
New York	1,337.0	141.0
North Carolina	49.7	5.8
North Dakota	1.5	0
Ohio	580.7	74.0
Oklahoma	36.3	0
Oregon	64.4	9.1
Pennsylvania	172.7	24.4
Rhode Island	12.0	2.6
South Carolina	9.2	0
South Dakota	5.0	3.0
Tennessee	44.7	11.2
Texas	329.5	0
Utah	2.6	.4
Vermont	2.2	0
Virginia	213.9	22.1
Washington	140.0	5.2
West Virginia	6.0	.6
Wisconsin	213.9	66.0
Wyoming	.6	0
Guam	1.9	0
Puerto Rico	88.4	4.1
Virgin Islands	3.1	.8

¹ Excluding cost of treating storm water overflow facilities.

ATTACHMENT E.—ESTIMATED COST OF CONSTRUCTION THROUGH FY 1974 ¹
 ACCORDING TO REGULATORY REQUIREMENTS
 [million dollars]

	"A"	"B"	"C"	Other	Total
Totals	5,483.2	2,141.3	874.9	4,065.8	12,565.2
Alabama				27.0	27.0
Alaska	28.1				28.1
Arizona				51.0	51.0
Arkansas	29.0			13.0	42.0
California	129.1			608.4	737.5
Colorado				47.4	47.4
Connecticut	229.5				229.5
Delaware	25.1			36.9	62.0
Dist. of Columbia		347.2			347.2
Florida		154.6	74.6	215.0	444.2
Georgia		61.0		13.0	74.0
Hawaii	50.8				50.8
Idaho	14.5				14.5
Illinois	914.2		63.7	65.7	1,043.6
Indiana	23.1	66.1	48.6	37.0	174.8
Iowa				111.9	111.9
Kansas	48.8			3.9	52.7
Kentucky	105.3			11.7	117.0
Louisiana	39.0			93.7	132.7
Maine	88.1		69.3		157.4
Maryland		49.0	109.1	191.6	349.7
Massachusetts	385.0		37.6		422.6
Michigan	518.2	41.0		229.6	788.8
Minnesota		186.0		109.2	295.2
Mississippi			34.1		34.1
Missouri	225.3			42.9	268.2
Montana	31.4				31.4
Nebraska	31.7			17.3	49.0
Nevada	40.9			6.3	47.2
New Hampshire	120.4		7.2	10.2	137.8
New Jersey	999.9		157.0	151.8	1,308.7
New Mexico			14.5	5.1	19.6
New York	432.0	509.4	141.1	638.5	1,721.0
North Carolina				125.3	125.3
North Dakota				8.4	8.4
Ohio	112.9	470.2	49.9	100.5	733.5
Oklahoma				69.8	69.8
Oregon	60.1		1.3	17.2	78.6
Pennsylvania				616.4	616.4
Rhode Island	37.7				37.7
South Carolina	13.8			43.8	57.6
South Dakota	13.5				13.5
Tennessee				88.9	88.9
Texas	398.7				398.7
Utah	22.6				22.6
Vermont			38.0		38.0
Virginia	43.4	111.2	28.9	96.6	280.1
Washington	210.0			6.3	216.3
West Virginia	51.4				51.4
Wisconsin		145.6		45.2	190.8
Wyoming				1.7	1.7
Guam	9.7				9.7
Puerto Rico				93.0	93.0
Virgin Islands				14.6	14.6

¹ Excluding Storm Overflow Facilities.

"A" Implementation plans

"B" Enforcement actions

"C" State orders or other State regulatory requirements

VOLUME II

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COST EFFECTIVENESS AND CLEAN WATER

INTRODUCTION

This is the fourth in a series of reports to the Congress that have been prepared in compliance with Section 26(a) of the Federal Water Pollution Control Act, as amended, that directs that the Administrator of the Environmental Protection Administration "make . . . a comprehensive analysis of the national requirements for and the cost of treating municipal, industrial, and other effluents to attain . . . water quality standards . . . established pursuant to this Act or applicable State law."

Previous studies have examined the total amount and the distribution of waste treatment requirements for public agencies and for industry, and have considered, to the extent that information and programs were developed, the kinds and costs of controls that might be directed at non-sewered pollutants.

The data which have been presented and analyzed in the previous reports have been addressed to normative rates of investment on a national basis, although last year's report began to investigate regional differences in costs. Data available then as well as new data provided the Agency by States in the past year show wide disparities in unit

prices. Indicated per capita investment requirements reported by the States for municipal waste treatment over the next five years range from almost \$500 to less than \$10.

Over the last decade, the nation has almost doubled its waste treatment capitalization and will double it again in the next five years. Yet the public hears little of accomplishment, and, quite the contrary is often led to believe that little has been done to control sewerred wastes.

An immutable tendency seems to be that as Federal financial assistance and investment increases, physical plant expands; and as physical plant expands, the volume of capital needs involving Federal financial assistance also expands. The more we invest, the more we seem to need to invest. The reasons for and effects of factors causing this are discussed in Volume I.

But it is also possible that much of the capital need flows from institutional inefficiencies at all levels of government, that some of the increase in costs of pollution abatement could be controlled by more efficient utilization of capital, and that more rapid progress in pollution abatement could be achieved by alternative investment arrangements.

[p. 1]

This volume of the report, then, considers the question of efficiency, directing its attention to: 1) the distribution of investments as compared to the distribution of polluting activities and the location of water pollution; 2) the results of municipal and industrial waste treatment investments made over the life of the Federal construction grant program, in terms of reduction of oxygen demand and nutrients in sewage; 3) avoidable increase in local operating, maintenance, financing, and overhead costs of waste treatment; and 4) the questionable strategy of making use of investment capital essentially to forestall some future needs, and at the same time permitting the persistence of existing treatment system deficiencies.

[p. 2]

INVESTMENT IN 1970 AND THE NATIONAL GOAL

A significant change in the conduct of water pollution control programs took place in 1970, when the Federal Government established a distinct objective for programs in support of public waste treatment. The program was intended to "provide every community that needs it with secondary waste treatment, and also special additional treatment in areas of special need . . .". From this posture, to be met in a five-year period, can be inferred the attainment of a condition in which required investments for waste treatment and related purposes (i.e., projects entitled to Federal assistance under Public Law 84-660) would be no greater in any year than the amount of the

requirements generated in that year. On the basis of exhaustive analysis involving two parallel studies that employed widely different methods—macroeconomic projection of the interaction of demand constituents on the one hand, inventorying of locally determined construction requirements on the other—it was determined that no less than \$2 billion a year of investment must be elicited over the five years 1970 to 1974 if the goal were to be attained. Descriptions of these analyses were transmitted to the Congress in the March, 1970 report, *The Economics of Clean Water*. That report emphasized that the amount of necessary expenditure was not fixed, but rather was a consequence of a series of functions, including price level changes, technological mixes, resource availability, and—most significant of all—the annual rate of investment.

As indicated in Volume I, during the course of the year 1970 it became obvious that several conditions were acting to upset the resolution of the proposed \$10 billion investment program. These include more stringent treatment requirements, improved perception of needs, refinements of estimates and construction sector inflation.

At the same time and in spite of the availability of expanded Federal and State financial assistance, investment in 1970 did not achieve the \$2 billion annual level thought to be required to sustain progress toward the provisional five-year goal of complete availability of waste treatment services compatible with water quality standards. By the end of 1970, over \$3 billion of Federally assisted works were under construction, and about \$1.2 billion worth of Federally assisted projects were begun during the year—up from \$865 million in 1969. But neither value could be considered sufficient to sustain progress toward the targeted goal. Table I shows a comparison of actual events in 1970 with those of 1969.

[p. 3]

TABLE I.—THE INVESTMENT PICTURE 1969 AND 1970
[Million dollars]

	1969	1970
Works under construction	2224	3398
New starts	937	1174
Completions	375	187

Most of the States seem to be recognizing the impact of these events on their own circumstances. Each State was requested during June 1970 to estimate on a point by point basis the desirable level of capitalization of waste treatment works for the four fiscal years 1971 through 1974 as described in Volume I.

Faced with a similar request in 1969, the States had estimated a

total need for \$10.2 billion of investment capital over five years. In June 1970, they expressed a collective need for \$12.2 billion—but in four years. (cf. Table 3). A more recent survey taken as of December 1970 shows a total need of \$12.6 billion somewhat higher than the \$12.2 billion estimate. The December 1970 estimates are shown in Table 3.

A careful State-by-State review of the data summarized in Tables 2 and 3 suggests that there may be a significant amount of uncertainty involved in local estimates of needs. In the course of a single year, ten States' estimates of need increased by 100% or more, in spite of investment occurring in the year. Granted that the scheduling of particular, large projects will have a significant effect on the distribution of requirements in any period, it seems unlikely that one State in five would suddenly feel that need to initiate projects of such significant magnitude in a single year. Rather, it would appear that there were either real changes in conditions, or that much of what was required in 1969 was simply overlooked in that year.

On the brighter side, sixteen States provided capital estimates that suggest that they have reduced their backlog of needed works during 1970. Fewer dollars will be required, if their estimates are good, to improve and maintain their public waste handling systems in the four years 1971 to 1974 than in the five years 1970 to 1974. In addition, nine States held their own, in the sense that their projected levels

[p. 4]

TABLE 2.—INDIVIDUAL STATES' ASSESSMENTS OF CAPITAL REQUIREMENTS, 1969 AND 1970

Location	Indicated FY 1971-4 Needs		Indicated FY 1970-4 Needs		Net Change		% Change in Annual Per- Capita Needs
	\$Mil- lions	\$Per- Capita*	\$Mil- lions	\$Per- Capita*	\$Mil- lions	\$Per- Capita*	
California	922.79	47.81	651.8	33.77	+271.0	+14.04	77
Idaho	11.44	16.27	0.5	0.71	+10.9	+15.56	2764
Nevada	57.86	128.87	28.6	63.97	+29.3	+65.17	152
Oregon	104.65	52.12	135.0	67.23	-30.4	-15.11	-3
Washington	214.74	65.55	160.0	48.84	+54.7	+16.71	50
Pacific Coast	1311.48	50.96	975.9	37.92	+335.5	+13.04	68
Iowa	66.77	24.07	33.3	12.00	+33.5	+12.07	151
Minnesota	161.67	44.33	136.3	37.37	+25.4	+6.96	48
Missouri	327.10	70.72	390.0	84.32	-62.9	-13.60	5
Montana	15.67	22.62	13.5	19.48	+2.2	+3.17	45
Nebraska	74.70	51.91	62.0	43.09	+12.7	+8.83	51
North Dakota	7.55	12.04	22.0	35.09	-14.5	-23.05	-57
South Dakota	17.25	26.30	27.0	41.16	-9.8	-14.86	-20
Wyoming	1.80	5.71	12.0	38.10	-10.2	-32.38	-81
Northern Plains	672.51	45.51	696.1	47.11	-23.6	-1.60	21
Arizona	78.75	47.36	86.0	51.71	-7.3	-4.36	14
Arkansas	30.50	15.36	33.0	16.62	-2.5	-1.26	16
Colorado	45.10	22.08	133.0	65.10	-87.9	-43.03	-58
Kansas	61.80	26.95	61.0	26.60	+0.8	+0.35	27

Location	Indicated FY 1971-4 Needs		Indicated FY 1970-4 Needs		Net Change		% Change in Annual Per- Capita Needs
	\$Mil- lions	\$Per- Capita*	\$Mil- lions	\$Per- Capita*	\$Mil- lions	\$Per- Capita*	
New Mexico	10.60	10.54	9.9	9.84	+0.7	+ .70	34
Oklahoma	78.80	31.27	65.3	25.91	+13.5	+5.36	51
Texas	573.70	52.26	525.0	47.83	+48.7	+4.44	37
Utah	33.67	32.56	11.7	11.32	+22.0	+21.25	260
Southern Plains	912.92	38.81	924.9	39.32	-12.0	-.51	23
Alabama	45.45	12.77	35.0	9.39	+10.5	+2.94	70
Florida	457.10	74.31	200.0	32.52	+257.1	+41.80	186
Georgia	177.62	38.88	150.0	32.84	+27.6	+6.05	48
Kentucky	94.59	29.38	62.6	19.44	+32.0	+9.93	89
Louisiana	162.00	43.48	140.0	37.57	+22.0	+5.90	45
Mississippi	42.96	18.33	40.0	17.06	+3.0	+1.26	34
North Carolina	122.02	23.82	69.3	13.53	+52.7	+10.29	120
South Carolina	58.29	21.88	75.0	28.15	-16.7	-6.27	-3
Tennessee	138.08	34.74	105.5	26.54	+32.6	+8.20	64
Virginia	220.70	48.03	151.0	32.86	+69.7	+15.17	83
Southeast	1518.81	38.04	1028.4	28.61	+490.5	+13.64	66
Delaware	63.20	118.35	28.0	52.43	+35.2	+65.92	182
District of Columbia	380.50	470.33	355.0	438.81	+25.5	+31.52	34
Illinois	695.27	63.26	437.2	39.78	+258.1	+23.48	99
Indiana	151.17	29.87	152.6	30.15	-1.4	-.28	24
Maryland	247.68	65.98	236.9	63.11	+10.8	+2.87	31
Michigan	690.69	79.04	253.7	29.03	+437.0	+50.00	240
Ohio	442.32	41.78	432.5	40.85	+9.8	+ .93	28
West Virginia	49.87	27.67	44.3	24.58	+5.6	+3.09	41
Wisconsin	139.88	33.14	243.7	57.74	-103.8	-24.60	-28
Central	2860.58	61.52	2183.9	46.97	676.8	14.55	64
Connecticut	231.60	78.16	280.5	94.67	-48.9	-16.50	3
Maine	137.90	141.29	140.9	144.36	-3.0	-3.07	22
Massachusetts	470.40	86.01	438.0	80.09	+32.4	+5.92	34
New Hampshire	163.15	232.41	138.0	196.58	+25.2	+35.83	48
New Jersey	1187.60	167.43	880.0	124.07	+307.6	+43.37	69
New York	1859.80	102.88	1900.1	105.11	-40.3	-2.23	22
Pennsylvania	567.07	48.35	432.0	36.83	+135.1	+11.52	64
Rhode Island	43.30	47.37	51.5	56.35	-8.2	-8.97	5
Vermont	41.20	96.94	70.0	164.71	-28.8	-67.76	-26
Northeast	4702.02	97.25	4331.0	89.58	+371.1	+7.68	36
Alaska	35.89	130.97	12.0	43.80	+23.9	+87.19	274
Guam	14.23	18.97	6.2	8.27	+8.0	+10.71	187
Hawaii	82.55	105.84	14.4	18.46	+68.2	+87.37	617
Puerto Rico	61.95	22.75	28.9	10.61	+33.1	+12.14	168
Virgin Islands	16.56	44.76	15.4	41.62	+1.2	+3.14	34
Non-Contiguous	211.18	43.12	76.9	18.68	+134.4	+32.65	189
U.S. total	12189.48	60.62	10217.1	50.81	+1972.4	+9.81	49

U.S. Bureau of Census Estimate of 1968 Population

TABLE 3.—FLUCTUATIONS IN STATE ESTIMATES OF CAPITAL NEEDS
JUNE 1970 AND DECEMBER 1970
(Million Dollars)

Location	June 1970	Indicated FY 1971-4 Needs December 1970	% Change
Needs Increase $\geq 75\%$:			
Montana	15.67	31.4	100.4
New Mexico	10.60	19.6	84.9
Minnesota	161.67	295.2	82.6
Needs Increase 50-74.9%:			
Iowa	66.77	111.9	67.6
Ohio	442.32	733.5	65.8
Illinois	695.27	1043.6	50.1
Puerto Rico	61.95	93.0	50.1
Needs Increase 25-49.9%:			
Maryland	247.68	349.7	41.2
Arkansas	30.50	42.0	37.7
Wisconsin	139.88	190.8	36.4
Virginia	220.70	280.1	26.9
Idaho	11.44	14.5	26.7
Needs Increase 10-24.9%:			
Kentucky	94.59	117.0	23.7
Indiana	151.17	174.8	15.6
Michigan	690.69	788.8	14.2
Maine	137.90	157.4	14.1
North Dakota	7.55	8.4	11.3
New Jersey	1187.60	1309.7	10.2
Needs Increase 5.1-9.9%:			
Pennsylvania	567.07	616.4	8.7
Colorado	45.10	47.4	5.1
Needs Change $\pm 5\%$:			
West Virginia	49.87	51.4	3.1
North Carolina	122.02	125.3	2.7
Washington	214.74	216.3	0.7
Connecticut	231.60	229.5	-0.9
South Carolina	58.29	57.6	-1.2
Delaware	63.20	62.0	-1.9
Florida	457.10	444.2	-2.8
Needs Decrease 5.1-10%:			
Wyoming	1.80	1.7	-5.6
New York	1859.80	1721.0	-7.5
Vermont	41.20	38.0	-7.8
District of Columbia	380.50	347.2	-8.8
Needs Decrease 10.1-25%:			
Massachusetts	470.40	422.6	-10.2
Oklahoma	78.80	69.8	-11.4
Virgin Islands	16.56	14.6	-11.8
Rhode Island	43.30	37.7	-12.9
Kansas	61.80	52.7	-14.7
New Hampshire	163.15	137.8	-15.5
Missouri	327.10	268.2	-18.0
Louisiana	162.00	132.7	-18.1
Nevada	57.86	47.2	-18.4
California	922.79	737.5	-20.1
Mississippi	42.96	34.1	-20.6
Alaska	35.89	28.1	-21.7
South Dakota	17.25	13.5	-21.8
Oregon	104.65	78.6	-24.9

Location	June 1970	Indicated FY 1971-4 Needs December 1970	% Change
Needs Decrease >25.1%:			
Texas	573.70	398.7	-30.5
Guam	14.23	9.7	-31.8
Utah	33.67	22.6	-32.9
Nebraska	74.70	49.0	-34.4
Arizona	78.75	51.0	-35.2
Tennessee	138.08	88.9	-35.6
Hawaii	82.55	50.8	-38.5
Alabama	45.45	27.0	-40.6
Georgia	177.62	74.0	-58.3
U.S. TOTALS	12,189.48	12,565.2	3.1

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of expenditures did not increase more than indicated by the impact of 1970 inflation—9.8%, given the normal mix of transmission and treatment plant investment. Twenty-five of the fifty-four States (i.e., fifty States, plus the District of Columbia, Guam, Puerto Rico, and the Virgin Islands) reduced or maintained the backlog of needed works, while twenty-nine indicated that backlogs increased during 1970.

Due to the changeable nature of the State-by-State estimates made in 1969 and 1970 it seems reasonable to conclude that the \$12.6 billion estimate in Table 3 does not represent a fixed estimate of investment need. As discussed in following chapters it appears that cost-effective opportunities exist which, if carefully implemented, could result in substantial overall savings for the nation. These chapters describe various practices and policies which affect cost. It is clear from these estimates showing a \$2.4 billion increase over the 1969 estimate, that annual investment will have to be accelerated above the \$2 billion level deemed necessary in the last years report.

As in previous years, estimates of industrial capital expenditures were available only from sources outside of government. Perhaps the best of these is the McGraw-Hill survey, conducted annually as a portion of that service's quarterly capital spending survey. The report's results—which do not distinguish between air and water pollution control investments—are contained in Table 4.

There are some interesting features hidden in the data. First actual investments reported for 1968 are somewhat above the investments previously reported for that year. Presumably, the deviation results from the process of extrapolating from a differently constituted sample. Though not a significant difference (7.2% for the manufacturing sector), the fact of difference indicates some of the difficulties involved in dealing with these very slippery facts. Second, actual investments reported for 1969 are 15% higher than planned for that year—almost an exact reversal of the previous year, when outlays

did not meet initial intentions. Perhaps the easing of the capital spending boom eliminated delivery and construction bottlenecks—or perhaps the differences are attributable to sampling variability.

While the McGraw-Hill survey provides no information with respect to the distribution of expenditures for air pollution control vs. water pollution control, another source, the National Industrial Conference Board, does make that distinction. Unfortunately, the NICB's most recent survey was for the year 1968, and so is of less immediate interest than the McGraw-Hill report. It may be considered significant, however, that the NICB data corroborate a steady upward trend in total industrial investment for environmental pollution control.

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TABLE 4.—INDUSTRIAL INVESTMENT IN AIR AND WATER POLLUTION CONTROL MCGRAW-HILL SURVEY

Millions of Dollars					
	¹ Normalized Water Component	1967	1968	1969	1970 (Planned)
Iron and Steel	48%	130	119	179	199
Nonferrous metal	NA	43	15	41	84
Machinery	60%	46	113	83	149
Transportation eqt.	20%	76	54	92	120
Stone, clay and glass	40%	48	40	63	95
Other durables	NA	45	68	172	163
Chemical	48%	92	109	140	226
Pulp and paper	65%	94	82	143	184
Rubber	50%		10	9	20
Petroleum	48%	102	170	260	205
Textiles	75%	7	9	10	23
Food and pdts.	55%	42	23	58	91
Other nondurables	NA	53	20	31	57
Manufacturing total	50%	785	832	1281	1614
Electric and gas utilities	NA	215	244	285	544
Mining	NA	66	56	105	126

¹ Based on series of NICB surveys and not a part of the McGraw-Hill report.

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They also suggest that a steadily decreasing share of that investment goes into water pollution abatement facilities. From 55% in 1962, water's share has dropped to 50% of manufacturing outlays in 1968; and some of the larger and more significant industrial components—primary metals, petroleum, and chemicals—now would seem to devote less than half of their pollution control investment to water pollution purposes. Whether the phenomenon is due to a more stringently enforced set of regulations or to a more fully available set of wastewater treatment controls it is impossible to say, given our

limited existing knowledge of industrial waste treatment facilities and investment.

It is expected that the recently initiated National Industrial Waste Inventory will improve our base of knowledge in the industrial sector. The next report in this clean water series should be able to provide an assessment of the progress made toward control of industrial wastes. In addition to the data which will become available through the inventory, the study being conducted for the Environmental Protection Agency, Water Quality Office by the National Industrial Conference Board will provide investment information on industrial waste treatment facilities in place and planned for the future. This report should be completed during the middle of calendar year 1971.

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THE CAPITALIZATION OF WASTE TREATMENT FACILITIES

SITUATION

Aggregate daily waste production and discharge, in terms of five day biochemical oxygen demand (BOD_5), are estimated to have a configuration approximately like that shown in Table 5. Mean waste production is estimated to be over 120 million pounds per day, and mean discharge 45 to 50 million pounds per day, thirty percent reaching water through the outfalls of public systems in standard metropolitan statistical areas, five percent occurring through the discharges of communities outside SMSA's, sixty-five percent occurring through separately discharging factories. Over-all effectiveness of waste treatment is estimated to amount to greater than sixty percent reduction of BOD , or very close to seventy percent of theoretical limits for conventional waste treatment; and reduction of oxygen demand of sanitary sewage approaches 65%. (cf. Table 6.)

Those relationships represent a substantial, though generally unrecognized, accomplishment of the American economy. Consider the situation. When World War II ended, less than 75 million Americans were provided with sewer services, compared to 140 million today. And of those 75 million, roughly 30 million—or forty percent—were discharging raw wastes. Industrial waste treatment simply did not exist in 1945, except as provided by light industry attached to sewers in communities that happened to supply waste treatment. While we have no information on either the distribution of waste treatment techniques or the volume of industrial waste, it is not unreasonable to assume that no more than half of municipal waste treatment capacity represented secondary treatment and the professional judgement of the period included the assessment that industrial wastes were as

great in volume as domestic (probably a considerable underestimate, in the light of later knowledge). Using such crude estimates, the aggregate level of BOD reduction could have been little more than 16% to 33% of domestic waste strength, and nothing for an equal volume of industrial wastes.

Between 1945 and 1968, then, the economy increased the relative effectiveness of its waste treatment fourfold, in the face of an expansion of waste production that may have amounted to as much as 390% of the 1945 level. Certainly that investment program must stand beside highway construction and physical expansion of educational facilities as an accomplishment, though the latter phenomena have received a great deal of attention, while the expansion of waste treatment has gone almost unnoticed. Here, however, the discussion relates only to the significant magnitude of construction works. As shall be discussed later, this same significance does not carryover to change in pollutants discharged to the nation's water's.

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TABLE 5.—COMPONENTS OF NATIONAL SEWERED WASTE DISCHARGE, 1968
[million pounds BOD₅/DAY]

	Produced	Percent of Total Produced	Discharged	Percent of Total Discharged	Percent Reduced by Treatment
Metropolitan population	17.9	14.7	6.4	13.9	64.3
Nonmetropolitan population	5.3	4.3	1.8	3.9	66.0
Separately discharging industries ¹	80.0	65.5	30.7	66.6	61.6
Industries discharging through metropolitan plants	18.2	14.9	7.2	15.6	60.7
Industries discharging through nonmetropolitan plants	0.7	0.6	0.4	0.9	42.9
TOTAL	122.1	100.0	46.1	100.0	62.2
(Industrial total)	98.9	81.0	38.3	83.1	61.3
(Population total)	23.2	19.0	8.2	1.8	64.6
(Through metropolitan plants)	36.1	29.6	13.6	29.5	62.3
(Through nonmetropolitan plants)	6.0	4.9	2.2	4.8	63.3

¹ Assumes 300 day average operating year

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TABLE 6.—DISTRIBUTION OF MUNICIPAL WASTE TREATMENT TECHNIQUES, 1962 AND 1968

Technique	Mean BOD Removal percent	Plants	1962 1000's Served	Indicated ¹ removal	Plants	1968 1000's Served	Indicated ¹ removal
Imhoff or septic tanks	30	1,592	3,173.7	952.1	1,179	2,864.4	859.3
Primary treatment	37	1,088	30,052.0	11,119.2	1,212	34,112.6	12,621.7
Chemical treatment	60	84	7,408.5	4,445.1	75	5,857.7	3,514.6
Lagoons	83	1,402	2,265.4	1,880.3	3,471	6,142.9	5,098.6
Biological filters	81	3,540	23,282.4	18,858.7	3,813	29,618.2	23,990.7
Activated sludge	87	798	33,276.3	28,950.4	1,312	38,560.9	33,548.0
Extended aeration	88	155	406.2	357.5	801	2,704.7	2,380.1
Other secondary	85	132	529.9	450.4	197	7,886.4	6,703.4
Land disposal	99	266	1,220.0	1,207.8	128	412.7	408.6
Int. sand filters	95	342	505.2	479.9	247	331.9	315.3
Tertiary treatment	94	0	0	0	10	325.5	306.0
Total treatment systems	1962 - 67.3	9,399	102,119.6	68,701.4	12,445	128,817.8	89,746.4
Total treatment systems	1968 - 64.6						
Untreated discharge	0	2,068	16,233.9	0	1,402	10,176.0	0
Total sewer systems	1962 - 58.1	11,467	118,353.9	68,701.4	13,847	138,993.8	89,746.4
Total sewer systems	1968 - 64.6						

¹ Population served X mean removal = Indicated gross removal of BOD, in population equivalents (6 P.E. = 1 lb. of BOD₅) and for domestic wastes only.

Much of the expansion of waste treatment services has taken place fairly recently. Between 1945 and 1949 incremental waste treatment service reached only 2 million persons, and public works activities of all types were slow paced during the Korean War. But from 1952 to the present, outlays for construction of waste treatment plants and related works have increased in almost every year. (cf. *The Cost of Clean Water and Its Economic Impact*, U.S.D.I., January 1969, Tables 4, 5). In sum, that investment is estimated to have exceeded \$16 billion at this writing.

The general dimensions of the investment, through 1968, are summarized by source in Table 7. Some of the obvious aspects of the current investment picture come into clear relief when arrayed in this form:

(1) The major burden of investment has been borne by public agencies, and particularly by those located in standard metropolitan statistical areas where almost 70% of U.S. population is concentrated.

(2) A significant portion of the higher investment by the public sector may be ascribed to the necessity of transmitting wastes to and from treatment plants. The network of interceptor sewers, pumping stations, and outfalls required in connection with the waste treatment process accounts for 70% of investment in metropolitan areas, and almost 25% in nonmetropolitan urban areas and in rural communities.

(3) Unit investments vary sharply between metropolitan, non-metropolitan, and industrial waste sources. The pattern follows closely the relative volume of wastes from the three sources, in that the more significant the waste-producing category, the less must be invested to achieve a given degree of treatment effectiveness, since—as Table 5 indicates—the aggregate degree of treatment is estimated to be approximately the same for metropolitan areas, non-metropolitan areas, and for industry. Those relationships are largely determined by some basic condition sets that have been examined at length in earlier reports in this series. (See *The Economics of Clean Water*, U.S.D.I., FWQA March 1970.)

(a) The relative efficiency, in terms of unit cost of removal, displayed by metropolitan area and industrial waste treatment systems arises in part from the obvious economies of scale available to them. Concentrated wasteloads, either expressed as number of people available within the reach of a given treatment plant, or in terms of the volume of wastes of a given factory, reduce fixed costs per unit.

(b) Industry, in particular, may enjoy scale advantages, in that the smaller manufacturing unit within the reach of a public system usually has the option of connecting to that system when the cost of

TABLE 7.—ESTIMATED INVESTMENT FOR WASTE TREATMENT WORKS
1952-1968¹

Source of Investment	1. Million of Dollars	Aggregate investment	
		2. Dollars Per LB. of 1968 BOD ₅ Removal	3. Dollars Per LB. of 1968 BOD ₅ Removal Excluding Transmission
Public agencies in SMSA's	8,549.3	336.59	102.40
Public agencies, Non-SMSA	1,953.7	465.17	338.60
Manufacturing plants (estimate)	3,619.8	73.42	73.42
TOTAL	14,122.8	179.00	96.52

¹ Excludes Collecting Sewers

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separate treatment appears to be greater than that of joint treatment. In increasing measure, the same mechanism is being utilized by metropolitan area communities. The decision to install separate treatment or to cooperate with one's neighbors becomes available to a community where population is sufficiently concentrated in a given area; and the lack of such options forces the outlying community (or factory) to provide treatment at a relatively high cost.

(c) The higher transmission costs characteristic of metropolitan areas are an obvious consequence, indeed, the precondition, of lower treatment costs. Use of larger waste treatment plants requires transmission of wastes over longer distances or in greater volumes.

(d) Industry, viewed in the aggregate, not only enjoys the advantage of choice of technology and location, but combines with it low relative unit transmission cost. Proprietary treatment plants are almost invariably located at the factory site, so that sewerage to the treatment plant is apt to cost little more than for untreated disposal. And when industry has the use of a public system available to it, it tends to occur within a format of developed waste transmission service, so that it may cost no more to transport the wastes of a factory to the plant site than it does a single household.

(e) The apparent unit investment advantage enjoyed by industry is exaggerated by an accident of time. Where a substantial portion of the nation's stock of public waste treatment works dates back to the nineteen-thirties, and a few units are even older, waste treatment had only begun to be a factor in industrial planning by the late nineteen-fifties. Essentially all of the industrial treatment projects that have been undertaken over the last decade are first generation facilities. In contrast, a very significant part of public capital spending has had to be devoted to replacement and improvement of existing facilities. Expenditures of substantial sums that result in no incremental waste reduction lend the appearance of high relative cost to public works as compared to industrial ones, but the disparity may be expected to disappear progressively over the course of the next

decade, as American industry becomes involved in the replacement and improvement process.

THE INFLUENCE OF FEDERAL CONSTRUCTION GRANTS

The expansion of waste treatment services over the last decade and a half is hardly conceivable without the intervention of Federal monies. Per-capita investment has doubled since enactment of Federal grants, and with time, the amount and the proportion of total public spending

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provided by Federal government has increased steadily. In consequence of the availability of the Federal funds, not only the prevalence of waste treatment but the nature of its application has changed. Interjection of large sums would appear have worked a qualitative as well as a quantitative change in the conduct of public waste handling services; and the scale of the problem-solving effort has enlarged so much as to effectuate a transformation of its character.

Rapid extension of sewer services, cooperative utilization of facilities by groups of communities, long-distance transmission lines, public treatment of industrial wastes, and the development of area-wide sanitary authorities may all, in some measures, be considered to be correlates of Federal investment. For with the availability of Federal assistance there has come an enlarged sense of the scope of the water pollution problem, and a more aggressive and imaginative public approach to the problem.

But much of the force of Federal financial assistance still remains to be felt. Amendment of Public Law 660 has resulted in a progressively larger Federal share of the total cost of waste handling projects, and has elicited additional matching funds from State government. It is possible to argue that these funds are entirely responsible for expansion in public waste handling practices over the last decade; for while total public investment for waste treatment advanced from \$350 million in 1956 to well over a billion dollars in 1970, local government's share of the capital has remained fairly constant at about \$300 to \$400 million a year.¹ Federal monies—including claims on still unappropriated funds available under the reimbursement provisions of PL 660—and those of State governments are essentially responsible for expansion.

Even given the situation that local expenditures for waste handling

¹ Correlation of total value of PL-660 eligible contracts, Federal Grants, and volume of local government bond financing indicates a \$302.7 million local government annual spending base (standard deviation \$65 million) during the life of the Federal Assistance program.

services are relatively constant, so that higher Federal and State outlays translate without a multiplier into new projects and ultimately into new works, the massive interjection of Federal monies currently being experienced in the market for waste handling

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facilities is sufficient to work an enormous alteration not only on the scale of water pollution control, but in its very substance. Appropriations for waste treatment plant construction grants in 1970 amounted to almost two-thirds of cumulative Federal appropriations for the purpose to that time, and exceeded the level of cumulative cash outlays (made in the form of progress payments) during the entire fourteen year life of the assistance program. Further, California, Oregon, Kansas, Ohio, and Illinois followed the lead of other States and initiated or implemented State fund-matching programs to enable them to take full advantage of the enlarged availability of Federal capital. As described later, even a \$200 million level of Federal funds has been absorbed into the economy only with the accompanying appearance of some very inefficient resource allocations; and there is some question as to the utility of a good portion of the expenditures made to date. The development of mechanisms to effectively utilize larger amounts of Federal funding will pose one of the significant public policy problems of the 1970's.

Another aspect of the impact of Federal construction grants on municipal pollution abatement capabilities makes it difficult to anticipate effects. The funds are devoted to major public works, that are usually among the most costly and the largest capital facilities operated by local government. As one would anticipate, significant lags are involved in their installation. The mean time lapse between the award of a Federal construction grant and the initiation of construction is 15 to 18 months, and an even longer period is devoted to actual construction. Those lags are responsible for the growing gap between Federal grant awards and actual disbursements. Time elapsed between the initiation of a project and its completion tends to be increased by the Federal allocation formula, which establishes each State's initial entitlement to grant assistance on the basis of population and income. In the past, there have consistently been States that could not allocate a year's full entitlement to funds in the same year; and the small list of States whose needs were not sufficient to take up allocations at a \$100 to \$200 million level will unquestionably expand at the much higher assistance levels proposed for the nineteen-seventies.

Time lags interfere, too, with our ability to gage the effect of Federal construction assistance. In the early years of the grant program,

dollar amount limitations and specific reservation of a significant segment of Federal funds for the use of small communities sharply reduced the reach of assistance. In general, application of Federal funds was limited to rather simple engineering projects whose scale and complexity seldom involved extended periods of construction. In consequence, little more than half of the value of waste treatment projects undertaken in the first years of the Federal program involved Federal assistance, and mean construction time for those that did [p. 18]

TABLE 8.—FEDERAL CONSTRUCTION GRANTS RELATED TO PUBLIC CONSTRUCTION ACTIVITY
[Millions of dollars]

Year	Total value of contracts	Federal grant appropriations	Federal grant awards	Federal disburse- ments	Appropriations basis	Awards basis
1957	351	50	38	1	14.3	10.8
1958	389	45	48	17	11.6	12.3
1959	349	45	46	36	12.9	13.2
1960	359	46	49	40	12.8	13.7
1961	449	46	45	44	10.2	10.0
1962	545	80	66	42	14.7	12.1
1963	679	90	93	52	13.3	13.7
1964	51	90	85	66	17.5	16.5
1965	522	93	84	70	17.8	16.1
1966	553	121	120	81	21.9	21.7
1967	597	153	134	84	25.6	22.5
1968	652	203	194	122	31.1	29.8
1969	865E	214	203	135	24.7	23.5
Totals	6824	1276	1205	790	18.7	17.7

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was about two years. But with larger amounts of Federal grant appropriations the dollar amount limitations were removed entirely, and the effective force of the fixed value reservation for use of small communities was dissipated. Since 1966, almost every municipal waste treatment project has involved PL 660 funds; and over the last three years, the value of Federally assisted new starts has exceeded the value of total contract awards—an anomaly produced by the reimbursement provision of PL 660, as well as by time lapsed between the award of a contract and the start of construction. In the future, it is probably safe to assume that as long as Federal construction assistance is available, no community will begin a waste treatment project without the assurance of Federal grants.

With the expansion of the scale of projects for which Federal funding has become available, the time to completion of such projects has steadily extended. The 1968 conditions evaluated at some length in this report include the effects, on average, of construction projects begun in 1966. The much greater rate of activity initiated in 1970 will not be translated into average effects until 1973 or 1974.

Considering the entire life of the Federal program of assistance for construction of waste treatment works, about half of the value of all construction projects initiated between 1957 and the end of October 1970 had actually been completed. (cf. Table 9. Adjusting for inflation makes some difference, since the amount of resources expended has increased as their purchasing power has declined; but even with the adjustment, almost 40% of the total value of projects undertaken with the assistance of PL 660 grants represented works still under construction in the third quarter of 1970.)

CAPITAL OVERHEAD

One sometimes receives the impression, from popular commentary on the water quality situation, that great volumes of untreated municipal sewage are being discharged into the nation's waters, and that these are a significant source of water pollution. In point of fact, only seven percent of the sewered population of the U.S. was discharging raw wastes in 1968; and the figure is probably closer to five percent today. Moreover, both treated and untreated municipal wastes are currently estimated to be responsible for little more than 20% of stream pollution, as discussed in a later section of the report.

It would be a mistake to infer from those relationships that capital requirements are subsiding. While there is definite room to complete the provision of waste treatment service, to upgrade the level of waste treatment effectiveness, and to accommodate expansion requirements, there is also a need to service the very considerable capital base

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TABLE 9.—ANNUAL VALUE OF FEDERALLY ASSISTED WASTE TREATMENT WORKS CONSTRUCTION

Calendar year	Value of federally assisted projects in millions of dollars			Cumulative completions as a percent starts ¹	Lag in months, starts = completions ¹
	New starts	Completions	Under construction at year end		
1957	165	5	160	2.9	....
1958	184	65	279	20.1	....
1959	173	142	310	40.6	27
1960	203	166	348	52.1	23
1961	248	172	423	56.5	21
1962	291	160	554	56.2	22
1963	449	193	811	52.7	26
1964	443	402	843	60.8	24
1965	365	340	868	65.4	34
1966	490	398	960	68.0	34
1967	397	265	1091	67.9	37
1968	765	194	1662	60.1	43
1969	937	375	2224	56.4	46
1970	1135 ²	158 ²	3201 ²	49.2 ²	48 ²
Cumulative	6164	3035	....	....	....

¹ Federally assisted projects only.

² 10 months, January 1970 through October 1970.

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already in existence. That overhead demand on capital has for some

years been the prime features of public waste treatment investments. Yet it has generally been overlooked.

At the levels of capitalization of the nineteen-sixties, recapitalization projects absorbed most of the waste treatment investment made by public agencies. That—though in lesser measure than the fact that municipal waste management is directed to only a part of the total water pollution problem—is a reason that public expectations have been disappointed. To deal with the complexities of public wastewater management, it must be recognized that most of the necessary capital base already exists, that its very existence creates a significant demand for capital services, and that great damage can result if we allow the existing system to deteriorate.

The dimensions of the overhead demand for replacement capital have been quantified. Replacement values of waste treatment plants in place in 1962 and 1963 were calculated, giving full weight to scaling and technological differences, in terms of constant (1957–59) dollars; and the values were compared to constant dollar investment over the period. Approximately \$2.1 billion of investment in waste treatment works (interceptor sewers, outfalls, and pumping stations are excluded from the analysis) produced only \$780 million worth of additional physical capital. The difference between the investment amount and the capital increment may be considered to constitute the value of recapitalization of existing works that took place over the period.

As presented in Table 10, where recapitalization or depreciation is expressed as the difference between the annual rate of investment and the annual rate of expansion of the capital base, recapitalization demand amounted to 4.4% of replacement value of fixed capital over the period. If depreciation is calculated on the basis of the average rate of depreciation of a moving capital stock, the rate amounted to 4.1% a year. Both values are very close to the design norm of 4% a year utilized by the sanitary engineering profession. That general agreement would seem to provide some confidence about the magnitude of waste treatment plant recapitalization requirements for any given capital stock, if one assumes that relative shortage of available capital did not constrain recapitalization expenditures to something below an optimum rate. On that matter there can be no assurance until the aggregate level of investment moves distinctly upward, to allow some scrutiny of the distribution of investments in a more generously funded condition set.

It may be noted that while the national rate of depreciation is very close to the 4% norm, there is distinct regional variation. Two factors may be considered to be operative. The age composition of

TABLE 10.—EFFECTIVE RATE OF RECAPITALIZATION, 1962-1968 (WASTE TREATMENT PLANTS ONLY)

Region	Millions of 1957-59 dollars			Annual rate		
	1962 Capital	1962-68 Investment	1968 Capital	Investment (percent)	Capitalization (percent)	Indicated depreciation (percent)
Pacific Coast	364.8	185.2	474.3	6.0	3.8	2.2
Northern Plains	297.5	210.0	363.0	8.0	2.2	5.8
Southern Plains	503.2	177.3	594.0	4.4	2.4	2.0
Southeast	507.7	383.3	710.0	8.2	4.9	3.3
Central	698.3	502.4	869.9	8.1	3.2	4.9
Northeast	566.4	589.4	725.8	10.9	3.6	7.3
United States	2938.3	2056.5	3719.9	7.9	3.5	4.4

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waste treatment plants varies from area to area; and the higher the average age, the greater the effective rate of depreciation. The other consideration is something of a mathematical fluke. Replacement value of plants at either period was calculated on the basis of national average costs, and so should conform closely to the national distribution of investment in facilities. There are, however, extreme variations in design and construction efficiency from region to region. (cf. *The Economics of Clean Water*, U.S.D.I., FWQA, March 1970, pp. 40-52.) Without exception, the higher than average depreciation rates occur in high cost regions, the lower than average depreciation rates occur in the low cost regions. Thus when the analysis moves from the national total to a region, what is presented as depreciation or recapitalization is a compound of recapitalization and efficiency differentials that apply in the construction activity. In part, comparison of the 7.3% indicated depreciation rate for the Northeast with the 2.2% rate of the Pacific Coast weighs the fact that it costs considerably more to build a waste treatment plant in New York than to build a similar plant in California.

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TREND OF WASTE DISCHARGES

One possible measure of the effectiveness of State and Federal water pollution control programs and expenditures is a comparison of the amounts of sewered waste materials flowing into waterbodies over time. It must be recognized that the test is by no means a satisfactory one—too many elements other than collected wastes bear upon the quality of water. Such a comparison, however, does have considerable validity as measurement of capital efficiency, in that the primary emphasis of the nation's water pollution control efforts has been to increase the degree of treatment of collectable wastewaters; and that activity has been very nearly the exclusive avenue for investment of funds intended to serve water quality purposes.

Unfortunately, there is no set of records to provide such a comparison on a macroeconomic basis. It is possible, however, to synthesize the information by calculating estimated waste production and discharge at different periods.

Performance of the calculations for two significant waste constituents, biochemical oxygen demand and dissolved phosphorus, at three points in time is scarcely reassuring. The estimates indicate that the gross oxygen demand of wastes discharged in 1968 was almost unchanged from—and probably slightly larger than—the level of 1957; and that in the same period, the total pounds of phosphorus discharged with domestic sewage had more than doubled. Almost \$15 billion of public and private monies were invested in waste handling facilities during that period—and as a consequence of that investment, annual operating charges increased by about \$300 million.

BIOCHEMICAL OXYGEN DEMAND

Five day biochemical oxygen demand (BOD_5) is probably the most useful general indicator of the strength of organic wastes. It is the measure of the amount of oxygen utilized in a fixed period of time and at a fixed temperature by the biological processes involved in the stabilization of organic matter. In itself it provides a very useful measurement of the strength of organic wastes or the amount of organic material present in a stream at any point in time. It is also an extremely useful indicator of the general quality of a waterbody, in that it has a loose and varying but largely dependable sort of association with other water quality measurements. In most cases we can assume that a stream with a high concentration of BOD_5 is apt to be marked by some lowering of concentrations of dissolved oxygen, a significant chemical oxygen demand, and elevated levels of bacterial presence. For this reason—and because there are standardized, generally accepted tests for BOD—it is the most widely used means

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of expressing, in almost shorthand fashion, the general quality of water, and it is accepted by sanitary engineers if not ecologists as a surrogate for other parameters in broad descriptions of waste characteristics or of stream quality. However useful this measure is in describing overall quality, one cannot in actual fact rely solely on it in specific cases of pollution. It does not comprehend such significant pollutants as mercury, pesticides, and other toxic and hazardous substances.

Because of its well established position as the prime measurement of waste strength, BOD reduction is the standard indicator of waste treatment plant efficiency, and the municipal waste inventories pro-

vide an excellent guide to the oxygen demand of public wastes; but it must be admitted that the estimates of industrial production and discharge of BOD present in the tables that follow are gross approximations. The technique employed to calculate production of BOD by manufactures involved the application of the ratio of the 1964 to the 1957 and the 1968 Federal Reserve Board Indices of physical production for various industrial sectors to annual waste reproduction calculated for the same industrial sectors in 1964. (The base data are summarized in Table II-2, p. 63 of *The Cost of Clean Water*, USDI; Washington, D.C., January, 1968.) The principal problem with the method—given the validity of the industrial production indices and the calculated base year wasteloads—is the assumption of a constant waste to output ratio. The assumption is crude, but the fact is that there is not sufficient information to attempt modification. A variety of recent events indicate that more adequate industrial waste information will be available to the Environmental Protection Agency in the coming year. Results of a questionnaire survey conducted for the Agency by the National Industrial Conference Board will be forthcoming in the next months. The survey is designed to provide information on current and expected waste control practices and expenditures. The questionnaire is reproduced as Appendix A.

In the late 1970, approval was gained to initiate an industrial waste inventory, on a national basis. A preliminary mailing of 250 questionnaires has been made to develop base information on anticipated response rates and completeness of data.

Activities related to implementing the Permit Program under the 1899, Refuse Act (33 U.S.C. 407) as called for by the President in Executive Order 11574, December 25, 1970, will shed further light on the industrial situation. Contracts for industry studies of those industrial sectors generating over three fourths of the total volume of wastes discharged directly by industry have been let. These contracts will produce guideline data on the most prevalent methods of industrial waste reduction as well as assessing the best waste reduction available with current technology.

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The permit applications themselves will provide an unequalled and hitherto unavailable source of information on the magnitude, distribution and remedial needs of the industrial community.

These coordinated efforts should essentially provide a quantum increase in useful information for assessing and evaluating all aspects, both physical and economic, of the industrial pollution abatement problem.

Gross production of "BOD wastes" is only a portion of the picture.

Pollution results from the strength and nature of wastes that are ultimately discharged. From the estimates of waste production we must deduct that portion of the polluting materials that is reduced by treatment. The gross effectiveness of industrial waste treatment was calculated from the ratio of investment capital in place to total estimated capital requirements for each industrial sector. (Estimated capital requirement,* modified by a factor equal to the production index for the given year divided by the 1968 production index. Capital in place in 1957 and 1964 was derived by deducting from the 1968 calculated replacement value, reported annual capital inputs after subtracting four percent of each year's capital in place—the four percent figure intended to eliminate replacement/depreciation expenditures to arrive at a value for net capital.) Treatment effectiveness, then, is expressed in terms of the proportion of the optimum capital supply available in aggregated industrial sectors at points in time. The optimum capital supply, by a loose interpretation of the definition established by the guidelines used to adopt interstate water quality standards, is that which is required to achieve 85% reduction of BOD₅.

Adjustment of the industrial waste load to account for that portion of industrial wastes that is sewered to public waste treatment facilities probably imparts a slight downward bias to the calculated degree of BOD reduction, because there is no accounting—from either municipal or industrial sources—of the sectoral distribution of the industries discharging to public facilities. It is possible to estimate with some degree of precision just how much industrial waste is handled by public facilities, but not what industries develop those wastes. To produce a comprehensive BOD model, then, it is necessary to work at the aggregate level, deducting from the total industrial load that portion which can be assigned to municipal or other public sources. Possible distortion in attributed efficiency of the self treating component occurs because the capital effectiveness of the treatment dollar varies between industries, due to scale factors and differences in waste composition. The distribution of total wastes [p. 27]

and of costs is, however, so strongly influenced by a few industries (pulp and paper, organic chemicals, oil refining) that average costs are in effect little more than the average costs that apply to the preponderant group of industries. The sensitivity of over-all efficiency to the sectoral incidence of use of public facilities is probably very slight. The 61% aggregate BOD₅ reduction efficiency calculated to apply to independently discharging factories¹ in 1968 changes little

* As developed in *THE COST OF CLEAN WATER*

more than 2.5% in either direction when one calculates the effect of consigning either the most capital-efficient block of industries or the least capital-efficient group entirely to the segment of plants making use of public facilities.

Determination of the discharges of public waste handling systems involves much less uncertainty than do attempts to estimate the same values for industry. The *Municipal Waste Inventory* provides us with a knowledge of the number, kind, size, and served population of waste treatment plants, as well as the number and service population of sewer systems without waste treatment service. A couple of thousand investigations of waste treatment plant operations provide a solid grasp of the range of waste loadings and the range of efficiencies associated with treatment plants of various sizes and types. By applying appropriate loading and reduction rates to the reported stock of waste handling systems, the order of magnitude of the wastes that pass through the nation's system of public sewers can be ascertained with considerable confidence.

If the validity of the data can be accepted, the largest problem in framing an estimate of publicly discharged wastes is distinguishing between domestic and industrial sources that are served by the same set of facilities. While modern data imply strongly that the rule of thumb which holds that the characteristic relationship of one hundred gallons of water and one-sixth of a pound of BOD per person overstates the "normal" domestic wasteloading, the latter value has been adopted in assessing the total domestic wasteload. The relationship has been accepted so generally and so long that its use has the great merit of reducing possible objections. And in view of the uncertainty associated with estimating the gross volume of factory wastes, a slight understatement of their proportionate share of the use of public systems does not seem to offer a problem of relative moment.

The sets of products of the various calculations are presented in Table 11.

While the details and the precision of the listed values may be subject to considerable suspicion, there is little reason to doubt the general validity of the relationships or the order of magnitude of the values. The story that they tell is not reassuring one for those concerned with environmental protection.

TABLE 11—ESTIMATED INCREASE IN GROSS PRODUCTION OF BODs, 1957-68

Waste source	Millions of pounds of BODs per year				
	1957	1964	1968	Increase ^a	
				1957-64	1964-68
Food processing	3400	4300	4600	900	300
Textile mill products	660	890	1100	230	210
Paper and allied products	4300	5900	7800	1600	1900
Chemical and allied products	5500	9700	14200	4200	4500
Petroleum and coal	410	500	550	90	50
Rubber and plastics	20	40	60	20	20
Primary metals	350	480	550	130	70
Machinery	100	130	180	30	50
Transportation equipment	50	120	160	70	40
All other	300	390	470	90	80
Manufacturing total	15,090	22,460	29,670	7370	7220
Sewered population	5,700	7,600	8,500	2100	900
Total	20,790	30,060	38,170	9470	8120
Annual rate				5.4%	6.2%
Reduced by treatment	8,090	14,090	24,610	6000	10,520
Annual rate				8.2%	15.0%
Discharged	12,700	15,970	13,560	3270	-2410
Annual rate				5.9%	-4.2%
Aggregate treatment efficiency	39%	47%	64%	21%	36%
Ratio of domestic to industrial BOD	1:2.6	1:2.9	1:3.5	1:3.9	1:8.0

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The gross biochemical oxygen demand generated in the collectable wastes of economic activities almost doubled between 1957 and 1968. Within the period, the process took place at an accelerating rate—increase in waste production for the four years 1964 to 1968 almost matched the total increase that took place in the seven previous years.

Manufacturing activities—paced by production of chemicals and chemical products, estimated by 1968 to account for more than a third of total BOD production—far outweighed domestic activities as waste sources in 1957, and steadily increased their lead with the passage of time. That rapid growth of industrial wastes traces not only to the raw increase in industrial production that occurred during the period, but to its composition. The economy of the U.S. has been marked not only by a voracious absolute demand for more goods, but by a relative preference for goods whose production involves a substantial wasting of organic materials to water.

Countering the increase in volume of organic wastes has required an enormous expansion of the prevalence and intensity of waste treatment. While total wastes, as measured by BOD₅, almost doubled in the period under consideration, the amount of reduction of oxygen demand through the application of waste treatment is calculated to have tripled. Overall, then, there appears to have been

only a slight increase in the oxygen demand exerted on the nation's water resources as a result of the discharge of collected wastes. And since 1964, the rate of change in the oxygen demand of waste discharges has been strongly negative.

NUTRIENT PHOSPHORUS

Streams, lakes, estuaries and their beds are in many instances producing rooted and floating flora in such profusion that they cause nuisances or profound alteration in aquatic ecology. The condition clearly relates to some significant set of changes in the circumstances that govern the life processes of aquatic organisms. But since many conditions have changed, there is no certainty as to what the critical productive mechanism may be. Increased clarity of waters as a result of sediment control and reduction of wastewater solids results in increased light penetration, clearly favorable to vegetable productivity. Escalation of the gross volume of materials discharged to water adds to the availability of all of the elements that nourish life forms. Heightened temperature—a result not only of heated waste discharges but of stream impoundment and reduction of streamflow—accelerates the life cycle processes of growth and decay. And there are known to have been substantial increases in the discharge to water of specific nutrient materials critical to the life forms involved.

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Explanations and control efforts, however, have been directed increasingly toward the relative availability of a single nutrient element, phosphorus. Underlying the attention to phosphorus are a set of probabilities derived from the law of the minimum. The hypothesis is supported by evaluation of production factors bearing upon the relative availability of phosphorus in water, by observations drawn from knowledge of the characteristics of treated wastewater, and by controlled laboratory demonstrations. It would seem probable that phosphorus is, indeed a key to problems posed by extremes in aquatic productivity.

In the context of a shift in all, or many, of the factors that affect biological productivity in water, investigators have attempted to deduce the most likely avenue for control by use of observations based upon the law of the minimum—a logical principle that holds that where more than one condition must be satisfied in order to produce a given event, that condition which is least abundant with reference to demand requirements will determine the magnitude of the consequent event.

In the case of algae and other water plants, the conditions required for development are the presence of energy in the form of sunlight

and a supply of nutrient materials, principally carbon, nitrogen, and phosphorus in the approximate relationship (for algae) of 106:16:1. (Other nutrient elements are required in trace amounts, but the insignificant quantities involved defeat any possibility for effective biological controls.) Because algae can normally satisfy carbon requirements from carbon dioxide in the atmosphere, and from the natural carbonate in water, efforts to control aquatic production settled very early upon nitrogen and phosphorus. Recognition of the fact that blue-green algae, and perhaps other types as well, can also draw nitrogen from the atmosphere, led to the conclusion that attempts to control growth solely by limiting availability of dissolved nitrogen in water would also be of little purpose. By process of elimination, then, attention has come to focus on phosphorus; and observations about the gross availability and the form of dissolved phosphorus strengthen the probability that it is the route to controlling the increased productivity problem.

There is no question that the gross increase in waterborne wastes has resulted in a significant increase in total amounts of dissolved forms of carbon, nitrogen, and phosphorus. But because of atmospheric availability of the others, only phosphorus can be considered to have experienced an increase in usable supply from waste discharges. Further, the relative availability of phosphorus to biota has been supplemented by the extension of secondary waste treatment.

The relationship between the prevalence of secondary waste treatment and relative availability of phosphorus is well understood, but often ignored because of its embarrassing conflict with other water pollution control requirements and prevailing strategies of water

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pollution control. Conventional waste treatment reduces the quantity of phosphorus dissolved in wastewater. But the average relationship of carbon to nitrogen and phosphorus utilization by the bacterial organisms that accomplish conventional waste treatment permits only a fraction of the nitrogen and phosphorus of sewage to be incorporated into sewage sludges; so that the major portions of these wastewater constituents remain in the discharged effluent. Furthermore, while biologic treatment reduces fractionally the amounts of nitrogen and phosphorus in sewage, it also stabilizes them, so that they are contained in the effluent in a form immediately available to fertilize growth. In the case of an untreated waste, or one subjected to only primary treatment, the discharged effluent also contains nutrient materials but in a different organic composition, so that they become available to algae as natural decomposition occurs.

The whole process has been accelerated by another factor, the replacement of ABS-based by phosphorus-based synthetic detergents. Where human metabolic processes are variously estimated to result in the wasting of from less than a pound to about a pound and a half of phosphorus per person per year, average phosphorus loadings in municipal wastewaters during the late nineteen-sixties were consistently found to be equal to about four pounds per person per year. Most of the difference has been attributed to the sewerage of used detergents.

To heighten problems of phosphorus availability, a significant change in detergent formulations was accomplished during the early nineteen sixties. Previously, detergents had demonstrated a distressing tendency to resist decomposition in either waste treatment plants or in the natural environment. Due to the slow stabilization of the compounds, foaming and discoloration became evident in many streams as consumption of detergents increased. Steps to abate that water pollution problem contributed to the creation of the problem of excessive productivity. The detergent industry was able to develop formulations that suffered no reduction in cleansing power, but broke down readily in waste treatment plants. That stabilization made the phosphatic constituents of wasted detergents available as aquatic nutrients. To add to the dimensions of the problem, "soft" or "biodegradable" detergents typically contain significantly more phosphorus per pound than the "hard" formulations that they replaced.

Such, in very general terms, are the qualitative dimensions of the matter as they are defined by what has come to be the conventional wisdom. Its quantitative aspects are not so readily manipulated. Evaluations, must rely on limited samples, general acceptance of some provisional relationships, and some functional derivations. Those circumstances mean that only order of magnitude accuracy can be claimed for the following analysis. It is unlikely, however, that greater precision would serve any useful purpose in this report. Remedial actions must take place in the context of conditions that apply in discrete river basins. At the level of macroeconomic overview, consideration of

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relative magnitudes over time would seem to provide a sufficient and credible level of detail.

Table 12 presents such a generalized description. While it must be emphasized that unit values for phosphorus content represent fairly arbitrary choices from ranges of cited values for influent and effluent wastewaters, the calculated net per-capita discharge of 3.3 pounds

per year agrees generally with the value of 3.5 pounds per-capita per year estimated by the International Joint Commission in its report on Lake Erie and with values reported by the Committee on Government Operations in its report *Phosphates in Detergents and the Eutrophication of America's Waters*. Estimated reduction of phosphorus by waste treatment processes is a particularly uncertain element of the system. Reductions are generally expressed in the literature in percentage terms, and the number of citations is depressingly slim—over half of the reported values from which the tabular data were deduced came from one survey in the State of Texas. The logic of the values presented depends on the concept that phosphorus reduction is a function of biochemical oxygen demand reduction, in that utilization of phosphorus is dependent on the degree of stabilization of dissolved organics in wastewater. The amount of phosphorus utilized in decomposition processes is largely dependent on the total quantity of organic matter stabilized rather than the amount of available phosphorus, given that phosphorus is available in amounts equal to or greater than nutrient requirements, so that percentage expression is considered to be an inappropriate means of gaging relative effectiveness in phosphorus reduction. (Complete elimination of dissolved phosphorus in domestic sewage is theoretically feasible at the point that concentrations in influent wastewaters are equal to nutrient requirements of bacteria).

There can be no doubt that industrial utilization of detergents as well as direct processing of phosphate and phosphorus products adds to nutrient availability, but there is simply not enough information to even attempt to make an estimate of quantities. Natural sources—decomposition products, resuspension of bottom muds, leaching—as well as mining and agriculture add to the gross quantity of phosphorus transported in water. To a considerable extent, however, these sources are reduced in their ability to produce excessive growth by the propensity of phosphorus to be absorbed by soils. So contained, phosphorus can be released to the water column through decomposition of rooted bottom plants. For these reasons, remedial attention has been devoted largely to phosphorus in sanitary sewage.

SOURCES OF WASTE INCREASES

Biochemical oxygen demanding materials and nutrient phosphorus are only two of the scores of possible pollutants with which the economy must deal. They have been selected for quantification and discussion because they are most amenable to generalized analysis, and because they serve to illustrate principal features of existing control programs. But it should not be inferred that they are the

TABLE 12—ESTIMATED INCREASE IN PHOSPHORUS DISCHARGED AS MUNICIPAL SEWAGE

	1957	1964	1968
Sewered population (millions of persons)	98.4	119.6	139.7
per-capita phosphorus production, pounds:			
(a) From metabolic process	1.0	1.0	1.0
(b) From consumption of detergents	2.0	3.0	3.3
Total sewered phosphorus (million pounds in year)	295.2	478.4	600.7
Less phosphorus incorporated in sewage sludge:			
(a) Primary treatment @ .5 lbs. per capita (million pounds in year) .	(12.9)	(20.4)	(21.8)
(b) Secondary treatment @ 1.3 lbs. per capita (million pounds in year)	(63.6)	(81.3)	(111.8)
Total discharged phosphorus (million pounds in year)	218.7	376.7	467.1

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only significant causes of pollution. Rather, they are convenient indicators of the dimensions of pollutant production and of the relative magnitude of pollutant sources, and while a broad group of pollutants and activities remains outside of the reach of current technology, traditional sewered sources of pollution such as solids, bacteria and BOD should be receding before the application of waste treatment.

But even in their cases, there may be doubts about our ability to maintain existing relationships between the rate of increase in waste generation and the rate of expansion in effectiveness of waste treatment. If the same processes were to continue into the future at the rates that obtained between 1957 and 1968, at some point in 1974-5 we would have reached the approximate threshold of waste treatment effectiveness that is attainable with conventional technology—85% to 90% BOD reduction. From that point forward, residual waste strength might be expected to add in full measure to the polluting pressures exerted on the national water resource; and in the 1980's that steadily increasing wasteload would again attain, then proceed to exceed, the peak levels of 1963 or 1964. (See Table 13). These considerations are not presented as a prediction, but only as a projection of the circumstances that will come into play in the future if substantial structural changes are not affected in ecological postures. Of course, current conventional waste treatment technology is in no way an ultimate barrier. Advanced water treatment techniques are available being refined, and coming into increasing uses. But technological shifts in water treatment tend to occur as series of step functions; and each translation to a higher step would seem to at least double the aggregate cost of treatment. Moreover—and perhaps most significant—waste treatment, regardless of its cost, is not an absolute good. There are secondary effects, not always foreseeable or beneficial, when one tampers with the quality of water in order to produce obviously desirable purposes.

The tentative conclusion that waste treatment is no more than a convenient point of departure for any meaningful strategy of water pollution control is reinforced by examination of the sources of recent increase of pollutants. Underlying the growth of available biochemical oxygen demand and of phosphorus are basic economic forces. To counter the polluting effects of fundamental features of twentieth century technology and social organization would seem to call for fundamental remedies.

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TABLE 13—PROJECTED INTERACTION OF TECHNOLOGICAL LIMITS AND EXISTING RATES OF WASTE INCREASES

Year	Million Pounds of BOD Per-Year				
	Produced	Reduced by Treatment		Discharged	
		At 85 percent	At 90 percent	At 85 percent	At 90 percent
1968	38,170		24,610		13,560
1972	47,560		36,915		10,645
1974	53,120		45,220		7,900
1975	56,150	47,730	50,535	8,420	5,615
1976	59,260	50,370	53,330	8,890	5,930
1980	73,840	62,760	66,460	11,080	7,380
1984	92,000	78,200	82,800	13,800	9,200
1988	114,630	97,440	103,170	17,190	11,460
1992	143,290	121,790	128,960	21,500	14,330

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Total Increase:

Between 1964 and 1968, the population of the U.S. was estimated to have increased from 191.4 million persons to 199.9 million persons, about 4.4% or just under 1.1% per year. During the same period, estimated annual production of biochemical oxygen demand advanced by a total of 8.1 billion pounds, or 27%, six times as fast as population, compounding at a 6.1% annual rate. And while the increase in the phosphorus content of sanitary sewage was not so great in absolute amount, an estimated 122 million pounds over the four years, it was equal in relative terms, rising almost 26%, an annual rate of increase of 5.9%.

Population Increase:

Population increase is, of course, related to the increase in production of pollutants, but it can by no means account for major part of the growth. If expansion of sewered domestic wastes had been directly proportionate to population growth, the rise in BOD of sanitary sewage would have amounted to 330 million pounds between 1964 and 1968, and the increase in the phosphorus component of sanitary sewage would have been limited to 23 million pounds. Ex-

pansion of industrial output to accommodate increased population at precisely the level and composition of per-capita consumption of 1964 would have added about 990 million pounds a year to BOD production by 1964. Pure growth of population, then, can be assigned the responsibility for no more than 16.3% of the gross expansion of BOD production and 19.1% of the incremental phosphorus production took place over the four year period.

Expansion of Sewer Service:

The effects of population increase on production of water-borne pollutants were heightened by a pronounced expansion of sewer service. Where population grew at 1.1% annual rate, sewerage population increased at a 2.8% annual rate, so that an incremental 570 million pounds a year of BOD and 33 million pounds of phosphorus had become available through the expansion of sewer services by 1968. The application of conventional sanitary engineering in the form of expansion of sewer service offset about half of the gain in reduction of BOD of sanitary sewage that was effectuated by increasing the prevalence and intensity of waste treatment during the period. It caused a net loss in the degree of phosphorus control, in that incremental phosphorus reduction—not a significant feature of conventional waste treatment—was well under the volume of phosphorus in the water-borne sewage produced by net expansion of sewerage. Seven percent of the total increase in BOD and 27% of the growth of phosphorus in domestic sewage between 1964 and 1968 can be traced to extension of sewer services in excess of the rate required to match population growth.

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Gross Increase in Consumption:

The lion's share of responsibility for rise in production of pollutants must go to the gross improvement and the distribution of per-capita production and consumption of goods that took place during the four years. Almost 77% of incremental BOD production and 53% of the increased discharge of phosphorus to sewers can be traced to the amount and composition of rising consumption of goods by Americans. Significantly, much of that production cannot be considered to have improved the real economic well being of consumers. Twenty-three percent of the total increase in BOD occurred as a result of the growth of pulp and paper output, where more elaborate packaging has provided much of the impetus for growth. Similarly, no less than 55% of the larger output of BOD arose from chemicals production; and an indeterminate but large portion of that increase must be ascribed to expanding use of various disposable products. In the same general way, an estimated 42 million pounds

of sewerred phosphorus can be ascribed to increased utilization of phosphorus in detergent formulations—an increase in unit use that was again reinforced after 1968 with the appearance of phosphorus-rich “enzyme” pre-soaks and detergent compounds.

DISPOSITION OF WASTE INCREASES

The more than 8 billion pounds of biochemical oxygen demand that were added to the annual waste production of the American economy between 1964 and 1968 represented not only an enormous potential to pollute water, but a significant materials handling problem. Eight billion pounds of BOD, given mean concentrations, implies the discharge of more than 4 trillion gallons of wastewater annually, well over 13 billion gallons per day. Quite apart from the matter of abating the polluting effects of materials carried in wastewater, the very volume of the water being discharged under conditions of unrestrained growth of wastes creates a source of continuous pressure on capital. For every dollar that was invested by public agencies for waste treatment, more than \$1.75 had to be invested in waste transmission facilities—for metropolitan areas it was \$2.37—and 75¢ was invested for collecting sewers. In reviewing the situation, one cannot help but wonder if the exigent pressures posed by the need to simply drain away the wastes of our cities are not so great that they divert a significant amount of the resources intended for water pollution control for purposes of simple waste disposal.

In terms of relative strength, manufacturing was responsible for almost 90% of the increase in BOD that occurred in the period. However, manufacturing outfalls are estimated to account for under 70% of the increase in ultimate volume of waste discharges. An amount of industrial waste equal to over 20% of the increase in industrial waste production was consigned to public facilities, so

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TABLE 14—COMPONENTS OF CHANGE IN PRODUCTION OF TWO MAJOR POLLUTANTS 1964-68

	Change, 1964-68	
	Millions of pounds	Annual rate (percent)
Total Increase in BOD	+8110	+6.1
From people	+ 900	+2.8
From industrial production	+7210	+7.2
Sources of Increase In BOD:		
Population growth	+ 330	+1.1
Net expansion of sewer service	+ 570	+1.7
Production to accommodate population growth	+ 990	+1.2
Increased per-capita consumption	+6220	+6.3
Total Increase in Phosphorus	+122.3	+5.9
Population growth	+ 23.4	+1.1
Net expansion of sewer service	+ 33.5	+1.7
Increased per-capita consumption	+ 65.4	+3.3

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that for every incremental pound of BOD entering public waste handling systems from domestic sources in 1964-68, about one and three quarters additional pounds from manufacturing plants is estimated to have also been accepted.

That broader exercise of public authority over the waste discharges of industry unquestionably played a large part in the ability of the economy to reduce total strength of waste discharges. Where an estimated 8 billion additional pounds of BOD were produced in 1968 as compared to 1964, the ultimate strength of wastes discharged was about 2.4 billion pounds less. And though 90% of the incremental wastes were generated by factories, 30% of incremental net removal is estimated to have occurred in public waste treatment plants.

That trend can be very closely traced through the size distribution of the stock of waste treatment plants over time. There is a distinct and well documented relationship (See figure 1) between the size of a waste treatment plant and the per-capita volume and strength of the waste that enters it. Given the fairly homogenous set of social preferences and of product distributions in the U.S., it is unlikely that the relationships trace to different consumption patterns between residents of large and small towns. (Moreover, in the U.S. today the small town with a waste treatment plant is slightly more likely to be a suburb—and thus essentially urban in consumption pattern—than it is a rural place.) The assumption upon which the quantification of publicly treated industrial wastes is based is that increase of per-capita loadings that accompanies an increase in size of plant can be attributed to the discharge of industrial wastes. And while it is true that some rise in hydraulic loadings occurs when increase in size and area add to the probability of infiltration, it should be noted

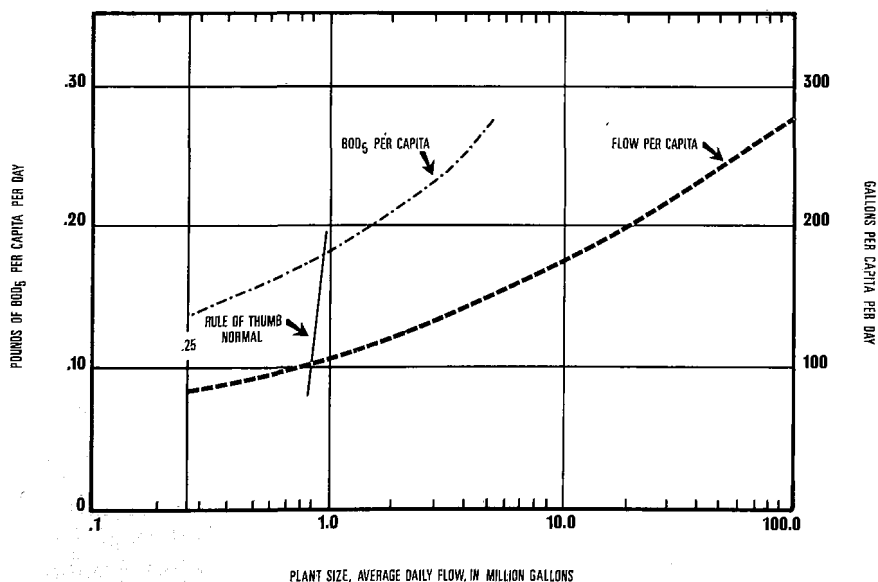
that *per-capita* area and infiltration probability tend to decline with population. Even more significant is the fact that increase in waste strength (BOD *per-capita*) takes place on a far more sharply sloped curve than that for *per-capita* flow. Given the higher average concentration of industrial wastes, one would expect precisely that sort of relationship between *per-capita* BOD in any situation marked by a significant amount of industrial waste discharge.

Some of the major outlines of the recent public investment program for waste treatment works are well understood, but the significance of larger plants is often neglected. Over the last decade and a half there has been a constant reduction in population discharging untreated sewage, a steady rise in the degree of sewage treatment, and a rapid growth of the proportion of the population that maintains sewer service. Less obvious, but equally well documented, is the fact that all of these converging lines of public activity have been accompanied by a steady increase in the size of waste treatment works. That increase in size implies a growing propensity by public agencies to assert control over the treatment of industrial wastes.

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RELATIONSHIP OF TREATMENT PLANT
SIZE TO PER-CAPITA WASTE LOADING

Figure 1



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Increase in average size of waste treatment plant was distributed fairly broadly through the economy, and is not a mere function of population growth. The average population served by a waste treatment plant has been declining as a result of emphasis on facilities for small rural and suburban towns. At least 70% of the new waste treatment plants coming into operation between 1962 and 1968 were in towns of 10,000 persons or less (the maximum normal service population for a million gallon per day waste treatment plant), and at least 28% of the new plants were located in towns of less than 1,000 persons. As a result, average population per plant dropped from 10,860 to 10,350. Yet 90% of the incrementally served population was connected to plants of more than a million gallons per day—50% of them by plants larger than 10 million gallons per day.

On the basis of the assumption that larger plants correlate positively with presence of industrial wastes, the general dimensions of the trend toward more treatment of industrial wastes by public facilities that provide a steadily rising degree of treatment is traced in Table 15.

It should be noted that the tendency to larger plants is by no means uniformly distributed through the U.S. There are distinct regional differences in per-capita loading of waste treatment plants of all sizes, and so, one assumes, in propensities to treat industrial wastes in public facilities. While the distinction in per-capita loading between regions of the nation is far more pronounced than is the distinction for size, and while Figure 1 represents a composite for the U.S., so that its application to any place is apt to result in distortion, all parts of the nation show evidences of the trend to larger plants and broader service.

The result of the expanding prevalence and intensity of public waste treatment services, and what we can infer from sample-based reporting of industrial waste treatment expansion, has been a sufficient improvement in the application of waste treatment to compensate for the net increase in biochemical oxygen demand that has occurred since 1964, and to eliminate much of the net growth of BOD discharges that occurred between 1957 and 1964 as well.

But the failure of broad gauge waste treatment strategy that is unaccompanied by efforts to reduce or eliminate sources of polluting wastes leaps into sharp prominence when attention is turned from BOD to phosphorus. In that area of water pollution control—municipal waste handling—where knowledge is greatest, where the reach of controls exceeds all others, where government and the public interest are involved directly and not as an external regulating force, estimated growth of phosphorus discharged after treatment was almost equal to increase in phosphorus discharged to sewers. A

marginal reduction in the percentage of discharged phosphorus was achieved by the increased relative prevalence of secondary—as opposed to primary—waste treatment. But on the basis of imputed removal effectiveness, we must conclude that three of every four additional pounds of phosphorus that entered sewers between 1964 and 1968 were discharged directly to water. (CF. Table 16.)

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TABLE 15.—NET SHIFT—IN TERMS OF 1962 POPULATION SERVED—
IN WASTE TREATMENT PLANT SIZE AND TYPE, 1962–68

Capacity, million gallons per day	Change, as a percent of 1962 sewered population, in population served				
	Primary Treatment	Intermediate treatment and Lagoons	Secondary treatment	Greater than secondary treatment	Total
Unknown	—1.7	0.5	0.9	—0.2	—0.5
0.5	—0.2	1.3	0.6	—0.1	1.6
0.5 — .999	0.2	0.4	0.4	—1.0	0.9
1.00– 4.99	0.8	0.9	3.6	0.1	5.2
5.00– 9.99	0.6	0.1	2.4	...	3.1
10.00–49.99	1.0	—0.6	4.8	0.3	5.5
50.00–99.99	2.0	0.7	3.2	—0.3	5.6
100.0	0.9	—1.0	4.8	...	4.7
TOTAL	3.6	2.3	20.7	—0.5	26.1

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TABLE 16.—DISPOSITION OF INCREASES IN TWO MAJOR POLLUTANTS 1964–68

	Change, 1964–68	
	Millions of pounds	Annual rate (percent)
Disposition of Net Increase in BOD:		
Public sewers, populations	+ 900	+2.8
Public sewers, factory connections	+1570	+8.4
Separately discharging factories	+5640	+6.9
Net Discharge of BOD	—2410	—4.3
From public systems	— 610	—3.3
From separately discharging factories	—1800	—4.6
Net Increase in Phosphorus	+122.3	+5.9

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PREVALENCE AND SOURCES OF WATER POLLUTION

BACKGROUND

The proposed substantial expansion of Federal grants for construction of waste treatment works, places the nation at the threshold of an enormous investment program. Current plans call for at least a 50% expansion within the next five years of the value of waste treatment capital put in place during the twentieth century.

Paradoxically, this massive spending program is being undertaken at a time when only about five percent of the sewered population of the nation is not served by waste treatment, and when the degree of waste reduction accomplished by treatment is greater than it has ever been before for the population of the United States.

There is little question that the money can be spent. Indeed, public comment on the question of funding tends to be directed exclusively to the possibility of deficiencies in the proposed level of spending. And if the public's tendency to question the adequacy of municipal waste treatment funding may be thought to arise more from an awareness of water pollution problems and from urgency with respect to their abatement than from knowledge of the causes of pollution or the status of municipal waste treatment, it is sophisticated analysis of the rate of growth of waste loadings, the shift of industrial waste treatment responsibilities to the public sector, the pressures of upgrading and replacement, and the effects of inflation and technological modification that is responsible for the enlarged investment targets.

There is some question, however, whether the money will be spent effectively. And here, the record of the past is not reassuring. The data indicate that cost-effectiveness may be low in the conduct of public waste disposal services without significant changes in existing practice, there is slim hope that the rate of environmental improvement will be proportionate to the rate of spending.

Evaluation of programs to abate water pollution on the basis of cost-effectiveness is scarcely possible, without first determining the prevalence and causes of water pollution. Prior to the enactment of water quality standards, such determinations were literally impossible, and the definition of a state of pollution was little more than a subjective exercise. While different persons could bring to the exercise varying degrees of knowledge and experience, no one person or group could claim more than self-constituted authority. Amendment of the Federal Water Quality Act in 1966, and the establishment of water quality standards pursuant to the Act, has completely changed that

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situation. At this time it is possible to take water samples at any point on an interstate water body and, on the basis of a comparison of laboratory determinations with legal definitions specific to that reach of that water body, determine that a state of pollution does or does not exist with respect to a given water quality parameter. Current intra-state standards and, if passed, legislation extending Federal standards to navigable, ground and

contiguous zone waters provide almost universal objective evaluation standards. Armed with those legal definitions, it is possible to speak with considerable confidence on the current prevalence of water pollution. The Federal Water Quality Administration * attempted in the summer of 1970, for the first time in the history of the nation, to make just such an assessment for all waters of the nation. Field offices in the nine FWQA Regions estimated the percentage of the stream miles in each of the 233 second order watersheds in the contiguous United States (in addition to Alaska, Hawaii, Puerto Rico, Guam, the Virgin Islands, and American Samoa) that could be said to be polluted. Pollution was defined very strictly as a demonstrable and recurrent breach of any of the physical or chemical criteria applying to waterbodies, and not merely as violation of regulatory requirements imposed upon waste dischargers. In addition, for each watershed the assessors estimated the relative weight of eight general classes of activity in causing pollution.

Water pollution may take so many forms that experience and judgement are essential in making determinations. A few years ago, for example, few even considered the possibility that mercury might be a significant pollutant: the element is so scarce and so expensive that its wasting was considered to be highly improbable. There was, then, no known pollution of water by mercury so long as nobody looked for mercury. And any of the natural elements in any of their inconceivably large number of compounds—including living ones—may pollute when present in excessive concentrations. The task of identification is an enormous one, and it is possible that the assessment fails to include the effects of obscure or unexpected pollutants.

Given these difficulties, it is impossible at this time to produce any objective comparative index of pollution which takes account of the multi-dimensional factors which cause pollution. At this point, assessment can be made with fair assurance with respect to one dimension of a

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multidimensional problem. It can be said that water pollution from a specific pollutant does or does not exist for specific places in waterbodies at a given point in time. But there is no universal procedure for relating to the statement of prevalence either time or intensity in a completely general way. It can for example, be said that a river is more polluted or less polluted than it was five years ago if the concern is with adverse effects of the same pollutant.

* Now the Water Quality Office, Environmental Protection Agency under provisions of Reorganization Plan No. 3, 12-2-70.

Similarly, comparisons may be made between Stream A and Stream B if the measure of concern is common. But the quantitative measure of the change in the state of pollution if the types of polluting substances are varying is undefined. How, after all, does one weigh a one part per million improvement in the dissolved oxygen concentration of the Delaware River in August against a fifty percent increase in annual production of blue-green algae in Lake Erie? Can one possibly set a five part per million reduction in the fluoride level of Idaho's Portneuf River against a two degree average temperature increase in Maryland's Anacostia River and say that the aggregate water quality of the nation is better or worse?

Another point deserves to be made about the water quality assessment that is summarized here. It is obviously impossible to provide sufficient data over a sufficient period of time to define in precise, quantitative terms what the quality of the nation's waters may be at any time. Rich as the U.S. is, its economy does not have the resources to conduct such an undertaking. What exist are samples of water quality made at different points and different times. In many cases fixed location testing stations provide recurrent data. In other cases, particular water quality monitoring campaigns have produced background data at a single point, or series of points, on a single occasion or at intervals. On the basis of such data, knowledge of streamflow, and other influences on quality, the assessors have extra-polated judgements. They are, like most scientific generalities, quasi-objective status reports and not actual measurements. The assessors, then, are critical elements of the assessment. The evaluations considered were prepared by men who are, by training and by inclination, attuned to the probability of pollution. The jobs they perform, the experiences they have accumulated, their status, the whole complex of conditions that has given them a particular view of the world, incline them to pessimism. If they err, it is likely to be in the direction of overstatement. These reservations are expressed not to cast doubts on the assessment—it is, after all, a compendium of the judgements of the best qualified professionals—but to indicate the volatile nature of the pollution phenomenon and to provide possible explanations of what may seem to be anomalies.

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A REGIONAL BASE FOR COMPARISONS

The assessment of the prevalence of pollution prepared by Regional Offices finds that almost a third of U.S. stream miles are characteristically polluted. (CF Figure 2.) Half or more of the total stream

miles of over 20% of all second order drainage systems* in the U.S. have been assessed to be polluted. In almost 50% of our watersheds, 20% to 50% of total stream miles are considered to be polluted. Less than 10% of U.S. second order drainage systems were characterized by the assessors to be unpolluted or moderately polluted.

There are distinct regional differences in the prevalence and ostensible causes of pollution. The most general statement of the distinction is that States lying west of the Mississippi River appear to have relatively more miles of polluted stream than do States that lie east of the Mississippi. The fact is entirely consistent with our understanding of the causes of water pollution, the effects of which are magnified by low natural streamflows. Much of the Western United States is arid, and that underlying deficiency in the quantity of water makes the task of insuring adequate quality more difficult than in the humid East.

But the distinction between East and West does not adequately characterize the variety of the American water pollution condition. Comparative analysis requires somewhat finer distinctions. For analytical purposes, then, a set of regional groupings are proposed here to distinguish groups of States characterized by similar climatic and hydrologic circumstances, and also by obvious consistencies in economic specialization, demographic trends, and water pollution control strategies. Six broad groups are proposed, three lying east of the Mississippi River, three west of the Mississippi, (See Figure 3.)

The Pacific Coast States (Washington, Idaho, Oregon, California, and Nevada) combine moderate, humid climates in a thin, densely populated coastal corridor with an arid, sparsely settled eastern plateau that occupies most of the land area. Population growth exceeds that of the other five broad regions; and a distinctly larger portion of the area's population is concentrated in standard metropolitan statistical areas than in the other regions. A very high percentage of the

* The nation's river systems are geographically classified for purposes of hydrologic description. There are major basins which encompass the waters of the coterminous U.S. These are further subdivided into 233 sub-basins. It is to these that the term "second order" drainage systems apply. They are shown in Figure 4.

Figure 2

**SECOND ORDER DRAINAGE SYSTEMS
CLASSIFIED BY PREVALENCE
OF WATER POLLUTION**

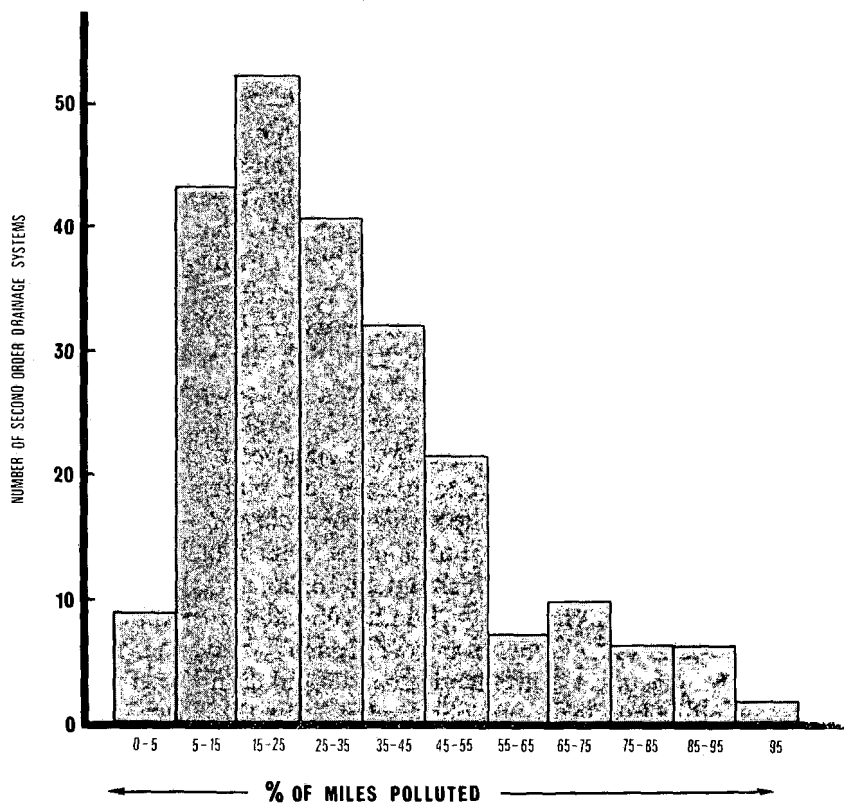
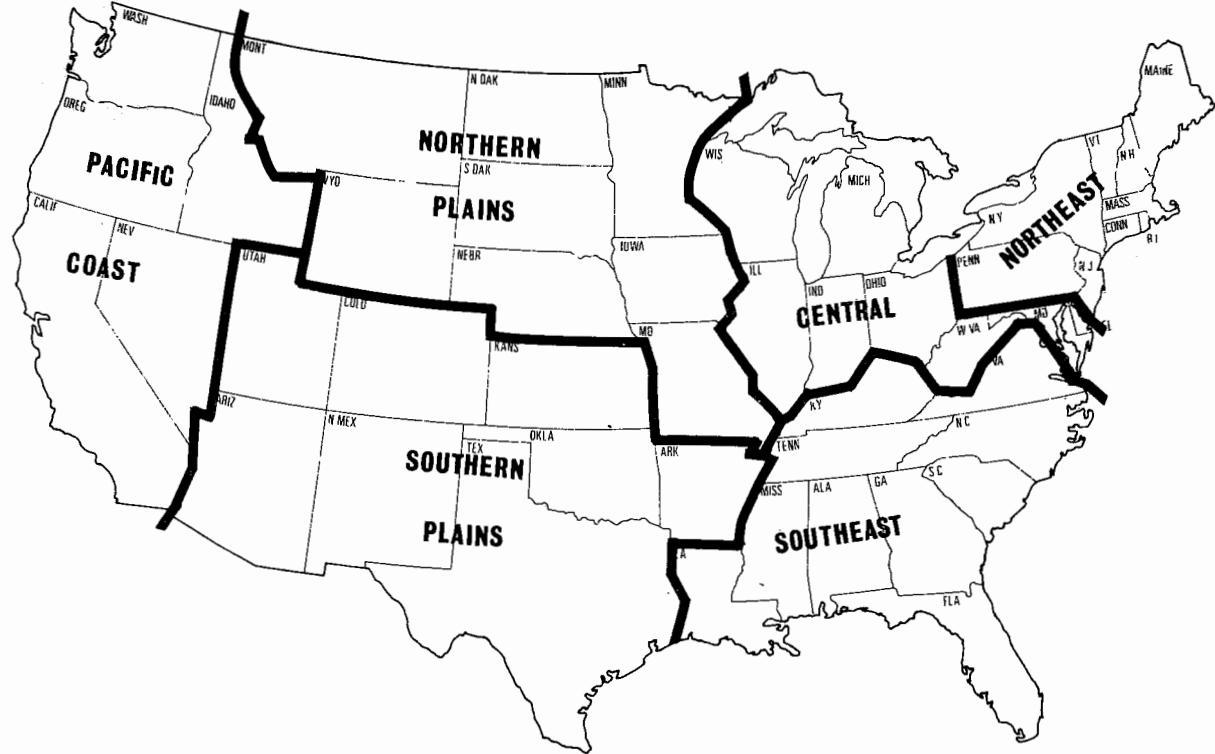


Figure 3

REGIONAL CONFIGURATIONS



total population has sewer connections. Waste treatment is almost universal; but the prevalence of secondary waste treatment is relatively low.

The Northern Plains States (Montana, North Dakota, Minnesota, Wyoming, South Dakota, Nebraska, Iowa, Missouri) constitute the most sparsely populated of the regional groupings; and in spite of the presence of three metropolitan areas having populations well over a million persons each (St. Louis, Kansas City, Minneapolis-St. Paul), very close to half of the total population is non-metropolitan. Population growth is slower than in the other regions, as is the rate of increase in sewerage. A substantial portion of the total population was without waste treatment in 1968, at least as compared to the other western regions; though that relative deficiency has been considerably reduced with the completion of the major St. Louis waste treatment plant and the extension of its services to outlying areas. (Over 800,000 persons were discharging raw waste in the St. Louis SMSA in 1968).

Southern Plains States (Utah, Colorado, Kansas, Arizona, New Mexico, Oklahoma, Arkansas, and Texas) make up the most arid of the six regions, the one with the highest incidence of sewerage, and the highest applications of waste treatment. Although recent population growth has occurred at a rate no greater than the nation's, population of the 38 SMSA's has increased at a rate equivalent to that of southeastern SMSA's, and little lower than that of those of the Pacific Coast. A relatively large, but declining, non-metropolitan population component is responsible for the apparent low rate of population growth. Because water is scarce, attention to it is imperative; thus the region not only stands first in incidence of sewerage, but leads by a considerable margin in the application of waste treatment at the secondary and higher levels.

The Central States (Wisconsin, Michigan, Illinois, Indiana, Ohio, West Virginia, Maryland-District of Columbia, and Delaware) comprise the most industrialized of the groups of States, are very densely populated compared to the Southeastern or any of the Western groups of States, and are growing in population at just about the same rate as the nation. A large proportion of the metropolitan population is sewerage, but a surprisingly small proportion of the non-metropolitan population receives sewer service. Virtually all of the sewerage population receives waste treatment; and the incidence of secondary treatment is considerably higher than for the nation as a whole.

The Northeast (New York, Vermont, New Hampshire, Maine, Massachusetts, Connecticut, Rhode Island, Pennsylvania, and New Jersey) is the most populous of the six regions, and the smallest in area.

Prevalence of sewerage is well above the national average for both metropolitan and non-metropolitan communities; but in spite of the incidence of sewerage and its highly concentrated population, application of waste treatment in the Northeast lags the rest of the nation. Almost 12% of the sewerage population was without waste treatment in 1968; and those 4.5 million persons constituted 45% of all persons estimated to be discharging untreated sanitary sewage that year (as compared to the region's 24.4% of U.S. population). Relative intensity of treatment, too, is distinctly below the national average, with almost half of the sewerage population provided with less than secondary waste treatment, as compared to a little over a third on a national basis.

Southeastern States (Kentucky, Virginia, Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, Louisiana, and Florida) are the most rural in composition of the six groups of States, but stand second only to the Pacific Coast in rate of population growth. Incidence of sewerage is lowest among the six regions, though the rate of expansion of sewer services exceeds that of the other areas east of the Mississippi. The region led all others in relative discharge of untreated sewage in 1968, due in large part to the substantial segment of the sewerage population of some of its principal metropolitan areas that was not provided with waste treatment services. (Charleston, S.C. 120,000; Columbia, S.C. 99,000; Jackson, Miss. 130,000; Memphis, Tenn. 522,000; Montgomery, Ala. 164,000; New Orleans, La. 542,000; Savannah, Ga. 124,000; Shreveport, La. 234,000.)* In fact, the metropolitan population without waste treatment of these States exceeded by a considerable amount the combined total for all persons west of the Mississippi plus the central States.

PREVALENCE OF WATER POLLUTION

A substantial portion of American waterways is characterized by FWQA assessors to be persistently polluted. Of 233 second order drainage systems in the forty-eight contiguous States, FWQA could define only 19 in which no greater than 5% of stream miles were continually or recurrently in violation of established physical, chemical, or bacteriological criteria—and 16 of those 19 are found in one area, the region distinguished here as the Southeast. Even with the relatively low prevalence of pollution in the Southeastern United States,

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* Sewage treatment plants are presently under construction or planned for in these communities.

NATIONAL WATER QUALITY ASSESSMENT:

PREVALENCE OF POLLUTION IN SECOND ORDER DRAINAGE SYSTEMS

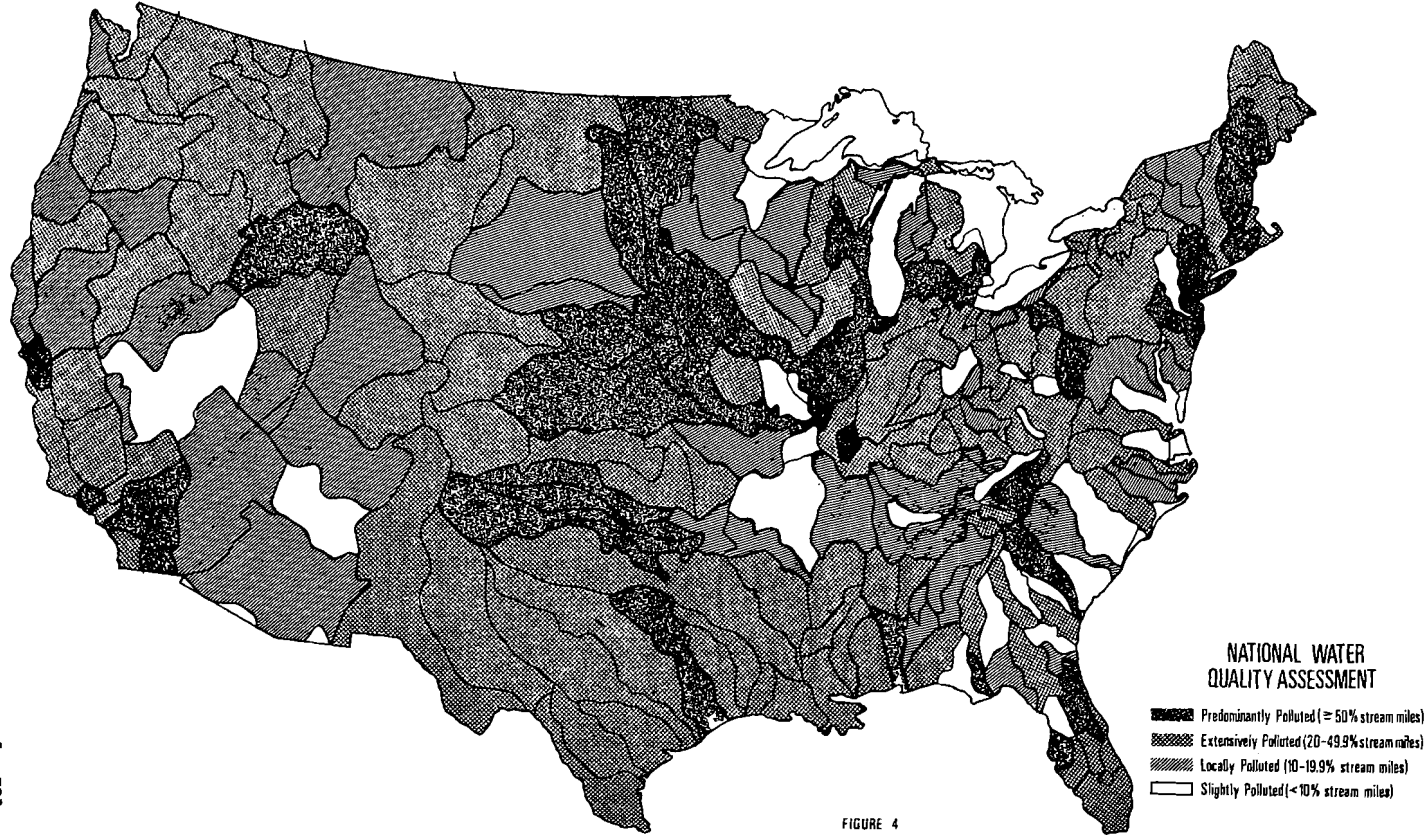


FIGURE 4

TABLE 17.—ASPECTS OF REGIONAL SEWAGE SERVICES 1968

	United States	Pacific coast	Northern plains	Southern plains	South-east	Central	North-east
1. Population, 1968:							
Total (millions)	198.0	25.7	14.8	23.5	39.9	45.7	48.3
Annual increase, 1962-68 (percent)	1.2	2.1	0.4	1.2	1.4	1.3	0.8
Percent metropolitan	68.6	83.6	53.4	59.6	46.4	74.8	82.4
2. Sewering, 1968:							
Percent of SMSA pop.	79.5	85.1	72.4	84.7	59.9	82.3	82.9
Percent of non-SMSA	45.9	53.8	48.6	59.8	37.4	36.2	58.7
Percent annual increase, 1962-68 SMSA	2.7	5.4	1.1	4.6	2.4	1.8	1.5
Percent annual increase, 1962-68 non-SMSA	2.9	2.5	1.6	3.3	3.3	1.2	4.2
3. 1968 Waste treatment:							
Percent untreated discharge	7.3	0.7	13.2	2.0	15.0	1.9	11.9
Percent primary treatment	26.6	46.0	22.6	4.6	24.5	22.7	33.5
Percent intermediate and lagoons	8.6	7.5	16.7	12.8	7.7	6.0	8.6
Percent secondary treatment	56.7	44.7	43.7	80.1	52.4	69.0	45.4
Percent greater than secondary treatment	0.7	1.6	3.7	0.5	0.6	0.2	0.5

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we find that the median and modal incidence of pollution for the nation occurs at over 30% of stream miles (cf. Table 18). More than a third of total stream miles are defined to be polluted in every region of the United States except the Southeast.

The incidence of pollution, as it is defined by the FWQA national assessment, fits none of the accepted patterns of cause. The conventional wisdom offers no ready explanations for the phenomenon. The fact that the Northeastern States have the highest indicated prevalence of pollution is almost comforting, in that it fits all of the preconceptions. The area is characterized by large and highly concentrated population, massive manufacturing capacity, a relative deficiency in waste treatment. The region *should*, according to the conventional scenario, have a great number of polluted stream miles. But the Northern Plains States stand second to the Northeast in the average prevalence of pollution, and exceed the Northeast in the relative number of watersheds in the most polluted category, reactions become more than a little uncomfortable. That the sparsely populated Dakotas, almost completely unindustrialized, where every small town has its secondary waste treatment plant, should have relatively more polluted stream miles than New York State is unsettling. And to find that the nation's best water quality—in terms of compliance with water quality standards—is to be found in the region with the lowest incidence of waste treatment does additional violence to any complacency about the direction of existing pollution abatement programs.

Not even the most ancient of our conceptions of sources of water quality degradation, deficiency of streamflow, holds up entirely. While eastern streams, in total, are judged to be less extensively polluted than western streams, the better showing traces entirely to the waters of the Southeastern States. Pacific Coast States provide a consistently better record of compliance with water quality standards than either the Central or the Northeastern States; and even the most arid of the six regions, the Southern Plains, compares quite favorably with the Northeast and not unfavorably with the Central States.

We are left, then, with only a single certainty. A very large portion of all U.S. waters consistently demonstrates quality characteristics that violate established criteria. These violations occur in densely populated and sparsely populated areas, in humid and arid climates, in industrialized, in agricultural, and in forested regions, and apparently without reference to either the prevalence or the intensity of waste treatment. The lack of a pattern makes it impossible to judge whether conditions are improving or deteriorating; but the consist-

ency of the pattern of pollution suggests that there may be inefficiencies in current approaches to pollution abatement.

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TABLE 18—GENERALIZED PREVALENCE OF POLLUTION, 1970

Region	Percent of stream miles polluted	Percent of Watersheds In Pollution Status			
		Predominantly polluted ¹	Extensively polluted ²	Locally polluted ³	Slightly polluted ⁴
Pacific Coast	33.9	14.8	59.3	22.2	3.7
Northern Plains	40.0	37.5	33.3	25.0	4.2
Southern Plains	38.8	27.3	51.5	18.2	6.1
Southeast	23.3	14.3	41.1	16.1	28.6
Central	36.6	23.2	51.8	21.4	3.6
Northeast	43.9	36.1	55.6	5.6	2.8
East of Mississippi River	31.6	23.0	48.7	15.5	12.8
West of Mississippi River	35.5	24.1	47.1	20.7	4.6
United States	32.6	23.7	48.5	17.7	9.9

¹ Predominantly polluted: \geq — 50 percent of stream miles polluted.

² Extensively polluted: 20 — 49.9 percent of stream miles polluted.

³ Locally polluted: 10 — 19.9 percent of stream miles polluted.

⁴ Slightly polluted: \geq — 10 percent of stream miles polluted.

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CAUSES OF WATER POLLUTION

The apparently erratic geographic distribution of water pollution may be explained in part by a review of apparent causes. The national assessment of the prevalence of water pollution included an evaluation for each second order watershed of the indicated causes of pollution, in terms of relative weight.

Causes of pollution were classified according to their association with categories of human activity. Natural causes of poor water quality were not considered, on the basis that water quality standards are, at least in theory, developed in terms of water uses that are possible within the framework of natural conditions. Recognized sources of pollution for the assessment were eight:

(1) *Municipal Wastes* include all wastes that are collected and transmitted through community systems of sanitary sewers. Both commercial and domestic sanitary wastes, and the wastes discharged by manufacturing plants to public sewer systems, fall into the category.

(2) *Other Urban Wastes* include the waterborne residues of urban activity that do not routinely enter the system of sanitary sewers. Direct runoff from urban areas, overflows and bypasses of waste treatment plants caused by combined storm and sanitary sewers, and the unassimilated drainage of septic tanks comprise the major elements of the category.

(3) *Industrial Wastes* include the separately discharged wastes of manufacturing. Both process waters and manufacturers' cooling waters fall under this heading.

(4) *Electrical Generating* was defined to include the discharge of heated cooling waters of thermal power generating stations, the presence of radioactivity from nuclear fueled power plants, and the particulate fallout and acidity associated with fossil fueled power plants. In several watersheds, however, the disruption of the natural hydrologic regimen associated with generation of hydroelectric power was included by assessors under this category rather than the general category of "other" which was intended to include all water management activities.

(5) *Agriculture*, as a source of water pollution, includes the effects of runoff on siltation of streams, organic and nutrient loadings originating with livestock, concentrations of pesticides and herbicides from the runoff of agricultural lands, and salinity that occurs with leaching and evapotranspiration in the irrigation process.

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(6) *Mining's* effects on water quality include siltation from scarred lands, acid drainage from reaction of water with exposed mineral seams, and pumping of brine deposits.

(7) *Spills*, which receive a great deal of attention because of their often catastrophic nature, include the deposit in water of any polluting or toxic material as the result of accident.

(8) *Other* sources of water pollution are, obviously, unlimited in concept, since they include any human event or activity not considered under one of the other seven categories of polluting activity. In practice, however, the "other" category resolves into three principal classes: water management in the highly regulated streams of the west, the promotion of sedimentation by construction, and the effects of transportation—principally navigation—including stream dredging.

The use of the eight categories of polluting practices is valuable for analytical purposes and for program formulation, but the real world distinction among pollution's causes are not nearly so distinct as the employment of the specific categories would imply. In practice, water pollution can rarely be traced to a single cause. In most cases, all eight forms of activity occur in the same watershed—and several of them may be found at approximately the same stream point. Distinguishing their relative impact, then, is very largely a matter of judgment and study.

The indicated causes of pollution, it must be stressed, do not constitute as reliable an assessment as that of the prevalence of pollution.

Judgment as to the occurrence or absence of pollution requires extrapolation between measured points in space and in time. In the case of causes, it requires a rather fine distinction among simultaneous occurrences, a weighting of the relative significance of inter-related conditions.

As in the case of the prevalence of pollution, this study's procedure includes no effort to revalue the judgments of the assessors. All data have been accepted as they were given, on the basis that the experienced judgment of the men on the scene must in most cases be better than that of the analyst removed from the event.

On the other hand, it must be recognized that there is something that is essentially specious about any effort to quantify the relative contribution to water pollution of various activities. The distinctions are simply too fine and interdependent for accuracy. For this reason, the analytical method has attempted to further separate the various influences on water quality into distinguishable *prime causes* and all other.

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TABLE 19—PRIME CAUSES OF STREAM POLLUTION, ALL SECOND ORDER WATERSHEDS

Prime causes, in descending rank	Percent of stream pollution attributed to prime causes						
	United States	Pacific Coast	Northern plains	Southern plains	Southeast	Central	Northeast
Industrial wastes	23.7	12.7	21.0	9.2	34.7	21.5	33.5
Municipal	21.8	13.0	15.6	14.2	21.2	28.5	27.1
Agriculture	11.2	19.1	28.8	27.6	1.3	5.8	0.5
Other	3.7	11.8	0.6	16.6	1.7	0.4	.....
Mining	2.8	2.4	2.6	12.6	0.3	4.9	2.6
Other urban wastes	0.9	.....	.....	0.1	0.7	1.9	1.3
Power generation	0.4	1.5	0.6	0.6	0.1
Spills	0.1	0.2
Total prime causes	64.6	60.5	68.6	70.3	60.5	63.8	65.1

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The selection principle was simple enough. In every watershed the assessors indicated that from five to eight of the categories of activity added to pollution of water. The analytical procedure was to select the smallest number of those causes that could be added together to account for at least 50% of the indicated pollution. These were then considered to be prime causes for that watershed. There is no difference in the aggregate between the categories of activity that are considered to be prime causes of pollution and those that are considered to be contributory causes. The distinction was made separately for each second order watershed. In most instances, one or two causes were thought to account for half or more of the polluting effects. For all watersheds, the mean number of prime causes

was 1.8, and the proportion of pollution attributable to them was greater than 65%—indicating that, in general, the major indicated cause of pollution in any instance is substantially more significant than other causes. Comparative significance of prime causes was assigned, within regions as well as for the nation as a whole, in terms of index numbers based on stream miles and degree of pollution. ([percent prevalence of pollution multiplied by stream miles multiplied by percent pollution attributed to a prime cause] divided by [the sum of percent prevalence of pollution multiplied by stream miles] = percent of pollution attributed to a prime cause.) Again, the procedure is by no means precise, but by limiting the analysis to prime causes, it is hoped that uncertainty attributal to background conditions is reduced, so that we distinguish the more obvious (and thus, hopefully, better founded) portions of the assessment.

The array of pollution sources reveals sharp differences in their impacts. Municipal and industrial wastes are evaluated to be the majority sources of pollution (cf. Table 19), and to be of approximately equal impact on a national basis. Industrial wastes emerge as the principal source of pollution in two regions, municipal wastes in one. In total, industrial wastes are indicated to be a fractionally greater cause of pollution; but the values are so impressionistic that the difference can scarcely be considered real much less significant. The parity accorded the two kinds of wastes by the assessors is unexpected, in view of greater quantity of industrial waste and the slightly higher estimated treatment efficiency in the public sector. (Surprising, too, is the fact that the one region in which municipal wastes are considered to be the leading cause of violations of stream criteria is the Central States, the most industrialized of the six regions.) One must presume that the relative importance assumed by municipal wastes strongly reflects frequent violation of bacteriological standards and increased fertility of water attributed to phosphorus discharges. Other possible explanations include the

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diffusion of municipal waste sources—significant to an assessment based on prevalence rather than intensity of pollution, concentration on traditional sanitary interests, and difficulty in measuring effects of some of the more obscure industrial wastes.

Agriculture, standing third nationally as a source of water pollution, is considered to be the leading cause in each of the three western regions—and by a distinct margin over either municipal or industrial wastes in each case.

Mining and "other" sources of pollution each receive some consideration as prime sources of water pollution, with mining's con-

tributary effect noted in all six regions, "other" sources largely restricted to the Pacific Coast and Southern Plains.

"Other urban wastes," power generation, and spills tended to be relegated by the assessors to the category of secondary or subsidiary sources of pollution. Their combined contribution, as prime sources, amounts to less than 1.5% of the total; and each tends to occur only in particular, scattered instances. While this might be expected in the case of spills, which occur mainly as accident, and so only in an actuarial or probabilistic sense in any listing of causes of recurrent pollution, one receives the distinct impression that the polluting effects of power generation and of unsewered urban drainage may well have been overlooked in many instances as a result of concentration on the obvious. Certainly the technical literature is full of examples of adverse water quality impacts from these sources.

The full range of differences between east and west becomes sharply evident when attention is shifted to the comparative contribution of the several categories of activities to stream pollution under varying degrees of prevalence. (cf. Table 20).

While the polluting influence of agriculture tends to remain constant over the various degree of pollution categories in the west, and the relative influence of municipal wastes declines with increased prevalence of pollution, the exact opposite is true in the east. At least two explanations come readily to mind. On the one hand, there is a distinctly lower incidence of waste treatment east of the Mississippi, together with a much larger total population. So it is entirely conceivable that some of the polluting effects of agriculture are masked by the overriding influence of municipal (and industrial) wastes. On the other hand, western agriculture is vastly different in the aggregate from that of the east. It is more extensive, characterized by larger land units, row crops, and highly mechanized operations. It tends to be more wasteful in its use of soils in order to make fuller use of its larger capital inputs. (Thus, for example, a

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TABLE 20—PRIME CAUSES OF STREAM POLLUTION, BY EXTENT OF POLLUTION

Prime causes and (rank)	Percent of pollution attributed to prime causes				
	All streams	Predominantly polluted	Extensively polluted	Locally polluted	Slightly polluted
Industrial Wastes (1)	23.7	24.9	24.0	14.9	20.8
East of Mississippi River (1)	28.9	31.0	28.3	19.6	18.2
West of Mississippi River (2)	14.6	14.8	15.7	8.4	12.4
Municipal Wastes (2)	21.8	23.2	19.6	23.7	27.2
East of Mississippi River (2)	26.0	26.5	25.0	29.4	34.5
West of Mississippi River (3)	14.4	17.8	9.9	15.7	34.3
Agriculture (3)	11.2	10.5	110.8	18.9	5.5
East of Mississippi River (4)	2.9	1.4	3.0	14.0	5.4
West of Mississippi River (1)	25.8	25.5	26.5	25.7	19.1
Other (2)	3.7	3.1	4.6	3.2	0.4
East of Mississippi River (7)	0.6	.....	1.2	1.3	.....
West of Mississippi River (4)	9.3	8.2	11.4	5.7	4.8
Mining (5)	2.8	3.0	2.3	2.5	5.8
East of Mississippi River (3)	2.9	3.9	2.2	.....	7.1
West of Mississippi River (5)	2.5	1.5	3.0	6.0	9.5
Other Urban Wastes (6)	0.9	1.0	0.9	0.2	.....
East of Mississippi River (5)	1.4	1.6	1.4	.....	.....
West of Mississippi River (7) .....	.....	.....	.....	0.4	.....
Power Generation (7)	0.4	0.3	0.6	.....	0.9
East of Mississippi River (6)	0.5	0.6	0.4	.....	1.2
West of Mississippi River (6)	0.4	.....	0.9	.....	.....
Spills (8)	0.1	0.1
East of Mississippi River (8)	0.1	0.2
West of Mississippi River (8)

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study of sedimentation in the Palouse River Basin of Washington and Idaho found, over a period of years, a much tighter correlation of silt loadings to fertilizer sales than to streamflow or precipitation. As farmers found it cheaper to synthesize new soils with chemical fertilizers than to preserve them, farming practices apparently altered in a fashion that promoted erosion.) There is relatively less forest and pasture cover to hold western agricultural land. A large portion of the cultivation of the west is an irrigated agriculture, in which water represents a planned resource input, increasing opportunities for hydraulic displacement of soils, depleting streams, and enhancing salinity. Western agricultural practices relating to livestock, too, are inherently more pollutorial, in that feeding operations that concentrate large numbers of animals in a limited space have become an integral part of the industry. Such feed lots produce point sources of wastes that, under some conditions, equal the polluting effects of major metropolitan areas.

Other obvious distinctions relate to the influence of mining and "other urban wastes." Mining, as a prime source of pollution in the east, seems to exercise some of its effects in the watersheds where pollution is most prevalent, as do "other urban wastes." The reverse is true in the west, where mining would seem to be a source of local-

ized pockets of pollution rather than a basin-wide influence. The differences probably trace to the character of the industry. Eastern coal mining is an essential part of the industrial base, with population and manufacturing centers located near the coal fields. The petroleum and heavy metals extraction of the west tend to be isolated; and the nature of the mining process and of soils tends to produce environmental impacts that are less extensive as well as less apt to be reinforced by other activities. In the category of "other urban wastes," precipitation patterns and a smaller scale of metropolitan units may limit relative pollution effects in the west, as may the lesser incidence of combined storm and sanitary sewers.

Perhaps the most dramatic of the differences between east and west is hidden in the undifferentiated category "other." The role of water management in arid areas is seldom considered in connection with water pollution; but the modification of streamflows that can vary from complete interruption of flow during the storage period to flooding rushes when storage reservoirs are filled, when the irrigation season is underway, or with peak generation of hydroelectricity, creates an environment that is inimical to maintenance of water quality standards. In the more extensively polluted watersheds of the Pacific Coast and the Southern Plains, the category is given a weight that is roughly equal to that of municipal wastes as a cause of pollution.

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The value of the assessment in resource allocation decisions as discussed next is significant. Because this was the first such assessment attempted, there may well be reservations as to the precision of its results; but it does provide a new and enlightening view of the entire water pollution picture. Future activities in this area will be designed to reduce the imprecision and reservations to enhance the utility of this form of assessment.

POLLUTION CAUSES AND RESOURCE ALLOCATION

Having established, in an admittedly subjective manner, the relative significance of major categories of polluting activities, the way is open to consider current resource allocation procedures that affect water pollution control. The task is by no means an easy one. Reliable data are simply not available for most of the eight kinds of activities known to cause water pollution, so that one is forced to make do with order of magnitude statements.

When there was a substantial amount of untreated sanitary sewage being discharged, there could be little doubt of the utility of increasing the prevalence of waste treatment. But untreated discharge is

now a rarity; and attention is shifting to higher degrees of treatment, to reworking sewerage systems, to provision of "fail safe" procedures, to providing for anticipated growth. There can be undoubted merit in all of these kinds of investments; but there is also a probability that there may be higher potential returns available in other areas.

Industrial wastes, which account for almost 80% of sewerage oxygen demand and for 34% of estimated stream pollution, have been the source of about half a billion dollars a year of investment and several hundreds of millions a year of operating costs over the last three years. Current targets call for investment to be increased to over \$600 million a year.

Municipal wastes, which account for a little over 20% of sewerage oxygen demand and are presumed to be the principal source of nutrient phosphorus, are estimated to be responsible for a third of all stream pollution. Investments, about a billion dollars a year over the last three years, will to step significantly as a result of increased Federal financial assistance. Operating costs, that currently approach \$300 million a year, should come close to half a billion by the middle of the current decade. A very minor part of the added financial burden will be directed toward alleviating the nutrient problem, believed to be the principal mechanism by which sanitary sewage causes water pollution today.

Agriculture, estimated to cause almost 20% of all stream pollution, makes almost no direct investment for pollution control purposes. Costs of remedial procedures—including erosion control, limitation of use of some pesticides, locational practices for feed lots and dairies

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—may amount to several tens of millions of dollars each year, with the benefits experienced in such areas as nuisance alleviation, increased productivity, and land resettlement alternatives as much as in water pollution control.

Other activities producing pollution—water management practices, construction, navigation, and recreation—are estimated to cause slightly more than 6% of stream pollution, most of it west of the Mississippi. Again, control measures can amount to no more than tens of millions, occurring principally in the form of higher construction costs.

Mining is estimated to account for about 5% of stream pollution, concentrated largely in the Appalachian coal mining region. The petroleum industry has indicated that its expenditures for pollution control consequences of production exceed \$100 million a year. While no estimates of costs have been presented for other mining sectors, it is considered improbable that their total would approach

half of that claimed for petroleum extraction.

Other urban wastes, estimated to account for a little over 1% of stream pollution, are approached almost entirely as a function of the system of storm and sanitary sewers that currently sustains an annual investment of about \$600 million. It is uncertain to what extent the sewerage program serves to alleviate water pollution due to urban drainage—indeed, there is some concern that the net effect of such programs is negative with respect to water quality.

Power generation is estimated to be directly responsible for less than 1% of stream pollution. Current investment in cooling water recycling facilities by the steam power industry is in the area of \$200 million a year. Air pollution control investments are approximately equal; and these have collateral water pollution control benefits in some cases, a function of reduction in fallout of particulate matter.

Spills are accorded responsibility for almost no recurrent water pollution, though intermittent spill damages have proved in some cases to be locally catastrophic. It is impossible to estimate costs of spill control measures, both because procedures are undefined in some cases, and because controls tend to be an inextricable part of the—largely industrial—production system that results in spills.

It is a crude sort of balance sheet drawn up here, but it does indicate that there may be distortion in the way resources are allocated

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for water pollution control. Sewered wastes have been estimated in these pages to account for more than two-thirds of stream pollution. They also receive almost all of the accountable expenditures for pollution control—very close to \$3 billion year—with the amount certain to rise sharply over the next few years. Other kinds of polluting activities receive about \$300 million of accountable expenditures by the petroleum extraction and steam power generating industries, and possibly several tens of millions from a variety of other interests. Polluting effects, estimated to be twice as great for sewered wastes as for other kinds of polluting activities, are countered by an allocation process that devotes almost ten times as much for sewered wastes as for the other procedures that may cause water pollution.

On the other hand, one cannot make the off-hand judgment that control of sewered wastes is overfunded relative to other categories of pollution control. There is so tenuous a grasp of control possibilities for unsewered pollutants that we do not know what control measures are possible in many cases, much less what is necessary or practical. Relative prices, then, will have to be taken into account, together with pollution reduction potential in making determinations of the aggregate effectiveness of water pollution control

allocations. Current relationships could conceivably be optimal.

The fact that we do not know the optimum relationships enough, however, to indicate that the nation is devoting an insufficient amount of attention to the relative seriousness of pollution resulting from sources other than sewered wastes.

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DISECONOMIES IN PUBLIC WASTE MANAGEMENT ACTIVITIES

Although the preceding discussion suggests the possibility that the allocation processes that assign resources to remedy water pollution are flawed by excessive concentration on sewered wastes, the fact is currently impossible to determine. So exclusive has been the thrust of water pollution control in the one direction, that there is only general and impressionistic basis for suggesting that other pollution-producing economic activities are neglected. No basis for comparing any distribution of resources with a theoretical optimum at any level of national expenditure can be developed as long as determinations have not been made regarding the cost, desirability and degree of control for non-sewered pollution sources. On the other hand, it is possible to determine generally what economic loss, on a national basis, ensues from suboptimal allocation of resources *within* the category of sewered wastes and treatment for those wastes. (That is not to say that definition of diseconomies offers any prospect of reducing their dimensions. For the most part, the economic losses stem either from uncertainty or from institutional constructs so strongly rooted that their elimination might involve a higher cost than that of the diseconomy they create.)

From an economic standpoint, though perhaps not from a regulatory one, there are continuous and substantial losses that ensue from two sources; promotion of sewerage, and overdesign of facilities, may be viewed as institutionalized allocational impediments to totally cost effective investment.

PROMOTION OF SEWERING

Diseconomies that stem from unnecessarily accelerated sewer connections are significant. While a direct measurement of their amount would require costly and extensive surveys, their general dimensions can be determined by reference to relative growth of U.S. population and of sewered population. (cf Table 21.)

Bureau of Census estimates indicate that between 1962 and 1968 national population increased by roughly 14 million persons. Estimates of sewered population compiled by State health and water pollution control agencies indicate that in the same period sewered

population increased some 20 million persons, almost half again as much in gross numbers, more than twice as fast in terms of rate of increase.

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TABLE 21—RELATIVE GROWTH OF POPULATION AND SEWER SERVICE 1962-68

Region	1962 Population, 1000's		Percent sewered	1968 Population, 1000's		Percent sewered	Annual rate of change (percent)
	Total	Sewered		Total	Sewered		
Pacific Coast, Metro	18,246	13,333	73.1	21,519	18,322	85.1	2.8
Other	4,547	1,959	43.1	4,217	2,269	53.8	5.4
N. Plains, Metro	7,343	5,361	73.0	7,903	5,720	72.4	-1.1
Other	7,092	3,038	42.8	6,879	3,342	48.6	2.5
S. Plains, Metro	12,191	9,062	74.3	14,016	11,877	84.7	1.2
Other	9,784	4,679	47.8	9,506	5,682	59.8	1.1
S. East, Metro	15,986	9,596	60.0	18,505	11,080	59.9	-0.4
Other	20,665	6,565	31.8	21,418	8,020	37.4	1.6
Central, Metro	31,190	24,905	79.9	34,187	28,132	82.3	2.4
Other	11,218	3,857	34.4	11,503	4,162	36.2	4.6
N. East, Metro	37,373	30,180	80.8	39,743	32,934	82.9	-0.5
Other	8,538	3,950	46.3	8,605	5,051	58.7	3.3
TOTAL Metro	122,328	92,437	75.6	135,873	108,065	79.5	2.5
TOTAL Other	61,845	24,049	38.9	62,127	28,526	45.9	2.4
United States	184,173	116,486	63.3	198,000	136,591	69.0	0.6
							3.3
							1.5
							1.8
							0.4
							1.2
							1.0
							1.5
							0.1
							4.2
							1.8
							2.7
							0.1
							2.9
							1.2
							2.7

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While there is no direct relationship between rate of population growth and a desirable rate of sewer connections, since local population density and soil conditions are the basic factors that dictate use of sewers rather than individual septic tank systems, there should be some underlying correspondence of the two rates. But both the higher overall rate of growth of sewerage and the disproportionate growth of sewerage in rural and non-metropolitan urban areas lead to the inference that sewerage is being extended far beyond any circumstances dictated by physical need. At a time when the non-metropolitan population of the United States increased by some 300,000 persons, sewer service to the population component added some 4.5 million persons; and even in the areas west of the Mississippi, where non-metropolitan population was declining, non-metropolitan

sewered population increased by some 1.6 million.

The critical point to be made here is that sewerage, considered in an environmental sense, is one of the prices paid for our urban condition. *To the point that the assimilative capacity of soils is not exceeded*, it is infinitely preferable to use ground disposal procedures. They have the great virtue of recycling the materials so disposed, both by replenishing water tables and by converting and utilizing organic and inorganic waste matter in natural life processes of decay and growth. Their secondary merit is more germane to this discussion. Water reaching watercourses after passage through the filtering and decomposition processes afforded by soil is far purer—provided that soil loading rates are not exceeded—than any waste treatment process short of distillation could make them. The effect of sewerage is to transfer conditions of soil pollution or groundwater pollution to surface waters. To make that transfer where sewage loadings are not so great as to threaten soil or groundwater pollution is to create surface water pollution.

Yet there is a tendency to regard sewerage as a progressive and sanitary process in all cases, and as a general rule to discourage and impede the alternative of ground disposal. Many State health departments actively promote sewer installations, as do Federal programs.

Sewerage beyond the level dictated by environmental considerations, then, must be conceded to be a polluting influence, with the influence exercised in surface waters. That pollutional impact is reinforced by the fact that local resources diverted to sewer installation may be denied to necessary waste treatment works. The situation is a universal one, but its effects are most noticeable in the Northeast.

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TABLE 22—CALCULATED INCREASE IN SANITARY WASTE DISCHARGE DIRECTLY ATTRIBUTABLE TO ACCELERATED SEWERING—NORTHEASTERN STATES, 1962-1968

	Thousand population equivalents of BOD	
	Metropolitan	Other
1962 Sewered Population	30,179.6	3950.3
Mean Waste Reduction ¹ .....	.697	.674
Daily Waste Discharge, 1962	9,144.4	1287.8
'Normal' Sewering, 1962-68	1841.0	23.7
Additional Sewering, 1962-68	913.3	1076.9
Mean 1968 Waste Reduction ¹ .....	.679	.621
Daily Waste Discharge, 1968	10,571.8	1914.3
Increase, 1962-68	1,427.4	626.5
Directly Attributable to Accelerated Sewering	293.2	408.1

¹ $.35 P_p + .85 P_s$

where P_p = sewerage population with primary treatment

P_s = sewerage population with secondary treatment

P = total sewerage population

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In that region, where untreated sanitary waste discharges are massively concentrated, water pollution abatement has been retarded significantly by the allocation of resources to the sewerage of rural communities. The effects—not adjusted for overloading of waste treatment plants or public treatment of industrial wastes—are demonstrated in Table 22, which depicts a significant increase in oxygen demand of both total sanitary wasteload and of discharged sanitary wastes occurring between 1962 and 1968 as a result of a substantial sewerage population increment beyond that indicated by population growth alone, and a related decline in the intensity of waste treatment.

OVER-CAPITALIZATION OF TREATMENT WORKS

A recent newspaper story carried a two column photograph with the following caption:

Control Panel Inspected

... inspects a control panel at the \$2 million ... sewage plant expected to go into operation ... by the end of the year. The plant, under construction since a year ago last summer, is expected to handle three million gallons of waste a day. It is being built simultaneously with a \$1 million expansion of the ... plant. The facilities have been designed to serve a population of 100,000, four times the present ... population.

One senses in the intent face of the inspecting technician who has been photographed a certain efficient satisfaction with the bank of controls and recording instruments; and the flat, no-nonsense journalistic prose of the caption has only a faint hint of civic pride in the new facilities. There is no indication that anyone is, or should be, disturbed at the thought of spending \$3 million to construct facilities that, when completed, will be 75% unused, at financing the unutilized capacity at about 6% a year, or at assuming excess annual operating costs of approximately \$15,000 per million gallons a day of sewage throughput. These things are, apparently, taken for granted. And the situation cited is by no means unique—more than 7% of the municipal waste treatment plants in the United States are scaled to accommodate four or more times their current loading. (Such plants account, however, for only 4.4% of gross capacity, due to the tendency for over-design to occur principally with smaller plants in smaller communities.) (cf Table 23.)

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The conventional explanation for installing multiples of currently needed capacity is that they are intended to provide for future growth. And in the case cited, the community is part of an SMSA

that has experienced extraordinary population growth since World War II, thus a considerable amount of spare capacity might be a good idea. However—if the city should continue to grow in population at the very high rate (2.8% a year) experienced from 1940 through 1970, it would take 50 years to fully utilize its current capacity. Should its population growth expand to that of the total SMSA over the last 20 years (3.8% a year), it would be using up its excess in only 37.5 years. And if population expansion should really skyrocket to the overall rate of the county, in which it is located (5% a year), only 28.5 years would be required to get 100% utilization of a set of facilities built to serve over a 'normal' operating span of 25 years.

In defense of the communities like the one cited, it should be noted that overdesign of waste treatment plants is not generally considered to be an abuse. To the contrary, standard design practice calls for the construction of facilities that are scaled to some "prudent" multiple of the existing loading rate, both to provide against loading surges and to have them available for larger future needs. The procedure makes such obvious good sense when contained within 'prudent' limits that there should be no need to call attention to it.

But there is room for disquiet when one takes into account the fact that fully a quarter of metropolitan area waste treatment plant capacity is less than half utilized, and that for non-metropolitan communities, over thirty percent of total waste treatment plant capacity is utilized at less than half of design rating. When one excludes the one sixth of all waste treatment plants that are overloaded, the mean utilization rate for publicly operated plants in the U.S. is found to be just under 63%—almost two-fifths of the total capacity of plants of every vintage, then, is simply unused. Worse, in terms of aggregated probabilities, much of it will never be used. The formal useful life of a waste treatment plant is 25 years. At the rate of population growth that applied during the 1950's only the fastest growing classes of communities could make full use of the capacity of a plant designed to serve twice its initial loading (cf. Figure 5). The rate of population growth has been declining without interruption since 1957; and during the 1960's it sank to 70% of the rate for the previous decade. Under those circumstances, one would anticipate that the margin of excess capacity would decline. Instead it has been rising.

RELATIVE POPULATION GROWTH EXPECTATIONS BY CLASS OF COMMUNITY BASED ON 1950-60

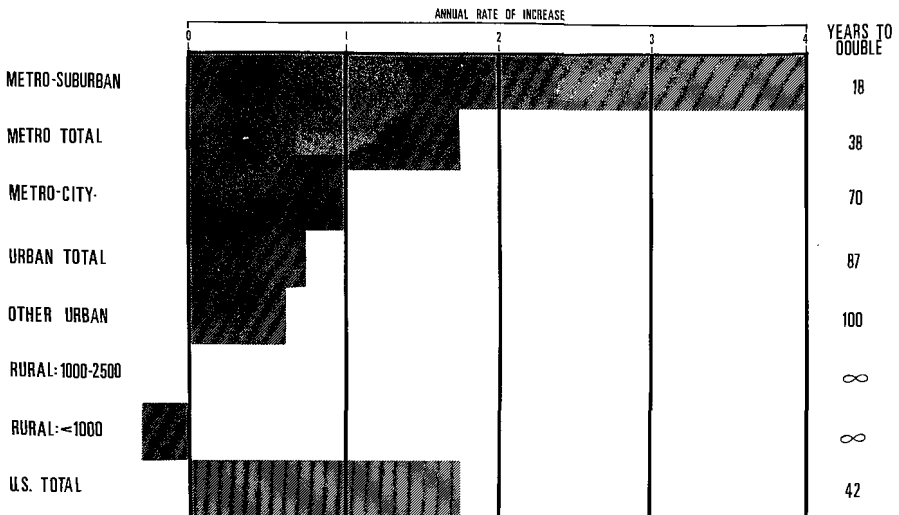


FIGURE 5

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TABLE 23.—REGIONAL DISTRIBUTION OF UTILIZATION RATES 1968

Region	Percent of capacity in utilization categories					
	100 percent	80-100 percent	67-79.9 percent	50-66.9 percent	25-49.9 percent	25 percent
Pacific Coast, total	4.1	23.7	7.8	18.0	40.5	5.9
Metropolitan	2.7	25.4	7.6	18.5	42.3	3.5
Other	13.5	12.5	9.2	14.6	28.6	21.6
Northern Plains	16.9	12.5	18.9	22.7	21.9	7.1
Metropolitan	22.3	10.6	17.8	21.4	20.5	7.3
Other	5.4	16.5	21.4	25.5	24.8	6.5
Southern Plains	11.1	21.6	17.8	17.4	26.6	5.4
Metropolitan	10.6	21.9	19.3	15.0	27.8	5.3
Other	12.3	20.7	13.8	24.1	23.5	5.7
Southeast	13.0	11.7	22.7	25.9	20.8	5.9
Metropolitan	14.0	9.0	24.7	29.5	17.0	5.6
Other	11.7	15.7	19.7	20.8	26.2	5.9
Central	28.5	27.7	18.0	13.2	11.0	1.6
Metropolitan	32.8	29.2	18.7	10.3	8.7	1.2
Other	15.6	22.2	15.4	23.9	19.7	3.2
Northeast	16.4	26.3	20.9	22.5	9.5	4.4
Metropolitan	14.3	27.8	22.7	22.7	8.3	4.3
Other	29.4	17.4	9.8	21.3	16.6	5.5
United States	12.7	23.0	17.0	18.9	20.7	4.4

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In the period 1962-1968, the average daily loading of public waste treatment plants increased some 4.1 billion gallons. Total available

waste treatment capacity increased 6.9 billion gallons. (cf. Table 24. The table is based on the roughly 50% of all waste treatment plants for which both design capacity and average daily loading were reported in the respective *Municipal Waste Inventories*. The sample was scaled to an approximate total on the basis that the distribution of capacity to loading for all plants was similar to that for reported plants in the metropolitan and non-metropolitan categories within each region.)

Thus for every two gallons of added sewage, more than three gallons of added capacity was installed. The relationship can, perhaps, best be viewed by a simple comparison of annual rates of expansion. Between 1962 and 1968:

- Population provided with sewer services increased 2.7% a year;
- Waste treatment plant hydraulic loadings increased 3.2% a year;
- Waste treatment plant capacity increased 4.0% a year; Idle waste treatment plant capacity increased 6.1% a year.

That set of numbers does not adequately reflect a significant feature of the idle capacity phenomenon. To fully appreciate the force of the trend that is apparently in effect, one must take into consideration the fact that 76% of all of the plants in operation in 1968 were also in operation in 1962, and that much of the growth of loadings occurred in such plants. Incremental idle capacity, as reported, is offset to some extent by the takeup of idle capacity in plants already in place. In logic, the total amount of excess capacity should begin to decline as a result of progressive utilization at some indeterminate point when the total stock of available capacity exceeds 50% of the required stock. Whatever that point may be, we have not reached it. Unused capacity as a percentage of total capacity and of utilized capacity continues to grow.

There are distinct and obvious penalties inherent in this situation. The cost of the construction project is increased materially—though not proportionately—by overbuilding, as are the costs of operating and financing the project. Assuming the substitutability of uninvested capital in one place for another, and a generally fixed level of funding, overbuilding at one set of points at the same time that untreated waste discharges and overloaded waste treatment plants occur at other points contributes to the persistence of pollutional conditions. Up to 80% of the cost of construction is now borne by Federal and State governments. The amount of such assistance that is used to

TABLE 24.—SHIFTS IN UTILIZATION OF WASTE TREATMENT CAPACITY 1962-68
 Million gallons per day

Region	Net overloading			Utilized capacity			Idle capacity		
	1962	1968	Shift	1962	1968	Shift	1962	1968	Shift
1. Metropolitan Areas:									
Pacific Coast	61.4	20.0	-41.4	2148.3	2409.6	+261.3	881.0	1628.9	+747.9
Northern Plains	85.8	61.6	-24.2	999.4	1479.7	+480.3	213.7	771.8	+498.1
Southern Plains	77.5	59.7	-17.8	860.4	1211.0	+350.6	399.2	662.8	+323.6
Southeast	75.1	107.8	+32.7	921.1	1350.2	+429.1	410.5	683.9	+273.4
Central	1034.1	1821.4	+787.3	4243.0	6021.6	+1778.6	1102.8	961.4	-141.4
Northeast	624.7	124.2	-500.5	4243.7	4041.5	-202.2	1017.9	1526.6	+508.7
Metropolitan Totals	1958.6	2194.7	+236.1	13,415.9	16,513.6	+3097.7	3965.1	6175.4	2210.3
Percent shift			+12.1%			+23.1%			+55.7%
2. Nonmetropolitan:									
Pacific Coast	51.4	36.5	-14.9	438.2	481.7	+43.5	237.6	377.8	+140.2
Northern Plains	82.0	48.5	-33.5	572.3	580.5	+8.2	243.8	351.5	+107.7
Southern Plains	33.7	43.4	+9.7	452.2	561.7	+136.5	228.0	293.2	+65
Southeast	46.5	52.3	+5.8	679.2	1015.2	+336.0	350.4	562.0	+211.6
Central	52.8	55.6	+2.8	696.3	906.9	+210.6	389.1	402.2	+4.1
Northeast	66.4	134.4	+68.0	492.7	771.1	+278.4	157.3	258.1	+100.8
Nonmetropolitan totals	332.8	307.7	+37.9	3303.9	4317.1	+1013.2	1615.2	2244.8	+629.6
Percent shift			+11.4%			+30.7%			+39.0%
United States totals	2291.4	2565.4	+274.0	16,719.8	20,803.7	+4110.9	5580.3	8420.2	+2839.9
Percent shift			+12.0%			+24.6%			+50.9%

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capitalize idle capacity when it might be allotted for productive purposes can under conditions of resource scarcity only be considered to contribute to the persistence of pollution, since, unlike local funds, it is potentially available for a number of other projects. The effect of that misallocation is most evident when one considers the fact that both overloading and idle capacity increased between 1962 and 1968; and that if only 10% of the surplus capacity installed during the period had gone instead to points of more immediate need, reported overloading of waste treatment plants could have been eliminated. (cf. Table 24.) Finally, capacity in place limits the flexibility of a community in adjusting to changing conditions including improvements in technology and requires regular capital expenditures to sustain operating efficiency. Such overhead penalties are an inescapable result of any capital investment. The effect of surplus capacity is to add unnecessarily to the overhead burden and to tie the owners to a less manageable fixed cost base.

The tendency to overbuild is a general one; though it seems to be most strongly in force in the Pacific Coast States, where almost 24% of total idle capacity was located in 1968. With the exception of the Southern Plains region, the relative prevalence of idle capacity is greatest in non-metropolitan areas. Though the 1962-68 trend was for greater relative growth of surplus capacity in metropolitan than in non-metropolitan areas, the 1962 surplus in non-metropolitan areas was great enough that the proportion of capacity utilized at less than half design rating in 1968 remained greater in non-metropolitan communities in most of the Nation. Thus the excess, ostensibly installed largely to provide for future growth of service, tended to be located where growth is less pronounced. (cf. Table 25.)

DOLLAR COSTS OF IDLE CAPACITY AND SEWER PROMOTION

It is probably safe to assume that the major costs of misallocating funds to purposes that have a low marginal utility—specifically, adding to the stock of idle waste treatment capital and sewerage portions of communities that do not require sewerage—are borne by the environment. Continued pollution of water is the prime price that the economy pays for directing investments into projects that offer a low return relative to other, more directly profitable, purposes.

But if environmental costs are of great, if unmeasurable, magnitude, dollar costs are by no means inconsequential. And they can be estimated. Another section of this report will examine the impact of

TABLE 25.—UTILIZATION OF METROPOLITAN AND NON-METROPOLITAN WASTE TREATMENT CAPACITY 1968

1. Metropolitan Areas						
Utilization rate	No. of plants	Million gallons/day		Percent of total		Mean utilization rates (percent)
		Capacity	Utilization	Plants	Capacity	
Overloaded	502	2200.2	3701.4	17.8	16.2	168.2
80-100 percent	593	3300.9	2953.5	21.1	24.3	89.5
67-79.9 percent	384	2384.4	1717.9	13.6	17.6	72.1
50-66.9 percent	526	2457.4	1412.7	18.7	18.1	57.5
25-49.9 percent	550	2730.2	1099.1	19.5	20.1	40.3
25 percent	262	498.3	59.8	9.3	3.7	12.0
Total	2817 ¹	13,571.4	10,944.4			80.6
Total—excluding overloaded plants	2315	11,371.2	7,243.0	82.2	83.8	63.7
2. Nonmetropolitan Areas						
Overloaded	710	599.0	781.4	15.1	15.0	139.8
80-100 percent	904	671.7	600.4	19.2	18.0	89.4
67-79.9 percent	761	563.8	409.3	16.2	15.1	72.6
50-66.9 percent	1030	813.4	471.4	21.9	21.8	58.0
25-49.9 percent	1012	857.2	388.9	21.5	22.9	45.4
25 percent	287	271.3	40.9	6.1	7.3	15.1
Total ²	4704	3736.4	2692.2			72.1
Total—excluding overloaded plants	3994	3177.4	1910.8	84.9	85.0	60.1

¹ of 4294 total plants² of 8069 total plants

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excess capacity on local operating cost structures. At this point it is concerned with the amount of the diversion of capital to relatively unproductive excess capacity and sewerage expansion.

Dollar value penalties of idle capacity have been calculated for both 1962 and 1968 by means of an uncomplicated, mechanical evaluation process.

The *Municipal Waste Inventory* for each year was scanned, State by State, with a digital computer. Wherever both design capacity and actual daily loading were recorded, the cost of building a plant of the given design size and general description (activated sludge, primary, trickling filter, oxidation pond) was calculated by the computer on the basis of the size to unit cost relationships developed by Robert L. Michel in *Construction Costs of Municipal Wastewater Treatment Plants* (U.S.D.I., FWQA, Washington, D.C., September 17, 1969). Where actual daily loading was less than 80% of rated capacity, the cost of the same type of plant, sized at 125% of average daily loading (80% operating rate) was also calculated. The differences between the two sets of values were summed, and the regional sums were scaled to include all plants on the basis of the assumption that the distribution of capacity was similar for all plants and for reported plants. Values are presented in Table 26 as the "under utilization penalty".

Penalties are assessed in terms of national average prices, a moderate (25%) allowance for growth of demand, and they include full consideration of the economies of scale that exist in the cost to size relationships observed for waste treatment plant construction. In total, the dollar value penalty associated with plants operated at less than 80% of rated capacity in 1968 was \$670 million, or 18% of the total value of public waste treatment plants.

Perhaps more significant than the total amount of the penalty is its trend. As noted earlier in terms of hydraulic capacity, the amount of capital incorporated in idle facilities increased substantially between 1962 and 1968. (\$180 million in constant dollars, probably \$205 million in value of actual dollar cost of construction projects, \$260 million in 1970 replacement value.)

The calculated value of the incremental capital sunk into idle capacity between 1962 and 1968 does not, however, present the full amount of the penalty. Incremental idle capacity amounted to \$180 million worth of waste treatment works. But the principal purpose of overbuilding is to provide for future growth, and in the aggregate the nation replaced every unit of idle capacity taken up by the growth

TABLE 26.—CAPITAL PENALTIES OF UNDER-UTILIZATION

	Millions of 1957-59 dollars								
	1962			1968			Incremental investment		
	Capital in place	Under- utilization penalty	Percent	Capital in place	Under- utilization penalty	Percent	Capital in place	Under- utilization penalty	Percent
Pacific Coast	364.8	81.5	23.3	474.3	109.9	23.3	109.5	28.5	26.0
Northern Plains	297.5	43.2	14.5	346.0	80.1	23.2	48.5	36.9	76.0
Southern Plains	503.2	86.4	17.2	594.0	104.9	17.7	90.8	18.5	20.4
Southeast	507.7	96.9	19.1	710.0	145.5	20.5	202.3	48.6	24.0
Central	689.3	108.2	15.7	869.9	114.5	13.2	180.6	6.2	3.6
Northeast	566.8	74.3	13.1	725.8	115.5	15.9	159.0	41.2	25.9
United States	2938.3	490.5	16.7	3719.9	670.4	18.0	781.6	179.8 ¹	23.0

¹ actual cost, 1962-68, based on average prices and construction rates in period, \$205 million.

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process and added to it. Thus the total 1962-68 investment for unused capacity is distributed throughout the \$670 million worth of idle capacity, and is not restricted to the \$180 million increment. Put another way, in terms of the total economy, surplus capacity available in 1962 proved, on balance, to be totally useless to the nation over the next six years.

Given available information with respect to investment between 1962 and 1968, changes in the physical stock of capital, changes in the number of users of waste treatment facilities, and changes in the hydraulic loading of waste treatment plants, it is possible to assign the approximate distribution of the nation's capital investment between 1962 and 1968 to several broad categories of activity. The distribution, for the nation and for regional groupings of States, is presented in Table 27.

Total investment, in constant dollars, amounted to just over \$2 billion for waste treatment plant construction, expansion, upgrading, replacement and major modifications. (A significantly larger sum was invested in interceptor sewers, outfalls, pumping stations, and collection sewers. Such investments are not taken into account in this analysis. While investments for those purposes have a major impact on waste treatment needs and on the quality of water, they do not serve a direct pollution abatement purpose.)

Recapitalization of existing facilities absorbed the lion's share of investment during the period. (cf. discussion pp. 13-25.) The fact is unexceptionable, given the high prevalence of waste treatment in 1962. The significance of the high capital overhead imposed by the size of the capital base is that less than 40% of capital made available for waste treatment plant construction during the period could be utilized to increase the aggregate level of control of wastes. Given the level of investment and of depreciation, a low marginal return was the best that the nation could anticipate, making the relative impact of any misallocation far more severe.

The attempt to quantify the marginal utility of the investment in terms of the various uses to which capital was applied involves analysis of reported growth in hydraulic loading of waste treatment plants and of population served by waste treatment plants. The total replacement value of waste treatment plants was calculated to have increased some \$780 million, of which \$180 million represented a net addition to idle capacity. To the utilized \$600 million worth of facilities we can assign a series of functions, based on shifts in population connections and hydraulic loadings. (The assignments are less precise

TABLE 27.—DISTRIBUTION OF WASTE TREATMENT INVESTMENTS 1962-68

Purpose	Percent of total	Millions of 1957-59 dollars, by region						
		Pacific Coast	Northern Plains	Southern Plains	Southeast	Central	Northeast	United States
Total Investment	100.0	185.2	210.1	177.3	383.3	502.4	589.4	2056.5
Recapitalization	62.0	75.7	161.6	86.4	181.0	330.8	439.4	1274.9
Treat untreated wastes(1)	4.4	12.9	4.6	3.4	36.9	10.9	22.8	91.5
'Normal' growth of sewerage(2)	8.5	53.3	0.7	14.9	30.6	31.3	43.6	171.4
'Promoted' growth of sewerage(3)	9.7	64.9	2.1	45.0	32.8	8.4	45.7	198.9
Incremental industrial wastes(4)	6.0	-62.8	1.3	9.6	60.1	214.8	-98.7	124.3
Relief of overloading(5)	0.6	12.8	3.0	-0.6	-6.7	-100.1	104.4	12.8
Additions to excess capacity	8.7	28.5	36.9	18.5	48.6	6.2	41.2	179.8

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than that for idle capacity, since they depend on proportional techniques and do not scale factors into account.)

Reducing the number of sewerred persons discharging raw wastes accounted for 4.4% of total investment between 1962 and 1968, and 11.7% of the capital available after recapitalization demand had been satisfied. Sixty-five percent of this kind of investment occurred in the Southeast and the Northeast, where the bulk of the nation's population without treatment was concentrated through the period.

Providing treatment to meet demands presented by growth of sewer services accounted for 18.2% of total investment, 47% of investment available to extend treatment services. On the basis of the assumption that normal growth of sewer services should be proportional to growth of population,* more than half of this investment component was applied in the area of promoted or unnecessary sewer-ing. Of the total amount of capital available for marginal extension of waste treatment, 25.4% was diverted to the purpose.

Increased treatment of industrial wastes exercised a claim on 6% of total capital investment, 20.7% of the net investment available after the recapitalization. The value attributable to incremental industrial demand for waste treatment services would have been much greater, except that there was a negative shift in demand in two regions, the Pacific Coast and the Northeast.

That shift should not be construed to conflict with the tendency of factories to utilize public systems, in view of the method. Industrial waste loadings were deduced from per-capita discharge attributed to the sewerred population, with loadings in excess of 100 gallons per capita per day assigned to industrial sources. Two quite logical explanations of the apparent decline in industrial usage come readily to mind. The nature of industrial specialization was changing in each region, moving away—in a relative sense—from heavy industry and first stage processing toward higher processing stages, fabrication, and low waste industries. The impact of that development is

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borne out by the fact that decline in reported per-capita discharge was limited to metropolitan areas in either region; non-metropolitan wastes per-capita continued to increase, suggesting the effects of connection of decentralized agricultural processing and pulp and paper production. Further, both areas have a fairly long history of public treatment of industrial wastes, at least as compared to the Southern Plains and the Central States. One of the characteristic

* The assumption accounts in part for concentration factors by recognizing the differential growth rates of metropolitan and non-metropolitan communities. That accounting was reinforced in computation by the constraint that in no case could growth be negative—after all, one cannot move sewers from place to place.

features of municipal finance during the nineteen-sixties was establishment of user charges for public utility and other services, including sewer services. Industrial waste discharges are known to be highly variable and controllable; and the use of sewer service fees provides an incentive to industrial management to limit the volume of its discharges. So that, where industrial use of public systems had become established prior to initiation of fee systems or to the increase in fees required in many cases to finance system improvement or expansion, a reduction in gross volume of industrial discharge might be expected, even where the number of industrial connections was increasing.

Reduction of the incidence of overloaded waste treatment plants had almost no net impact on aggregate capitalization, due to a sharp increase in overloading in the Central States. Overloading declined markedly in the Northeast, and in a relative sense on the Pacific Coast, where little was reported in 1962; and it remained fairly constant in other areas. Individual expansion projects unquestionably reduced overloadings of many waste treatment plants during the period, but we deal here with net effects. And those expansion projects were apparently offset in the aggregate by the other factors evaluated—population growth, sewer promotion, industrial wastes. On a national basis, meaningful reduction of overloading occurred only with reduction of industrial waste discharges in two regions. There is a suggestion in the fact that the factors that govern the increase of waste loadings are to some meaningful extent unpredictable. If uncertainty does, in fact, play such a large part in distribution of growth processes, should not the strategy of installing significant

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amounts of excess capacity to support growth be subject to greater question?*

* A note on method: the relationships discussed above were determined by use of the following formulae. Each formula is keyed to a numerical notation on Table 26.

$$(1) \frac{(R_2 - R_3) 100}{C} \cdot I$$

where I = Constant dollar investment excluding value attributed to recapitalization and idle capacity

R_2 = Sewered population without treatment in 1962

R_3 = Sewered population without treatment in 1968

100 = Gallons per capita per day, the norm for domestic wastes

C = Increase in gallons per day of sewage throughput between 1962 and 1968

$$(2) \frac{[(P_2 G) - P_2] 100}{C} \cdot I$$

where P_2 = Sewered population in 1962

G = Appropriate growth factor, based on U.S. Bureau of Census population estimates, for metropolitan and non-metropolitan components of each regional grouping, subject to the constraint that $P_2 \cdot G$ may not be negative

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$$(3) \frac{100 P_8 - [P_2 \cdot G - P_2] 100}{C} \cdot I$$

where P_8 = Sewered population in 1968

$$(4) \frac{C - 100 (P_8 - P_2)}{C} \cdot I$$

$$(5) \frac{O_2 - O_8}{C} \cdot I$$

where O_8 = Net hydraulic overloading in 1968

O_2 = Net hydraulic overloading in 1962

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OPERATION AND MAINTENANCE COSTS

BACKGROUND

Operation and maintenance costs of waste treatment plans consist of expenditures for operators and technicians, power, chemicals and miscellaneous supplies. A previous volume in this series documented the magnitude of operations and maintenance costs. *The Cost of Clean Water and Its Economic Impact*, Volume I, FWQA, U.S. Department of the Interior, 1969. Furthermore, it was reported then that there has been a failure to appreciate the magnitude of this cost and rather to concentrate on plant investment. Further statistical analyses summarized here, indicate that annual operation and maintenance expenditures have been somewhat underestimated in previous reports. The revised estimates are that in 1962 operating and maintenance costs totaled \$185.7 million (1962 = 100) and that in 1968 the total was \$230.0 million (in 1962 dollars), a 23.8 percent increase. The objective of this chapter is: to reevaluate the method of measuring these costs; to recalculate the total amount of annual O&M costs; and to evaluate the relationship between the size of the treatment plant, the degree of utilization of the plant, and the resulting costs of operating and maintenance.

Annual operation and maintenance (O&M) expenditures should be

considered as a short run cost rather than a long run cost. Traditional methods of estimating O&M costs have assumed that these costs were of a long run nature. The approach used in this chapter assumes that O&M costs are short run, the basic difference being that the plant size is fixed in the short run while in the long run it is allowed to vary. This method of estimating O&M costs provides an O&M cost curve for each plant size category. Thus the O&M cost for treatment plants of different sizes within the U.S. can be estimated. Also, this approach provides a framework for evaluating the excess cost incurred for constructing a plant that has a larger capacity (size) than is needed at a given time.

The 1969 Cost of Clean Water report also discussed factors tending to lead to an increase in operating costs on a national aggregate basis not the least significant of these are the pressures for improved operational efficiency. This analysis does not address an optimum level of operation and maintenance expenditures; the total will well exceed current levels. However, in the face of a significant total increase in this area, the inefficient use of operation and maintenance expenditures becomes more critical. The section therefore concerns itself with more efficient allocation of such funds within the context of a growing expenditure.

DETERMINANTS OF OPERATING AND MAINTENANCE COSTS

A number of factors influence the level of operating and maintenance costs of a sewage treatment plant. First, as the degree of

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treatment becomes higher for a given concentration of wastes in the influent, operating and maintenance costs will increase.

Second, the operating and maintenance costs vary with the type of treatment and the waste characteristics to which applied. Technological characteristics differ among treatment types which, in turn, will lead to corresponding differences in costs for different rates of flow, quality of effluent, and geographical characteristics. For example, for 85 percent BOD removal at an average flow rate of 15 million gallons per day (MGD) with a highly concentrated influent, an activated sludge process may prove to be less expensive to operate than a standard rate trickling filter, but at a considerably lower flow rate with a less concentrated influent, the standard rate filter would probably prove to cost less to operate and maintain than an activated sludge process. Within a given category of treatment, no simple ordering of process types by operating and maintenance costs is possible, but given the full characteristics of the waste treatment needs of a community, one type of treatment will generally yield the min-

imum attainable level of operating costs consistent with a desired effluent quality. Population density and the mix of industrial activities are two rather obvious features that partially determine both the hydraulic loading and waste concentration demands on a treatment plant and, thus, partially determine the level of operating and maintenance costs of the plant.

Third, the location and geographical characteristics of a community will, in part, determine the level of operating and maintenance costs that the community will experience subsequent to the installation of a waste treatment plant. Among the locational factors influencing operating costs are the prices of power and personnel and the general level of prices facing the community. Climatic conditions affecting operating costs include thermal patterns and the frequency, duration, amount and intensity of precipitation. Topographic characteristics can sometimes affect treatment plant costs, particularly pumping and transmission costs. Ascertaining the specific impact of these locational and geographical factors on the costs of operating and maintaining a treatment plant is beyond the scope of this study, but it is necessary to recognize that they are part of the complex of determinants affecting the levels of operating and maintenance costs.

Finally, an additional determinant of a treatment plant's operating and maintenance costs which has not generally received attention is the interaction between the design capacity of the plant and the actual rate of capacity utilization of the plant. The design capacity of a plant can be identified as the rate of flow that the plant can treat, at a desired degree of waste removal. It is also the rate which is expected to yield the lowest unit costs of operation and maintenance. For an operating plant of given design capacity, with the exception of some stabilization ponds, certain costs are necessarily incurred. A minimum amount of personnel is required for operation, maintenance and surveillance. To not maintain minimum numbers of personnel is to risk plant breakdown and to sacrifice quality of

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effluent. In order that chemical treatments have their intended effects on influent, certain minimal chemical feed rates depend not only on the actual flow into the plant but also on the volume and surface area of the tanks in the plant. Even at the lowest rates of capacity utilization, a minimum level of power consumption is necessary for the treatment plant to be operative. All of these minimum technological requirements imply that a treatment plan will incur a necessary minimum level of operating and maintenance costs, and these costs are a direct function of the design capacity of the plant. Such costs are referred to as overhead costs.

Overhead costs increase as the design capacity of a treatment plant increases, other things being equal. A bigger plant simply requires larger minimum amounts of personnel, chemicals, and power. Up to a point in the neighborhood of design capacity, then, for a treatment plant of a given type and design capacity, unit operating and maintenance costs should decline with increased plant utilization. As utilization increases from lower rates toward 100% of design capacity, the overhead costs are spread over a greater average daily flow and input units become more effective. Conversely, unit operating and maintenance costs should rise as the rate of capacity utilization declines below design capacity. This cost behavior is illustrated in Figures 6 and 7 by the statistically estimated cost functions for primary treatment and trickling filter treatment plants of 2.5 and 10 MGD design capacity.

In the range of zero to fifty percent of capacity, unit costs decline rapidly and begin to level off thereafter and the unit cost curve for the larger plant lies above that of the smaller plant, in the ranges depicted, reflecting cost differences between design capacities.

Thus, it is clear that in addition to the degree of wastewater treatment, treatment plant technology, and the hydraulic and geographical characteristics of a community, the design capacity of a community's treatment plant, together with the actual rate at which the capacity is utilized, will have a significant bearing on the level of operating and maintenance costs that a community will experience. This last factor is important not only for the purposes of understanding the underlying determinants of operating and maintenance costs, but also provides, in part, a basis for assessing and evaluating the economic consequences of over-capacity in sewage treatment plants in the United States.

THE CONCEPT OF A PENALTY COST

From an earlier discussion in this volume, it is apparent that underutilization of capacity is the rule in the operation of sewage treatment plants in the United States. Taking eighty percent utilization of plant as benchmark for effective capacity utilization, it can be seen from Table 25 that in 1968 (the most recent year for which data are available) 61.1 percent of the plants in metropolitan areas and 65.7

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UNIT COST CURVES FOR PRIMARY PLANTS —
2.5 AND 10.0 DESIGN CAPACITY

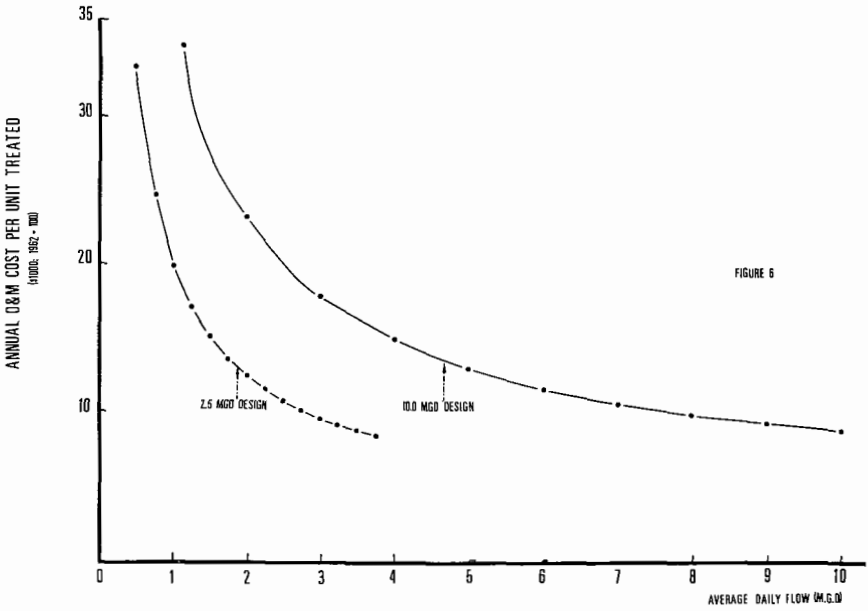
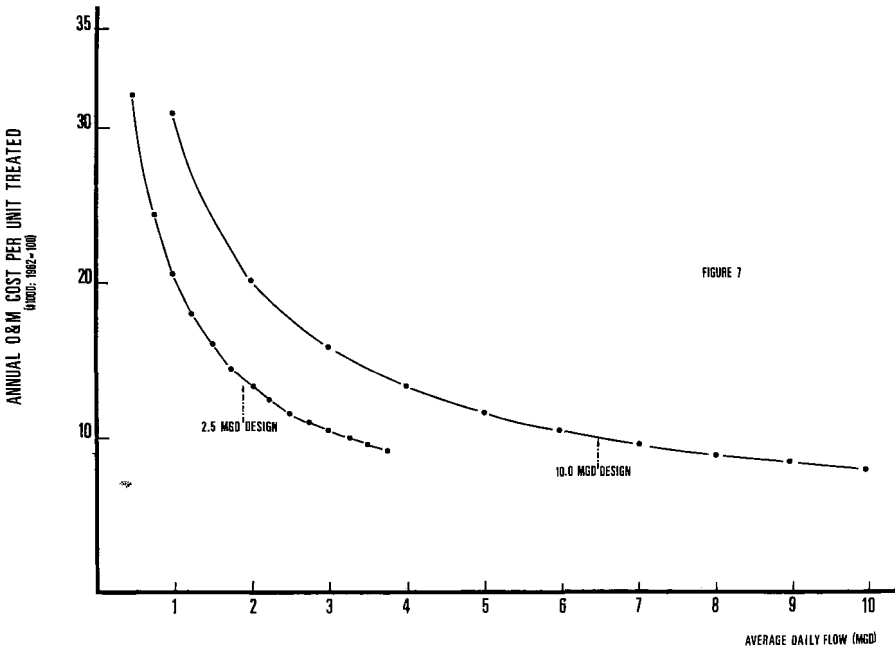


FIGURE 6

UNIT COST CURVES FOR TRICKLING FILTER PLANTS—
2.5 AND 10.0 DESIGN CAPACITY



percent of the plants in non-metropolitan areas are operating at less than the eighty percent rate—82.2 percent of the metropolitan plants and 84.6 percent of the non-metropolitan plants operated below stated design capacities. It is of interest for this cost effectiveness study to attempt to assess the economic consequences of the prevalence of underutilization of treatment plant capacity, and to inquire as to the possible reasons for the prevalence of underutilization.

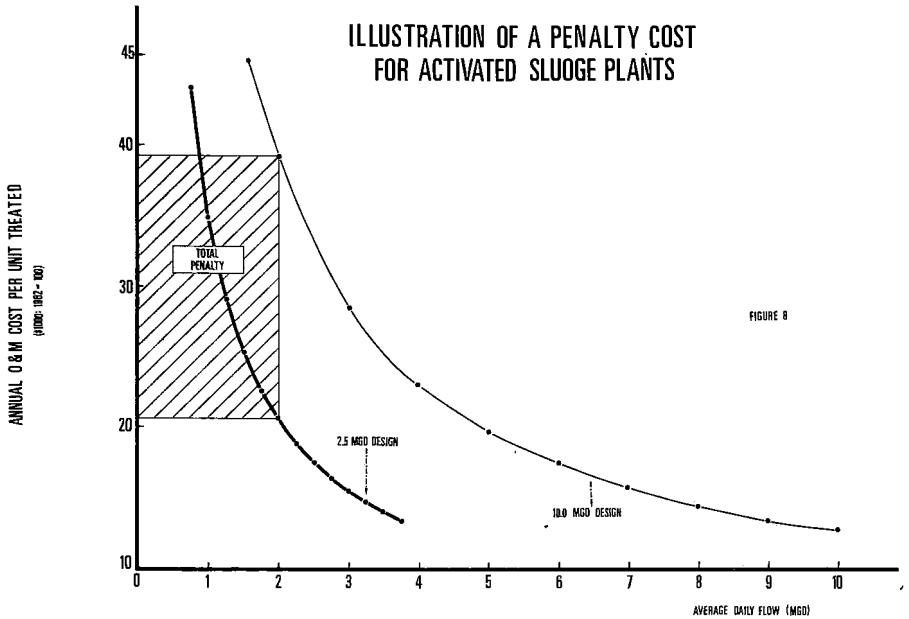
A community incurs a pecuniary penalty in at least two ways by operating its treatment plant at rates below full utilization or, equivalently, by possessing a treatment plant with a design capacity in considerable excess of its current needs. First, by operating a plant at less than full utilization a community is incurring a penalty in that lower costs could be achieved for the same average daily flow and treatment effectiveness by operating a plant of smaller scale. That is, had a community with excess treatment plant capacity built a plant of a design capacity in line with their actual needs, then the community would be experiencing lower operating and maintenance costs than it is currently experiencing. This is because of the effects of the interaction between design capacity and actual flow discussed in the previous section. Though it is generally true that lower unit operating and maintenance costs obtain with a larger plant rather than a smaller plant when operated in the neighborhood of design capacity, it is not usually the case that for a given rate of flow a large plant operating considerably below design capacity will have lower unit operating and maintenance costs than a smaller plant operating close to design capacity.

An example of the operating and maintenance penalty cause by underutilization of treatment plant capacity is illustrated in Figure 7 by statistically estimated cost curves for the activated sludge process. In this example both the 2.5 and 10.0 MGD design capacity plants are processing an average daily flow of 2.0 MGD. The larger plant requires unit operating and maintenance expense of \$39,400 (1962 = 100) but the smaller plant's annual unit operating and maintenance expense is \$20,600 (1962 = 100). The difference between these two figures multiplied by the average daily flow is the total penalty cost, which amounts to \$37,600 (1962 = 100) for the year and is illustrated by the shaded area in Figure 8. Though the data do not allow a precise definition of cost curves through the entire range of utilization, there are unquestionably financial penalties for overloading, as indicated by the calculated extension of the curves presented in Figure 9.

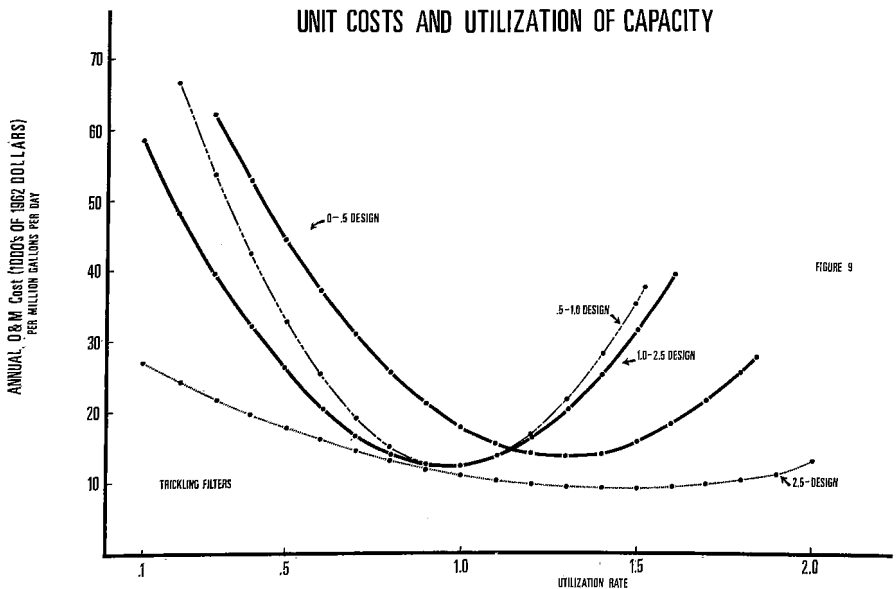
The second type of penalty associated with overbuilding is the interest which must be paid on the difference in capital costs between a community's relatively oversized treatment facility and a treatment plant with a design capacity closer to the community's actual needs.

This type of penalty cost can be computed in a manner similar to the computation of the operating and maintenance cost penalty: estimates of the construction costs of the two sizes of plants are made and an

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appropriate rate of interest is applied to the differences in costs; in order to determine the community's interest burden, a factor measuring the community's share of the financing is applied.

Adding the operating and maintenance cost penalty and the interest charge penalty provides an estimate of a community's annual out-of-pocket expenses attributable to building a treatment plant with a capacity in excess of the community's needs. Although the underutilization penalty incurred by one community may not appear large when viewed for a single year, the aggregate value of all such penalties may be of a considerable magnitude; and the cumulative value of the community's penalties over time may prove to be of some significance. Thus, the next step in this study of cost effectiveness will be to utilize existing data to make estimates for the United States of the monetary penalty associated with the existence of excess capacity in sewage treatment plants.

PENALTY COSTS FOR OVERCAPACITY

Absolute precision in estimating the costs of treatment plant overcapacity is unattainable for at least three reasons: First, actual operating and maintenance cost data are collected for only a relatively small number of plants; second, to derive the operating and maintenance costs that a community would obtain if it had a treatment plant with a design capacity in line with its actual needs would require detailed knowledge of the design characteristics of this hypothetical plant—this point also applies to the computation of the interest charge penalty and third, no universally acceptable definition of full capacity utilization is available. In spite of these obstacles to precision, estimates of the costs of overcapacity can be obtained through the use of statistical procedures.

Through the use of data on operating and maintenance cost, average daily flow, and stated design capacity for a representative sample of treatment plants, operating and maintenance cost functions for various plant technologies have been statistically estimated. These cost relationships explicitly include the interaction between average daily flow and design capacity as determinants of unit operating and maintenance costs. These relationships provide estimates of the unit operating and maintenance costs for a plant with stated average daily flow, design capacity, and plant technology which are statistically "best". Examples of the cost functions are illustrated in Figures 6 and 7 in the previous section.

In addition to providing an estimate of a plant's operating and maintenance costs, given its reported average daily flow and design capacity, the cost functions allow an estimate to be made of the operating and maintenance costs that an underutilized plant could

achieve at its reported average daily flow, but with a plant of design [p. 95]

capacity more in line with its actual needs. The difference between the former and latter quantities is an estimate of the operating and maintenance cost penalty incurred by the underutilized plant in question. Estimates of the operating and maintenance cost penalties for the entire United States for the years 1962 and 1968 have been derived for treatment plants having needed data reported in the 1962 and 1968 municipal waste inventories. These figures were adjusted by an appropriate scaling factor to account for plants not having necessary data reported in the inventory.

By a procedure analogous to the one described above, interest charge penalties caused by overbuilding of treatment plants have been estimated. Statistical investigations of capital cost functions for treatment plants which have been made make it possible to estimate the cost of building a given plant with a given average daily flow and the cost of building a plant designed to operate at a rate closer to full utilization. The difference between the former and latter magnitudes is an estimate of the total construction cost penalty caused by overbuilding. Multiplication of this aggregate figure by an average rate of interest will indicate roughly the total interest burden caused by overbuilding.

In Table 28 estimated operating and maintenance cost penalties, by

TABLE 28.—ESTIMATED OPERATING AND MAINTENANCE COST PENALTIES FOR PLANTS OPERATING AT LESS THAN FULL CAPACITY (Dollars Millions, 1962 = 100)

	1962		1968		Annual rate of rate of increase (percent)
	Millions penalty (dollars)	Percent of total O&M	Millions penalty (dollars)	Percent of total O&M	
Pacific Coast	3.04	14.4	3.69	17.5	3.3
Northern Plains .....	.99	12.6	1.99	13.1	12.3
Southern Plains	1.70	16.1	2.14	16.3	3.9
Southeast	2.58	17.1	3.78	15.4	6.6
Central	3.12	14.0	3.43	13.0	1.6
Northeast	2.35	11.3	4.31	15.3	10.7
United States	13.76	14.1	19.33	15.0	5.8

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regions and for the nation, are reported. Eighty percent has been taken as the benchmark of full utilization; that is, the operating and maintenance cost penalties have been calculated only to the degree that treatment plants were operating at less than eighty percent of their design capacity. The estimate for the entire United States is not large in magnitude for either 1962 or 1968: for 1962 the amount

of annual operating and maintenance costs that could have been saved by building plants that could serve communities' needs at a rate of utilization of eighty percent is just under \$14 million (1962 = 100) and the analogous figure for 1968 is just over \$19 million (1962 = 100). On a per capita basis, the estimated operating and maintenance cost penalty for 1968 amounts to roughly 22 cents per person served per year.

Though the magnitudes of the operating and maintenance cost penalties are slight, both in absolute and per capita terms, it should be noted that these penalties amounted to 14.1 and 15.0 percent of the operating and maintenance costs of underutilized plants in 1962 and 1968, respectively. That is, underutilized plants, on average, could have reduced operating and maintenance costs by 15 percent in 1968 by having built plants in line with their actual treatment needs. The possible cost savings by utilization categories are reported in Table 29. The incidence and relative magnitude of operating and maintenance cost penalties are notable. As can be seen in this table, the relative penalty increases as capacity utilization decreases, increasing from 4.4 percent for a range of utilization between 60 and 80 percent

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TABLE 29.—INCIDENCE OF OPERATING AND MAINTENANCE COSTS PENALTIES
BY UTILIZATION CLASSES, 1968
[Utilization defined as average daily flow/design capacity]

Utilization range	0 — .2	.2 — .4	.4 — .6	.6 — .8
Penalty as a percentage of O&M costs	59.8	32.8	14.6	4.4
Share of total penalty	21.6	31.5	33.8	13.4
Percentage of all plants	5.6	15.1	24.3	24.0
Percentage of underutilized plants	8.2	22.1	35.7	33.9

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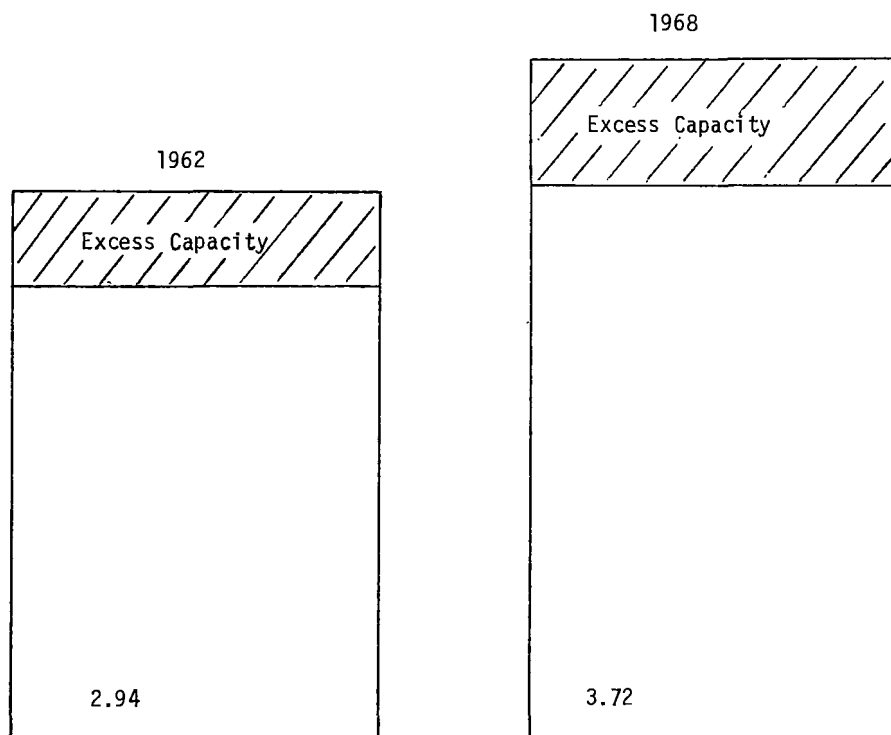
up to 59.8 percent for the range zero to 20 percent. At around 60 percent capacity utilization, the cost penalty begins to become marginal, being equal to about ten percent of total operating and maintenance costs. With regard to the incidence of cost penalties, plants working at less than 40 percent of capacity account for 53.1 percent of the total penalty costs but only account for 20.7 percent of all plants. Thus, though the total monetary burden stemming from operating and maintenance cost penalties is not massive, it is generally not in a community's interest to build treatment plant capacity far in excess of its needs.

The other source of additional costs to a community that arises from the existence of excess capacity is the additional interest that must be paid for the construction of excess capacity. In Figure 10 it can be seen that the estimated replacement value (rather than original

cost) of treatment plant capacity, exclusive of land, interceptors, and outfalls, was \$2.94 billion and \$3.72 billion (1957-59 = 100) in 1962 and 1968, respectively. Of these totals, \$490 million and \$670 million went into excess capacity, using 80% as the full utilization benchmark. These latter amounts are represented by the shaded areas in Figure 10.

FIGURE 10

Replacement value of treatment plant capacity in 1962 and 1968
in \$ billions (1957-59=100)



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In order to estimate precisely the interest burden for communities with excess capacity, interest rates paid by communities and the communities' share of construction costs are necessary. For purposes of this analysis such precision did not seem warranted in view of the

difficulty in assembling these data. Consequently, the total interest penalties have been calculated for a range of reasonable values for 1968, and are presented in Table 30. As can be seen in this table, the

TABLE 30.—INTEREST PENALTIES IN MILLIONS OF DOLLARS (1962 = 100) FOR 1968

	Interest rates (percentage)		
	.03	.04	.05
Community share:			
.5	10.8	14.3	17.9
.6	12.9	17.2	21.5
.7	15.1	20.1	25.11

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values range from \$10.8 million to \$25.1 million. On a per capita basis these estimates work out roughly to a range of \$.12 to \$.29 per person served per year. Thus, as in the case of operating and maintenance costs, the total and per capita interest costs incurred by overbuilding are of a rather small magnitude.

In spite of the small size of the estimated penalties it is worthwhile comparing them for 1962 and 1968 to discern any trends. First, it should be noted that excess capacity has been increasing between 1962 and 1968: 23% of non-replacement investment has gone into excess capacity (see Table 26) and the construction excess depicted in Figure 10 has increased from 16.7% to 18.0%. Second, operating and maintenance cost penalties relative to total operating and maintenance costs increased from 14% to 15% between 1962 and 1968. It appears, then, that there has been no tendency for the practice of overbuilding and its consequent costs to decrease. It is expected that total expenditures from all sources for treatment plant construction will continue to increase substantially over the next several years. Because excess capacity in public investments is indicative of a misallocation of resources, an examination of the possible causes for overbuilding in treatment plant construction should prove helpful in planning for the future growth of waste treatment facilities.

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PLANNING DECISIONS AND INSTITUTIONAL BEHAVIOR

BACKGROUND

Under a system of pure competition, economists postulate, the firm (or other economic unit) acts according to a set of desirable conditions. In the absence of non-market constraints, the firm will continue to produce up to the point where the cost of producing an additional unit of output—marginal cost—is equal to the average cost which, in turn, equals the price of the product. This pricing and sizing rule, pro-

vides a minimal or least cost solution for the firm working under these conditions.

In the public sector—including the construction of waste treatment facilities—the allocation process is not guided by a market mechanism and relationships at the margin do not constrain decisions. Rather, institutional arrangements of a non-market nature determine the amount of goods and/or services to be produced and the price to be charged. The size of pollution abatement facilities is dependent upon myriad factors—population projections, waste projections, engineers' design rules, regulatory impositions, local aspirations and financial resources (including State and Federal grants). The pricing mechanism depends on an equally complex mixture of factors, ranging from the amount of wastes produced to assessed value of property.

The absence of an internally operating allocation scheme places the responsibility for maintaining optimal sizing and pricing rules within the controlling institutions. The institutional configuration should not ignore the principles of efficient and optimal resource allocation. Instead, it must first attempt to recognize how the institution affects the pattern of resource allocation, and when this pattern deviates from some predetermined optimum the allocation design should be altered.

The institutions that bear directly upon production decisions in the area of municipal waste handling include local government and the balance of local interest groups that determine its direction, local financial conditions as modified by Federal and State financial assistance, State regulatory boards, and the design-construction industry.

The explanation for the prevalence of waste handling diseconomies may be found in the fact that among these institutions, only one is so structured as to include economic efficiency among the values that go into the formulation of an optimum solution of a waste handling prob-

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lem; and often this is manifested as a disinclination to finance waste facilities at all in the absence of legalistic incentives. Local finances are constrained by basic scarcity in the direction of efficient use of resources. None of the other institutional forces has any incentive to maximize investment utility.

State regulatory agencies, in general, have taken the position that waste treatment is a good and desirable thing; and that, all other things being equal, the more effective the treatment, the better the situation. Federal regulatory philosophy has generally concurred in, and sometimes run ahead of, the State attitude. The optimum solution for regulators, then, is one which includes the widest application of the highest degree of waste treatment.

The local government and the constituencies that give it legitimacy, are often severely hampered in the decision process by lack of knowledge. Waste handling matters tend to assume complex technical configurations that are beyond the range of knowledge of the normal municipal agencies. Except in the case of the largest cities or consolidated metropolitan sanitary districts, local government's decision role tends to be limited to "sewer or don't sewer, treat or don't treat." Once a decision is made and most often it is a forced decision stemming from Federal or State action, it is the prisoner of the regulatory agencies of higher levels of government and of its own consultants. Moreover—as we shall see—even the definition of its own financial self interest is altered by the administration of State and Federal grants.

The major thrust of this study has been to identify the pattern of the resource allocation process existent in the construction of pollution abatement facilities—in particular the construction of waste treatment and transmission facilities. Chapter II of this report describes the recognizable increase in the amount of sewerage and treatment that occurred in the period 1945–1968. The incentive effect of Federal grants in achieving this dramatic upswing in construction activity is well documented. This section will analyze the allocation effect that controlling institutions have on investment in pollution abatement.

FEDERAL GRANTS

Chapters V and VI of this study demonstrated that the capacity expansion (sizing) of treatment facilities was not optimal, except in terms of the postulated objectives of regulatory agencies and the construction industry. Excess capacity has been detected in a large number of plants, while in many cases under-capacity exists. The opportunity costs or penalties of excess capacity on a national basis

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have also been calculated. The circumstance to be analyzed in this section is the effect that Federal grants have had on the magnitude of this opportunity cost. Although this section considers only the relationship of Federal grants to excess capacity penalties, from a resource allocation standpoint, those plants with under-capacity are just as relevant. Because these under-sized plants not only incur an economic penalty, namely, higher average costs, they also produce an environmental penalty caused by lower removal efficiencies. Adequate information is not available at the present to estimate such penalties. Therefore, the analysis and conclusions drawn from this analysis may be considered to be biased to the low side because of the exclusion.

Since the passage of Public Law 84-660 in 1956, Federal grants have been continually increasing. Federal grants, and where existent, matching State grants have been a major impetus to communities to increase waste treatment construction activity. While increased investment activity, on the surface, demonstrates progress in the construction of waste facilities, the excess capacity prevalent in investment dilutes the effectiveness of the dollars expended. Therefore, in order to identify the effective impact of grants, the relationship between grants and excess capacity must be isolated.

Before this relationship can be analyzed, the fiscal environment in which grants are allocated must be understood. If expenditure levels for local government services increase at a rate equivalent to the post-1945 experience—and there is good evidence they will increase—while local revenue patterns, which are already extended, do not change, then local governments will be faced with increasing deficits. This fiscal pressure facing local governments has been acknowledged by the President in his statements on "Fiscal Federalism." Grants from Federal and State governments have become the prime methods of filling these gaps.

Pollution abatement programs are one reason for increased local expenditures. Public Law 84-660 was designed to alleviate some of the fiscal pressures created by this demand. This program specifically designates that certain types of local government expenditures for pollution abatement—projects related to treatment plants, interceptors and outfalls—are eligible to receive grant monies. Discussions in other parts of this report have pointed out that expenditures for those projects constitute only a portion of the funds needed for total water pollution abatement programs. Aside from determining the nature of expenditure to be supported, the grant component of Public Law 84-660 as amended has a prescribed life span, being scheduled to terminate in 1971. It would appear that a community faced with an increased demand for abatement facilities that is constrained by local fiscal

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pressures would seek grant aid. If the existence of the grant program is uncertain over the long run, and the investment categories are specified, then construction of excess capacity in the eligible categories is likely.

Another statutory element of the grant program that is likely to cause excess capacity is the allocation formula. The allocation formula of the existing program is based on a combination of State per capita income and population. If the needs for funds within a given State are not related to these allocation criteria, then over or under funding for the State may occur. Those States with an excess of

allotted funds are likely to allocate the money on a less competitive basis than States near or below the level of funding where supply of funds equal demand.*

Excess capacity incentive effects of grants can be approximated by comparing investment trends, grant allocations and changes in excess capacity. The comparison will be made for the 1962-68 period. Earlier chapters estimated the opportunity cost due to excess capacity for both 1962 and 1968. While Federal construction grants have been made since 1957, the opportunity cost calculations for this earlier period are not available. The opportunity cost for plants operating at 80% or less of capacity in 1962 was 490 million dollars, while the opportunity cost for 1968 was calculated at 670 million dollars. One would expect the opportunity cost for 1962-68 to decrease in view of the high prevalence of treatment in 1962—as communities with excess capacity absorbed that capacity through a process of natural population and industrial growth. In fact, the amount of excess capacity became larger.

Aside from the penalties derived from excess capital costs, there is a related higher operation and maintenance cost for plants with excess capacity. Chapter VI developed and documented the concept that size, independent of the degree of utilization, does not necessarily produce economies of scale. Plants with excess capacity have higher unit operation and maintenance costs than smaller plants that are fully utilized. Where excess capacity is constructed, due to the availability of a Federal grant or other cause, the community will be faced with higher operation and maintenance costs. Similarly, if a

* Review of Financing the Section 8 Construction Program, Federal Water Quality Administration, U.S. Department of the Interior, Office of Survey and Review, October 1970.

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community has excess capital it will be paying interest on the excess capital investment. As interest rates rise such costs will constitute higher penalties. The operation and maintenance costs penalty together with the interest penalty constitute an annual penalty which, when cumulated, might offset the Federal fiscal aid provided for the capital expenditures. It should also be noted that grants are not allocated for operation and maintenance and interest payments. Therefore, the grant might initially help the capital investment position of the local entity, but distort its long run operating budget by causing communities to operate on the higher portion of their average cost curve.

Aside from the effect of encouraging communities to operate on an inefficient level of average cost, excess capacity constructed from grant outlays constitutes an opportunity cost for the larger economic

community. This opportunity loss may be viewed either from a fiscal or an expenditure view. From the expenditure side, grant monies that go to communities with excess capacity are potentially diverting money from communities which need capacity in conditions of resource scarcity which have indeed prevailed with respect to Federal grant funds. When viewed fiscally, those communities which are constructing excess capacity with the help of Federal and State aid are able to finance this excess at the expense of citizens located outside the boundaries of the community in question. If a majority of the expense is financed by means external to the local entity, then the community's financial share of the facility is lessened. Thus, the average out of pocket fixed cost to the community is lessened by the grant financing.

Both economic losses—the opportunity costs and higher average variable costs—are demonstrated in the following example.

Consider a community of 8,500 persons that decides to build a waste treatment plant. The community's immediate need (and allowing for some short term growth) is for a 1 million gallon per day secondary waste treatment plant (high rate trickling filter, for the sake of example), that will have a useful life of 25 years and can be financed serially at 6% in a situation marked by 25% State and 50% Federal matching grants. Under these conditions, annual costs will be:

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(1) Depreciation (capital cost)	\$21,000
Operation and maintenance	15,500
Interest	15,800
Total	52,300

(Assuming national average prices in 1962 dollars)

of that, the community's share will be:

(2) Depreciation	\$ 5,250
Operation and maintenance	15,500
Interest	3,950
Total	24,700

If, instead of a 1 million gallon per day plant, the community decides to construct a 2.5 million gallon per day plant, then annual cost will be:

(3) Depreciation	\$37,200
Operation and maintenance	20,500
Interest	27,900
Total	85,600 or 64% more;

of which the community's share will be:

(4) Depreciation	\$ 9,300
Operation and maintenance	20,500
Interest	7,000
Total	36,800 or 49% more.

Regardless of the design size, the community will only have an immediate need for 1 million gallons of capacity per day, thus any capacity in excess of the needed capacity will be idle, at least initially. By obtaining grants, the community is capable of increasing the design capacity of the plant by 150% while the capital cost (depreciation) obligation increases by 64%. While the average fixed costs on a total cost basis is higher, Item 3 the average fixed cost incurred by the community out of pocket is lower, Item 4, and the difference in average fixed cost is charged against revenue sources extraneous to the community. When variable costs enter the analysis—and operation and maintenance—the financial picture is not as advantageous for the community. Total costs to the community increase by 50%, indicating that the capital cost advantage is more than cancelled by the increase in other costs.

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The example is highly simplified, and the analysis is static; nevertheless, it does demonstrate the losses possible from a construction program that is structured without efficiency constructs.

In sum, the structure of the Federal waste treatment plant construction program does affect the allocation process of treatment plant construction. Both the specific categories eligible for funding and the temporal limitations of the program have created incentives that may be construed to modify capacity expansion practices. To the extent that this has occurred, the grants act counter to the basic concepts of efficient resource allocation. Either a more flexible or a more closely constrained program might encourage cities to define their system needs more accurately, and might enable cities to direct expenditures to meet these needs. Essentially, the design of the grant system must take into consideration the allocative effect of institutional constraints. This realization will be important for the duration of the construction grant program for waste facilities and for related future programs.

LOCAL GOVERNMENTS

Policy and programs instituted on a Federal level which affect local and State governments must consider the behavior of the governmental units. The water quality program is determined on a national level, but the main participants in the program are the local entities. Thus a better understanding of the *modus operandi* of this level of government is essential to an effective program.

While a discussion of local government activity seems logical and while its importance seems obvious, there has been little organized research and analysis on the subject. Rather, this crucial phase of

program analysis is often left to vague impressions of the analyst and/or decision-maker on the Federal level. Based on these particular impressions generalized rules of local behavior are postulated; and programs are formulated on the strength of the postulates. This section does not attempt to be a definitive work on the behavior of State and local government, a subject that needs to be researched further. Rather, it presents some hypotheses about local behavior and its effect on efficient allocation of resources.

A number of interesting hypotheses have been proposed by John M. Richardson, Jr. and Howard Maier of Case Western University.*

* J. M. Richardson and H. Maier, "Incongruent Goals, Politics and the Pollution of Lake Erie," a paper delivered at the Fourth Annual Midwest Student Seminar on Urban and Regional Research, Northwestern University, April 24-25, 1970.

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Their research, based on a study of local governments surrounding Lake Erie, concludes that we have the engineering answer for most sewage problems. However, the optimum solution may not be implemented because of important intervening political factors. Examples of such political factors abound and form the core of the following hypotheses.

(1) Each local governmental organization has as its chief goals: (a) continuation of its existence; (b) if possible, an increase in its power. Local governments often exist which are responsible for only one part of pollution abatement. Responsibility often overlaps. Such fragmented structures will carefully guard their existing functions, for should these functions be assumed by another governmental unit, their *raison d'être* would disappear. While continuing to perform its distinctive functions, each local unit—at the same time—competes with other local structures for new functions being delegated to the local level. Such behavior is modified by a desire to maintain the unit's political autonomy and its relative importance *vis-a-vis* other local units. Maintenance of one's organization and the increase, where possible, of one's power constitute only one element of a situation in which local goals may conflict with a "best solution" to a given problem.

(2) Local government goals may conflict with the goal of a least cost clean environment because of the role played by personal goals in the decision process. Richardson studied a pollution problem having only two viable alternatives: a regional solution and a local solution. In his case study, the desire to represent community attitudes favored the local treatment approach. The goal of community protection was also seen by the local Mayor and city council as best served by the local treatment alternative. Clearly the decision-making process is

not that simple. Goals may be congruent or conflicting, and their interrelationships greatly affect the policy outcome.

It is a general hypothesis of organization theory that a decision making unit having two or more conflicting goals will be most influenced by the more operational goal. And the more operational goal of the local government official may be assumed to be the one which satisfies the above hypotheses. Maintenance of political power or increased political gain, when in conflict with a goal to achieve a clean environment using a least cost solution, will dominate. Thus the priorities of those organizations supporting a least cost goal may often be in conflict with those of local government.

Further, if two goals are nearly equally operational, Richardson hypothesizes the dominance of the salient one for the decision-maker

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For example, a local official's immediate political goals would dictate the choice of a continuing pollution problem rather than the choice of raising taxes significantly for a new treatment plant. For the ecologist, the options would presumably be reversed. Richardson and others point out that the local politician is not an ecologist; he is, rather, a person who identifies with his organization and whose goals are highly operational where the organization is concerned. In short, his predominant concern is with maintaining the existence of the organization and, where possible, with increasing its power.

The process of preserving the environment must operate within the political milieu described briefly above. The precepts of regionalism, systems, and comprehensiveness must contend with political impediments characteristic of government at all levels. In terms of resource allocation on a national scale, local behavior patterns add another dimension to the institutional constraints preventing the concepts of marginality from working. In the previous section the possible distortion caused by Federal activity was described. Because of constraints inherent in the grant allocation mechanism, misallocations occur and economic efficiency is hampered. Local government behavior also may prevent the optimum solution from being employed.

That optimum solution can be described in a theoretical way by taking the economic concepts of marginality which apply to the single firm, and extending the principles to the operation of the market having many firms. In theory, each firm (city) should be able to define the average and marginal costs of its treatment facilities. The market then combines these costs curves and derives a market share rule—which can be interpreted as a sizing or capacity expansion criteria—and a pricing rule. At a market level the marginality rules form the basis upon which these other rules are determined. The optimum

solutions described by such a system are often thwarted by non-economic decisions. The least costly solutions, the comprehensive systems approaches, are usually not implemented.

The relationship between economic efficiency concepts and political decision making and its effect on the problem of capacity expansion will be translated into more real terms and illustrated by means of case study.

On a single community basis, in which the community has no neighbors, the capacity expansion problem involves an estimation of population growth, behavior of cost functions, (e.g., a recognition of economies of scale) operating cost levels, and decisions concerning uncertainty.

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When regional concepts are introduced, the number of technical variables to be considered multiplies. Regionalism involves a new set of cost functions. The trade-offs between components of the system become greater; e.g., shall more interceptors be constructed, requiring more pumping but permitting a larger treatment plant to be constructed? Or is the plant of sufficient size so that unit costs actually increase as the plant size increases? There are technical bottlenecks which cause modal points in the definition of cost curves; at these points, either economies or diseconomies of scale occur. Technically it is feasible to estimate what the modal points are, and to make comparisons of the mix of alternatives. The environmental field has not been slow in adopting the kinds of systems analysis tools that were used so successfully in the space program. But once the cost functions are identified, the system is identified, and the market shares estimated, this allocation process breaks down and institutional constraints dominate.

Richardson and Maier demonstrate such a breakdown in implementation. A city must increase the size of its treatment plant. Because the plant operates at full capacity or more, the city officials contemplated joining the system of the major city in the metropolitan area, which has developed a regional plan for the metropolitan area. As negotiations for a cooperating agreement began, the desire to preserve autonomy also began to grow. The mayor and council were faced with a dilemma: the existing plant site was limited—reached a point of diseconomies of scale—and cooperation with major city was undesirable to some local values. In the situation, local autonomy proved, rather than technological effectiveness or economic efficiency, to be the determining factor. A large number of case studies demonstrating the conclusion that institutional values of a non-economic—or even uneconomic—nature are critical could be repeated. Nor is local

autonomy alone in producing sub-optimum problem solving. Health department rigidity, uninformed rate-making, established client relationships with engineering firms, industrial management's influence on local government—a host of organizational and sociological constructs stand between the technocrat's dream of efficiency and the real world of political decisions. This may be desirable for non-economic reasons but the costs should be assessed and the decision made on an informed rational basis.

LOCAL FINANCE

A community's share of treatment plant construction cost is often met by issuing bonds. The issuance of bonds, though, must often be approved by the electorate of a community; and this necessary but

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desirable process can create problems for the efficient allocation of resources to water pollution control and abatement. Specifically, problems associated with local bond financing can induce municipal officials to build waste treatment facilities in considerable excess of their current and near-term needs, to reduce the occasions when they must go before the voters.

Alternative methods of dealing with treatment plant design uncertainty can be categorized into two broad strategies. First, a community can build a capacity which is far in excess of current needs, and as a consequence be reasonably assured that additions will not be needed for quite a number of years. Second, a community can build capacity to meet increases in waste treatment demands as these demands occur. The first strategy requires an initially large issuance of local debt, but with the anticipation of little or no subsequent issuance for a considerable length of time. The second strategy requires a lesser initial capital expenditure, but subsequent expenditures must be incurred at relatively frequent intervals. Several structural features of local finance tend to lead municipal officials to favor the first strategy over the second, because a number of problems are created by frequent bond issues for the same activity. Among those problems are: possible voter rejection because of frequent reappearance of proposals for the same purpose, the fixed costs associated with marketing a bond issue, and current uncertainty about future interest rates and inflation.

Frequent reappearance of bond issues for the same program may make local voters suspicious of the program. Voters may feel that the program has been misrepresented in the past if the same bond issue reappears frequently and, consequently, may be led to seriously question the necessity of yet a further funding of the same program. Also,

repetition of the same kind of bond issue may lead voters to assume that the program has not been conducted in the most effective manner in the past and that ineffectiveness should not be, in a sense, rewarded. To the extent that a significant number of members of the local electorate react in these fashions to a frequently repeated issue, local officials must weigh the risks of voter rejection of a frequently presented bond issue against the risks of rejection of one large bond issue. With respect to treatment plant construction, then, these considerations can lead local officials to opt for the strategy of overbuilding rather than adding increments to capacity to meet demand as it occurs.

After a bond issue is authorized by an electorate, the sale of the bonds must be effected. The sale is not a costless transaction. Rather, market information must be obtained and brokerage fees must be

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paid. Part of these costs are independent of the amount of the issue. The more frequently a community markets a bond issue, the more often these necessary transaction costs will be incurred. The implication of this feature of the financial markets for treatment plant construction bond issues may prove to be cheaper to administer than the alternative of marketing bond issues at more frequent intervals.

It is a well-established economic phenomenon that inflation creates the expectation of further inflation, along with an attendant anticipation of higher interest rates. Such expectations, in turn, lead to an acceleration in the purchase of durable goods and structures. Local officials are not exempt from this syndrome of inflation. With regard to treatment plants, an inflationary situation may induce a "big push" attitude: construct as large a plant as possible within political and financial limits before prices and interest rates rise further.

Thus, a number of problems associated with local bond finance lead to a bias toward overbuilding treatment plant capacity in many communities. But treatment plant overbuilding is just one of the many consequences attributable to the maladroitness of local finance in coping with ever increasing demands for public services.

ECONOMIES OF SCALE

Every published investigation of the relationship between treatment plant construction costs and design capacity has indicated that economies of scale in treatment plant construction exist. That is, as the design size of the plant increases, unit construction costs decline. These studies indicate that, over the valid size ranges, a 10% increase in design capacity will lead to an increase in unit construction cost

in the range of six to eight percent, depending on the type of plant.* It would appear, then, that for a given target treatment flow that it is less costly to build one plant rather than two or more plants to accommodate this flow. However, in assessing the potential economies in an actual system design, the costs of interceptors required to convey the wastes to a single plant must be considered. In addition, if existing facilities with remaining usefulness are to be scrapped in the process of moving to a large single plant, the salvage value of that facility must also be included in the analysis to reach a true cost effective solution.

* See P. M. Berthouex and L. B. Pollowski, "Design Capacities to Accommodate Forecast Uncertainties," *Journal of the Sanitary Engineering Division*, Vol. 96, No. SA5, October 1970, p. 1191. It should be noted that the costs exclude the costs of interceptors, outfalls, and land acquisition.

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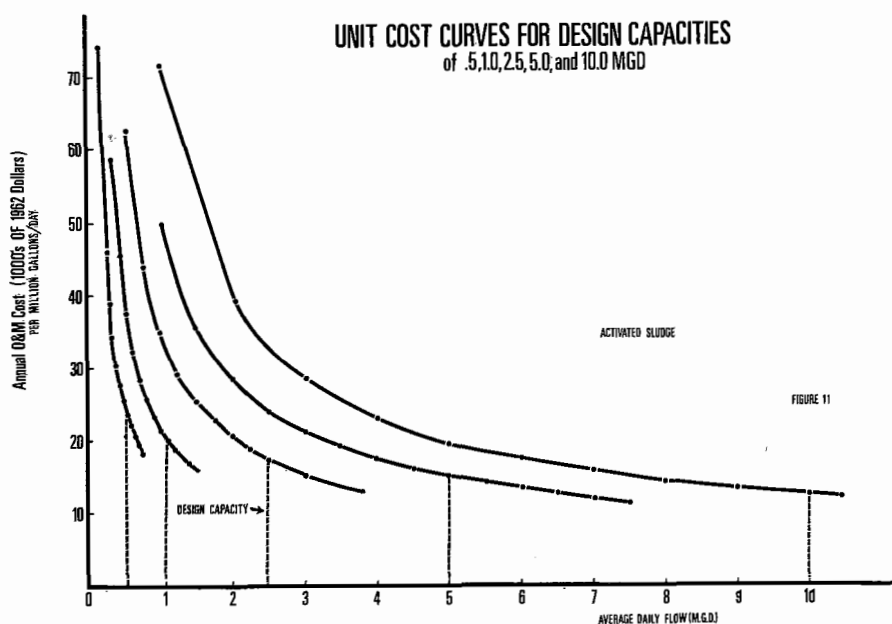
Previous studies of operating and maintenance costs for treatment have tended to substantiate the belief that there are economies of scale in treatment plant operation. The usual practice in these investigations is to statistically fit a relationship between annual unit operating and maintenance costs and average daily flow or design capacity (but not both) for a sample of treatment plants. Generally, the results indicate that unit operating and maintenance costs decline as the rate of flow increases.

In hopes of achieving the greatest economies possible, many communities have built treatment plants and/or added treatment plant capacity in considerable excess not only of their initial needs but also of their needs over the near future, say five to ten years. On the one hand, construction costs per unit of flow, and, thus, interest payments, should decrease with plant size. On the other hand, based on past investigations, community officials might expect to attain lower unit operating and maintenance costs with increasing plant capacity. Reinforcing the strategy of overbuilding is the apparent assurance of being able to meet the additional treatment needs caused by an increase in population growth. Thus, for reasons of economy and uncertainty it would appear that the practice of overbuilding treatment plant capacity rests on substantial economic and engineering grounds.

Upon closer investigation, however, the economic foundations for the practice of overbuilding are, in part, illusory and if not properly assessed will entail higher effective unit construction costs and operating costs than would be the case if the alternative strategy of building and adding treatment plant capacity in accordance with current and near-term needs was followed. First, lower construction and interest costs per unit of flow can only be achieved if a treatment

plant is actually operating near or at its design capacity. (cf Figure 11) Chronic operation at less than full utilization will result in higher construction and interest costs per unit treated than would be the case with a smaller plant. Second, similar considerations apply to the proposition that lower unit operating and maintenance costs will necessarily be achieved with larger plant sizes. From the discussion in a previous chapter, it is clear that lower unit operating and maintenance costs may not be achieved with a plant capacity in considerable excess of actual needs. In fact, it is generally the case that for any given actual flow that can be accommodated, operating and maintenance costs will be higher for a larger plant than for a smaller plant. Economies of scale in operation will be attained only if a treatment plant is operated near its intended capacity.

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Finally, to build an oversized treatment plant in order to meet possible unexpected increases in demand is a one-sided strategy that ignores the full range of alternatives. The possibility that future demand might exceed forecasted demand arises because of the confidence with which the forecast is held. However, if a forecast is not held with certainty, then it is generally the case that future demand can fall short of the forecast with about the same probability as rising

above the forecast. What, then, are the alternative design strategies when demand forecasts are not held with certainty? On the one hand, a plant can be built to accommodate treatment needs in excess of currently forecasted needs. However, if actual future demand is not above forecasted demand, then the community incurs higher construction, operating, and interest costs on both a total and per-unit basis than would be the case if a smaller plant had been built. On the other hand, a plant can be built to meet current and short-range needs, say five to ten years, and the community can build increments to treatment plant capacity to meet additional needs as they occur. A potential loss is associated with this latter strategy, though; namely, if future demand is higher than forecasted, then the economies of scale associated with a larger plant have been foregone. Under uncertainty, which of these two general strategies should be pursued? A recent study has indicated that the strategy of overbuilding treatment plant capacity in order to meet unexpected increases in future treatment needs is generally imprudent.* The rationale behind this finding is that, generally, the expected loss from building incrementally to meet short-term needs stemming from the potentially foregone economies of scale is less than the expected loss from overbuilding stemming from the potential higher costs of construction and operation.

Thus, economies of scale and safety margins are not, in and of themselves, sufficient economic justifications for overbuilding treatment plant capacity. Only if a community is expected to operate its treatment facility near full capacity within the near future, say five to seven years, will the potential cost savings be realized. In general, a strategy of building capacity to meet current and near-term needs will yield lower costs of construction and operation than the strategy of overbuilding.

PEAK LOADING

A community's hydraulic characteristics must be incorporated into the design characteristics of its treatment plant in order to attain

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target degrees of treatment. The expected peak load is one of the most important characteristics that must be considered in meeting design efficiencies of a plant on a continual basis. Peak loads can be met by a combination of three basic methods: varying detention times and recirculation rates, use of flow equalization devices or tanks to smooth the flow of influent and permit processing at non-peak

* *Ibid.* pp. 1195-1206.

periods, and building sufficient operating capacity to handle peak loads as they occur.

If it is the case that anticipated peak loads are met primarily by building sufficient capacity to meet them as they occur, then this practice will contribute to the prevalence of stated excess capacity. To illustrate, suppose that two communities plan to treat the same average daily flow, say one million gallons per day, but that the first community has an average peak at a daily rate of 1.2 million gallons and the second has a peak of 2.0 million gallons. If these peaks are met solely by building capacity to handle them, then the first community will build a plant with a smaller design capacity than will the second community. Consequently, the first community's plant will have a higher calculated utilization rate (actual flow/design flow) than the second community's plant. From this example it can be seen that if it is common design practice to build enough treatment plant capacity to meet peak loads as they occur, then it might be expected that observed lower rates of utilization are associated with higher peak loads.

The validity of this partial explanation for the prevalence of excess capacity can be statistically tested by computing the correlation between the rate of capacity utilization and a measure of peak loading. A negative correlation between these two variables is expected if the practice of using excess capacity in order to meet peak loads is prevalent. The rate of utilization is measured by the ratio of actual average daily flow to design capacity and peak loading is measured by the ratio of peak load to average daily flow.

The statistical results are reported in Table 31. As can be seen by inspection of the first row of this table, the correlation between peak loading and utilization rates is negative but low (a value of -1.0 denotes perfect negative correlation, 0 is perfect non-correlation, and 1.0 is perfect positive correlation). Each correlation is, however, significantly negative (i.e., significantly below zero) by the usual tests of statistical significance. In the second row of the table the

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TABLE 31.—STATISTICAL RELATIONSHIPS BETWEEN CAPACITY UTILIZATION AND THE RATIO OF PEAK LOAD TO AVERAGE DAILY FLOW

Treatment type	Primary	Activated sludge	High-rate trickling filter	Standard-rate trickling filter	Stabilization ponds
Correlation coefficient	-.221	-.292	-.224	-.290	-.188
Percent of variation explained	4.9	8.6	5.0	8.4	3.5
Average utilization rate .....	.62	.67	.64	.66	.67
Average of peak load/average daily flow ..	3.55	2.75	2.85	4.18	2.25
Number of plants in sample	158	77	159	77	41

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percentages of variation between plants in capacity utilization attributable to variation between plants in peak loadings are reported. The percentage of explained variation ranges from a low of 3.5 percent for stabilization ponds to a maximum of only 8.6 percent for the activated sludge process. In other words, less than nine percent of variation in utilization rate can be accounted for by peak loading, and so justifiable on an engineering basis. The remaining 90-odd percent is attributable to factors other than peak loading.

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APPENDIX A—SURVEY QUESTIONNAIRE STUDY OF WATER POLLUTION ABATEMENT COSTS

GENERAL DIRECTIONS

A separate report should be prepared for each plant. It is necessary to know these data for each plant so as to relate the production and financial data to the wastewater abatement cost data when making cost burden and incentive analyses.

A plant is defined as the total facilities and operations at one location. Whether a few or many products are made at this location, it still should be considered one plant. This excludes facilities restricted entirely to such operations as warehousing and storage, research and development, and sales offices.

In the preparation of this survey questionnaire, care was taken to request information, wherever possible, in terms identical to those utilized in various reports to the Bureau of the Census. This was done to provide a recognized standard for some of the information requested and to permit the respondent to provide information similar to that which has been compiled for other reports.

Please report for *calendar year 1969* unless otherwise specified. If this is not possible, specify the reporting period for which data are provided.

Please return the completed form to *Leonard Lund, National Industrial Conference Board, 845 Third Avenue, New York, New York 10022*. Do not indicate your name or company on this form. The Code Number on this page identifies you to The Conference Board. No personal or corporate identification will appear in any report based on this survey without your explicit authorization.

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ITEM 1. PRODUCT INFORMATION

(a) Principal product(s) of this plant

(Describe by using categories defined in the Standard Industrial Classification Manual, e.g., "Chemicals and Allied Products," "Industrial Gases," "Food and Kindred Products, Fluid Milk," "Transportation Equipment, Motor Vehicles," or similar descriptive phrases.)

(b) Standard Industrial Classification Code(s). (If known)

(4 digit code(s))

ITEM 2. NUMBER OF EMPLOYEES

- (a) **Production Workers—Workers** (up through the working foreman level) engaged in fabricating, processing, assembling, inspecting, receiving, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, watchman services, product development, auxiliary production for plant's own use (e.g., powerplant), recordkeeping, and other closely associated services. Exclude proprietors and partners.

Number of production employees
during typical month

- (b) **All Other Employees—Nonproduction personnel**, including those engaged in the following activities: supervision above working foreman level, sales (including driver salesmen), sales delivery (truck drivers and helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office functions, executive, purchasing, finance, legal, personnel (incl. cafeteria, etc.), professional and technical. Exclude proprietors and partners.

Number of all other employees
during typical month

- (c) **Total number of employees** (sum of lines a and b)

ITEM 3. PAYROLLS

Enter the total (before deductions) of wages, salaries, bonuses, commissions, and other remunerations paid in 1969 to "Production Workers," and "All Other Employees," as defined in Item 2 above.

- (a) Production workers' wages \$.....
- (b) All other employees' salaries and wages \$.....
- (c) **TOTAL PAYROLL**
(Sum of Lines a and b) \$.....

ITEM 4. PRODUCTION COSTS

- (a) What were the costs of materials, fuels, electricity and contract work put into production in 1969?

\$

Note: The figures reported should represent the total cost of materials, supplies, semi-finished goods, fuels, etc., actually consumed or put into production as in reports to the Census Bureau.

If your records do not show the amounts actually consumed or put into production, the reported figures may be derived from purchase and other records.

- (b) What were the depreciation charges in 1969? \$

ITEM 5. VALUE OF SHIPMENTS

What was the value of products shipped in 1969? \$.....

ITEM 6. VALUE AND AGE OF FIXED ASSETS

In order to obtain an estimate of the value and age of the plant and equipment, please answer the following:

- (a) What was the gross investment in plant and equipment as of December 31, 1969 \$.....
- (b) What was the book value (gross investment minus straight line depreciation) of plant and equipment? \$.....
- (c) Was the plant built within the last five years? Yes ☐ No ☐
- (d) Was the capacity of this plant expanded significantly (more than 50%) within the past five years? Yes ☐ No ☐
- (e) Was more than 50% of the production equipment in this plant installed or significantly modified within the past five years? Yes ☐ No ☐

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ITEM 7. CAPITAL EXPENDITURES FOR ABATEMENT FACILITIES

- (a) Please estimate the capital expenditures for the purpose of water pollution abatement at this plant for each year of the period 1965-1969. Report separately the amounts spent for *replacement and modernization of existing facilities* and the amounts spent for *new facilities including expansion*.

Note: Report only those expenditures made for the purpose of pollution abatement. If improvements have been made in the production process which provides an incidental benefit in the abatement of pollution do not include the expenditure for that improvement.

Year	Replacement and modernization of existing facilities	New facilities including expansion	Total Expenditure
1965	\$ _____	\$ _____	\$ _____
1966	\$ _____	\$ _____	\$ _____
1967	\$ _____	\$ _____	\$ _____
1968	\$ _____	\$ _____	\$ _____
1969	\$ _____	\$ _____	\$ _____
Total (1965-1969)	\$ _____	\$ _____	\$ _____

- (b) For which of the following types of water pollution abatement measures were most of the capital expenditures made at this plant during 1965-1969? (If the investment falls primarily in one category, check that box; if it is divided among several, check all appropriate boxes for which expenditures were more than 20% of total.)

Manufacturing changes to reduce water pollution ☐

Wastewater treatment ☐

Water cooling (See Note below) ☐

Other (please specify) ☐

Note: Water cooling done primarily to reduce the quantity of intake water needed for production purposes is not considered pollution abatement. Cooling for the purpose of preventing the discharge of heated water to a river, lake, stream, or estuary, is considered pollution abatement.

- (c) If this plant currently has no water pollution abatement facilities, does it plan to build any? Yes ☐ No ☐ If yes, when? Next year ☐
In five years ☐ After that ☐

ITEM 8. PLANNED CAPITAL APPROPRIATIONS FOR POLLUTION ABATEMENT FACILITIES

Please report:

- (a) Capital appropriation for abatement facilities for 1970

\$

- (b) Number of years in which to be spent

- (c) For which type of measures: (see 7b)

Manufacturing process changes ☐Wastewater treatment ☐Water cooling (see Note 7b) ☐Other (specify) ☐

.....

Please report:

- (d) Total future capital requirements, including 1970, to meet present water quality standards

\$

- (e) Number of years in which to be spent

- (f) For which type of measures: (see 7b)

Manufacturing process changes ☐Wastewater treatment ☐Water cooling (see Note 7b) ☐Other (specify) ☐

.....

ITEM 9. WATER POLLUTION ABATEMENT MEASURES

Using the accompanying chart of abatement measures (Attachment I), please indicate the code numbers of those measures already in place in this plant, and in the order in which applied. In the event that wastewaters from more than one source within the plant are combined for treatment in a common facility (e.g., process and sanitary wastewaters) please indicate this by showing which sources are combined.

*Wastewater Source**Abatement Measure
Code Numbers*

Manufacturing process

Sanitary

Cooling (see Note 7b)

Other—(please specify)

.....

.....

ITEM 10. VOLUME AND CHARACTERISTICS OF DISCHARGED WASTEWATERS

- (a) Average daily volume of discharged wastewater by source:
(Report typical discharges in million gallons per operating day.)

Source	Discharged Directly		Discharged to Public Sewer		Other manner of disposal (specify)	
	Treated	Untreated	Treated	Untreated	Treated	Untreated
Manufacturing Process	_____	_____	_____	_____	_____	_____
Sanitary	_____	_____	_____	_____	_____	_____
Cooling (see Note 7b)	_____	_____	_____	_____	_____	_____
Other (specify)	_____	_____	_____	_____	_____	_____
Total	_____ mgd	_____ mgd	_____ mgd	_____ mgd	_____ mgd	_____ mgd

- (b) Wastewater constituents discharged directly by source:
(Report in pounds per day, pH units, degrees Fahrenheit)

Source	Biochemical Oxygen Demand (Five Day)	Chemical Oxygen Demand	Suspended Solids	pH	Temperature Rise	Other (Please specify)
Manufacturing Process	_____	_____	_____	_____	_____	_____
Sanitary	_____	_____	_____	_____	_____	_____
Cooling (see Note 7b) .	_____	_____	_____	_____	_____	_____
Other (Please specify) .	_____	_____	_____	_____	_____	_____
TOTAL	_____	_____	_____	_____	_____	_____

- (c) Please describe any seasonal aspects of production that may affect the quantity of wastewater discharged.

.....
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ITEM 11. EXPENDITURES FOR OPERATION AND MAINTENANCE
OF WATER POLLUTION ABATEMENT FACILITIES

- (a) Annual expenditures for operating and maintaining existing water pollution abatement facilities. 1968 \$..... 1969 \$.....
- (b) Estimate of annual expenditures for operating and maintaining abatement facilities upon completion of construction noted in ITEM 8d. \$.
- (c) Estimate of number of employees engaged in operating and maintaining pollution abatement facilities in 1969.
(Equivalent full-time manpower)

ITEM 12. USE OF PUBLIC SEWER SYSTEMS

- (a) Is there a public sewer system available for use by this plant?
Yes ☐ No ☐
- (b) If yes, does this plant discharge wastewater into public sewer?
Yes ☐ No ☐

If answer to (b) is Yes:

- (c) What was annual payment by this plant to municipality or other authority for sewer service, excluding property tax?
\$

- (d) What was basis of payment?
(Check all relevant boxes)

Water use ☐

Waste strength ☐

Over-strength surcharges ☐

Other (Specify) ☐

.....

If answer to (b) is No:

- (e) If plant does not, does this plant plan to use public sewer in the future? Yes ☐ No ☐

- (f) If yes, when?
Next year? ☐
In five years? ☐
Later? ☐

- (g) If yes, what kind of wastewater will be discharged?
Please check.

All wastewater ☐

Manufacturing process only ☐

Sanitary only ☐

Manufacturing process and sanitary ☐

Cooling (see Note 7b) ☐

Other (specify) ☐

.....

ITEM 13. OTHER CONTRIBUTIONS TO FINANCING OF PUBLIC SEWER SYSTEM

- (a) What payments were made to a local government unit for sewer service in the form of property taxes or assessments? \$
- (b) What, if anything, has been contributed to the capital cost of constructing a new public wastewater treatment facility or expanding of an existing facility in cooperation with a municipality or other public authority in addition to amounts reported above?
\$

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ITEM 14. GENERAL OBSERVATIONS

We would appreciate any observations which you would care to make regarding features of the operation or location of this plant that you feel would make for special problems in wastewater treatment; and any comment you may wish to make concerning this questionnaire or the use of the data provided. If any costs have been incurred or are anticipated because of plant relocation or process change primarily influenced by water pollution abatement requirements, please describe their nature and costs in this section.

ITEM 15.

Name and title of person to be contacted in the event that additional correspondence may be required.

Name

Title

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4.1b ECONOMICS OF CLEAN WATER, VOL. I, AND SUMMARY, ENVIRONMENTAL PROTECTION AGENCY, APRIL, 1972

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WATER POLLUTION IN 1971

INTRODUCTION

This section describes a procedure that is being developed by EPA for evaluation of water pollution. The indexing procedure allows any waterbody or set of waterbodies to be described with respect to water pollution characteristics. Data on the prevalence of pollution for this index has been collected for the years 1970 and 1971.

A further development of this index is to include duration and intensity of water pollution as factors in describing waterbodies. Such data were collected for the first time in 1971. These results show that pollution varies from region to region and is a response to geographical as well as economic circumstances.

[p. 3]

METHODOLOGY USED TO CALCULATE INDEX

The Environmental Protection Agency is continuing its efforts to develop a comprehensive measure of relative water quality. It has developed internally a procedure for measuring not water quality in the absolute, but deviations from established standards of water quality.

Water Quality Standards

Interstate water quality standards are the basis of the definition of the condition of pollution.

The water quality standards are a three-fold device that established for discrete stream reaches: (1) a statement of the uses of water that are physically and chemically possible in nature and which are desired by the users and potential users of those waters, (2) a definition—generally in quantitative terms—of the physical, chemical, and biological conditions that are minimally consistent with those uses (subject to the general constraint that where one or more of those conditions were superior to the scientifically-determined minimum at the time the standards were developed, the existing quality of the waters in question would constitute the acceptable minimum for such parameters), and (3) a plan for meeting water quality criteria.

The "water pollution index" addresses only the first two of the three elements of the standards. It is concerned with observable, verifiable environmental fact rather than legal, regulatory, administrative, or technological arrangements of implementation plans.

COMPARISON TO STANDARDS—PREVALENCE OF POLLUTION

The basic element of the index is a simple measurement or judgement. Once standards have been determined for a set of water

quality parameters, the procedure calls for a comparison of those standards with measured quality. Where any variable or combination of variables do not meet or exceed the standard, then a state of pollution exists—by definition.

This rather rudimentary test was first applied in 1970, when a ratio of polluted waters to total waters was established for the nation, using the simple formula:

$$\frac{P}{M} = \text{prevalence of pollution}$$

Where P = number of stream and shoreline miles in which one or more of the established chemical and biological criteria had not been met one or more times.

[p. 4]

M = total stream and shoreline miles, to and including third-order tributaries

1970 Results

The assessment of the prevalence of pollution made in 1970, indicated that almost 27 percent of America's stream miles were polluted.¹

1971 Results

Measuring the prevalence of pollution alone (which excludes duration and intensity factors; cf. Table 1), it appears that water pollution increased from 1970 to 1971. While the 1970 assessment indicated that water quality criteria violations occurred over almost 70,000 stream miles, the assessment in 1971 suggested that more than 76,000 stream miles did not conform to water quality criteria. In terms of relative prevalence, pollution extended from 26.8 percent of the nation's waters to 29.3 percent.

In point of fact, the assessed prevalence of water pollution in 1971 may understate the amount of the increase. Several States of the Upper Mississippi Basin and the Southwest have included in their water quality standards exceptions for conditions due to precipitation. The 1970 evaluation of stream conditions took into account only in-stream violations of water quality criteria, without making the stipulated allowance for source. On the other hand, the addition of stream miles predominantly polluted by acid mine drainage in the

¹ As originally reported in *Cost Effectiveness and Clean Water*, the value was given as 31.2 percent. Continuing analysis of the data indicated that (1) length of minor tributary streams was under-reported in the aggregate and (2) overlapping administrative boundaries caused double-counting of polluted miles in some cases. When adjusted for these factors, reported prevalence of pollution dropped to 26.8 percent.

Ohio Basin would tend to overstate the increase since they were not assessed in 1970.

Regional Variation in Pollution Prevalence

Every part of the nation has some water pollution, but the shares are very unevenly distributed. There were in 1971 almost twice as many polluted stream miles east of the Mississippi River as west of it.

When viewed from the standpoint of the ten Federal Administrative Regions, as presented in Table 1, pollution was more than five times as common in the Chicago Region as in the Kansas City Region. (It should be noted, however, that the Kansas City Region is one where assessment is heavily affected by the exclusion of stream

[p. 5]

TABLE 1.—PREVALENCE OF STREAM QUALITY CRITERIA VIOLATIONS—1971

EPA region	Stream and shoreline miles	Miles of criteria violation	Percent of miles polluted	Percent of total U.S. miles	Percent polluted miles
I Boston	29,701	4,869	16.4	11.4	6.4
II New York	4,889	2,071	42.4	1.9	2.7
III Philadelphia	24,311	8,437	34.7	9.3	11.1
IV Atlanta	39,125	14,840	37.9	15.0	10.4
V Chicago	28,769	18,569	64.5	11.1	24.3
VI Dallas	46,646	10,010	21.5	17.9	13.1
VII Kansas City	19,189	2,396	12.5	7.4	3.1
VIII Denver	22,693	5,688	25.0	8.7	7.4
IX San Francisco	16,693	3,956	23.5	6.5	5.2
X Seattle	28,166	5,477	19.4	10.8	7.2
Contiguous United States	260,324	76,299	29.3	100.0	100.0
East of Mississippi River	126,795	48,777	38.5	48.7	63.9
West of Mississippi River	133,529	27,522	20.6	51.3	36.1

[p. 6]

quality criteria violations traceable to precipitation.) While the Chicago Region was the only one in which polluted natural waters were more common than unpolluted, more than a third of the waters of the New York, Philadelphia, and Atlanta Regions were found to be polluted during 1971.

COMPARISON TO STANDARDS

DURATION AND INTENSITY OF POLLUTION—INCIDENCE

An assessment of pollution in terms of mere prevalence is essentially unsatisfactory—rather like equating cancers, chronic appendicitis, and the common cold in an assessment of health conditions. Degree of pollution and its persistence are significant dimensions of the phenomenon—perhaps the more significant, given the range of uncertainties that attach to the water quality criteria. EPA is developing the pollution index to include such factors.

The water pollution index, using 1971 data, takes these factors into account by establishing separate weighting values to a circumstance of pollution, according to its seasonal characteristics and its interference with uses sanctioned by the water quality standards. The simple formula for determining the prevalence of pollution becomes only slightly more complex, but the level of effort and judgement required to apply the formula is increased enormously:

$$\frac{P \cdot D \cdot I}{M} = \text{Water Pollution Index}$$

Where D = a factor ranging from 0.4 to 1.0 to express the inter-seasonal duration of pollution.

I = a factor ranging from 0.1 to 1.0 to express the intensity of water pollution in terms of damage.

(An explanation of these variables is contained in the *Technical Appendix* [Volume II of this report].)

When reach-by-reach pollution conditions are weighted to give expression to duration and intensity an index is formed which provides a consistent measurement of unequal variables against a common base—in this case, the water quality standards.

Relationship of the Duration-Intensity Factors to Prevalence of Pollution—1971

The relative water pollution standing of Federal Administrative Regions is not significantly changed when the frame of reference shifts from simple prevalence of pollution to an index of prevalence weighted by relative duration and severity (cf. Table 2).

[p. 7]

TABLE 2.—RELATIVE INCIDENCE OF WATER POLLUTION

EPA region	Percent of stream miles polluted	Duration intensity factor	Duration-Intensity as a percent of U.S. mean	Percent polluted U.S. miles
I Boston	16.4	0.62	151	6.4
II New York	42.4	.45	110	2.7
III Philadelphia	34.7	.58	141	11.7
IV Atlanta	37.9	.45	110	19.4
V Chicago	64.5	.43	105	24.3
VI Dallas	21.5	.37	90	13.1
VII Kansas City	12.5	.33	81	3.1
VIII Denver	25.0	.23	56	7.4
IX San Francisco	23.5	.20	49	5.2
X Seattle	19.4	.11	27	7.2
Contiguous United States	29.3	.41	100	100.0
East of Mississippi River	38.5	.48	117	63.9
West of Mississippi River	20.6	.28	68	36.1

[p. 8]

In general, the greater the prevalence of water pollution, the higher the aggregated duration-intensity factor. There are, however, exceptions. The Boston Region—that is, the New England States—is second only to the Kansas City Region with respect to the portion of its waters that is not polluted; but it is the worst region in the nation with respect to persistence and damage. The Denver Region, which stands fifth among the ten administrative regions in extensiveness of pollution, is a creditable ninth with respect to duration and intensity. And though the Chicago Region has the worst pollution index, it is largely because it has the highest prevalence of pollution, since it is no worse than fifth in terms of persistence and damage.

These distributional features become more apparent when the categorical focus is shifted from political to natural boundaries. For comparative purposes, then, the discussion from this point will be framed in terms of nine sets of physical drainage areas (cf. Figure 1):

1. "The Northeast Basins" is composed of those watersheds that drain directly to the Atlantic from the Canadian border on the north to the drainage area of Chesapeake Bay on the South;

2. "The Middle Atlantic Basins" comprises drainage to the Atlantic from Chesapeake Bay southward to the drainage of the Santee River;

3. "The Southeastern Basins" consists of the drainage to the Atlantic from the Santee River southward, the east bank drainage to the Mississippi from the Tennessee River southward, and direct drainage to the Gulf of Mexico east of the mouth of the Mississippi;

4. "The Great Lakes Basins" consists of the drainage of the Great Lakes and the St. Lawrence River;

5. "The Ohio Basin" is the area drained by the Ohio River;

6. "The Missouri River Basin" consists of the drainage area of the Missouri and the Souris-Red-Rainy systems, as well as direct western discharges to the Mississippi River north of the confluence with the Missouri River;

7. "The Gulf Basins" consists of the west bank discharges to the Mississippi River that occur south of the drainage of the Missouri, together with direct discharges to the Gulf of Mexico that occur west of the Mississippi River;

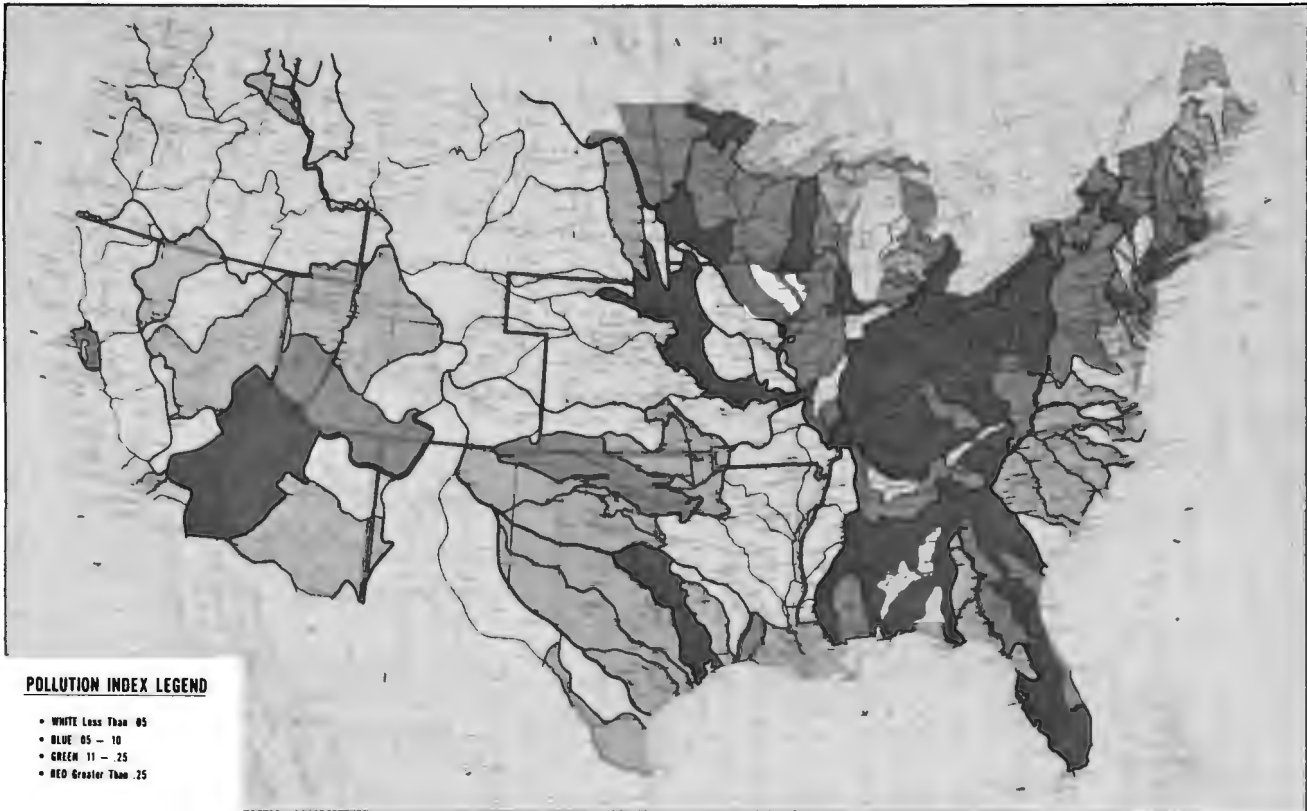
8. "The California Basins" includes the area drained by all discharges to the Pacific Ocean south of the Oregon-California border, together with discharges to the Gulf of California and the closed watersheds of the Great Basin; and

9. "The Columbia North Pacific Basins" includes the area drained by the Columbia River and all direct discharges to the Pacific Ocean between the Canadian and California borders.

When the pollution index data are framed in these hydrologic terms, the degree to which water pollution is concentrated becomes more evident. The three broad hydrologic groupings for which both the prevalence factor and the duration-intensity factor are above the national mean include 48 of the 61 second-order watersheds in which

[p. 9]

FIGURE 1
RELATIVE WATER POLLUTION



more than half of all stream and shoreline miles are reported to be polluted. The same three (Ohio, Southeast, Great Lakes) also include 79 of the 113 second-order watersheds in which aggregated duration-intensity factors exceed the national value. Among them, they include 23.9 percent of the nation's stream miles (third-order streams or greater), but 48.9 percent of the polluted stream miles.

The smaller the units of the hydrologic system that are considered, the more apparent it becomes that water pollution may be far more concentrated than is generally supposed. Table 3 provides a demonstration of that fact. It arranges the 241 first-order tributaries of the nine broad, synthetic hydrologic groupings in class intervals according to prevalence of pollution and duration-intensity. The table makes it clear that extensive pollution is very nearly limited to the Ohio, Great Lakes, and Southeastern drainage systems. And though the Northeastern watersheds are in a class with the other three with respect to duration and intensity of pollution, they tend to dominate that measure as well.

Thus the median class interval for prevalence of pollution is:

21-30 percent of stream and shoreline miles for the U.S.

81-90 percent for the Ohio River Basin,

21-30 percent for the Southeastern Basins,

41-50 percent for the Great Lakes Basins, and

11-20 percent for the rest of the nation.

Similarly with respect to duration-intensity of pollution, where the median is:

.410-.509 for the nation,

.410-.509 for the Ohio River Basin,

.610-.709 for the Southeastern Basins,

.410-.509 for the Great Lakes Basins, and

.310-.409 for the rest of the nation.

It is not appropriate to compare 1970 and 1971 conditions of water pollution on the basis of the separate national assessments. The quality of the 1971 survey was far superior to its predecessor, due largely to the facts that an informational and experiential base was established by the 1970 survey that resulted in an improved second effort, and that a more rigorous methodology was imposed on the assessors in 1971. Further, the 1971 assessment included provision for the duration and intensity factors that go into the water pollution index.

A comparison of the common factor of prevalence, however, can be made. Such an evaluation is summarized by major drainage area in Table 4. In general, the major drainage areas with the higher prevalence of pollution in 1970 became even worse in 1971.

TABLE 3.—DISTRIBUTION OF POLLUTION BY MAJOR DRAINAGE AREAS

Percent of stream miles polluted	Number of Tributary Basins										Percent of U.S. total
	Ohio	Southeast	Great Lakes	Northeast	Middle Atlantic	California	Gulf	Missouri	Columbia	U.S.	
0		1	1	1		3		3	1	10	4.2
1-10		10	7	9	5	5	6	6	2	50	20.8
11-20		5	4	6	8	6	15	3	5	52	21.6
21-30		4	9	6		1	6	2	5	33	13.7
31-40	2	5	3	3	1	2	2	1	1	20	8.3
41-50	2	4	4	1		1	2	1		15	6.2
51-60		1	3	4		2				10	4.2
61-70	3	4	5			4		1		17	7.1
71-80	3	2	5							10	4.2
81-90	2	1	2	1		1				7	2.9
91-100	9	2	6							17	7.1
Total	21	39	49	31	14	25	31	17	14	241	100.0
Prevalence											
Factor .....	.84	.38	.41	.18	.17	.29	.17	.17	.19	.29	
Duration-Intensity											
Factor .....	.42	.74	.45	.61	.47	.27	.35	.37	.12	.41	
0-109		1	3	1		6	1	6	9	27	11.2
110-209	1		2			8	12	2	3	28	11.6
210-309	2	1	8	3	2	5	4	2		27	11.2
310-409	7	2	3	2	2	3	5	5	2	31	12.9
410-509	3	2	11	4	8	1	4	1		34	14.1
510-609	4	5	4	5	2		3			23	9.5
610-709	3	10	3	5		1	1			23	9.5
710-809	1	12	6	8		1				28	11.6
810-909		4	6	3			1	1		15	6.2
910-1.00		2	3							5	2.1

[p. 12]

TABLE 4.—WATER POLLUTION INDEX SUMMARIZED FOR MAJOR DRAINAGE AREAS, 1970 AND 1971

Major watershed	Stream miles	Polluted miles			1971 D.I. factor
		1970	1971	Change	
Ohio	28,992	9,869	24,031	+13,746	0.42
Southeast	11,726	3,109	4,490	+1,381	.74
Great Lakes	21,374	6,580	8,771	+2,191	.45
Northeast	32,431	11,895	5,823	-6,072	.61
Middle Atlantic	31,914	4,620	5,627	+869	.47
California	28,277	5,359	8,429	+2,499	.27
Gulf	64,719	16,605	11,604	-5,001	.35
Missouri	10,448	4,259	1,839	-2,420	.31
Columbia	30,443	7,443	5,685	-1,758	.12
United States	260,324	69,739	76,299	+5,435	.41
United States less Ohio	231,332	59,870	52,268	-8,311	.40
United States less Columbia	229,881	62,296	70,614	+7,193	.43

[p. 13]

Unfortunately, of the four apparently significant shifts in reported water pollution that took place—in the Ohio, Gulf, Missouri, and Northeastern Basins—three are so obscured by variations in procedure that it is difficult to evaluate the degree of real change. Both the Gulf and the Missouri Basins reported an enormous improvement in compliance with water quality standards. But in each case, the 1970 assessment failed to make allowance for legally sanctioned breaches of water quality criteria that resulted from precipitation; and in either case, that exception is a significant matter. Apparent improvement, then, can only be ascribed with assurance to compliance with a legal standard, not to better water. And in the case of the Ohio River Basin, the 1970 assessment concentrated on the quality of major waterbodies, overlooking smaller tributaries. But in the Ohio, a phenomenon that is almost unknown elsewhere is common, in that many streams are polluted at the source as a result of the acid drainage of mountain coal mines. Of twenty-one river systems in the Ohio River Basin, nine—the Little Miami, the Licking, the Miami, the Kentucky, the Salt, the Green, the Wabash, and the East and West Forks of the White—are in violation of water quality criteria over their total span during at least part of each year. Three others—the Guyandot, the Hocking, and the Cumberland—have only a few miles free of pollution. Failure to account for this total prevalence of pollution in 1970 is at least partially responsible for the increase in reported pollution in 1971.

On the basis of the data available, if data anomalies are overlooked, we may conclude that substantially the same number of river miles was polluted in 1971 as in 1970 and that the western States had less water pollution and less severe water pollution than eastern States. (The evaluation holds for changes in the water quality of discrete river systems as well as for gross hydraulic groupings (cf.

Table 5).² In coming years as comparable data is developed, the water pollution index will be able to better identify trends in pollution for the nation.

² Appendix—presents instructions for calculating the pollution indices, and index data summarized for second-order watershed.

[p. 14]

TABLE 5.—SHIFTS IN PREVALENCE OF POLLUTION SUMMARIZED FOR MAJOR DRAINAGE AREAS, 1970 AND 1971

	Number of tributary basins ¹		
	Pollution increased	Unchanged (± 10 percent)	Pollution decreased
Ohio River Basin	18	1	0
Southeastern Basins	13	24	1
Great Lakes Basins	25	5	18
Northeast Basins	5	5	18
Middle Atlantic Basins	5	2	5
California-Colorado-Closed Basins	11	4	9
Gulf-Southwest Basins	4	6	20
Missouri Basin	3	1	12
Columbia-North Pacific Basins	4	2	8
United States	88	50	91

¹ 1970 Data not available in all cases.

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I

TRENDS IN INDUSTRIAL WATER USE—DISCHARGE AND TREATMENT

INTRODUCTION

The chapter traces quantitatively trends in manufacturing use of water between 1959 and 1968, concentrating on growth of discharge volume, rates, and waste treatment, and relating them to changes in the institutional setting.

SUMMATION

Industrial water intake and discharge is increasing at a less pronounced rate than industrial output. The proportion of industrial wastewater discharge that is treated continues to grow, and amounted to 37 percent of discharge in 1968. Waste treatment growth was less between 1964 and 1968 (3.1 percent annual rate of increase), however, than between 1959 and 1964 (10.5 percent annual rate of increase). Most of the increase in industrial waste treatment occurred at the factory. For, although use of public sewers and waste treatment plants is the main method of waste disposal for a number of manufacturing sectors, the portion of industrial effluent discharged to public facilities dropped from almost 9 percent in 1959 to little more than 7 percent in 1968.

[p. 17]

Publication of *Water Use in Manufacturing, 1967* permits a survey of trends over the period 1959 to 1968 and re-examination of findings reported in Volume II of the *Cost of Clean Water* for 1967. Also available for analysis of industrial practices with respect to handling of liquid-borne wastes is a recent survey conducted by the Conference Board. Under the sponsorship of the Federal Water Quality Administration, the Conference Board (formerly the National Industrial Conference Board) conducted a survey of establishments in the seven heaviest water-using manufacturing groups.¹ From the almost 800 responses, a number of significant findings emerged.

THE INSTITUTIONAL

Important changes in institutions and attitudes with respect to industrial waste discharges, and discharge of pollutants generally, occurred during the sixties. Amendments to PL 660 (the Federal Water Pollution Control Act) in 1966 required the States, in consultation with all users of interstate waterways and to the satisfaction of the Secretary of the Interior, to set standards for interstate waterways. The standards were to account for all uses of the waterways except as a medium for the disposal of wastes. Negative sanctions for dischargers, including industrial dischargers, who violated the standards were also developed. As a consequence of State and Federal efforts to attain, or in some cases maintain, water quality standards, a large number of industrial dischargers have indicated they will comply with the standards by installing treatment measures, altering processes, or curtailing pollutant-generating activities. Prior to the promulgation of water quality standards, a number of States had some kind of pollution surveillance and enforcement program. These provide an indication of the differences in intensity of water pollution control activities between the first and second half of the sixties. Man-years of such programs in the United States grew at an annual rate of 3.3 percent from 1959 to 1964, but from 1964 to 1968 the annual rate of growth was 13.4 percent; and since 1968 the annual rate of growth has been almost 21 percent. Assuming that there is a positive correlation between effectiveness of a program and the resources allocated to it, the growth in State water pollution control activities has provided an additional impetus to curtailment of waste discharges by industries.

¹ The industry groups surveyed were Food and Kindred Products (SIC 20), Textile Mills Products (SIC 22), Paper and Allied Products (SIC 26), Chemical and Allied Products (SIC 28), Petroleum and Coal Products (SIC 29), Rubber and Plastics Products (SIC 30), and Primary Metals (SIC 33).

decade have increased both the amount of federal funds devoted to municipal wastewater treatment works and the federal share of the total funds. To the extent that local communities are primarily interested in recovery of local out-of-pocket costs rather than total system costs from those connected to the system, the increased federal share and funding levels represent an increase in subsidies to connected industrial establishments. This added incentive to treat wastes should have resulted in increased industrial connections to municipal treatment works, and, presumably, more adequate treatment of industrial wastes.

Continued pressures on existing supplies of freshwater, both surface and ground, have, in a large portion of the continental United States, increased the cost of obtaining additional units of water suitable for industrial application. In order to obtain additional units of water, industry has had to turn to poorer quality water, such as brackish water or treated sewage effluent, and to sink deeper wells. In effect, the price to industry of obtaining water has generally increased during the last decade and has provided an incentive to economize² on water intake. Process change, including recycling, directed towards more efficient use of water can have a number of benefits. Process changes may decrease the amount of water-borne residuals per unit of product produced. Industrial recycling and reuse of water will often result in a highly concentrated end-of-stream effluent which generally eases the problems of waste handling and disposition, and can make by-product recovery a profitable activity. In addition to the problem of increasing pressures on available supplies of freshwater, the Northeastern drought of the early 'sixties has probably brought the necessity for planning for adequate industrial water supplies into many capital budgeting decisions. In fact, a study of the response of local government and industry to the Northeastern drought in the State of Massachusetts indicates that industry primarily adjusted to the situation by investing in equipment to recirculate water—almost 70 percent of the reported investments to adjust to the drought were for recirculation facilities.²

One additional change in the climate in which decisions concerning ultimate disposition of industrial waste discharges were made is the increased public relations value to a firm of industrial pollution control measures. In the late 'sixties environmental and consumer issues received considerable attention from citizens and politicians. This concern has increased the value to a firm of installing and publicizing a pollution control facility.

² Clifford S. Russell et al., *Drought and Water Supply* (Johns Hopkins Press, 1970), p. 110.

Although all of the above developments might be expected to provide an incentive to industry to curtail and treat liquid-borne wastes, other trends mitigate against reduction in the discharge of industrial pollutants. The sheer growth of manufacturing output and the associated production of residuals continues to create waste handling problems. Over the period 1959-1968 the Federal Reserve Board Index of Industrial Production for manufacturing increased 59 percent, and for the five major water-using industries—food products, paper, chemicals, petroleum, and primary metals—the index grew by 29, 48, 94, 33, and 52 percent, respectively. In addition to water demand growing directly out of production growth, industry's continued accumulation of capital created both a direct demand for cooling water and indirect demand by increasing the consumption of thermally generated power used by industry.

In summary, a number of economic and institutional changes in the last decade lead to the expectation that incentives have been provided for industry to curtail and treat liquid-borne wastes. Offsetting these incentives are growth of production and consequent residuals production.

INDUSTRIAL WATER USE AND DISCHARGE 1959-1968

According to the *Water Use in Manufacturing, 1967*, 14,276 billion gallons of wastewater were discharged in 1968 by manufacturing establishments using 20 million gallons of water or more. The 1968 figure represents an 8.5 percent increase over 1964 and 24.7 percent increase over 1959. However, as Tables 1 and 2 indicate, discharge across the nation and for most industries over the period 1959 to 1968 grew at a slower rate than did value added (in constant dollars), as is also the case for most of the industrial water use regions.

For those industries for which this was not the case the following observations can be made. Data anomalies result from industry concentration which leads to fewer and larger firms with a higher number of establishments in the over 20 MGY category. Some industries using lower grade raw materials have more need for residuals elimination and some could have operations at a lower percent of capacity on a more heavily capitalized base.

Estimates of industrial production of BOD₅ presented in the 1971 *Cost of Clean Water*³ indicated that this component of total waste produced increased by 97 percent between 1957 and 1968, though, of course, a significant portion of this load was withheld from surface water bodies through treatment.

The geographical incidence of industrial waste discharges in 1968 is shown in Table 3. Not surprisingly, the industrial Northeast and Midwest are the largest repositories of industrial discharges, with

the Western Gulf area also receiving a significant portion. The industrial sources of discharges within regions are indicated in Table 4.

³ U.S. Environmental Protection Agency, Water Quality Office, *Cost Effectiveness and Clean Water* (1971), p. 29.

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TABLE 1.—INDUSTRIAL WASTEWATER DISCHARGE AND VALUE ADDED BY INDUSTRIAL WATER USE REGIONS, 1959–68

	Total industrial wastewater discharges, 1968 (billions of gal.)	1968 industrial wastewater discharge as a percentage of 1959 discharge	1968 value added (deflated) as a percentage of 1959 value added
Industrial water use region:			
New England	558.4	113.0	131.6
Delaware and Hudson	1191.9	98.1	114.6
Chesapeake Bay	754.7	133.8	140.8
Ohio	2295.4	111.2	133.1
Eastern Great Lakes	1459.7	112.0	120.3
Tennessee-Cumberland	535.9	185.7	196.1
Southeast	1099.6	140.1	162.0
Western Great Lakes	1811.3	131.4	136.9
Upper Mississippi	581.6	144.7	131.4
Lower Mississippi	744.6	175.6	179.0
Missouri	141.9	102.1	147.5
Arkansas-White-Red	184.6	114.0	105.0
Western Gulf	1899.1	135.8	185.0
Colorado Basin	18.3	261.4	256.6
Great Basin	26.8	116.5	179.7
California	314.1	110.6	154.4
Pacific Northwest	532.5	119.4	159.4
National ¹	14150.4	124.6	138.6

¹ Excludes Hawaii and Alaska.

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TABLE 2.—INDUSTRIAL WASTEWATER DISCHARGE AND VALUE ADDED BY INDUSTRY GROUPS, 1959–68

Industry	Total industrial wastewater discharged, 1968 (billions of gal.)	1968 industrial wastewater discharge as a percentage of 1959 discharge	1968 value added (deflated) as a percentage of 1959 value added
Food and kindred products	752.8	131.9	130.3
Textile mill products	136.0	113.3	122.1
Lumber	92.7	73.8	99.9
Paper	2077.6	113.9	133.4
Chemicals	4175.1	136.4	181.9
Petroleum and coal	1217.0	101.1	178.7
Rubber	128.4	107.9	137.8
Leather	14.9	125.0	143.2
Stone, clay, and glass	218.4	82.6	116.1
Primary metals	4695.5	132.2	122.5
Fabricated metals	65.0	158.5	148.7
Machinery	180.8	109.6	157.7
Electrical equipment	118.4	134.5	242.3
Transportation equipment	293.1	128.0	179.6

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TABLE 3.—REGIONAL INCIDENCE OF INDUSTRIAL WASTE DISCHARGE, BY MAJOR INDUSTRIAL SECTORS, 1968
[Percent of Discharge of Industry's Wastewater, by Industrial Water Use Region]

	Regionally Assignable Discharge	New Eng.	Del. & Hud.	Chesa. Bay	East. Gr. Lak. St. Law.	Ohio Riv.	Tenn. Cum.	S.E.	West. Gr. Lak.	Upper Miss.	Lower Miss.	Mo.	Ark. W&R	West. Gulf	Colo. Basin	Gr. Basin	Cal. ¹	Pact. ² N.W.
Meat products	99.0	0.5	4.2	2.7	1.0	8.6	1.5	11.6	2.8	30.9	1.7	17.9	6.7	2.8	D	D	3.5	2.6
Dairy products	98.8	7.5	4.3	4.9	8.9	5.1	.6	2.3	12.5	24.7	2.8	4.3	4.7	1.0	D	1.3	7.0	6.4
Canned and frozen foods	93.1	1.4	3.2	2.5	3.9	2.3	D	29.0	5.3	2.9	1.9	.9	1.8	.8	D	D	20.5	16.7
All other food products	84.4	3.7	5.9	.7	1.0	4.0	.2	3.4	9.8	14.0	11.7	6.7	.3	1.5	D	D	20.3	1.2
Textile mill products	98.5	13.5	4.7	2.9	.5	2.4	6.3	65.7	D	.5	1.4	—	D	D	D	D	.6	D
Paper and allied products	98.7	11.9	3.3	4.9	3.2	2.4	3.1	28.9	7.8	6.0	2.7	1.0	3.8	2.5	.1	D	2.1	15.0
Chemical and allied products	99.0	1.2	7.3	5.7	6.4	16.6	9.3	4.7	2.7	2.1	8.0	.4	.9	31.5	D	D	.6	1.6
Petroleum and coal	92.0	.1	26.4	D	5.8	2.3	—	2.0	13.0	1.2	10.2	1.6	1.1	27.5	D	.1	8.4	.2
Rubber and plastic, n.e.c.	92.9	15.8	7.4	2.5	35.7	6.8	D	6.9	8.4	4.3	3.3	D	.9	D	D	D	.9	D
Primary metals	96.6	.7	6.1	6.9	17.5	29.4	.5	1.7	25.2	2.6	D	.4	.6	3.4	.2	D	.2	1.2
Machinery excluding electrical	99.9	14.9	34.0	1.2	4.8	9.0	.8	.7	12.5	19.8	.3	.2	.3	.7	D	D	.7	D
Electrical machinery	96.9	9.6	18.0	10.8	8.5	25.6	1.0	4.1	9.0	5.0	.5	.8	.9	D	D	D	3.0	D
Transportation equipment	97.0	31.4	3.0	5.1	33.3	4.6	.6	1.7	7.1	2.1	D	D	.5	5.0	D	D	2.2	D
Assignable discharge	96.5	93.2	96.7	82.6	95.9	98.1	91.5	97.8	96.1	88.7	78.7	81.3	95.7	99.3	61.7	8.2	81.6	87.6
Percent of industrial discharge, 1968	100.0	3.9	8.3	5.3	10.2	16.1	3.8	7.7	12.7	4.1	5.2	1.0	1.3	13.3	.1	.2	2.8	4.0
Percent of industrial discharge, 1959	100.0	4.3	10.7	5.0	11.5	18.1	2.5	6.9	12.1	3.5	3.7	1.2	1.4	12.3	.1	.2	2.5	3.9

¹ Includes Hawaii.

² Includes Alaska.

D = Disclosure not available due to disclosure constraints on U.S. Bureau of Census.

TABLE 4.—SOURCES OF INDUSTRIAL WASTE DISCHARGE, BY MAJOR INDUSTRIAL SECTORS, 1968
[Percent of Regional Discharge by Industry]

	New Eng.	Del.	Chesa. Bay	East. Gr. Lak.	Ohio Riv.	Tenn. Cumb.	S.E.	West. Gr. Lak.	Upper Miss.	Lower Miss.	Mo.	Ark. W&R	West. Gulf	Colo. Basin	Gr. Bas.	Cal.	Pacif. N.W.
Meat products	0.1	0.4	0.4	0.1	0.4	0.3	1.0	0.2	5.3	0.2	12.5	3.6	0.1	D	D	1.1	0.5
Dairy products .....	.7	.2	.3	.3	.1	—	.1	.4	2.3	.2	1.6	1.4	—	D	2.6	1.2	.6
Canned and frozen foods .....	.3	.6	.4	.3	.1	—	3.2	.4	.6	.3	.8	1.2	—	D	D	7.8	3.8
All other food products	2.5	4.0	.5	.3	.8	.2	1.5	2.4	11.6	7.6	22.6	.7	.4	D	D	9.1	1.1
Textile mill products	3.3	.5	.5	—	.1	1.6	8.1	D	.1	.3	—	D	D	—	—	.3	D
Paper and allied products	44.1	5.8	13.4	4.5	2.1	11.8	54.6	9.0	21.4	7.7	14.3	42.7	2.7	D	—	14.1	58.5
Chemical and allied products	9.3	25.7	31.7	18.4	30.2	72.6	18.0	6.2	15.0	45.0	12.3	20.9	69.2	15.3	D	8.5	12.3
Petroleum and coal .....	.1	26.9	D	4.8	1.2	—	2.3	8.7	2.5	16.6	13.6	7.4	17.6	D	5.6	32.4	.5
Rubber and plastic, n.e.c.	3.6	.8	.4	3.1	.4	—	.8	.6	.9	.6	D	.6	D	—	D	.4	D
Primary metals	5.9	24.0	31.0	56.1	60.1	4.1	7.2	65.3	20.7	D	14.0	15.5	8.4	46.4	D	3.2	10.3
Machinery excluding electrical	4.8	5.2	.3	.6	.7	.3	.1	1.2	6.2	.1	.3	.3	.1	D	D	.4	D
Electrical machinery	2.0	1.8	1.7	.7	1.3	.2	.4	.6	1.0	.1	.6	.6	D	D	D	1.1	D
Transportation equipment	16.5	.8	2.0	6.7	.6	.4	.5	1.1	1.1	D	D	.8	.8	D	D	2.0	D
Assignable discharge	93.2	96.7	82.6	95.9	98.1	91.5	97.8	96.1	88.7	78.7	81.3	95.7	99.9	61.7	8.0	81.6	87.6

D = Disclosure not available due to disclosure constraints on U.S. Bureau of Census.

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With the exception of the petroleum industry in the Delaware-Hudson and California regions, paper, chemicals, and primary metals are the principal sources of industrial discharges. Clearly, these industries in the industrialized areas create the largest demand for curtailment of waste discharges.

INDUSTRIAL WASTE TREATMENT, 1959-1968

Although industrial wastewater discharge has not grown as rapidly as industrial production—and the gap between the two rates of growth has widened⁴—the volume of industrial waste discharge must still be handled to attain, or maintain, acceptable levels of water quality. Four broad methods of curtailing the polluting effects of industrial liquid-borne wastes can be distinguished; (1) Waste treatment facilities can be added prior to discharge; (2) A plant can also discharge its wastes to a sewer and thereby place the responsibility for treatment upon a political jurisdiction; (3) Application to land, either through surface irrigation or well injection, can be a very thorough treatment technique, provided that precautions to prevent ground water contamination or run-off of pollutants are exercised; (4) Process change is, from both an environmental and administrative standpoint, perhaps the most attractive technique because of its reliability, predictability, and potential for recycling of waste materials. Process change, though, is part of the economics of water use generally. Accordingly, a discussion of process change is deferred to a later chapter which concerns water as an industrial input.

Superficial inspection of Tables 5 and 6 suggests that progress in the treatment of wastes by industry has been made during the last decade. In 1968, over 30 percent of industrial wastewater was reported to have received some kind of treatment performed by industry. This represents an increase of about 87 percent in treated discharge since 1959. In all regions and for most industries, the amount of wastewater treatment performed by manufacturers increased both absolutely and relative to total discharge over the period. Based on a consideration of the development of water quality standards, greater regulatory activity and other developments discussed in the previous section, these findings might be expected. It cannot, however, be inferred from these data that the amount of industrial pollutants reaching water has necessarily decreased.

⁴ Excluding Alaska and Hawaii, between 1959 and 1964 value added (in constant dollars) grew at an annual rate of 2.2 percent and industrial discharge grew at a rate of 2.7 percent; but between 1964 and 1968 value added grew at a rate of 4.8 percent which exceeds the 2.1 percent rate of growth of discharge by a wide enough margin to give the entire decade a creditable showing with respect to water productivity in manufacturing.

TABLE 5.—PERCENTAGE OF INDUSTRIAL WASTEWATER RECEIVING TREATMENT AND GROWTH IN TREATMENT BY INDUSTRIAL WATER USE REGIONS, 1959-68

Water use region	Industrial wastewater discharge			Annual rate of growth of treated discharge		
	Percent treated					
	1959 ¹	1964 ²	1968	1959-68	1959-64	1964-68
New England	4.7	11.4	10.0	10.4	19.1	0.4
Delaware-Hudson	25.0	40.2	42.0	5.7	9.6	.8
Chesapeake Bay	24.5	25.6	28.5	5.1	5.8	4.1
Ohio	14.5	17.7	23.3	6.6	6.7	6.5
Eastern Great Lakes	20.3	31.7	22.0	2.2	11.6	-8.3
Tennessee-Cumberland	18.0	31.3	26.4	11.8	19.6	2.9
Southeast	17.3	36.8	43.1	14.9	19.3	9.6
Western Great Lakes	19.4	34.8	41.7	12.2	15.3	8.5
Upper Mississippi	16.9	35.0	23.7	8.2	21.0	-5.5
Lower Mississippi	6.4	23.8	21.0	21.6	38.0	2.9
Missouri	16.5	48.1	45.5	12.2	22.0	1.0
Arkansas-White-Red	30.9	50.6	67.0	10.6	15.2	8.9
Western Gulf	31.3	22.6	23.2	.1	-2.6	3.5
Colorado Basin	14.3	31.3	19.1	14.9	38.0	-8.5
Great Basin	13.0	58.6	42.9	16.1	41.0	-9.3
California	51.8	59.7	55.4	1.9	5.3	-2.2
Pacific Northwest	14.3	29.6	36.3	13.1	20.0	4.8
National ³	20.3	29.2	30.4	7.2	10.5	3.1

¹ Volume of treated discharge derived from 1958 *Census of Manufacturers*.² Volume of treated discharge derived from 1963 *Census of Manufacturers*.³ Excludes Alaska and Hawaii.

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TABLE 6.—PERCENTAGE OF INDUSTRIAL WASTEWATER RECEIVING TREATMENT AND GROWTH IN TREATMENT BY INDUSTRY GROUPS, 1959-68

Industry group	Percent of industrial wastewater discharge treated			Annual rate of growth of treated discharge		
	1959	1964	1968	1959-68	1959-64	1964-68
Food and kindred products ...	13.0	22.9	24.6	10.7	16.4	4.0
Textile mill products	14.2	25.9	39.7	13.7	15.5	11.5
Lumber	24.6	27.6	20.4	-5.3	1.9	-13.5
Paper	41.8	36.4	44.0	2.1	-1.0	6.7
Chemicals	16.3	16.0	16.1	3.4	3.4	3.4
Petroleum and coal	54.5	76.4	75.4	3.8	8.9	-1.8
Rubber	3.4	7.8	5.4	6.4	17.6	-6.3
Leather	16.7	63.6	66.7	19.6	28.5	9.3
Stone, clay and glass	4.2	18.8	16.5	14.1	30.0	-3.2
Primary metals	15.1	26.9	30.8	11.5	16.7	5.4
Fabricated metals	7.3	12.0	13.8	13.0	14.9	10.7
Machinery	18.8	8.0	13.8	-2.3	-17.4	20.0
Electrical equipment	8.0	17.0	23.7	16.7	16.5	16.9
Transportation equipment	9.6	10.3	7.8	.5	1.8	-1.1

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Available data do not permit estimation of the degree of treatment received by final industrial waste discharge. In the absence of inventories of industrial treatment facilities analagous to the Municipal Waste Inventories, it is presently impossible to estimate the amount and rate of change of the discharge of industrial liquid-borne pollutants.

Another reason that the apparent increases in wastewater treatment by industry do not necessarily imply a decrease in industrial pollutants is that treatment of industrial wastewater is often a requirement for discharge to sewers. As presented in the 1968 *Water Use in Manufacturing*, the data did not allow an estimate of treatment prior to sewer discharge or application to land. In 1964 the volume of industrial waste receiving treatment prior to discharge to sewers or ground appears to have been about 5 percent of the total treated discharge. This percentage may have increased by 1968 because of the growth in municipal waste treatment and associated pretreatment requirements for industrial connections.

One disturbing finding which emerges from an examination of the data over the period 1959 to 1968 is that treatment of wastes by industry grew at a considerably faster rate from 1959 to 1964 (10.5 percent annual rate) than from 1964 to 1968 (only a 3.1 percent annual rate, cf. Table 5). In fact, in five of the seventeen water use regions and five of the fourteen industries there was both a relative and absolute decline in the amount of industrial wastewater receiving some kind of treatment over the period 1964–1968. As a consequence of the differing rates of growth in treatment, the amount of untreated wastewater discharged by industry grew at an annual rate of 1.6 percent over the 1964–1968 period, even though total discharge of industrial wastewater grew at a slower rate in the later period (2.1 percent annual rate of growth) than in the earlier period (2.8 percent). The nature and detail of available data do not permit an investigation as to the many possible reasons for the decline in the rate of growth of industrial wastewater treatment. However, the period 1964–1968 experienced generally increasing rates of interest which, because the rate of interest is an integral part of the cost of capital investments to industry, may have discouraged or postponed investment generally and investment for industrial treatment facilities in particular. Another conjecture which might bear on the decline in the rate of growth of industrial treatment concerns the responses of firms to increased scarcity of fresh water for industrial use and increased regulatory pressures. More stringent effluent requirements and increased enforcement of such requirements provide an incentive to industry to amend production processes to curtail the production of liquid-borne pollutants and/or to find profitable uses for the would-be waste discharges. Also, while regulatory constraints on industrial discharges have become tighter, the demand on available water supplies has increased, which provides an incentive to economize on water intake and discharge. The total effect of these pressures may have been to drive below the 20 million-gallons-

a-year threshold some of the establishments which had reported in the *Water Use in Manufacturing* series prior to 1968. Thus, these establishments did not report in the 1968 survey. In other words, establishments which significantly altered processes to decrease the amount of their discharge to be treated may have thereby eliminated themselves from the request to report their discharges and associated amount of treatment to the Bureau of the Census, and decreased the apparent rate of growth in industrial wastewater treatment.

It should also be noted that quantitative representations of wastewater treated over time may not be an accurate indication of growth. Industrial management's view of what constitutes treatment is unconstrained by definition, so that waste-amending practices tend in all cases to be reported as treatment. But as waste treatment requirements become more stringent, intake economies and segregation modify utilization practices in such fashion that the amount of wastewater treated declines in rough proportion to the intensity of treatment. (For example—a factory in which water application is divided equally among cooling, process, and sanitary purposes might have discharged in 1959 through a common outfall, with coarse screening the only treatment provided, and have reported treatment of 100 percent of its aqueous wastes; by 1968, as a result of regulatory pressures, the same factory might be discharging sanitary wastes to a public sewer, discharging once through cooling waters through a separate outfall to prevent contamination by other wastewaters and providing a high degree of treatment to process wastes, yet report—quite accurately—that only 33 percent of its wastes were treated.) To what extent such considerations are reflected in the apparent slowing of waste treatment growth we cannot guess.

PUBLIC TREATMENT OF INDUSTRIAL WASTES

Discharge of industrial wastewater to public sewers places the requirement for adequate waste treatment upon local public agencies responsible for municipal waste treatment. As wastewater treatment at the secondary level (i.e., about 80 to 90 percent BOD reduction) or above becomes more prevalent among municipalities, the degree of treatment of sewered industrial wastewater should generally increase. However, as municipalities raise their target rates of waste removal, they must become more discriminating about the types and timing of industrial discharges that they will accept in order to prevent adverse consequences on the operation of their treatment works. Increased selectivity of acceptable discharge to sewers generally means outright prohibition on the discharges of certain industrial residuals and/or pretreatment requirements. For the sewered manufacturing plant, greater selectivity can translate into separation

of waste streams and/or treatment of discharges bound for the sewer, both of which entail an increase in costs. From the data reported in the *Water Use in Manufacturing* series it appears that these develop-

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ments have been an offset to the subsidies provided by Federal and State grants for municipal wastewater treatment plant construction.

From 1959 to 1968 the percentage of industrial wastewater discharged to sewers declined from 8.7 percent to 7.2 percent (cf. Table 7). However, all of this decline took place in the 1959-1964 period, and over the 1964-1968 span relative discharge to sewers remained virtually constant, with the absolute amount of sewerage discharge increasing slightly. Although the relative amount of industrial discharge going to sewers is rather small, it can be inferred from Table 8 that municipal waste treatment is the primary method of curtailing industrial liquid-borne pollutants from the food processing, textiles, rubber, leather, and the various metal manufacturing industries.

(The percentages in Table 8 probably understate the relative amount of industrial discharge going to sewers by a percentage point because municipal waste treatment is also the primary method by which the water-borne wastes of minor urban manufacturing establishments whose intake is less than 20 million gallons a year are handled.)

GROUND DISPOSAL OF INDUSTRIAL WASTES

Discharge to the ground can be an effective method of treating industrial wastewater. Direct application to land utilizes the evaporative powers of the atmosphere and the filtering action of soil and rock strata to eliminate and purify industrial wastewater. Deep-well injection is a method of withholding and isolating particularly dangerous or conservative industrial wastes from surface streams. The use of disposal to land as a technique is constrained by the cost and availability of land, the possible contamination of ground waters, and the possible nuisances of noxious odors and aesthetic degradation. However, as long as proper precautions are taken, applications to land are valuable in cleansing and recycling liquid industrial discharge.

Discharge of industrial wastewater to the ground is not a prevalent disposal technique; according to the data presented in the *Water Use in Manufacturing*, 1968 only 1.3 percent of industrial wastewater was discharged to the ground (cf. Table 9). The use of land as a disposal medium has grown however, between 1959 and 1968 industrial discharges going to the ground grew at an annual rate of 7.8 percent. From Table 9 it appears that ground discharge is a significant technique of disposal in the sparsely populated and arid regions

of the Colorado Basin and Great Basin, where the wastes may have an economic value for irrigation use. Ground discharge is generally least used in the humid and often densely populated areas east of the Mississippi River and in the Western Gulf. Among industries, the food and kindred industry group discharged the largest percentage of its wastewater to the ground—5.8 percent in 1968 (cf. Table 10)—and the chemicals and primary metals groups discharged to the ground 40.3 billion gallons and 38.1 billion gallons, respectively.

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TABLE 7.—PERCENTAGE OF INDUSTRIAL WASTEWATER DISCHARGED TO SEWERS AND GROWTH OF SEWERED DISCHARGE BY INDUSTRIAL WATER USE REGION, 1959-68

Water use region	Industrial wastewater discharge percent discharged to sewers			Annual rate of growth of sewered discharge		
	1959	1964	1968	1959-1968	1959-1964	1964-1968
New England	12.6	10.0	8.4	-3.0	-5.0	-0.5
Delaware-Hudson	7.4	4.0	7.3	-.4	-11.8	16.1
Chesapeake Bay	5.0	5.6	4.3	1.7	7.4	-5.1
Ohio	5.4	7.1	7.5	4.9	8.2	.8
Eastern Great Lakes	10.1	10.7	13.9	4.9	3.1	7.1
Tennessee-Cumberland	3.5	2.7	2.6	3.7	1.9	6.0
Southeast	5.0	5.4	5.2	4.3	4.3	4.3
Western Great Lakes	17.7	9.8	7.4	-6.5	-8.9	-3.3
Upper Mississippi	26.4	21.1	18.5	.2	-.4	.9
Lower Mississippi	6.4	3.5	3.1	-1.9	-5.8	3.2
Missouri	20.1	27.9	17.8	-1.2	5.1	-8.5
Arkansas-White-Red	4.9	8.0	7.9	6.8	11.8	.7
Western Gulf .....	.9	.8	.8	1.7	1.5	2.1
Colorado Basin	42.9	25.0	20.2	2.4	5.9	-2.0
Great Basin	4.4	6.9	6.3	6.1	14.9	-4.0
California	15.1	15.1	16.8	2.3	2.2	2.5
Pacific Northwest	9.6	6.7	5.7	-3.8	-3.5	-4.5
National ¹	8.7	7.3	7.2	.3	-.9	1.9

¹ Excludes Alaska and Hawaii.

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TABLE 8.—PERCENTAGE OF INDUSTRIAL WASTEWATER DISCHARGED TO SEWERS AND GROWTH OF SEWERED DISCHARGE BY INDUSTRY GROUPS, 1959-68

Industry group	Industrial wastewater discharge percent discharged to sewers			Annual rate of growth of sewered discharge		
	1959	1964	1968	1959-1968	1959-1964	1964-1968
Food and kindred products	36.6	35.0	31.6	1.4	2.9	-0.3
Textile mill products	31.7	32.6	37.2	3.2	3.0	3.6
Lumber	6.3	3.3	2.7	-12.1	-13.0	-11.1
Paper	4.4	4.2	3.5	-1.2	0	-2.7
Chemicals	3.5	4.2	4.3	6.0	7.4	4.3
Petroleum and coal .....	.9	2.4	.6	-4.1	23.0	-43.0
Rubber	19.3	15.5	17.4	-.3	.9	-1.7
Leather	50.0	63.6	68.0	6.1	3.1	9.9
Stone, clay and glass	8.0	8.7	9.4	-.3	-2.0	1.8
Primary metals	7.4	3.6	3.1	-6.5	-9.8	-2.2
Fabricated metals	70.7	64.0	59.4	3.2	2.0	4.8
Machinery	22.4	26.8	24.6	2.1	1.6	2.7
Electrical equipment	46.6	53.8	62.8	6.8	3.6	11.0
Transportation equipment	36.2	33.3	26.3	-.8	-1.0	-.6

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TABLE 9.—PERCENTAGE OF INDUSTRIAL WASTEWATER DISCHARGED TO THE GROUND AND GROWTH OF GROUND DISCHARGE BY INDUSTRIAL WATER USE REGIONS, 1959-68

Water use region	Industrial wastewater discharge percent discharged to ground			Annual rate of growth of discharge to ground		
	1959	1964	1968	1959-68	1959-64	1964-68
New England	0.4	0.4	0.9	10.9	0	26.0
Delaware-Hudson	1.1	1.3	1.5	3.7	4.2	3.0
Chesapeake Bay	1.2	1.5	.6	1.7	7.4	— 5.0
Ohio .....	.6	.6	.5	— .3	2.9	— 4.5
Eastern Great Lakes .....	.6	.6	.5	—1.8	2.4	— 6.8
Tennessee-Cumberland .....	.4	2.5	.3	6.8	N.C. ²	N.C. ²
Southeast .....	.9	1.3	1.7	11.3	11.4	11.3
Western Great Lakes .....	.4	.5	.6	6.6	5.9	7.5
Upper Mississippi	1.7	1.2	4.3	15.1	— 3.0	43.0
Lower Mississippi .....	.2	.5	1.5	35.0	25.0	39.0
Missouri .....	.7	1.6	1.4	8.0	14.9	0
Arkansas-White-Red	1.2	1.7	2.8	11.2	8.4	14.7
Western Gulf .....	.2	.1	.5	13.0	— 7.8	N.C. ²
Colorado-Basin	28.6	6.3	44.3	16.8	—12.9	N.C. ²
Great Basin	N.R. ³	6.9	21.3	N.R. ³	N.R. ³	30.0
California	4.6	6.0	6.1	4.3	7.9	0
Pacific Northwest	2.2	3.7	4.1	10.8	14.9	5.9
National ¹ .....	.8	1.1	1.3	7.8	7.7	7.9

¹ Excludes Alaska and Hawaii.² Exceeds 50 percent in absolute value.³ Calculation not possible because the necessary datum was not reported.

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TABLE 10.—PERCENTAGE OF INDUSTRIAL WASTEWATER DISCHARGED TO THE GROUND AND GROWTH OF GROUND DISCHARGE BY INDUSTRY GROUPS, 1959-68

Industry group	Industrial waste discharge percent discharged to ground			Annual rate of growth of discharge to ground		
	1959	1964	1968	1959-1968	1959-1964	1964-1968
Food and kindred products	4.2	11.5	5.8	6.8	27.0	—13.9
Textile mill products	1.7	3.7	1.0	—3.9	20.0	—27.3
Lumber	1.6	2.4	4.1	7.4	8.4	6.1
Paper .....	.5	.6	.8	6.5	4.1	9.7
Chemicals .....	.6	1.0	1.0	8.7	14.9	1.5
Petroleum and coal .....	.4	.4	1.1	11.5	0	28.0
Rubber	1.7	1.7	2.0	2.5	0	5.7
Leather	8.3	0	2.7	—9.7	—	—
Stone, clay and glass	1.9	8.3	5.3	9.8	29.0	—10.4
Primary metals .....	.6	1.3	.9	5.4	14.9	— 5.4
Electrical equipment	1.1	3.4	3.3	14.9	24.6	6.1
Transportation equipment	1.7	2.1	2.5	6.9	4.6	9.9

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II

PROCESS AND THE USE OF WATER IN INDUSTRY

INTRODUCTION

The chapter considers the utility of water as an industrial raw material, the increasing intensity of its application, the substitution of capital for water inputs, and the relationship of these phenomena to water quality and effluent treatment.

SUMMATION

The real price of water—measured by its scarcity and the cost of its application—is increasing for industry. In consequence, manufacturers are using it with growing intensity. Use of capital to provide more effective utilization of each intake unit at each application and to increase the number of applications by recycling is indicated by positive correlations between growth of output per intake gallon with (a) growth of output, and (b) water scarcity. Neither characteristic correlates with growth of industrial waste treatment, suggesting that management response to an increase in the price of water is limited to each firm's internal operations and does not extend to measures that will reduce prices for society as a whole. Nevertheless, increased demand for water leads to processing methods that result in reduced dependence on the available supply, thus supplementing—and in some degree substituting for—the effect of waste treatment.

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PROCESS CHANGE AND THE USE OF WATER IN INDUSTRY

UTILITY OF WATER IN MANUFACTURING

In 1968 about 15.5 trillion gallons of water were withdrawn in the United States by manufacturers (cf. Table 11)—an increase of 27.5 percent from 1959. According to U.S. Geological Survey sources, industry, exclusive of electrical utilities, accounted for 14.5 percent of withdrawals in the United States from 1950 to 1965. Water provides a number of productive services within manufacturing processes. A number of products, notably beverages and prepared foods, incorporate water directly into the product. Water can be used to transport materials in a manufacturing process; for example, water is used to carry partially prepared fruits and vegetables between stages of production. But the most common use of water by industry is to transport or flush away residual matter, the inevitable by-products of manufacturing processes that must be carried away in order to prevent counter-productive effects.

Much of the intake of water by industry is directly toward cooling; in 1968, the percentage of initial intake for the purpose of cooling amounted to 65.5 percent (cf. Table 12). Cooling water is used to absorb the heat arising from the difference between thermal energy generated and that used in production. The heat, in turn, can be identified as a residual from industrial production. Although cooling tends to be the major use of water in industry, process water carried almost all residuals other than heat. Respondents in the Conference Board survey indicated that 93.4 percent of the BOD, 89 percent of

chemical oxygen demand (COD), and 85 percent of suspended solids contained in their wastewater were contributed directly by the production process. Table 12 indicates waste concentrations in process water, generally highest for paper and allied products. Clearly, it is the use of water directly in the production process which creates a need for curtailment of the amount of residuals discharged to waterways.

PROCESS CHANGE—AN ALTERNATIVE TO TREATMENT

The trends presented in the previous chapter indicated that wastewater treatment by industry has increased over the past decade, but that considerable increases in the amount and, probably, the degree of wastewater treatment are necessary in order to meet current regulatory standards for waterways. An alternative to end-of-stream treatment as a method for reducing the discharge of liquid-borne residuals is alteration of production processes so that the production of residuals decreases. Process change can involve adoption of known low-residual techniques, development of new techniques, alteration of product lines from high-residual to low-residual goods, and use of low-residual raw materials.

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TABLE 11.—VOLUME OF INTAKE AND PERCENT CONSUMED BY INDUSTRY GROUPS, 1968

Industry	Intake, 1968 (billions of gallons)	Percent consumed, 1968
Food and kindred products	811	7.2
Textile mill products	154	11.7
Lumber	118	21.2
Paper	2252	7.7
Chemicals	4476	6.7
Petroleum and coal	1435	15.2
Rubber	135	5.2
Leather	16	6.3
Stone, clay, and glass	251	13.1
Primary metals	5005	6.2
Fabricated metals	68	4.4
Machinery	189	4.2
Electrical equipment	127	7.1
Transportation equipment	313	6.4
All manufacturing	15467	9.6

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TABLE 12.—COMPOSITION OF INDUSTRIAL WATER INTAKE AND WASTE CONCENTRATION BY INDUSTRY GROUPS, 1968

Industry	Percent of Intake, 1968			Waste concentration of process water (in p.p.m.) ¹		
	Cooling	Process	Other	BOD	COD	SS
Food and kindred products	52.6	35.8	11.6	87	114	703
Textile mill products	15.3	70.7	14.0	304	327	70
Paper	28.9	65.6	5.5	336	3565	388
Chemicals	78.9	16.4	4.7	130	378	225
Petroleum and coal	85.7	6.6	7.7	52	210	76
Rubber	70.9	17.6	11.5	17	57	30
Primary metals	72.6	24.1	3.3	18	80	259
Fabricated metals	28.4	54.8	16.8	² N.A.	N.A.	N.A.
Machinery	72.0	15.3	12.7	N.A.	N.A.	N.A.
Electrical equipment	38.4	36.8	24.8	N.A.	N.A.	N.A.
Transportation equipment	25.6	20.2	54.2	N.A.	N.A.	N.A.
All manufacturing	65.5	27.8	6.7	N.A.	N.A.	N.A.

¹ Source: Conference Board Survey of 800 manufacturing establishments.² N.A.—not available.

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Most of the documented cases of process changes which reduced the pollutant loadings per unit of product indicate that the reduction in wastes produced was fortuitous rather than deliberate. For example, in the pulp and paper industry the substitution of the sulfate process for the older and much more residual-intensive sulfite process has occurred primarily because the newer process effects lower unit costs of production than the older process. The consequent decrease in residuals production has been, from the point of view of the pulp producer, an incidental benefit.

One piece of evidence suggests that firms are directing investments toward process change in order to reduce waste loadings. The survey on water pollution abatement costs conducted by the Conference Board¹ indicates that 27.9 percent of capital expenditures for water pollution control by the sampled plants were for manufacturing changes to reduce water pollution. This percentage varied from 35.6 percent in paper and allied products to 2.8 percent in textile mill products.

Lack of data prevents an analysis and evaluation of the extent and changes over time in alterations of production process that reduce the amount of residuals generated. Only a few case studies of process change exist, and these have generally examined plants in which a dramatic change in production technique was instituted. Most process changes, like technological progress in industry generally, tend to be incremental and cumulative. No systematic and inclusive collection of data related to process change over time (for example, investment for process change and waste loads produced) has ever been undertaken, and, thus, direct assessment of the rate of process

change and its effects on waste loadings is not possible.

Indirect inferences concerning changes in the pollutant content of industry's discharged wastewater can be made by examining changes in the intake, use and discharge of water over time in industry. As stated in an earlier volume in this series of reports to the Congress, "there is an indication that reduction in volume of wastewater is often accompanied by a reduction in the volume of pollutants discharged. While concentrations of pollutants might, in the normal order of things, be expected to rise in direct proportion to the decline in the volume of carrying liquid, this is simply not the case for industry as a whole. The reason is that operating practices—"good housekeeping"—have a high degree of influence on the volume of wastes produced in a factory; and when hydraulic controls are

¹ U.S. Environmental Protection Agency, *The Economics of Clean Water*, Vol. III, January 1972.

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tightened there is a corollary reduction in materials losses. In addition to this influence on waste volume, there are direct reductions attributable to engineering improvement specifically aimed at materials reclamation."² In other words, economizing on water intake, and thus discharge, is often accompanied by increased attention to the production and handling of water-borne residuals, and materials control generally, which have a negative effect on the amount of pollutants discharged.

In addition to having a generally depressing influence on the production of residuals, economizing on water intake will have beneficial effects for environmental enhancement and protection. Water not withdrawn for the purpose of residual elimination means more water is available in streams for assimilative processes. Recycling and reuse of water is a common method of economizing on water intake per unit of product. Recycling of water can cause an increase in the concentration of pollutants in industrial wastewater which generally lowers the cost of treatment per unit of waste and cheapens the cost of by-product recovery.

The trends in water intake for industrial water use regions and industry groups reported in Tables 13 and 14 indicate that water intake increased over time for all regions and for most industries. This finding is not surprising, given the growth in production in the economy over the period 1959-1968. However, growth in production alone hardly accounts for differences in the trends in water intake across regions and across industries; the percentages of variation in water intake growth explained by growth in value added are only 18 and 21 percent for regions and for industries, respectively, neither

of which is different from zero by the usual tests of statistical significance. In other words, growth in water withdrawals by industry has not been primarily conditioned by growth in industrial production.

Examination of the ratio of growth in value added (in constant dollar) to growth in water intake (cf. Tables 13 and 14) indicates that production has generally grown more rapidly than water intake. Productivity, which is most often defined with respect to labor, can be defined as the ratio of the rate of growth of output to the input in question. The sources of productivity increases are improvements in the quality of the input, increased application or substitution of other inputs, and technological progress, by which is meant improvements in products and production processes. Although the treatment of wastewaters discharged to surface streams has increased in both

¹ U.S. Department of the Interior, Federal Water Pollution Control Administration, *The Cost of Clean Water*, Vol. II (U.S. Government Printing Office, 1968), p. 82.

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TABLE 13.—TRENDS IN INDUSTRIAL WATER INTAKE AND IN MEASURES OF PROCESS CHANGE
BY INDUSTRIAL WATER USE REGIONS, 1959-1968

	1968 as a percentage of 1959				Recycle ratio, 1968
	Intake	Value added (deflated)/intake	Value added (deflated)/use	Value added (deflated)/discharge	
New England	105.3	125.0	108.8	116.4	1.65
Middle Atlantic ¹	110.7	109.8	128.8	110.0	1.78
Ohio	114.3	116.4	105.1	119.7	1.68
Eastern Great Lakes	117.5	102.4	94.9	107.4	1.72
Tennessee-Cumberland	187.3	104.7	127.9	105.8	1.85
Southeast	138.4	117.1	97.6	115.7	3.15
Western Great Lakes	135.6	102.4	114.7	104.2	1.52
Upper Mississippi	157.6	83.4	83.8	90.8	2.18
Lower Mississippi	178.2	100.4	99.5	101.9	2.30
Missouri	108.2	136.3	121.6	144.5	3.56
Arkansas-White-Red	120.3	87.0	89.4	92.1	6.93
Western Gulf	136.4	136.2	117.7	136.8	3.49
Colorado Basin	122.6	209.3	227.5	98.2	6.15
Great Basin	113.9	157.8	118.5	154.2	5.50
California	113.5	136.0	121.7	139.6	4.09
Pacific Northwest	128.1	124.4	104.5	133.6	2.82
National ²	126.9	109.2	103.5	111.2	2.31

¹ Delaware-Hudson and Chesapeake Bay.

² Excludes Alaska and Hawaii.

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TABLE 14.—TRENDS IN INDUSTRIAL WATER INTAKE AND IN MEASURES OF PROCESS CHANGE
BY INDUSTRY GROUPS, 1959-68

[1968 as a Percentage of 1959]					
	Intake	Value added (deflated)/intake	Value added (deflated)/use	Value added (deflated)/discharge	Recycle ratio, 1968
Food and kindred products ..	130.0	100.2	125.6	98.8	1.66
Textile mill products	114.1	123.5	78.2	124.3	2.13
Lumber	84.3	118.5	89.7	135.3	1.74
Paper	116.3	106.8	115.1	109.0	2.90
Chemicals	138.1	122.0	93.5	123.5	2.10
Petroleum and coal	108.8	163.1	140.8	175.6	5.08
Rubber and plastics	106.3	129.6	111.7	128.1	1.99
Leather	133.3	107.4	100.2	114.6	1.25
Stone, clay and glass	100.0	116.1	115.9	116.9	1.64
Primary metals	135.2	90.2	89.0	92.3	1.55
Fabricated metals	154.5	96.2	62.4	93.8	2.48
Machinery	110.5	141.7	116.3	142.8	1.79
Electrical equipment	136.6	159.4	93.6	162.4	2.91
Transportation equipment ...	120.4	119.4	82.4	112.4	2.91

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volume and degree, it is unlikely that stream quality has increased to the point where less water per unit of product is needed. Instead, increased deterioration of surface waterbodies can lead to an increase in water productivity: decreased quality of intake can lead to increased treatment prior to application, which effectively raises the cost of utilizing an additional unit of water and provides an incentive to economize on intake. It would appear, then, that the increased productivity of water in industry is attributable to substitution of other inputs (primarily capital and less pollutational raw materials) and improvements in production technique.

Similarly, the ratio of the growth in value added (deflated) to the growth in industrial wastewater discharge generally increased over the 1959-1968 period. In fact, for most of the regions and industries this ratio grew at a slightly faster rate than did the ratio of value added to intake. (Water use is defined as the quantity of water that would have been required if no water were recirculated or reused, less consumption and evaporative loss.) Use measures the actual application of water in production processes. From Tables 13 and 14 no clear pattern emerges with respect to the growth of value added relative to use; increases and decreases in this ratio are almost equally numerous across regions and industries although nationally there was a slight trend toward using less water per (constant) dollar of production.

Clearly, there has been a discernible, and apparently deliberate, effort by industry to economize on water intake. Additionally, casual inspection of the first and second columns of Tables 13 and 14 shows that there has been considerable variation between regions and industries with respect to trends in intake and productivity of intake.

These trends are consistent with the proposition that water is not treated as a freely available commodity by industry. What, then, have been the incentives which have led industry to economize on water intake?

INFLUENCES ON PROCESS MODIFICATION

One possibility is that incentives to economize on water use emanate from the price of water and product demand. To examine this possibility, the sixteen industrial water use regions were cross-classified by (1) regional growth in value added being above or below the median value and (2) the ratio of total freshwater withdrawals in 1965 to median available supplies being above or below the median value. Averages of the magnitudes of interest for each category were computed and are reported in Tables 15 through 17. The price of water to industry cannot be directly measured because most of the water used in industry is self-supplied; according to Census sources, 87.2 percent of freshwater intake and 89.7 percent of total intake came from company sources in 1968. However, it is highly likely that as withdrawals of freshwater, both from surface and ground sources, increase relative to available supplies, the cost of securing an addi-

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tional unit of water will increase. In other words, increased demand for water relative to supply will, *de facto*, increase the implicit price of water to industry.

The averages reported in Tables 15 through 17 indicate that the pressure on available supplies of fresh water and growth in value added have provided incentives to industry to economize on water.³ Intake increased most rapidly for regions which experienced above average growth in production but increased more slowly for regions in which pressures on water supplies were above the average (cf. Table 15). Growth in the ratio of value added to water intake, a measure of the productivity of water in industry, was higher for the faster growing regions and for regions in which water demand relative to supply was above average (cf. Table 16). Recycling and reuse of water is a prevalent method of economizing on industrial water intake. The results in Table 17 indicate that, excluding the Arkansas-White-Red region from the computations,⁴ the recycle is a positive function of both growth in product demand and the implicit price of water. Thus, it appears that the incentives for economizing on water in industry are much the same as those for any other industrial input.⁵

An interesting question arises from this conclusion: namely, do the same incentives which, in part, guide industrial water intake and use

influence the amount of wastewater treatment performed by industry? Based on the same type of analysis, the answer to this question is negative. Tables 18 through 20 show that there is no consistent pattern among different measures of increases in industrial waste treatment (i.e., the ratio of treated discharge to total discharge in 1968, the growth in the ratio of treated discharge to total discharge from 1959 to 1968, and the growth in treated discharge from 1959 to

³ There is a high degree of confidence that the ROW averages are different from one another as are the column averages. In the language of the statistician, difference between ROW means and differences between column means are significantly different from zero at the .10 level.

⁴ The Arkansas-White-Red region, which had the highest computed recycle ratio among the regions, deviates from the relationship between recycling and the growth in production and the pressure on available freshwater supplies. One possible reason for this deviance is that much of the surface water in this region is acknowledged to be of poor quality which, in turn, increases the need for treatment prior to application. The treatment is an additional cost of using the water which creates an incentive for further recycling.

⁵ A multiple regression analysis using value added and the ratio of withdrawals to available supplies as explanatory variables also supports this conclusion.

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TABLE 15.—AVERAGE OF 1968 INTAKE AS A PERCENTAGE OF 1959 INTAKE FOR INDUSTRIAL WATER USE REGIONS CLASSIFIED BY RATIO OF WITHDRAWALS TO MEDIAN WATER SUPPLY AND GROWTH IN VALUE ADDED

Growth in value added, 1959-68	Ratio of withdrawals to median available supply, 1965		Row mean
	Below median	Above median	
Below median	123.5	118.9	123.5
Above median	158.0	121.6	140.1
Column mean	141.1	120.3	....

TABLE 16.—AVERAGE OF 1968 VALUE ADDED/INTAKE AS A PERCENTAGE OF 1959 VALUE ADDED/INTAKE FOR INDUSTRIAL WATER USE REGIONS CLASSIFIED BY RATIO OF WITHDRAWALS TO MEDIAN WATER SUPPLY AND GROWTH IN VALUE ADDED

Growth in value added, 1959-68	Ratio of withdrawals to median available supply, 1965		Row mean
	Below median	Above median	
Below median	101.3	113.7	107.8
Above median	111.7	159.8	136.1
Column mean	106.8	137.0	....

TABLE 17.—AVERAGE OF 1968 RECYCLE RATIO FOR INDUSTRIAL WATER USE REGIONS CLASSIFIED BY RATIO OF WITHDRAWALS TO MEDIAN WATER SUPPLY AND GROWTH IN VALUE ADDED

Growth in value added, 1959-68	Ratio of withdrawals to median available supply, 1965		Row mean
	Below median	Above median	
Below median	¹ 1.87	2.12	2.00
Above median	2.53	4.80	3.67
Column mean	2.20	3.46

¹ Excludes Arkansas-White-Red region.

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TABLE 18.—AVERAGE OF PERCENTAGE OF DISCHARGE TREATED, 1968, FOR INDUSTRIAL WATER USE REGIONS CLASSIFIED BY RATIO OF WITHDRAWALS TO MEDIAN WATER SUPPLY AND GROWTH IN VALUE ADDED

Growth in value added, 1959-68	Ratio of withdrawals to median available supply, 1965		Row mean
	Below median	Above median	
Below median	34.5	33.2	33.9
Above median	31.5	35.0	33.2
Column mean	33.0	34.1	....

TABLE 19.—AVERAGE OF 1968 TREATED DISCHARGE AS A PERCENTAGE OF 1959 FOR INDUSTRIAL WATER USE REGIONS CLASSIFIED BY RATIO OF WITHDRAWALS TO MEDIAN WATER SUPPLY AND GROWTH IN VALUE ADDED

Growth in value added, 1959-68	Ratio of withdrawals to median available supply, 1965		Row mean
	Below median	Above median	
Below median	196.0	215.7	205.8
Above median	376.0	255.6	315.8
Column mean	286.0	235.6	....

TABLE 20.—AVERAGE OF 1968 RATIO OF TREATED TO TOTAL DISCHARGE AS A PERCENTAGE OF 1959 FOR INDUSTRIAL WATER USE REGIONS CLASSIFIED BY RATIO OF WITHDRAWALS TO MEDIAN WATER SUPPLY AND GROWTH IN VALUE ADDED

Growth in value added, 1959-68	Ratio of withdrawals to median available supply, 1965		Row mean
	Below median	Above median	
Below median	163.8	189.7	176.8
Above median	219.3	176.8	198.0
Column mean	191.6	183.2

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1968) and the growth in value added and the ratio of withdrawals to median available supply. Other regional characteristics, such as regulatory activity, might explain variations in regional differences in industrial wastewater treatment.

Economic behavior, then, leads to process changes which can be expected to decrease industrial waste loadings. At first appearance it might seem paradoxical that increased industrial production and increased pressures on available supplies of fresh water, both of which are pointed to as prime causes of environmental deterioration, also lead to industrial process changes that have—at least relative—environmentally beneficial effects. The paradox is easily resolved by viewing industrial intake and discharge of water as activities subject to the same set of rational calculations that govern the use of any productive input.

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III

INDUSTRIAL COST MODEL

INTRODUCTION

The chapter outlines the major assumptions and data sources for the calculation of industrial waste treatment costs presented in subsequent chapters.

SUMMATION

Industrial waste treatment costs are dependent on flow volumes, residuals characteristics, waste segregation opportunities, and available technology. Although these vary greatly from plant to plant, they can be generalized for industrial categories, and evaluated on the basis of reported flows and flow-to-cost relationships for specified engineering constructs.

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MODEL COMPONENTS AND LOGIC

The data and interpretations that constitute the remaining chapters of this report are based largely upon a modelled restructuring of *Water Use in Manufacturing*. This portion of the *Census of Manufactures, 1967* provides a data catalog on the water use characteristics of 9402 manufacturing establishments that reported an intake of 20 million gallons or more of water in 1967, and responded to a detailed questionnaire on their water utilization for the year 1968.

MODEL CHARACTERISTICS

The characteristics of the evaluation model can best be appreciated by a comparison of its aggregated structure with that of the establishments covered in *Water Use in Manufacturing, 1967*.

The basic distinction between the evaluation model and its Bureau of Census source is the expansion of the model to include establishments with an intake of 10 to 20 million gallons a year, where census data include only users of 20 million gallons or more. The total number of establishments covered is increased by this device by more than 50 percent (cf. Table 21). But in the case of food processing, wood products, and leather, an approximate doubling occurs. These industries tend to be broadly distributed and characterized by moderately-sized plants rather than a few dominant factories (food processing in particular which accounts for 25 percent of the Census-reported sample and 42 percent of the entire expansion in number of modelled factories) so that a truly significant portion of their pollution-associated features are concealed if only larger plants are considered.

A second distinction between the two data structures is critical to the assessment of waste treatment requirements. The manner in which an industry uses water is at least as important to a consideration of its pollution characteristics as is the amount of water it uses; and the distribution of pollution potential—as measured by calculated treatable discharge, which includes process water, sanitary sewage, and cooling water recirculation to process applications—varies significantly from the distribution of total discharge. Pulp and paper production, third in gross water use, becomes the largest source of treatable wastewater, due to the large amount of the industry's intake for processing. Conversely, petroleum refining slips behind

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TABLE 21.—COMPARISON OF CENSUS REPORTED ESTABLISHMENT AND WATER DATA FOR FACTORIES WITH INTAKE $\geq 20,000,000$ G/YR. WITH MODELLED FACTORIES

SIC	Industry	Percent of reported intake	Percent of calculated treatable discharge	Establishments		
				Reported	Modelled	Difference
20	Food and kindred products ...	5.2	8.3	2,345	4,494	Percent +91
22	Textiles .....	.9	2.1	684	1,021	+49
24	Lumber and wood products ...	.8	1.9	188	405	+116
26	Paper and allied products	14.6	29.5	619	862	+39
28	Chemical and allied	29.0	27.8	1,125	1,421	+21
30	Rubber and plastics .....	.9	.6	301	459	+52
31	Leather .....	.1	.5	92	215	+134
32	Stone, clay, glass	1.6	2.3	586	945	+61
33	Primary metals	32.6	17.8	841	1,137	+35
34	Fabricated metals .....	.4	1.1	569	1,037	+82
35	Machinery	1.2	1.0	471	790	+68
36	Electrical equipment .....	.8	1.4	562	817	+45
37	Transportation equipment	2.0	1.6	392	562	+44
	Manufacturing	100.0	100.0	9,402	14,499	+54

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food processing as a source of treatable wastewater, not so much as a result of the expansion of the food industry's evaluated discharge as because of refineries' relatively heavy use of water for cooling rather than processing. The leather industry—mainly its tanning component—stands out as the one whose relative significance is most affected by the modelling procedure. Heavy use of process water, combined with a large relative number of units with an intake of 10 to 20 million gallons a year, make the industry's share of waste treatment demand five times as great as its reported share of total water demand.

The aggregate impact of these distributional features is not great. Though more than half again as many factories are covered by the evaluation model as by the report of the Bureau of Census, employment in industries covered is only increased by 18 percent, and water

use by an even lesser percentage (cf. Table 22). However, the logic of the recirculation device employed in the model, plus the broadening of the population covered, provide a treatable discharge value that not only exceeds reported process intake for plants using 20 million gallons by a gross factor of almost 2.4 to 1, but also exceeds total reported intake for the larger users alone in seven of the fourteen (two digit SIC) industries. It is clear that while a relatively few factories account for the bulk of manufacturers' use of water and for discharge of pollutants, water use technology and size distribution of a number of industries for which water is not so significant a resource tend to conceal a somewhat larger pollution potential than might be thought.

The modelling procedure also affects the interregional distribution of discharges, and so of costs. Not surprisingly, treatment costs for the Colorado, Great Basin, and California regions experience a significant increase in relative dimension when calculated treatable discharge is compared to reported process intake. In those arid areas, resource constraints act to hold an atypical proportion of manufacturers below an intake of 20 million gallons a year, and also to promote recycling. In two of the more humid and less industrialized regions—Southeast and Pacific Northwest—a substantial increase in treatable discharge, as opposed to reported total intake, traces to the presence of a larger number of moderate-sized food processors and a lesser number of wood products factories that would not be included in an evaluation limited to plants with an intake of 20 million gallons or more. These five regions—together with the Western Gulf, where the high degree of recycling characteristics of the petroleum based industries inflates calculated treatable discharge—all experience a significant expansion of indicated waste treatment costs as a result of the procedures employed (cf. Tables 22 and 23).

TABLE 22.—FLOW AND EMPLOYMENT COMPARISON BY U.S. BUREAU OF CENSUS WATER USE REGIONS

Water use region	Number of employees		Total water use (BGY)			
	Census reported ¹	Modelled establishments ²	Process Intake ¹	Total Intake ¹	Total DSGE ¹	Synthesized process discharge ²
1 New England	525,800	721,838	245	585	558	459
2 Delaware-Hudson	738,500	937,824	228	1,259	1,192	478
3 Chesapeake	385,500	447,107	164	816	755	312
4 Eastern Great Lakes	878,700	947,579	413	1,626	1,460	709
5 Ohio	1,014,000	1,284,711	424	2,455	2,295	912
6 Cumberland-Tennessee	174,600	215,130	117	558	536	209
7 Southeast	686,000	889,309	548	1,181	1,100	1,654
8 Western Great Lakes	862,400	1,010,992	674	1,924	1,811	1,043
9 Upper Mississippi	556,100	558,473	200	695	582	359
10 Lower Mississippi	95,000	124,459	116	780	745	388
11 Missouri	147,300	149,789	67	162	142	146
12 Arkansas-Red-White	168,800	190,533	104	237	185	185
13 Western Gulf	244,500	259,663	420	2,031	1,899	2,059
14 Colorado	40,700	45,602	12	23	18	35
15 Great Basin	17,800	16,939	18	35	27	35
16 California	419,400	579,946	115	370	314	375
17 Pacific Northwest	209,100	210,695	353	599	533	876
National Totals	7,275,600	8,590,589	4,295	15,467	14,276	10,231

¹ Reported by U.S. Bureau of Census for establishments with an intake \geq 20 million gallons in 1968.² Developed by E.P.A. for establishments with an intake \geq 10 million gallons in 1968.

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TABLE 23.—FLOW AND EMPLOYMENT COMPARISONS BY INDUSTRY

SIC	Industry	Number of employees (1,000's)		Total water use (BGY)			
		Census reported ¹	Modelled establishments ²	Process Intake ¹	Total Intake ¹	Total DSGE ¹	Synthesized processes discharge ²
20 Food and kindred products		633.3	924.0	290.6	810.9	752.8	852.0
22 Textiles		413.5	548.5	109.0	154.2	136.0	216.6
24 Lumber and wood products		63.4	149.4	36.5	117.9	92.7	193.9
26 Paper and allied products		267.6	348.5	1,477.9	2,252.0	2,077.6	3,014.7
28 Chemical and allied products		526.8	781.9	733.4	4,476.2	4,175.1	2,844.3
29 Petroleum and coal		106.3	127.3	94.6	1,435.1	1,217.0	430.3
30 Rubber and plastics		214.2	304.3	23.8	134.9	128.4	61.5
31 Leather		32.0	102.3	13.9	15.8	14.9	51.1
32 Stone, clay, glass		224.8	325.7	89.1	251.1	218.4	239.9
33 Primary metals		894.5	1,025.7	1,027.2	5,004.7	4,695.5	1,821.5
34 Fabricated metals		357.2	586.0	37.1	67.7	65.0	110.1
35 Machinery		673.2	995.3	28.9	189.0	180.8	99.2
36 Electrical equipment		978.9	1,254.1	46.6	126.6	118.4	139.4
37 Transportation equipment ..		1,304.0	1,080.5	63.3	312.8	293.1	159.5
		7,275.6	8,590.6	4,295.1	15,466.5	14,275.9	10,231.1

¹ Reported by U.S. Bureau of Census for establishments with an intake \geq 20 million gallons in 1968.² Developed by E.P.A. for establishments with an intake \geq 10 million gallons in 1968.

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WASTE TREATMENT PROCESSES EVALUATED

Treatment of the liquid wastes of manufacturing processes is so different in application from sewage treatment that it is very nearly a separate concept. Sewage treatment occurs at the nodal point of a

complex of collection and transmission works. Central processing of a relatively homogeneous materials input through a sequence of similarly scaled steps is the essence of the method.

Industrial waste treatment, on the other hand, tends to be practiced in terms of the residuals characteristics of separate manufacturing processes. Segregation, rather than collection, of waste streams becomes a prime method of increasing treatment effectiveness and controlling treatment costs. Each waste stream tends to receive only that treatment that is appropriate to its volume and constituents. Uncontaminated waste waters—the prime example is cooling water that does not come into contact with other materials—are segregated and discharged directly or recycled. Complementary waste streams sometimes provide effective treatment without the intervention of any process other than natural mixing—the combination of an acid with an alkaline waste stream, for example, will often provide an appropriate remedial reaction. Even where conventional primary and secondary waste treatment are practiced, it is common that dilute waste streams enter the secondary (biological) stage directly in order to reduce capacity required for sedimentation.

The nature of the procedure has many implications for both industrial water use and for analysis of the costs of industrial waste treatment. (1) Given the significance of segregation of waste streams, there is no configuration of treatment modes that can be assigned as ideal for any group of industrial plants. To some degree, each factory becomes a separate and distinct unit of account, with not only the nature of its processes, but even their physical configuration within the plant dictating the most efficient sequence of liquid waste treatment measures. (2) Because waste streams may be segregated and treated according to waste characteristics, some processes become integral parts of the manufacturing operation rather than waste treatment *per se*. In effect, the interjection of the treatment process obviates the need for pumping and treatment of fresh intake water and promotes water recycling. (3) Faced with the added cost of waste treatment, management has an incentive to use water more sparingly in other ways than recycling, and may, in fact, abandon some hydraulic processes altogether.

Any consideration of industrial waste treatment, then, must start from the view that it is an integral part of the production process, and must be approached in terms of the general issue of water productivity. From the practical standpoint of analysis, improvements in the productivity of water tend to be distributed through the nation's capital stock in a fashion that is highly influenced by age and location of plants. Because it is such a basic feature of a factory, water engineering does not tend to change, once that factory has been built and

is operating. There is, then, good reason to believe that historical

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trends in reduction of water inputs per unit of product output largely reflect the time stream of plant construction. The same firm can include plants that utilize the water technology of 1871 and 1971—and often the two plants produce the same product and may even be located in the same factory complex.

Quite clearly, the variety of production conditions precludes the development of any precise projection of waste treatment costs for manufacturing, and the wide range of waste treatment possibilities open to industrial management only makes the matter more difficult. It should be recognized, however, that the cost of waste treatment is usually not significant enough in itself to justify major plant redesign, so the capitalization of industrial waste treatment will probably continue for some years to reflect a sub-optimal allocation of resources that derives from the existence of many factories that date from a time before water utilization practices and waste treatment constraints exercised any influence on production costs.

In the absence of reliable decision rules to apply to the complex trade-offs and variations in efficiency that will condition the final cost for any given time period, the model employs the knowledge we possess about the amount of manufacturers' wastes discharges and the characteristics of the water-borne residuals of various manufacturing processes. Using this information, the model attempts to determine with some accuracy the upper limits of such costs and modifications likely to occur as a direct result of the imposition of those costs.

The method of calculation was dependent on the treatment of all process waste streams for each pollutant identified with the process by the most effective (as opposed to most efficient) conventional treatment method now available. And wherever options might be discerned, the higher (or highest) cost solution to the problem was assumed. Consonant with a procedural requirement that all wastes be treated to the highest degree possible with conventional technology, it was assumed that all waste constituents, except dissolved mineral solids, would be removed, reduced, or emended. In effect, it was assumed that floating and settleable materials be removed—with chemical assistance in many cases, that dissolved organics be stabilized, that caustics and acids be neutralized, that potential pathogens be subject to disinfection, that uneven waste streams be equalized, and even—in some particularly difficult situations—that concentrated waste streams be evaporated or incinerated.

Industrial categories reported in *Water Use in Manufacturing, 1967*

were regrouped into subgroups according to the kinds and concentrations of waste products that were considered to be characteristic of various industrial processes based on an extensive literature. The 320 four digit SIC groupings reported by the Bureau of Census emerged, when reassembled, as 71 components, with a generalized waste treatment configuration established for each (cf. Table 24). The decision rules applied in determining the configuration were:

a. Standardized treatment procedures were to be applied in [p. 56]

every case, and where modifications peculiar to a plant or any industry were reported in the technical literature, the modification was rendered in terms of a similar standard solution to the engineering problem.

b. No treatment method, or sequence of treatment methods, drawn from the technical literature was to be applied unless it was associated with a reduction of 90 percent or more of the polluttional aspects of wastewater that it was intended to remedy.

c. All treatment sequences and other system components were to embody the highest cost standard methods; and when there was uncertainty as to what portion of the waste stream was to undergo a given treatment procedure, then the larger possible component—up to the total waste stream—was to be assigned that procedure.

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TABLE 24.—BASIC ELEMENTS OF THE INDUSTRIAL WASTE TREATMENT MODEL

Industrial classification		Number of establishments		Percent of process wastewater requiring treatment														
Code	Name	10-19 MGY	≥ 20 MGY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
201	Meat products	189	541	250	2.00	1.2	33				80			166	33			
202	Dairy products	456	729	250	1.00	1.2			50					100				
203	Canned, frozen preserved foods	174	518	200	2.00	1.2		50				100		140				
2041-5	Flour and other grain mill products	60	78	250	1.00	1.2						100		100				
2046	Wet corn milling	4	17	200	3.00	1.3		100				100		100				
205	Bakery products	153	208	250	1.00	1.2		50				100		100				
2061-2	Cane sugar	6	67	150	3.00	1.35		100		100		200		100				
2063	Beet sugar		60	150	3.00	1.35		100		100		200		100				
207	Confectionary and related products	153	208	250	1.00	1.2		50				100		100				
208	Beverages	239	412	300	2.00	1.35		25				100		125				
209	Miscellaneous foods and kindred products	220	380	200	1.00	1.3				50		100		100				
20XX	Other food processing			250	1.00	1.25		35		25		90		90				
2211	Weaving mills, cotton	51	148	250	2.00	1.2				20		100		100				
2221	Weaving mills, synthetic	29	76	250	2.00	1.3		50	44					66				
2231	Weaving and finishing mills, wool	18	82	250	3.00	1.2				35		100		100				
226	Textile finishing, except wool	25	139	250	1.00	1.2				20		100		100				
22XX	Other textiles	176	261	250	1.00	1.2		13	11	19		64		91				
24	Lumber and wood products	175	231	250	2.00	1.2				50		75		100				
261	Pulp mills	1	36	350	4.00	1.35				52		43		86				
2621	Paper mills, except building paper	6	269	350	2.00	1.35				40		100		100				
2631	Paperboard mills	14	185	350	2.00	1.35				40		100		100				
264	Miscellaneous connected paper products	59	100	350	1.00	1.35				60		100						
265	Paperboard containers and boxes	94	48	250	1.00	1.2						100		100				
266	Building papers	5	47	350	2.00	1.3						100		100				
26XX	Miscellaneous paper products			350	2.00	1.3				45		90		100				
2812	Alkalies and chlorine	1	31	350	1.00	1.35		20	100	60								
2813	Industrial gases	36	82	350	1.00	1.35		20	100	60								
2815	Cyclic crudes and intermediates	7	64	350	3.00	1.35	20	25	20	33	67			100				
2816	Inorganic pigments	4	27	250	1.00	1.35		20	100	60								

TABLE 24.—continued
BASIC ELEMENTS OF THE INDUSTRIAL WASTE TREATMENT MODEL

Industrial classification			Number of establishments			Percent of process wastewater requiring treatment														
Code	Name	10–19 MGY ≥ 20 MGY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
2818	Industrial organic chemicals	20	147	350	3.00	1.35	20	25	20	33	67	100								
2819	Industrial inorganic chemicals	39	198	350	1.00	1.35	20	100	60											
282	Fibres, plastics resins	31	177	350	4.00	1.35	50	15	50	100	100									
283	Pharmaceuticals	22	75	250	2.00	1.2	20		80		65	185	60							
284	Toiletries and detergents	41	64	250	1.00	1.25			33	100		33								
2851	Paints	28	53	250	1.00	1.25	20	100	60											
2861	Wood chemicals	4	19	350	2.00	1.35	25	20	33	67		100								
287	Agricultural chemicals	28	85	350	1.00	1.35		20	30	77		70								
289	Miscellaneous chemical products	32	116	300	1.00	1.3	10	20	60	45	23		50							
28XX	Miscellaneous chemicals			300	1.00	1.3	10	20	60	45	23		50							
2911	Petroleum refining	25	206	350	2.00	1.35	100	20	40	20							130			
29XX	Petroleum and coal—other than refining	35	69	300	1.00	1.3	40	20	40	20	60		100							
30	Rubber and plastics	142	317	350	1.00	1.3		50	15	50	100		100							
3111	Leather tanning and finishing	22	88	250	4.00	1.2	100	100	100				100							
31XX	Leather	77	28	250	1.00	1.2				100			100							
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3211– 322–3	Glass	36	148	350	1.00	1.2		100	100		50									
3241	Cement	10	140	350	1.00	1.2		100	100											
325–326	Clay	73	51	300	1.00	1.2		100	100											
327	Concrete and plaster	102	179	300	1.00	1.25		100	100											
3281	Stone	10	28	250	1.00	1.25		100	100											
329	Non-metallic minerals	49	121	250	1.00	1.2		100	100											
32XX	Miscellaneous—stone, clay, glass			250	1.00	1.2		100	100											
3312	Blast furnaces and steel mills	13	189	350	1.00	1.35	75	75	100	75			35							
331X	Steel rolling and finishing	35	107	350	1.00	1.3	75	50	100	75										
3321	Gray iron foundries	41	76	300	1.00	1.2		50	50		100									
332X	Iron and steel foundries	13	189	300	1.00	1.2		50	50		100									

3331	Primary copper	1	26	350	1.00	1.3	100	100	100	.....
3332-3	Primary lead and zinc	1	22	350	1.00	1.3	100	100	100	.....
3334	Primary aluminum		21	350	1.00	1.3	60	60	60	40
33XX	Other primary metals	149	254	300	1.00	1.3	45	70	75	30
34	Fabricated metals	404	633	250	1.00	1.25	56	93	110	22
35	Machinery	281	510	250	1.00	1.25	56	93	110	22
36	Electric machinery	255	562	250	1.00	1.25	56	93	110	22
37	Transportation equipment	115	447	250	1.00	1.25	56	93	110	22
39	Miscellaneous manufacturing*	99	117	250	1.00	1.25	25	40	55	47 12 62 5

Explanation of numbered columns:

- 1 Operating Year (Days)
- 2 High Waste Concentration Factor
- 3 Installation Multiple Factor

Columns 4 thru 15—treatment processes:

- | | |
|---------------------------------|-----------------------------|
| 4 Oil Separation | 10 Aeration |
| 5 Equalization | 11 Biological Stabilization |
| 6 Coagulation and Sedimentation | 12 Chlorination |
| 7 Neutralization | 13 Evaporation |
| 8 Flotation | 14 Incineration |
| 9 Sedimentation | 15 Activated Sludge |

* Arithmetic mean for all listed industries.

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IV

COST OF INDUSTRIAL WASTE TREATMENT

INTRODUCTION

The chapter presents the range of capitalization levels and annual costs that have been calculated to coincide with levels of industrial effluent treatment dictated by current interpretations of water quality standards.

SUMMATION

Through manufacturers' investments to provide waste treatment consistent with current effluent standards may be as high as \$12.2 billion (August 1971 = 100), the most likely level of capitalization is roughly \$8.3 billion. Annual costs—operation, maintenance, debt service, and replacement—associated with those levels of capitalization are \$2.4 billion and \$1.6 billion, respectively. Depending on policy flexibility and management skill, the costs are highly controllable, so there are many opportunities to reduce the burden of pollution abatement, both for the firm and for society at large. However, costs are very unevenly distributed, and obsolete factories will bear a share of the total that is disproportionate to either their output or employment. Cost minimizing strategies, then, are likely to produce localized hardship.

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MAXIMUM CAPITAL REQUIREMENTS

Capital facilities having a maximum replacement value of \$12.2 billion¹ would be required to provide American manufacturers with the level of waste treatment consistent with current interpretations of State and Federal water quality standards. Availability and utilization of that capital would result in maximum annual costs of \$2.4 billion (cf. Table 25).

RELATIVE INFLATION, MEASURED BY SELECTED PRICE INDICES

Year	STP, Construction cost ¹	GNP deflator			Consumer prices	
		Structures ²	Total ³	All Items	Food	Services
1967	100.0	100.0	100.0	100.0	100.0	100.0
1968	103.5	105.1	104.0	104.2	103.6	105.2
1969	111.1	113.8	108.9	109.8	108.9	112.5
1970	120.3	122.7	114.7	116.1	114.9	121.3
1971	135.7	137.4	120.4	121.3	118.4	128.4

¹ 1967 = 119.4.² 1967 = 124.0.³ 1967 = 117.6.

¹ Dollar values are reported in the text of this study in August 1971 dollars. Tabular data, however, are in all cases presented in the terms in which they were calculated, that is,

purchasing power at August 1967 for materials, labor, and equipment in the approximate mix in which they occur in waste treatment plant construction and operation. It should be noted that inflation in the costs of waste treatment plant construction—probably due in large measure to the enormous increase in activity since 1966—has exceeded that in most economic sectors in recent years. During the nineteen-fifties and early nineteen-sixties, waste treatment plant and sewer construction costs rose at an average rate that was less than that of prices generally, and well below that of all construction. Since 1967, such costs—as measured by Sewage Treatment Plant Construction Cost Index—have increased at a materially faster rate than prices generally. And in 1971, when the relative rate of inflation for most items dropped below the experience of 1969 and 1970, the increase accelerated for sewage treatment plant construction.

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TABLE 25.—MAXIMUM INDUSTRIAL WASTE TREATMENT REQUIREMENTS, 1968 CONDITIONS

SIC	Industry	Capital required	Millions of 1967 Dollars		
			Annual cost		
			Replacement ¹	Interest ²	Operation
20	Food and kindred products	\$ 997.5	49.9	76.8	57.6
	201 Meat products	116.1	5.8	8.9	8.5
	203 Canned and frozen foods	227.9	11.4	17.5	10.3
	206 Sugar refining	294.2	14.7	22.7	19.9
	208 Beverages	112.1	5.6	8.6	5.0
22	Textiles	251.4	12.6	19.4	11.4
24	Lumber and wood products	186.1	9.3	14.3	10.1
26	Paper and allied products	1,550.5	77.3	119.4	112.3
	261 Woodpulp	653.8	32.7	50.3	34.3
	262 Paper	711.5	35.6	54.8	42.6
	263 Paperboard	321.5	16.1	24.8	21.7
28	Chemical and allied products	1,550.5	121.8	187.6	123.9
	281 Industrial chemicals	1,252.4	62.6	96.4	93.6
	282 Fibers, plastics, resins	144.1	7.2	11.1	8.1
29	Petroleum and coal	1,096.1	54.8	84.4	48.4
	291 Petroleum refining	1,083.6	54.2	83.4	47.3
30	Rubber and plastic	96.0	4.8	7.4	6.1
31	Leather	86.8	4.3	6.7	4.3
32	Stone, clay, glass	182.3	9.1	14.0	21.3
33	Primary metals	1,620.5	81.0	124.8	147.3
	331 Basic steel products	981.8	49.1	75.6	110.6
	333 Primary non-ferrous metals ...	204.6	10.2	15.8	12.9
34	Fabricated metal products	1,124.14	6.2	9.6	12.6
35	Machinery	100.1	5.0	7.7	10.7
36	Electrical equipment	129.46	6.5	10.0	14.1
37	Transportation equipment	122.71	6.2	9.4	15.9
	Manufacturing	8,965.7	448.3	690.4	600.3

¹ 20 year average life.² 7.7% average rate, Moody's Industrials, January-August, 1971.

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The amounts—which are based on the 1968 distribution and utilization of productive capital—are gross figures. They include the replacement value of waste treatment facilities already in place, waste treatment services provided by public agencies, and no allowances for relative efficiencies or in-plant modifications that may provide equivalent effects for less cost.

Capital requirements are distributed through the various manufacturing sectors in a manner that strongly reflects their water use characteristics and has loose direct correlation with output values.

Chemicals manufacture, primary metals production, pulp and paper production, petroleum refining, and food processing account, respectively, for 27 percent, 18 percent, 17 percent, 12 percent, and 11 percent of the indicated investment, and 29 percent, 32 percent, 15 percent, 9 percent, and 5 percent of reported water intake. Eighty-five percent of the capital requirement associated with water pollution abatement, then, comes from five manufacturing sectors that, in the aggregate, provide little more than a third of values added by manufactures.

The association of capital requirements with water use practices has enormous implications for the dimensions of ultimate costs. Higher treatment costs, other things being equal, are a direct consequence of wasteful use of water. And water is wasted largely because it has had many of the characteristics of a free good. Imposition of a wastewater treatment requirement—or other cost-incurring constraint on water utilization—will, it has been demonstrated both in theory and in practice, lead to production practices that are less water-intensive, and thus have lower associated waste treatment values.

In the eventual resolution of the industrial waste-handling situation, it is almost inconceivable that the maximum investments summarized in Table 25 will occur under existing abatement requirements. A significant segment of the total value calculated must be attributed to the fact that a good portion of the investment represented has not been made. When it is made, the process of investment may be expected to lead to a pattern of water utilization that eliminates a significant portion of the cost.

VARIATION OF CAPITAL REQUIREMENTS

Several modifications of the evaluation model were attempted in order to arrive at a more realistic assessment of capital requirements, one that took into account the modification of water utilization practices that accompanies installation of waste treatment as well as hardware and construction costs. Without altering the relationships among treatment process components, water use coefficients were substituted for the observed ones—though all substitutions were made by recourse to observed conditions—and investment and annual cost calculations were produced to reflect the altered variables. Table 26 presents distribution of capital requirements in terms of alterna-

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TABLE 26.—VARIATION IN CAPITAL REQUIREMENTS UNDER ALTERNATIVE WATER UTILIZATION REGIMENS, 1968 CONDITIONS

Level of industry efficiency	Capital requirements	
	Billions of 1967 dollars	Billions of 1967 dollars
Actual 1968 distribution	\$8.97	\$12.17
Least efficient (17th) regional component given characteristics of directly superior (16th)	7.57	10.27
All efficiencies less than median given characteristics of median component	5.96	8.09
All efficiencies less than most efficient third (6th) given characteristics of sixth component	4.84	6.57
Most efficient component's characteristics used in all cases	3.12	4.23

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tive water use regimens. The most likely investment level is thought to be the one associated with median efficiency—certainly somewhere in the range between “most efficient third” and modification of “the least efficient region”.

The levels of capitalization thought to define probable requirements were reached by calculating costs for each of 71 industrial subgroups on the basis of water use characteristics of the industry at unit water utilization rates no greater than those characteristic of the median region among the census defined “Industrial Water Use Regions”, the sixth in relative efficiency among the seventeen regions, and the sixteenth in relative efficiency. That is, water use rates were utilized precisely as observed for nine regional/industrial components in the one case; in the other cases for six and sixteen regional segments of each industry, with the characteristics of the ninth, the sixth and the sixteenth substituted for those regions in which they are exceeded in reported practice.

The likelihood of achieving such enormous efficiencies—in aggregate terms they amount to \$2 to \$5 billion worth of waste treatment capital at little or no cost—is not as remote as it might appear on the surface. The substitute variables imposed upon the matrix are not expressed as levels of firm or factory efficiency, but as expressions of existing regional distributions that include all of the parameters—age of plant, processing technique, size of plant, raw material quality, water availability—that affect unit water use in large subsets of a total industry. Further, the range of conditions that is thought to include the most probable set of investments is not extended to less efficient industrial subsets on the basis of the values at the ends of the chosen regional groupings. Costs imposed on the less hydraulically efficient industry/region subsets did not come from a compression of the distributions for the more efficient regions, so do not reflect the more demanding use regimens of arid regions. The manufactur-

ing technologies that are implied, then, lie not only well within the bounds of existing practice, but also within the bounds of practice for areas where there are no significant resource constraints.

In short, the imposed conditions do not represent any theoretical or arbitrary modifications of existing practice, but the extension of practices that are currently employed in substantial segments of each industry. It is not an attempt to discern what would happen if industry made a maximum adjustment of its use of water to accommodate waste treatment, but an attempt to measure what does happen when waste treatment or other cost-imposing constraints on water use occur.

At the risk of redundancy, it should be stressed that the full range of values presented in Table 26 refers to current practice and to an equal degree of waste treatment effectiveness. The values simply provide quantitative expression to the often repeated truism that industry has a number of internal options in dealing with its waste handling problem.

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POLICY IMPLICATIONS OF COST VARIABILITY

The breadth of the range of values contains some significant policy implications. These should be taken into account in any resolution of the waste handling problem:

1. Alternative approaches to waste reduction requirements can produce similar efficiencies within a wide range of costs. Measures that stress one approach or another to industrial water pollution abatement will inevitably be unsuited to some industry segments, thus will tend to increase costs unnecessarily. Flexibility in approach to the issue should reduce the burden of water pollution abatement on the economy, freeing resources for other uses.

2. Given the significance of flexibility, and accepting the general rule (that underlies all domestic policy on the issue) that management will not act to reduce its discharge of pollutants in the absence of external pressures, it would appear that very direct incentives that embody water quality goals without specifying the means to reach them should provide an approach to a least-cost solution of the waste treatment question. Suitably scaled taxes on amount of waste discharge constituents or limits on allowable pollutant concentrations in the effluent should, for example, prove superior to regulatory specification of treatment procedures.

3. Because the various unit water use values are calculated at the mean for each regional segment of an industry, and because

the very wasteful users of water in any industry/region component strongly influence the mean, it is obvious that a relatively few factories—the most inefficient plants in the least efficient regions—account for a very considerable portion of the total cost of water pollution control. A few hundred factories create the almost \$2 billion capital gap between the least efficient and next-to-least efficient users. It may be assumed that those plants—mainly engaged in the production of pulp and paper and organic chemicals—are in many cases obsolescent in other respects than their water engineering. That concentration of avoidable costs in a few establishments suggests that factory replacement may in more than a few instances be the most rational solution to waste treatment requirements. The fact that waste treatment does not represent a significant capital burden in the aggregate should not be allowed to obscure the subordinate fact that a number of plants may be scheduled for closure and replacement as a consequence of the very uneven distribution of such costs.

ANNUAL COST COMPONENTS

The matter of initial capitalization of waste treatment works tends to be over-stressed. Granted that installing up to \$12 billion worth of facilities represents a significant pressure on management's financial sources and overall capital planning, the first cost of facilities

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represents less than a fourth of the total cost of industrial waste treatment. Once installed, facilities must be operated and maintained. Given the composition of the set of treatment requirements evaluated here, operation and maintenance accounts for 35 percent of the ultimate total cost. (In the less capital-intensive approach to waste treatment that industry prefers in actual practice, operation and maintenance charges currently amount to 55 percent of annual costs.) Interest, at current rates, accounts for a large, if not the largest, share of annual charges for waste treatment. Some 40 percent of the annual costs of the modelled treatment system, and 27 percent of the annual costs of the system of works that industry reported to be in operation in 1968, can be attributed to interest payments implicit in the value of the capital stock. And to make the sequence of major and minor replacement expenditures required to sustain the stock of physical capital, the firm faces a continuing capital demand, one that is estimated to equal the initial cost within a 20 year period, and to account for 25 percent of the annual costs of the modelled system of waste treatment works.

ANNUAL CAPITAL CHARGES

To restrict our view of the costs of industrial waste treatment to the price of installing the devices is to overlook between three-quarters and four-fifths of the total cost and ultimate impact on prices.

That evaluation, it should be noted, is an even more conservative statement of conditions than most industrial spokesmen would accept. Where this report assesses replacement requirements in terms of the 20 year average life that engineers design into facilities, and assesses interest charges at the current rate for industrial bonds, industrial management tends to view investments in terms of capital recovery factors. These vary from industry to industry, and are influenced by the tax laws, but in few cases is it likely that industry sources would accept the moderate rates of capitalization utilized here as being consistent with their financial management practices.

Recognizing that difference in concept, this study attempts to focus on the practical realities of cost rather than the accounting and financial management conventions that interpret reality within a framework of time preferences, tax liability, and public relations pressures. The emphasis here is on likely amount of annual cash flow and not the vagaries of reported profits or anticipated rates of return.

Expenditures for replacement are based on engineering estimates of the mean expected useful life of facilities. The concept evaluated assumes that five percent of the value of the total capital stock of waste treatment works in any industry will, on average, be replaced each year. The assessment is one of maintenance of the physical stock of capital and consequent cash outlays, not on depreciation as that term is used for tax and other reporting purposes. And while

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any given rate of replacement may infer an unrealistic evenness to the pattern of expectable outlays, the ultimate occurrence of such costs is undeniable.

While there is almost no evidence available upon which to gauge the rate at which replacement of industrial waste treatment works actually takes place, the five percent figure assigned is considered to be reasonable, in that it takes into account the rated operating life of components and the demonstrated industrial preference for short-term application of capital. (Short-term, that is, as compared to public works.) The assumption that assigns the replacement function at a rate that is 25 percent more rapid than that for municipal waste treatment plants is not, then, based on allowable depreciation accounting, but on anticipations that take into account the nature of

components, industrial behavior, and the greater quantity and more corrosive nature of typical industrial wastes per gallon of water.

The interest rate that is assigned includes no selectivity or judgment. The established market rate for industrial instruments is accepted as the appropriate indicator of the cost of capital at any point in time. Thus, the average monthly yield in the most recent twelve month period, (i.e. 7.7 percent July, 1970 to August, 1971) as reported by a standard financial service (Moody's) for industrial bonds, has been applied consistently to evaluate interest charges.

OPERATING AND MAINTENANCE COSTS

Operating and maintenance charges are a function of capital configurations. As assessed in the model, they deviate sharply from estimates of existing operating costs as a percentage of capital values (cf. Table 27).

Such significant differences cannot be attributed to a difference in method. American industry does not report its operating outlays for waste treatment, so both the value and operating costs had to be calculated in essentially the same manner as were targeted goals. Both values were synthesized from the same sets of coefficients. In the case of existing capital, normal cost to size relationships were applied to the various kinds of reported facilities on the basis of the mean capacity for each industry. A number of explanations for the variation in operating cost ratios are available, and these have potential bearing on policy formulation.

1. Current operating ratios may reflect the fact that industrial wastes, in the aggregate, are under-treated. As the degree of waste treatment increases, the process becomes increasingly capital-intensive. Normal economies of scale find expression as the waste treatment process is intensified, but they are less pronounced—at least in terms of the progression pre-treatment, primary treatment, secondary treatment—with respect to capital than for labor costs,

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TABLE 27.—ANNUAL OPERATING AND MAINTENANCE COSTS AS A FUNCTION OF CAPITALIZATION

SIC	Industry	Estimated operating cost ratio, 1968	
		Modelled requirements	Modelled available capital
20	Food and kindred	0.058	0.076
22	Textiles .....	.045	.078
24	Lumber and wood products .....	.077	.155
26	Paper and allied products .....	.057	.122
28	Chemicals and allied products .....	.079	.184
29	Petroleum and coal .....	.060	.214
30	Rubber and plastics .....	.056	.100
31	Leather .....	.050	.100
32	Stone, clay, glass .....	.116	.075
33	Primary metals .....	.092	.162
34	Fabricated metal products .....	.091	.060
35	Machinery .....	.096	.054
36	Electrical equipment .....	.098	.063
37	Transportation equipment12	.063
	Miscellaneous and unidentified050
	Mean, all manufacturing073	.147

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which account for roughly half of normal operating costs. Thus all costs rise as degree of treatment increases, but capital costs rise more sharply than operating charges.

2. Capital saving expedients that reduce total costs but increase unit costs by forfeiting economies of scale are probably available in far greater measure than the modelled evaluation indicates. More stringent waste segregation and process water recycling (as opposed to the cooling to process cycles assumed in the model) would permit much smaller waste treatment plants, thus lower capital costs, without a comparable reduction in operating costs.

3. Industry is known to favor waste treatment solutions that minimize capital requirements. There are a number of treatment configurations, and treatment-process combinations, that provide equivalent waste control in any given situation. In approaching a possible trade-off between capital and operationally intensive alternatives, management has every reason to favor the one that promises capital savings up to—and perhaps even beyond—the point of actual total cost:

a. Capital savings may be applied to other purposes; operating economies must be accumulated over time to provide the same utility. Available savings, then, are inherently more valuable than potential ones, with the amount of the premium generally considered to be expressed by the prevailing interest rate (though the return on invested capital anticipated by any firm establishes its particular level of preference). Over the last three to four years—when a significant portion of total manufacturers' investment for waste treatment has taken place—interest rates have

held at levels not generally seen in the U.S. since the eighteenth century. Given the consequent penalty on capitalization and expectations for more characteristic interest charges in the future, management has a strong incentive to seek out treatment solutions with low capital requirements—even at the expense of otherwise avoidable operational penalties.

b. The composition of outputs shifts rapidly, and the nature of processes somewhat less rapidly, in a number of industries. Least-cost solutions that are tied too intimately to a particular product or process carry with them a high degree of risk. Management may, in such circumstances, find it preferable to accept operational cost disadvantages in order to insure flexibility. Land intensive and operationally demanding treatment configurations in many cases serve as insurance against sunk capital losses. (The phenomenon is probably most evident in segments of the chemicals industries, where batch processing persists in order to reduce the impact of process change on risk factors, leading management to resist capital intensive continuous flow production processes of inherently greater efficiency.) If the waste treatment system is viewed as an extension of the total production process, it is not surprising that the same risk-avoidance mechanisms should produce the same augmenting effects on operating costs.

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c. Taxes on business are framed to make it more advantageous to accept incremental operating costs, all other things being equal. Materials and labor utilized in operations may be used as an offset in the year of the expenditure, while capital must be charged off over time.

There is, then, a wide possible variation in the composition of annual costs. Not only hydraulic efficiency, but trade-offs between capital and operational elements, between equipment and land within the capital costs, and between the capital and operating component of waste treatment practice will affect the resolution of costs.

One may make the simplifying assumption that trade-offs all take place virtually at the point of intersection of marginal cost curves for capital and other factors. If the assumption approximates reality, then costs derived from the evaluation model may be trusted. Unfortunately, there are no data with which to test the assumption. On the other hand, it should be kept in mind that the logic of the model is based upon determining the highest possible costs that are consistent with current waste treatment standards. It is reasonable, then, to assume that annual costs, at any given level of efficiency,

will be no greater than those presented here, regardless of the relative weight of operations, replacement, and interest charges. (In the public sector, the bias to capital-intensive solutions created by existing cost-sharing procedures results in unnecessarily high annual costs. Subsidy and other market-limiting arrangements could produce a similar effect in the case of industrial waste treatment. At the present time, however, the cost-ceiling thesis seems generally accurate.)

The product of the evaluation procedure, as reported in Table 28, is the determination that complete adherence by manufacturers to the waste treatment requirements of existing water quality standards would have amounted to something between \$1.2 and \$1.7 billion of value added by manufactures in 1968, or between \$1.6 and \$2.4 billion in 1971 prices. (Values added by manufactures in 1968 amounted to \$260 billion—including the value of waste treatment provided in that year.)

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TABLE 28.—ANNUAL COST OF WASTE TREATMENT UNDER 1968 PRODUCTION CONDITIONS

SIC	INDUSTRY	Millions of 1967 dollars								
		1968 Utilization efficiency			Median efficiency			Most efficient third		
		Operating	Capital ¹	Total	Operating	Capital ¹	Total	Operating	Capital ¹	Total
20	Food and kindred products	57.6	126.7	184.3	51.5	116.0	167.5	43.5	101.1	144.6
22	Textiles	11.4	32.0	43.4	10.4	29.8	40.2	9.1	27.0	36.1
24	Lumber and wood products	10.1	23.6	33.7	5.3	14.7	20.0	5.3	14.7	20.0
26	Paper and allied products	112.3	196.7	309.0	86.9	156.9	243.8	75.3	138.2	213.6
28	Chemicals and allied products	123.9	309.4	433.3	71.4	110.2	181.6	45.7	75.5	121.2
29	Petroleum and coal	48.4	139.2	187.6	38.1	103.8	141.9	31.4	82.2	113.6
30	Rubber and plastics	6.1	12.2	18.3	5.0	10.5	15.5	3.7	8.4	12.1
31	Leather	4.3	11.0	15.3	4.3	11.0	15.3	4.3	11.0	15.3
32	Stone, clay, glass	21.3	23.1	44.4	17.3	19.9	37.2	14.0	17.0	31.0
33	Primary metals	147.3	205.8	353.1	114.7	138.4	253.1	88.9	102.2	191.1
34	Fabricated metal products	12.6	15.8	28.4	9.6	12.7	22.2	8.6	11.6	20.2
35	Machinery	10.7	12.7	23.4	8.0	10.2	18.3	6.2	8.4	14.6
36	Electrical equipment	14.1	16.5	30.6	11.7	14.4	26.1	10.0	12.8	22.8
37	Transportation equipment	15.9	15.6	31.5	9.0	10.1	19.1	4.8	6.1	10.9
	Manufacturing	600.3	1,138.6	1,738.9	443.1	757.5	1,200.6	350.9	615.2	966.2

¹ Replacement and interest

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V

CURRENT LEVEL OF INDUSTRIAL WASTE TREATMENT COSTS

INTRODUCTION

The chapter evaluates treatment currently provided to industrial wastes by industry-supplied and public waste treatment plants.

SUMMATION

Though there are significant problems of interpretation, it would seem that in 1968 manufacturers were operating \$2.4 billion worth of waste treatment works, and that another \$1.5 billion worth of public waste treatment capacity was taken up by manufacturers' wastes.

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EVALUATION CONDITIONS

It is not possible to gauge beyond the level of gross approximation the degree to which manufacturers as a group currently meet their waste treatment requirements. To compound the difficulties of assessment presented by the various water use, recycling, and process modification options open to management, there are complications presented by use of public waste treatment plants, and the fact that data are reported on industrial investment in a fashion that will not permit consistent calculations.

In general, it would appear that problems of evaluation tend to result in an understatement of the current level of waste treatment, in that waste segregation, internal process adjustments, and use of public facilities are only slightly—if at all—assessable. To counterbalance these forces for under-evaluation is the fact that the only investment data available are those from industry sources, and in the reporting of such data a certain degree of self-serving is almost inescapable. Additionally, there is serious question as to the quality of the capital that is available. Spokesmen for industry admit that at least some of the adjustments to regulation that have been made in the past were in the nature of a minimal response. A portion of the available capital is said to be incompatible with today's more stringent requirements, and so of limited utility. Even if such claims tend to be advanced to support request for relief from regulation in the form of subsidies or time extensions, they cannot be dismissed out of hand.

INDUSTRY-SUPPLIED TREATMENT

Recognizing those difficulties, it is possible to at least partially evaluate the current replacement value of the waste treatment works that industry reported to be in operation in 1968, using the same gen-

eralized cost-to-size coefficients utilized to scale treatment requirements. The procedure provides a value of \$2.42 billion for the 6820 treatment components operated by 3521 establishments treating wastewater, as these are cataloged by the Census Bureau (cf. Table 29). The total value of supplied works may be somewhat higher than

TABLE 29.—CURRENT REPLACEMENT VALUE AND ANNUAL COSTS ASSOCIATED WITH REPORTED INDUSTRIAL WASTE TREATMENT, 1968

		Millions of 1967 dollars				
SIC	Industry	Replacement value	Annual costs			
			Operation	Interest	Replacement	Total
20	Food and kindred products	193.8	14.8	14.9	9.7	39.4
22	Textiles	48.8	3.8	3.8	2.4	10.0
24	Lumber and wood products	9.7	1.5	.7	.5	2.7
26	Paper and allied products	529.5	64.5	40.8	26.5	131.8
28	Chemical and allied products	343.2	63.1	26.4	17.1	106.6
29	Petroleum and coal	342.1	73.2	26.3	17.1	116.6
30	Rubber and plastics	3.0	.3	.2	.2	.7
31	Leather	17.0	1.7	1.3	.9	3.9
32	Stone, clay and glass	20.0	1.5	1.5	1.0	4.0
33	Primary metals	216.3	35.0	16.7	10.8	62.5
34	Fabricated metal products	6.7	.4	.5	.3	1.2
35	Machinery	14.8	.8	1.1	.7	2.6
36	Electrical equipment	23.8	1.5	1.8	1.2	4.5
37	Transportation equipment	17.4	1.1	1.3	.9	3.3
	Manufacturing	1,787.0	263.2	137.3	72.2	472.77

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the calculations suggest, due to the fact that 5881 treatment operations were identified only as "other" than one of the standard treatment procedures (i.e. primary and secondary settling, coagulation, flotation, pH adjustment, aeration, various biological stabilization methods, sand filtration, and chlorination). Judgement and experience suggest, however, that the bulk of the "other" treatments performed consists of screening, flow equalization, and similar rudimentary pre-treatment practices whose costs are calculated as integral components of the defined methods. Total understatement of costs to be attributed to unreported kinds of treatment is probably not significant.

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The notable thing about the currently available stock of treatment works is, perhaps, its configuration. The reported plants do not generally conform to the high cost set of procedures used in the evaluation model. It has been indicated at several points in this report that there are possible trade-offs between capital and operating costs in the conduct of the waste treatment activity, and that the optimum mix is to be found not at the level of the industry, but at the factory. Given such trade-offs, it is probably reasonable to assess the degree

to which any industry fulfills its waste treatment requirements by level of annual costs as well as according to capital availability (cf. Table 30). In those terms, it would appear that American manufac-

TABLE 30.—PERCENTAGE OF REQUIRED WASTE TREATMENT SUPPLIED BY INDUSTRY, 1968

SIC	Industry	Percent of median requirement	
		Available capital	Annual costs
20	Food and kindred products	21.2	23.5
22	Textiles	20.8	24.9
24	Lumber and wood products	8.4	13.5
26	Paper and allied products	42.8	54.1
28	Chemicals and allied products	39.5	58.7
29	Petroleum and coal	41.8	82.5
30	Rubber and plastics	3.6	4.5
31	Leather	19.6	25.5
32	Stone, clay and glass	12.8	10.8
33	Primary metals	19.8	24.7
34	Fabricated metal products	6.7	5.5
35	Machinery	18.3	14.2
36	Electrical equipment	21.0	17.2
37	Transportation equipment	21.8	17.3
	Manufacturing	29.9	39.4

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turers in 1968 supplied between 30 and 40 percent of the waste treatment required of them, with enormous variation in degree of compliance to be found between one industry and another.

PUBLICLY-SUPPLIED TREATMENT

Both the total deviation from compliance with treatment requirements and the inter-industry variation in degree of compliance shrink when use of publicly supplied waste treatment capacity is taken into account. Eight of the fifteen (two-digit SIC) manufacturing industries discharge a greater volume of wastewater to public sewers—and so, presumably, to public waste treatment plants—than they treat (cf. Table 31). There is a measure of double-counting, in that much

TABLE 31.—VOLUME OF MANUFACTURERS WASTES, SEWERED AND TREATED
PRIOR TO DISCHARGE BREAK, 1968

SIC	Industry	Billion gallons of discharge		Percent	
		Treated discharge	Sewered discharge	Sewered of treated	Of total sewered discharge
20	Food and kindred products.....	184.7	237.5	128	23.2
22	Textiles	53.7	50.6	94	5.0
24	Lumber and wood products	18.7	2.5	13	.2
26	Paper and allied products	915.3	72.4	8	7.1
28	Chemical and allied products	674.2	181.1	27	17.7
29	Petroleum and coal	917.7	7.5	1	.7
30	Rubber and plastics	7.3	22.4	335	2.2
31	Leather	9.5	10.2	107	1.0
32	Stone, clay and glass	36.3	20.4	56	2.0
33	Primary metals	1,430.9	143.3	10	14.0
34	Fabricated metal products	9.0	38.6	429	3.8
35	Machinery	24.5	44.5	182	4.3
36	Electrical equipment	27.5	74.4	270	7.3
37	Transportation equipment	22.5	77.2	343	7.6
	Miscellaneous and unidentified	12.7	12.8	101	3.6
		4,353.2	1,021.6	23	100.0

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of the reported treatment occurs prior to sewerage. Unfortunately, the 1967 edition of *Water Use in Manufacturing*, unlike earlier editions, fails to provide data to assess the extent of the circumstance. To the degree that this use of public facilities provides an effective supplement to the capital supplied by industry itself, it must be considered to reduce the deficiency in industrial waste treatment.

The extent of that supplement must be gauged from very gross and aggregate waste flow data. Thus the best that can be provided is an order of magnitude kind of estimate, one that places the value of public waste treatment capital supplied to industry at \$0.9 to \$2.2 billion. The range is determined not by differences in conditions but by point of reference, and whether one attempts to judge the value of the public service from the standpoint of its value to the industry that receives it, or from that of the local government that provides it.

Evaluation of Equivalent Service: If one assumes that the value of treatment of a gallon of wastewater is precisely the same in all cases, without regard to who supplies the treatment, then the relationship between reported volume of industrially treated wastes, sewered wastes, and value of waste treatment provided by each industry will provide an evaluation of publicly supplied industrial waste treatment. Table 32 provides such an assessment under the column headed

TABLE 32.—VALUE AND PERCENTAGE OF INDUSTRIAL WASTE TREATMENT REQUIREMENTS SUPPLIED PUBLICLY IN 1968

SIC	Industry	Basis of estimate			
		Equivalent service \$ millions	Percent of requirements	Utilized capacity \$ millions	Percent of requirements
20	Food and kindred products	249.0	27.2	381.6	40.7
22	Textiles	45.0	19.2	82.2	35.0
24	Lumber and wood products	1.3	1.1	3.3	2.9
26	Paper and allied products	41.8	3.4	116.8	9.4
28	Chemical and allied products	92.0	1.1	291.1	33.5
29	Petroleum and coal	2.7	.3	11.5	1.1
30	Rubber and plastics	9.2	11.1	36.2	43.6
31	Leather	18.2	21.0	16.4	19.0
32	Stone, clay and glass	11.2	7.2	32.9	21.0
33	Primary metals	21.6	1.9	230.3	21.6
34	Fabricated metals products	40.3	40.4	62.5	62.6
35	Machinery	26.9	33.2	70.7	67.5
36	Electrical equipment	64.4	56.6	120.1	116.0
37	Transportation equipment	59.7	74.8	125.0	157.0
	Manufacturing	684.5	11.5	1,644.8	27.6

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"Equivalent Service". Each of the values in the column was calculated according to the formula:

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$$\frac{G_s}{G_t} C$$

where: G_s = gallons of wastewater discharged by the industry to public sewers in 1968, as reported in *Water Use in Manufacturing, 1968*;

G_t = gallons of wastewater treated prior to discharge by the industry in 1968;

C = current replacement value of waste treatment facilities provided by the industry in 1968, as calculated by the evaluation model and summarized in Table 29.

The procedure almost certainly results in an understatement of values received, in that the average degree of waste reduction accomplished by municipal waste treatment plants is considerably higher, thus incorporating more capital values, than the average degree of treatment provided by industry itself, if we are to judge on the basis of reported waste treatment procedures available to municipalities and to factories.

Evaluation of Utilized Capacity: If one assumes that the value of waste treatment service provided to industries by local governments is proportional to the amount of their capacity taken up by industrial wastes, then the relationship between total sewage flow, total capacity, nonindustrial sewage flow, and value of municipal waste treat-

ment plants will provide an evaluation of the publicly supplied waste treatment capacity devoted to industrial wastes. Table 32 provides such an assessment under the column headed "utilized capacity". Each of the values in the column was calculated according to the formula:

$$\left[\left(\frac{T_v}{T} \times \frac{T_v + T_o - 100P}{T_v + T_o} \right) C \right] \times \frac{S_i}{S}$$

where: T = total municipal waste treatment capacity in 1968, as reported in the *Municipal Waste Inventory* and summarized in Table 25, *Cost Effectiveness and Clean Water* (26.4×10^6 G/D);

T_v = utilized waste treatment capacity, excluding overloading (20.8×10^6 G/D);

T_o = net overloading of waste treatment plants (2.6×10^6 G/D);

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100 = rule of thumb per-capita sewage discharge;

P = population served by waste treatment (137×10^6 persons);

C = current replacement value of municipal waste treatment plants in 1968 as reported in Table 12, *Economics of Clean Water* ($\$4,934.4 \times 10^6$, 1967 = 100);

S_i = sewerage discharge for a given industry, as reported in *Water Use in Manufacturing, 1968*;

S = total sewerage discharge of manufacturers.

While the procedure probably gives a better evaluation than does the assessment of equivalent service, there is unquestionably some overstatement to be attributed to inadequate accounting for non-factory discharges in excess of 100 gallons per-capita per day, capitalization in excess of what industry itself would provide for a similar solution (an evaluation of share of annual charges rather than capital shares might obviate the weakness), and the necessity on the part of site-bound plants to discharge uncontaminated waters to sewers where they exercise a demand on available capacity without receiving any effective treatment service.

STRIKING A BALANCE

Clearly, there are enormous uncertainties remaining after the various evaluation procedures have been conducted. Manufacturers' waste treatment requirements in 1968 occupied a range between \$4 billion and \$12.2 billion. Industry itself supplied between \$2.4 billion and \$3.1 billion (based on percentage of annual costs) of that amount,

and public sources provided an additional \$0.9 to \$2.2 billion toward the satisfaction of the requirement. At one extreme, it could be stated that the total capital demand was over-supplied; at the other, that only \$3.3 billion, or less than a third, had been supplied.

Where the data provide such divergence, interpretation, and judgment become necessary. It would appear that (though no single set of conditions can be described as accurate) the most valid estimate of the situation is one that assesses requirements at the median level of efficiency, evaluates industry-supplied treatment on the basis of capital available, and weighs the public sector contribution somewhere between the points provided by capital utilization and equivalent service.

Table 33 hazards such a summation. While the detail is open to serious question, even at the very high level of aggregation employed, the order of magnitude of the components would seem to be highly reasonable: requirements, \$8.3 billion; available capital supply, \$4.0 billion; unmet demand, \$4.3 billion.

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TABLE 33.—INDUSTRIAL WASTE TREATMENT SITUATION SUMMARY, 1968

SIC	Industry	Millions of 1967 dollars					
		Capital supplied		Median requirement	Deficiency	Maximum requirement	Deficiency
		By Industry	Publicly				
20	Food and kindred products	193.8	315.3	913.3	404.2	997.5	488.4
22	Textiles	48.8	63.6	234.8	122.4	251.4	139.0
24	Lumber and wood products	9.7	2.3	115.8	103.8	186.1	174.1
26	Paper and allied products	529.5	79.3	1,235.6	626.8	1,550.5	941.7
28	Chemicals and allied products	343.2	191.5	867.6	332.9	2,436.8	1,902.1
29	Petroleum and coal	342.1	7.1	817.4	468.2	1,096.1	746.9
30	Rubber and plastics	3.0	22.7	82.9	57.2	96.0	70.3
31	Leather	17.0	17.3	86.5	52.2	86.8	52.5
32	Stone, clay and glass	20.0	22.0	156.5	114.5	182.3	140.3
33	Primary metals	216.3	125.9	1,089.8	747.6	1,620.5	1,278.3
34	Fabricated metal products	6.7	51.4	99.9	41.8	124.1	66.0
35	Machinery	14.8	48.8	80.7	17.1	100.1	36.5
36	Electrical equipment	23.8	92.2	113.5	(2.5)	129.5	13.5
37	Transportation equipment	17.4	92.3	79.8	(12.5)	122.7	13.0
	Manufacturing	1,787.0	1,131.7	5,964.2	3,045.5	8,965.7	6,047.0

¹ Mid-point of estimates presented in table 32.

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VI

WASTE TREATMENT COSTS THROUGH 1976

INTRODUCTION

The chapter assesses manufacturers' waste treatment investments since 1968, projects investments and annual costs consistent with a policy of full compliance with effluent standards by 1976, and relates those costs to annual cash flow and prices of manufactured goods.

SUMMATION

On the basis of industry-supplied data, manufacturers' investments in the period 1969–1971 roughly doubled the value of industrial waste treatment supplied in 1968. Expressed investment intentions and investments reported for the last four years are generally consistent with—though slightly below—the values thought to be necessary to achieve full effluent treatment compliance by 1976. In total, manufacturers must anticipate a probable cash flow of \$20 billion (1971 = 100) over the years 1968–1976, in connection with compliance to effluent standards. While incremental annual costs will probably amount to only about 0.2 percent of aggregate values added by manufacturers, up to 4 percent of total capital spending will be required to comply with standards, and as much as 1 percent of values added in some industries (pulp and paper, steel) will be provided by waste treatment. If additional costs are passed forward to consumers, with full maintenance of margins, prices of manufactured goods may increase a little more than 0.1 percent.

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THE SITUATION SINCE 1968

Although absence of industrial waste data precludes any coherent association of the conditions evaluated in the previous chapter with events of the last three years, it is possible to make some assessment of trends in terms of capital accumulation.

Since 1968, McGraw Hill & Co. has included a survey of pollution control expenditures in its first quarter survey of capital spending intentions. That survey is the only consistent source of information on manufacturers' waste treatment outlays. And though it is presented in aggregate terms that make direct correlation with interpretations derived from Bureau of Census data difficult, it does contain a high measure of authority, and adds considerably to our understanding of evolving conditions.

Taken at face value, the survey indicates that manufacturers' investments for waste treatment have been rising at an almost 20 percent annual rate, after adjustment for inflation, and that reported

investment since 1968 is sufficient to have roughly doubled the available capital stock (cf. Table 34).

There are obvious problems in interpreting the data. On the quantitative side, the user runs up against a set of reporting conventions that lists standard industrial classifications by major business of the firm rather than the factory. The vertically integrated firm and the conglomerate make any comparison with the situation summary presented earlier (Table 33) very tenuous. There is not even any assurance that the indicated investments relate to the manufacturing sector; the degree of integration in many predominantly manufacturing firms extends to the conduct of transportation, agriculture, mining. And for the extractive industries it is probably safe to assume that environmental controls in the extraction process (e.g. oil drilling—or even exploration) are as great, or greater, a source of investment demand as are treatment requirements at the factory. Certainly the data reported by the petroleum industry to McGraw Hill & Co. and the American Petroleum Institute's excellent study, *1967 Domestic Refinery Effluent Profile*, are consistent with an assignment of major cost at points other than the refinery.

Nor can these dollar amounts be related to specific physical facilities. To what extent they reflect production shifts and process rationalizations that contribute to waste reduction but are in themselves necessary or profitable simply cannot be determined. (Though

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TABLE 34.—INVESTMENT, 1969–1971 (AS REPORTED BY MCGRAW HILL & CO.)
[Millions of dollars]

SIC	1969 ¹				1970				1971 ²				Total	
	Total	Inflation	Replacement	Net	Total	Inflation	Replacement	Net	Total	Inflation	Replacement	Net	Investment	Net Investment
20 Food and kindred	32	— 3	—10	19	46	— 8	—11	27	87	—23	—13	51	165	97
22 Textiles	7	— 1	— 2	4	9	— 2	— 2	5	21	— 6	— 3	12	37	21
24 Lumber and wood products	N.A.				N.A.				N.A.				N.A.	N.A.
26 Paper and allied	88	— 9	—26	53	94	—16	—29	49	185	—50	—32	103	367	205
28 Chemical and allied	47	— 5	—17	25	90	—15	—18	57	133	—36	—21	76	270	158
29 Petroleum and coal	143	—14	—17	112	185	—31	—23	131	227	—61	—29	137	555	380
30 Rubber and plastics	3	—	—	3	18	— 3	—	15	21	— 6	— 1	14	42	32
31 Leather	N.A.				N.A.				N.A.				N.A.	N.A.
32 Stone, clay and glass	24	— 2	— 1	21	25	— 4	— 2	19	42	—11	— 3	28	91	68
33 Primary metals	115	—11	—11	93	140	—24	—16	100	135	—36	—21	78	390	271
34 Fabricated metal products	23	— 2	— 5	16	28	— 5	— 5	18	33	— 9	— 6	18	84	52
35 Machinery	20	— 2	— 1	17	39	— 7	— 2		53	—14	— 3	36	112	83
36 Electric equipment	16	— 2	— 1	13	27	— 5	— 2	20	29	— 8	— 3	18	72	51
37 Miscellaneous and unidentified	96	—10	* —11	75	140	—24	* —15	101	109	—29	* —16	64	345	240
Total	643	—64	—94	476	87	—149	—127	596	1,133	—305	—154	674	2,648	1,746

¹ Distribution between Water and Air Pollution Abatement assumed to be same as reported for 1970.

² Planned investment.

³ Total replacement—that accounted for in other rows.

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the Conference Board Survey mentioned earlier leads to the inference that roughly 30 percent of the investment is for such purposes.) Nor can the extent to which they include the write-off of properties that are being taken out of production—one of the most convenient means of bringing an obsolescent factory into compliance at a time when a quarter of productive plant and equipment is idle.

The point is not that the reported values published by McGraw Hill & Co. are suspect. There is no reason to infer any lack of credibility. Rather, it should be understood that these data are not consistent with those used elsewhere in this report—they are from a different source, apply to different uses, evaluate separate aspects of the situation.

What is significant about them, in the context of this report, is their magnitude and their trend. They suggest that most segments of manufacturing are investing aggressively for water pollution abatement, and that regulatory incentives as presently structured are securing a healthy response. Attainment of current discharge standards by 1976 is not likely to occur at the mean level and existing distribution of industrial investments since 1968—but if the trend of increase is sustained, and the inter-industry pattern of outlays is modified, the experience of the last three years may be construed as favorable.

AN INVESTMENT SCHEDULE

While the water pollution abatement schedule to be met by any industry or any firm represents a diverse mix of compliance order dates, negotiated understandings, and internal decisions, there is an administratively expressed target of full national compliance by 1976. Given more than 14,000 significant manufacturing users of waters and nine years time, there is a nearly infinite number of investment possibilities that are consistent with the target.

The most likely schedule must be assumed to be one that eliminates deficiencies at a fairly even rate, while the processes of growth and replacement assert their effects quite naturally as functions of the capital structure and the rate of economic activity.

Such a schedule, assuming the probable set of costs associated with median hydraulic efficiency and a rate and distribution of output growth for the period 1968–76 similar to that of 1959–68, dictates the investment of \$11.2 billion between 1968 and 1976 for treatment of manufacturers' wastes (cf. Table 35).

There is no implication of optimality in the schedule advanced. (And no judgement as to the source of investment, some of which will certainly come from the public sector as a result of industrial

discharge to sewers.) It is simply proposed as the most likely response to regulation in the absence of any formal schedule.

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TABLE 35.—ANNUAL EXPENDITURES CONSISTENT WITH STANDARDS COMPLIANCE BY 1976 (PROBABLE COST: MEDIAN EFFICIENCY)
[CAPITAL EXPENDITURE,¹ MILLION OF DOLLARS, 1967]

SIC	Industry	1968	1969	1970	1971	1972	1973	1974	1975	1976	TOTAL	Capital required, 1976
20	Food and kindred products	93.8	114.7	125.5	131.4	137.4	143.4	149.5	155.6	161.9	1,213.2	1,102.3
22	Textiles	24.1	31.9	35.4	37.6	39.8	42.1	44.6	47.1	49.7	352.3	317.1
24	Lumber and wood products	12.4	12.4	13.3	13.7	14.2	14.6	15.1	15.5	16.0	127.2	98.9
26	Paper and allied products	118.8	134.4	146.2	152.5	158.9	165.3	171.8	178.4	185.1	1,411.4	1,380.9
28	Chemical and allied products	65.0	110.3	123.6	134.2	146.2	160.0	176.1	195.0	217.2	1,327.6	1,439.9
29	Petroleum and coal	72.6	79.2	85.2	88.3	91.3	94.1	97.4	100.4	103.5	812.3	872.3
30	Rubber and plastics	9.5	13.5	15.0	15.9	16.8	17.7	18.6	19.6	20.6	147.2	121.3
31	Leather	9.0	11.1	12.1	12.7	13.2	13.8	14.3	14.9	15.5	116.6	104.9
32	Stone, clay and glass	17.1	19.9	21.9	23.0	24.0	25.1	26.2	27.3	28.5	213.0	183.5
33	Primary metals	112.7	162.9	182.0	194.6	208.2	222.9	238.8	256.2	275.3	1,853.6	1,649.3
34	Fabricated metal products	11.2	16.2	18.0	19.0	20.1	21.2	22.4	23.5	24.7	176.3	147.4
35	Machinery	8.4	9.1	9.9	10.3	10.7	11.1	11.5	11.9	12.3	95.2	85.9
36	Electrical equipment	11.7	15.4	16.9	17.8	18.6	19.5	20.3	21.2	22.1	163.5	147.4
37	Transportation equipment	8.2	9.6	10.5	10.9	11.4	11.8	12.3	12.8	13.2	100.7	92.3
	Manufacturing	574.5	740.6	815.5	861.9	910.8	962.6	1,018.9	1,079.4	1,145.3	8,110.1	7,743.4
	For comparison: Reported investment ...	416	579	723	828							

¹ Net investment (difference between median requirement and industry-supplied capital at 1968) plus annual growth and replacement.

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There is no question that the indicated schedule will be difficult to achieve. Manufacturers are responding to waste treatment requirements at the same time that the public sector is increasing its capitalization of waste treatment works. Total sewerage starts had not reached a billion dollars as late as 1967; but in 1971, manufacturers and municipalities together initiated about \$3.0 billion of sewerage and waste treatment contracts. As a consequence of such growth, extreme inflation and lengthening construction schedules have marked this particular component of the construction industry. Whether it can continue to expand sufficiently to meet the schedule, and what price the economy will pay in terms of inflation and quality defects, are probably the critical questions with respect to the waste treatment target.

Unfortunately, there has been little recognition of this really difficult functional problem. Policy formulation in both the public and private sectors has been concerned principally with questions of demand—how much treatment is needed? how much will it cost? and who will pay? Subordinate issues of employment displacement and regulatory mechanics have also been engaged. But in spite of increasing evidence in the form of delayed deliveries, lengthening construction times, and soaring construction costs, the ability of the sewerage construction industry to supply a ballooning demand has never been investigated, and scarcely questioned. There is reason to believe, however, that the supply of suitable construction services will prove far more critical to meeting waste discharge standards by 1976 than will financial commitment.

It should be noted that secular expansion of the level of investment is necessary, even with a constant increment abatement strategy. Growth and replacement demands account for over half of the indicated capital requirement to 1976, and their level is in large measure determined by the dimensions of the capital base. The schedule illustrated in Table 35 may be slightly over-ambitious in that it embodies rates of output growth that applied in one of the most expansionary periods in our history. A slower rate of economic growth would, of course, permit attainment of the target with a lower rate of increase than the 8.9 percent per year dictated by the projection. But internal growth of the system—that is, installation of the treatment capital associated with 1968 output levels—is a more significant influence on the indicated annual level of investment than the external imposition of treatment requirements that arises out of projected production growth.

If we can judge from manufacturers' investments reported by McGraw Hill & Co., the scheduling procedures actually being used by industrial management must adhere fairly closely to the constant

increment strategy embodied in the projection. Reported investments since 1968 have advanced at a much faster rate (19 percent a year, exclusive of inflation) than the illustrated schedule, but their approximate dimensions, though somewhat lower, are much the same. This expansion of water pollution abatement investment has been in contrast to total plant and equipment expenditures by man-

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ufacturers, which has adopted a slightly downward slope over the last four years when adjusted for price level changes. In consequence, the proportion of total manufacturers' reported investments devoted to waste treatment works has risen from 1.5 percent in 1968, to 2.0 percent in 1969, 2.5 percent in 1970, and an estimated 3.1 percent in 1971.

Given a resumption of the rate of capital accumulation that occurred in the period 1959-68, just under 3 percent of manufacturers' investment must continue to go to waste treatment through 1976 if the target is to be met. But maintenance of a flat pattern of non-inventory investment through 1976 would dictate that an increasingly large share of total investment would be required for the purpose—up to 4 percent, based upon the indicated amount of expenditures for plant and equipment in 1971.

MANUFACTURERS' INVESTMENT INTENTIONS

Not only do reported investments of manufacturers over the last four years indicate a pattern of behavior that is generally consistent with attainment of current waste treatment goals, but also the information we possess with respect to their longer range intentions is not inconsistent with the same purposes.

Again, McGraw Hill & Co. is the source of our information. It has reported "the total cost of bringing industries' (sic) existing facilities up to present pollution control standards as of January 1, 1971," as industrial management has assessed that cost. Unfortunately for the purposes of this report, there is no available distinction between expenditures for air pollution control, water pollution control, and other forms of environmental protection. We are forced to draw inferences from prior experience. There are the additional difficulties of categorization presented by multi-establishment, multi-industry firms. And, unlike the schedule against which these intentions must be compared, there is no statement of time associated with reported dollar values. Nonetheless, the information is useful, and moderately reassuring.

Limiting our consideration to the manufacturing sector, we find that industry in the aggregate is operating on the assumption that an

investment of \$12.36 billion is required to meet environmental standards (cf. Table 36). Of that, roughly half—on the basis of the recent past—may, perhaps, be allotted to water pollution control projects.

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TABLE 36.—MANUFACTURERS' ASSESSMENT OF INVESTMENTS REQUIRED TO COMPLY WITH POLLUTION CONTROL REQUIREMENTS, JANUARY 1971
[As reported by McGraw Hill & Co.]

SIC	Industry	Millions of 1970 dollars	Percent to water pollution, 1970-71
			(percent)
20	Food and kindred products	400	57
22	Textiles	110	34
24	Lumber and wood products	N.A.	N.A.
26	Paper and allied products	1,840	59
28	Chemical and allied products	1,000	52
29	Petroleum and coal	2,120	49
30	Rubber and plastics	300	42
31	Leather	N.A.	N.A.
32	Stone, clay, and glass	160	40
33	Primary metals	4,260	59
34	Fabricated metal products	190	50
35	Machinery	690	32
36	Electrical equipment	210	51
37	Transportation equipment	440	37
	Manufacturing	12,360	48

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There are some distressing inter-industrial divergences from the values produced by the evaluation model, and there are some huge definitional questions. But when the projected investment schedule and the industrial expressions are considered in their most aggregated form, in same year dollars with appropriate situational adjustments, they are very close:

	<i>Million</i>
Industry intentions (48 percent of total in 1967 dollars)	\$4,372
Projected capital requirements	\$8,110
Less public capital available, 1968	(1,132)
Less reported investment, 1969-71	(2,130)
Net capital requirements	\$4,848

The relationship is comforting in the aggregate and on first inspection, if we assume that public treatment of industrial wastes stays fairly constant—but we do not know enough about the values supplied by industry to feel entirely at ease. There is, of course, the inter-industry distribution of intentions as a prime cause of aggravation. But other matters also need to be defined.

1. There is considerable question as to whether the portion of industry's pollution abatement investment that is available for water

pollution control will stay constant. Both air and water pollution control expenditures have been rising for a decade, but the relative share to water (where the bulk of the money has gone in the past) has been shrinking. In the early nineteen-sixties, surveys by the National Industrial Conference Board found 60 percent of manufacturers' environmental protection investments devoted to water. In the last half of the sixties, water's share had dropped to 52 percent. And in the last two years, McGraw Hill's data show water pollution abatement supplying less than half of environmental capital expenditures by industry. Air pollution regulation has become far more stringent, and the general impression is that industrial deficiency in that area is greater. Hence, it seems likely that outlays for water pollution control will continue to decline in a relative sense.

2. Because the values are reported in their least useful form, an aggregated lump, we have little insight into their referents. We do not know if they are for treatment facilities, for reworking processes, for fuel substitutions, for plant abandonment, or any of a host of possible alternatives. Nor do we know if they include investments in 1971 and prior years, or how many years into the future they may include.

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3. To what extent the estimates account for anticipated inflation determines to some extent how adequately they will cover the eventual bill. The assumption used in balancing the estimates against indicated requirements was that they represented 1970 constant dollars. There is no hint in the report of the possible validity of that assumption.

The combined weight of these considerations must leave the analyst with some reservations as to whether U.S. manufacturing adequately recognizes the dimensions of the investment it must make for water pollution control over the next five to six years. While the indicated intentions are, on the surface, generally consistent with evaluated requirements—particularly in a context that includes the availability of public facilities and lower cost treatment configurations—there are too many undefined possibilities for shortfall to provide a high measure of satisfaction.

CASH FLOW IMPLICATIONS

To meet the 1976 compliance target will cost American manufacturers between \$10 billion and \$25 billion between 1968 and 1976. The ultimate amount of direct expenditure will depend principally on the compliance strategy that the preponderance of management adopts. Maximum application of water conserving production pro-

cess, with an attendant increase in disposition of residuals in dry form, could eliminate more than half of the cost of waste treatment. However, the reduction in the one kind of cost could entail disproportionate increases in other costs, or the application of significantly greater amounts of capital than would be consistent with other investment demands. Persistence of high interest rates would be expected to inhibit realization of a low liquid waste strategy, too, in that such an approach to waste production would probably require very significant recapitalization of existing production facilities.

A high cost strategy would seem as unlikely as one devoted to minimum waste treatment costs. In essence, the highest set of costs associated with industrial waste treatment is predicated on the assumption that industry would meet its waste treatment requirements by simply adding necessary treatment facilities to production conditions in existence in 1968, making no effort to adjust production processes to those treatment facilities or to take indicated water conservation measures to reduce costs.

The probable path to achievement of discharge requirements appears to be at some intermediate route between the two extremes; and the gross magnitude of the manufacturer supplied capital requirements assessment tends to corroborate that judgement. Without significantly recapitalizing existing factories, manufacturers may be expected to make obvious adjustments in water utilization practices to accommodate waste treatment, to

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close those marginally profitable factories for which adequate waste treatment would impose either a significant incremental investment or serious technical problem, and otherwise to accommodate to discharge limits by providing waste treatment. Over the longer run, new plants may be expected to incorporate cost-reducing water utilization procedures that result in a slightly higher capital to output ratio for the plant as a whole, but a distinctly lower unit cost of waste treatment.

It is that scenario which is felt to be most adequately characterized by the projection of conditions to 1976 that was presented in terms of investment in Table 35.

When that set of conditions is extended to cover interest and operating charges, it suggests the probable expenditure of more than \$20 billion by manufacturers for waste treatment between 1968 and 1976 (cf. Table 37). Of that amount, more than half—almost \$11 billion—will be required for capital investment to eliminate existing deficiencies, to provide for increased output, and to maintain the capital stock through the replacement process.

The heavy demand for capital is consistent with the significant shortage of waste treatment among manufacturers. However, a part of that capital is being, and will be, supplied through public sources. It might be assumed, then, that actual capital outlays of manufacturers over the period will be somewhat less than is indicated, with operating charges being much greater as a result of payment of user charges to public authorities.

On balance, the use of public facilities could marginally reduce short-term cash flow requirements, in that capital contributions would be engaged through the amortization schedules built into user charges, and thus largely deferred to later years. In addition to relief from cash flow pressures, use of public facilities suggests opportunity to utilize the more advantageous interest rates provided by tax free bonds, to profit from the longer average life (25 years, rather than 20) of the more heavily capitalized plants found in the public sector, and to enjoy the operational cost savings also afforded by higher capital inputs per unit of capacity. (These advantages apply in addition to possible scale economies, the subsidy features provided through State and Federal capital inputs, or the additional subsidies quite often advanced by municipal government in the form of discriminatory user charges or payment for sewerage services from general taxation.)

In spite of those apparent advantages to be obtained by making use of public facilities, only slight reduction of cash requirements is thought likely to eventuate from that source by 1976. The reasons are to be found in technical and institutional aspects of industrial waste treatment.

TABLE 37.—PROJECTED CASH OUTLAYS ASSOCIATED WITH ATTAINMENT OF DISCHARGE STANDARDS BY 1976 (MEDIAN EFFICIENCY)
[Millions of 1967 dollars]

SIC Industry	Outlays, 1968–1976						Total 1971 dollars
	Net investment	Growth	Replacement	Interest	Operations	Total	
20 Food and kindred products	722	189	302	474	413	2,100	2,850
22 Textiles	186	82	84	131	77	560	760
24 Lumber and wood products	99	— ⁽¹⁾	28	44	26	197	267
26 Paper and allied products	856	145	410	641	591	2,643	3,587
28 Chemical and allied products	324	572	432	671	729	2,728	3,702
29 Petroleum and coal	475	55	282	439	265	1,516	2,057
30 Rubber and plastics	80	38	29	45	36	228	309
31 Leather	70	18	29	45	29	191	259
32 Stone, clay, glass	138	27	48	75	108	396	537
33 Primary metals	873	560	421	659	917	3,430	4,655
34 Fabricated metal products	93	48	36	56	70	303	411
35 Machinery	66	5	24	37	48	180	244
36 Electrical equipment	90	34	40	62	83	309	419
37 Transportation equipment	62	13	26	40	59	200	271
Manufacturing total	^a 4,134	1,786	2,191	3,419	3,451	14,981	20,329
(1971 dollars)	(5,610)	(2,424)	(2,973)	(4,639)	(4,683)	(20,329)	.....
Maximum cost total	5,430	1,845	2,520	3,939	4,637	18,609	.....
(1971 dollars)	(2,504)	(2,504)	(3,420)	(5,345)	(6,292)	(25,252)	.....
Minimum cost total	1,416	880	1,267	1,976	1,792	7,322	.....
(1971 dollars)	(1,922)	(1,194)	(1,719)	(2,669)	(2,432)	(9,936)	.....

¹ Rate of improvement in water productivity is greater than rate of growth of output.

^a Does not account for publicly supplied waste treatment.

On the technical side, water use and waste treatment requirements are heavily concentrated in a few industries. Of these, both the scale of operations and the nature of wastes in only one, food processing, is generally amenable to conventional sewage treatment. Much of the chemicals industries, and most pulp and paper, petroleum refining, and primary metals industries represent difficult—in some cases insuperable—problems in the context of sewage treatment. Probably, less than half of industrial wastes (though this includes the wastes of the vast preponderance of all factories) could be treated by sewage treatment organizations if circumstances were otherwise generally favorable. A number of institutional factors, however, are so clearly unfavorable that it does not now seem probable that the percentage of industrial wastes that is publicly treated will increase much beyond the current 7–8 percent.

1. The same loss of operational flexibility that motivates manufacturers to avoid heavy capital commitments for waste treatment (even at the expense of higher total costs) causes them to avoid too intimate an association with municipal treatment when liquid waste disposal is a significant feature of factory operations. Limitations on the volume and kinds of wastes that may be discharged to sewers may present a real or potential constraint on operations, or may imply pretreatment costs significant enough to override the advantages of the arrangement. Additionally, it is becoming increasingly common for municipalities to regularize their relationships with discharging factories by long-term contracts that, in protecting the municipality's revenue source, tie the factory to a fixed schedule of payments.

2. Municipal waste treatment works represent only a fraction of the total cost of sewerage, in that the treatment plants are tied to elaborate collection and transmission systems that account for a major share of capital values, and a substantial portion of annual costs. Economies of scale are slight—and may be negative—with respect to collection costs. Yet municipal sewerage systems have in recent years demonstrated a tendency to increase in size and reach. This tendency has carried with it substantial acceleration of replacement charges, as existing plants are abandoned through tie-ins with larger systems. Conforming to the general trend toward more capital intensive municipal waste treatment, the amount of capacity provided per unit of demand has also been rising. Under these circumstances, the manufacturer who connects to a public system does so at the risk of becoming a contributor to revenue demands associated with heavy fixed charges and increasing redundancy.

3. Waste treatment requirements have for some years been evolving in the direction of greater stringency and greater specificity. The

principal attraction of the municipal sewerage system to the manufacturer has been the breadth of its application. Elimination of specific contaminants can often be done more easily and more cheaply within the

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TABLE 38.—INCREMENTAL WASTE TREATMENT COSTS RELATED TO VALUES ADDED BY MANUFACTURERS, 1968
[Millions of 1967 dollars]

SIC	Industry	1968 conditions			Increase for full compliance	Incremental value added (percent)
		Industry supplied	Sewer charges ¹	Total		
20	Food and kindred products	39.4	46.0	85.4	82.1	0.3
22	Textiles	10.0	9.3	19.3	20.9	.2
24	Lumber and wood products	2.7	.4	3.1	16.9	.3
26	Paper and allied products	131.8	11.6	143.4	100.4	1.0
28	Chemical and allied products	106.6	28.0	134.6	47.0	.2
29	Petroleum and coal	116.6	1.0	117.6	23.9	.1
30	Rubber and plastics .....	.7	3.3	4.0	11.5	.2
31	Leather	3.9	2.5	6.4	8.9	.3
32	Stone, clay and glass	4.0	3.2	7.2	30.0	.3
33	Primary metals	62.5	18.4	80.9	172.2	.8
34	Fabricated metal products	1.2	7.5	8.7	25.7	.1
35	Machinery	2.6	7.1	9.7	8.6	.03
36	Electrical equipment	4.5	13.5	18.0	8.4	.03
37	Transportation equipment	3.3	13.5	16.8	2.3	.01
	Manufacturing	472.7	165.3	638.0	514.8	.2

¹ Calculated from value of capital supplied publicly, Table 33, on basis of mean ratio of sewerage operating costs to treatment plant value at 5.1 percent, 3 percent replacement rate, and interest charge of 6.5 percent.

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production process than by waste treatment. Moreover, some of the pollutants that are to be reduced in sewage treatment do not occur in the wastes of all manufacturers (e.g., pathogenic organisms and excess phosphorus). Thus to be tied to a municipal system implies for the plant manager the possibility of paying—and at the margin—for treatment of wastes that he might more cheaply eliminate himself, or which he does not discharge.

These institutional factors should not be expected to eliminate public treatment of industrial wastes, but they should slow materially, if not reverse, the trend toward cooperative waste treatment that has marked the last decade. Site constraints and processing patterns that do not make heavy use of water will probably continue to direct the wastes of most factories into metropolitan sewerage systems. But among the manufacturers who make the largest use of water, cooperative solutions are becoming less and less attractive. Capital shortage and location-induced absence of options are probably the principal remaining incentives for the large industrial user of water to abandon operational control of waste treatment, at this time exceed-

ing both subsidy advantages and the relief from regulatory pressure which had been prime motivating forces in the past.

Given that set of conditions, it is probable that the bulk of the cash requirements associated with industrial waste treatment will be met by industry out of internally generated cash flow or by recourse to financial markets.

The ability of manufacturers to generate the indicated cash flow will probably best be related to total values added by manufacturing. Waste treatment is, after all, nothing more than an additional manufacturing process that confers some incremental utility to purchased materials. It is true that the utility does not flow directly to the user of the product. (Except, perhaps, to the extent that he derives a psychic benefit from the enjoyment of non-polluting characteristics of his consumption pattern.) But the same is true of many of the characteristics of value added. The external character of the particular utility component is in no way different from taxes, advertising, working conditions and wage differentials, or many other components of the value added by the manufacturing process to a particular commodity.¹³

It is clear that a process whose capitalization will require no more than 3 to 4 percent of manufacturers' investments over the next five years will constitute a very small incremental cost, or value added, when the full range of resources that goes into the manufacturing process is taken into account. In the aggregate, the difference between value of waste treatment provided in 1968 and that estimated to be necessary at the probable level of hydraulic efficiency amounts to a 0.2 percent incremental cost (cf. Table 38). (Under the maximum cost of treatment evaluation set, incremental annual costs amount to 0.4 percent of values added in 1968.)

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More significant than the aggregate level relationship, however, is the incidence of added costs among industries. Depending on the significance of water as a raw material and the degree of required treatment already available, the increase in relative costs occupies three orders of magnitude, ranging from .01 percent of values added for transportation equipment up to full percentage point for pulp and paper.

PRICE LEVEL IMPACTS

It would scarcely seem that cost increases of the dimensions indicated would threaten any industry—not even the paper or primary metals producers who will bear such a significant share of the total cost. But it seems even less likely that management would be sat-

ified to absorb such costs. If absorbed, the incremental costs in 1968 would have reduced the \$53.3 billion (1967 = 100) pre-tax profits of manufacturers by 0.9 percent, and would have probably imposed a reduction of several percent on low-margined steel, paper, and food processors.

Price increases to cover the additional values conferred are, then, likely. And it is almost equally likely that such increases will be framed in dimensions that are consistent with maintenances of margins. While no technique short of a complex input-output analysis is available to trace the total impact on prices through the transaction chain—and the bulk of the impact is introduced with first stage processors very early in the chain, thus subject to a series of markups before its effect is exhausted in the ultimate retail sale—gross markups can be calculated quite easily, and these are sufficient to sustain order-of-magnitude judgments about impact on the prices of manufactured goods (cf. Table 39).

Giving full expression to calculated markups, and providing not only for recovery of costs but maintenance of margins, such calculations disclose that the costs of incremental waste treatment could have been passed on to consumers in 1968 for little more than a 0.1 percent aggregate increase in the prices of manufactured products. (Manufacturers' sales, in 1967 dollars, are estimated by the Department of Commerce to have been \$607 billion in 1968.)

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TABLE 39.—INCREASES IN THE PRICES OF MANUFACTURED GOODS TO BE ATTRIBUTED TO
WASTE TREATMENT COMPLIANCE, 1968 CONDITIONS
[Millions of 1967 dollars]

SIC	Industry	Incremental values added	Indicated markup ¹	Price effect
20	Food and kindred products	82.1	.191	97.8
22	Textiles	20.9	.172	24.5
24	Lumber and wood products	16.9	.183	20.0
26	Paper and allied products	100.4	.238	124.3
28	Chemical and allied products	47.0	.396	65.6
29	Petroleum and coal	23.9	.144	27.3
30	Rubber and plastic	11.5	.253	14.4
31	Leather	8.9	.202	10.7
32	Stone, clay and glass	30.0	.312	39.4
33	Primary metals	172.2	.213	208.9
34	Fabricated metal products	25.7	.234	31.7
35	Machinery	8.6	.226	10.5
36	Electrical equipment	8.4	.221	10.3
37	Transportation equipment	2.3	.197	2.8
	Manufacturing	514.8		688.2

¹ Values added, less payrolls, divided by value of shipments.

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APPENDIX: THE INDUSTRIAL WASTE TREATMENT MODEL

MODEL COMPONENTS AND LOGIC

The data and interpretations of this report are based largely upon a modelled restructuring of *Water Use in Manufacturing*. This portion of the *Census of Manufactures, 1967* provides a data catalog on the water use characteristics of 9402 manufacturing establishments that reported the intake of 20 million gallons or more of water in 1967, and responded to a detailed questionnaire on their water utilization for the year 1968.

There are significant problems in making use of those data. Every effort is made by the Bureau of Census to avoid the possibility of disclosing information about any respondent, thus the data are aggregated to a degree that makes it impossible to determine directly any but the grossest distributional characteristics of the population presented. Further, the information tends to reflect an emphasis on water as an industrial resource rather than an environmental contaminant. The items reported are in few cases directly useful to the study of pollution control. They must be manipulated within a format of assumptions to yield useful answers for that purpose.

1. The first premise of the model is that the 9402 establishments that were reported upon in *Water Use in Manufacturing* are too small a number to adequately reflect manufacturers' costs. The *Census of Manufacturers, 1967* does not provide any indication of total manufacturers' use of water. However, *Water Use in Manufacturing, 1963* did present such data. (Among other things, it reported a total of 10,580 establishments using 20 million gallons or more of water, of which only 8925 responded to detailed questionnaires, suggesting that the 1967 report may also include a less than complete population of plants using 20 million gallons a year). The sample of 9402 establishments was, then, expanded on the basis of the 1963 census to include over 14,000 establishments, that being the greater part of those reported to have an intake of 10 million gallons or more in 1964. (Ten million gallons, assuming a normal five day work week, amounts to a discharge of less than 40,000 gallons per day, or about as much as the sewage from a town of 600 persons—well below the threshold at which sewerage is necessary under any but the most unfortunate soil conditions.)

2. Having determined that the model should be expanded to include those manufacturing plants that use approximately 10 million gallons or more of water a year, the modellers accepted the premise that waste characteristics have a significant relationship to waste treatment costs. Industrial categories reported in *Water Use in Manufacturing, 1967* were then regrouped into subgroups according to the kinds and concentrations of waste products that were considered to be

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characteristic of various industrial processes on the basis of an extensive literature search. The 320 four-digit SIC groupings reported by the Bureau of Census emerged, when reassembled, as 71 components, with a generalized waste treatment configuration established for each.¹ The decision rules applied in determining the configuration were:

a. Standardized treatment procedures were to be applied in every case, and where modifications peculiar to a plant or any industry were reported in the technical literature, the modification was rendered in terms of a similar standard solution to the engineering problem.

(The effect of the rule is to increase calculated costs, in that modifications reported generally relate to a means to reduce costs at an equal or greater treatment efficiency through adaptation to specific conditions.)

(The decision rule was breached for two industry components. In the pulp and paper industry, SIC 26, sulfite waste liquors do not seem adaptable to any of the standard waste treatment procedures. In their case, evaporation and burning prior to treatment of condensates was assigned as an element of the treatment series. In the case of primary non-ferrous metals, SIC 333, the "red mud" wasted in aluminum reduction did not appear to be amenable to any of the standardized waste treatment methods, so evaporation of the liquid component of the slurry was assigned as an element of the treatment series.)

b. No treatment method, or sequence of treatment methods, drawn from the technical literature was to be applied unless it was associated with a reduction of 90 percent or more of the pollutional aspects of wastewater that it was intended to remedy.

c. All treatment sequences and other system components were to embody the highest cost standard methods; and when there was uncertainty as to what portion of the waste stream was to undergo a given treatment procedure, then the larger possible component—up to the total waste stream—was to be assigned to that procedure.

3. Having established a study population—establishments with an intake of 10 million gallons or more of water, distributed through waste and product grouped industrial categories—it was necessary to define the population in terms of size distribution and locational characteristics. The census data do not include such information, so they were disaggregated on the premise that the largest water-using establishments in each of the 320 SIC categories are identical with the largest users of labor in each category.

¹ Thanks are due to Messrs. Ralph Scott, John Fairall, James Horn, Leon Myers, and Kirk Willard who took time from extremely busy schedules to review the technical aspects of the model and who contributed enormously to such merits as it may have.

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Since employment data is as protected by Federal sources as water use data, Dun & Bradstreet files were used to establish distributional characteristics. From the firm's computerized catalog of manufacturers, establishments were drawn from each of the relevant SIC categories on the basis of employment, until a sample population equal to the number of establishments reported to use 10 million gallons or more in 1964 was created. These, with listed employment, are the building block of the model.

4. With location and size distributions of the model components approximated on the basis of the employment surrogate, employment data were translated into hydraulic terms with the use of annual water intake per employee factors derived from *Water Use in Manufacturing*, 1967. Unfortunately, Census data are not sufficiently detailed to conduct an analysis of water use per employee by location at more than the two digit SIC level of detail, and all available studies of industrial water use indicate that location is equally—if not more—important a determinant of water use as industrial type. To accommodate locational factors, a multiplier was applied to the intake per employee factor, representing the ratio of intake per employee in each of 17 water use regions (designated by the Bureau of Census) to national water use per employee at the 2 digit SIC level. Wasteflow for each of 14,449 modeled establishments was, then, a construct of the formula:

$$Q_a = E \cdot Q_i \cdot Q_r$$

Where: Q_a = annual wasteflow

E = establishment employment, reported by Dun & Bradstreet

Q_i = water discharge per employee, nationally for each of 320 four digit industry categories

Q_r = ratio of regional to national water use per employee in 15 major (2-digit) industry categories

Because wasteflows on an annual basis are of slight significance to design of abatement facilities, annual discharges were further modified by establishing a general divisor for each industry, based on an assessment of average number of working days in the operating year. ($Q = \frac{Q_a}{d}$ Where d = estimated days in working year.)

5. Segregation of wasteflows was accommodated at two levels. Census data are reported for purpose of intake—cooling, process, sanitary, boiler feed, and other—and for gross water used, including recirculation, rather than for discharge after type of use. In 1968, for example, less than 28 percent of manufacturers' gross water

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intake was for process use and 66 percent was for cooling, thus potentially uncontaminated except by heat. Yet it is known that some recycling involves diversion of used cooling waters to process streams, and some cooling involves direct contact with products in process—as in ferrous metallurgy. The modelers were, then, faced with a situation that can be defined only in the very general sense that wastewater requiring treatment is something greater than process water intake, and something less than total discharge.

For the purposes of the model, then, wastewater requiring treatment was defined to be:

$$Q_d = (Q_p \frac{U}{I}) + 30 E$$

Where Q_d = design flow for treatment system

U = total water use, including recycling

I = total intake

Q_p = process intake

E = employment (i.e. 30 gallons per employee per day for sanitary purpose)

The consequence of the procedure is to establish each factory's treatable discharge in terms that stipulate that recycling of process water is equivalent in degree to total recycle for the industry, with all process recycling accomplished by bringing cooling water into the process stream. Adhering to assumption 2.c, the procedure probably overstates considerably the amount of water requiring treatment. (And, in fact, it was necessary in calculation to set constraints that limited treatable discharge for any component to the amount of its total discharge.)

The values for daily wasteflow requiring treatment were then multiplied by factors intended to give effect to (a) proportion of treatable wastewater requiring a given method of treatment, (b) costs based on flow to cost relationships for con-

struction and operation of the given normal waste strength² and, (c) a factor intended to provide an

² Strengths were gauged in terms of concentration multiples (e.g. BOD₅ 400 MG/L = 1), and the multiple became a simple multiplier of flow to be treated (e.g. BOD₅ 400–800 MG/L = 2). Economies of scale were, however, taken into account at a level slightly more conservative than the six-tenths power rule, so:

If Multiplier is:

	Treatable flow is	Where flow 0.6 would be
1	1	1
2	1.6	1.5
3	2.2	1.9
4	2.8	2.3

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approximation of non-recurring installation cost imposed by land purchase, re-piping, and production losses ranging from 0.2 to 0.35 times construction cost, depending on the complexity of the hydraulic engineering characteristic of an industry. The sums of individual factory component are able according to SIC grouping (one to four digit), location (county, State, water use region, nation), or waste treatment process. Substitution of alternative flow, treatment, and cost variables allows assessment of impact of policy or technological changes at any level from a single factory to all manufacturing.

Table 24, Chapter III, Part I, presents the elements of the basic industry matrix utilized in the model. Table A presents the cost-to-flow equations and examples of costs associated with selected flow values.

Water Use in Manufacturing, 1967 also provided the information upon which current capitalization estimates were based. The document reports number of plants and volume of flow in a variety of treatment categories for industrial sectors. On the basis of previously established operating rates and the same set of cost functions used to determine requirements, existing facilities were evaluated in terms of average daily flows through facilities of specified types.

It should be noted that—quite apart from distortions involved in assessments at the mean—the procedure significantly understates the degree of required capital that is currently available in many industries. In addition to facilities operated by plants using less than 20 million gallons, wastes discharged to public sewers and treated by public sewage treatment facilities are not accounted for; and in a number of cases, governmental bodies, through the normal sewage handling systems, accepted a major part of an industry's discharge. Nor can wastes discharged to land (septic tanks, irrigation, deep-well disposal) be accounted for in financial terms. In either case, the Bureau of Census simply does not provide sufficient information to permit an evaluation.³

³ A possible offset to this understatement has been suggested by a number of industrial sources who have stated quite freely that much of the treatment capital currently available is under-designed and has been under-maintained. Its operational utility may be considerably less than its current replacement value would suggest.

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TABLE A.—COST TO FLOW RELATIONSHIPS, BASIC WASTE TREATMENT PROCESSES

Treatment processes		Cost coefficients			Cost in dollars			
CC—Capital cost								
OM—Operation and maintenance cost		Log(cost) = A + Log(flow)(B + Log(flow))			Flows in million gallons per day			
		A	B	C	0.10	1.0	10.0	100.0
CC	Oil separation	4.74702	0.92844	0.22100	10,976	55,849	789,514	31,009,875
OM	Oil separation	0.64345	—0.17671	0.0	2,313	15,399	102,519	682,492
CC	Equalization	4.62325	0.74646	—0.22358	7,529	42,000	234,266	1,306,682
OM	Equalization	—0.30103	—0.51016	0.06646	660	1,750	6,299	30,800
CC	Coagulation-sedimentation	5.52401	0.61843	0.00842	82,035	334,202	1,415,337	6,230,889
OM	Coagulation-sedimentation	0.86923	—0.11755	0.00586	3,441	25,899	200,266	1,590,882
CC	Neutralization	4.69897	0.98560	—0.52716	5,168	50,000	483,693	4,679,182
OM	Neutralization	0.24304	—0.10083	0.0	772	6,125	48,559	384,988
CC	Flotation	4.59106	0.44964	—0.02748	13,849	38,999	109,824	309,271
OM	Flotation	0.64345	—0.17671	0.0	2,313	15,399	102,519	682,492
CC	Sedimentation	5.45089	0.55368	0.0	79,824	282,416	1,010,578	3,616,179
OM	Sedimentation	0.64345	—0.17671	0.0	2,313	15,399	102,519	682,492
CC	Aeration	4.54407	0.23408	0.0	20,416	35,000	59,999	102,856
OM	Aeration	—0.30103	—0.51016	0.06646	660	1,750	6,299	30,800
CC	Biological oxidation	5.07555	0.643000	0.0	27,073	119,000	523,058	2,299,058
OM	Biological oxidation	0.09934	—0.36057	0.07879	1,209	4,399	22,994	172,753
CC	Chlorination	4.17609	0.66317	0.0	3,257	14,999	69,065	318,002
OM	Chlorination	0.24304	—0.10083	0.0	772	6,125	48,559	384,983
CC	Evaporation	6.11227	1.0000	0.0	129,500	1,295,000	12,950,007	129,500,076
OM	Evaporation	—0.7112	—0.24314	0.0	520	2,971	16,974	96,076
CC	Incineration	5.83373	0.64339	0.0	155,002	681,914	2,999,991	13,198,057
OM	Incineration	1.57978	—0.37205	0.0	31,325	132,998	564,674	2,397,441

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MODEL CHARACTERISTICS

The characteristics of the evaluation model can best be appreciated by a comparison of its aggregated structure with that of the establishments covered in *Water Use in Manufacturing, 1967*.

The basic distinction between the evaluation model and its Bureau of Census source is the expansion to include establishments with an intake of 10 to 20 million gallons a year. The total number of establishments covered is increased by this device by more than 50 percent (cf. Table 21, Chapter III, Part I). But in the case of food processing, wood products, and leather, an approximate doubling occurs. These industries tend to be broadly distributed and characterized by moderately-sized plants rather than a few dominant factories—food processing in particular, which accounts for 25 percent of the Census-reported so that a truly significant portion of their pollution associated features is concealed if only larger plants are considered.

A second distinction between the two data structures is critical to the assessment of waste treatment requirements. The manner in which an industry uses water is at least as important to a consideration of its pollutional characteristics as is the amount of water it uses; and the distribution of pollutional potential—as measured by calculated treatable discharge—varies significantly from the distribution of total discharge. Pulp and paper production, third in gross water use, becomes the largest source of treatable wastewater, due to the heavy portion of the industry's intake for processing. Conversely, petroleum refining slips behind food processing as a source of treatable wastewater, not so much as a result of the expansion of the food industry's evaluated discharge as because of refineries' relatively heavy use of water for cooling rather than processing. The leather industry—mainly its tanning component—stands out as the one whose relative significance is most affected by the modeling procedure. Heavy use of process water combined with a large relative number of units with an intake of 10 to 20 million gallons a year make the industry's share of waste treatment demand five times as great as its reported share of total water demand.

The aggregate impact of these distributional features is not great. Though more than half again as many factories are covered by the evaluation model as by the report of the Bureau of Census, employment in industries covered is only increased by 18 percent, and water use by an even lesser percentage (cf. Table 22, Chapter III, Part I). However, the logic of the recirculation device employed in the model, plus the broadening of the population covered, provides a treatable discharge value that not only exceeds reported process intake for plants using 20 million gallons by a gross factor of almost 2.4 to 1, but also exceeds total reported intake for the larger users alone in seven of the fourteen (two digit SIC) industries. It is clear that

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factories account for the bulk of manufacturers' use of water and for discharge of pollutants. Water use technology and size distribution of a number of industries for which water is not so significant a resource tend to conceal a somewhat larger pollution potential than might be thought.

(The principal weakness of employment as a water use determinant can be noted in Table 23, Chapter III, Part II. Employment, and thus calculated discharge, in transportation equipment [SIC 37] is significantly less for the evaluation model than for reported users of 20 million gallons or more. Examination of components derived from Dun & Bradstreet reports leads to the inference that aircraft factories consigned to the transportation equipment industry by the Bureau of Census may have been reported by Dun & Bradstreet in the ordinance category. The understatement has little influence on aggregate values for manufacturing presented in

this report. The user should be aware, however, that in the case of transportation equipment, total costs are probably under-represented throughout, and by 17 per cent or more, if relative employment is a guide.)

The modelling procedure also affects the interregional distribution of discharges, and so of costs. Not surprisingly, the Colorado, Great Basin, and California regions experience a significant increase in relative dimension when calculated treatable discharge is compared to reported process intake. In those arid areas, resource constraints act to hold an atypical proportion of manufacturers below an intake of 20 million gallons a year, and also to promote recycling. In two of the more humid and less industrialized regions—Southeast and Pacific Northwest—a substantial increase in treatable discharge, as opposed to reported total intake, traces to the presence of a larger number of moderate-sized food processors and a lesser number of wood products factories that would not be included in an evaluation limited to plants with an intake of 20 million gallons or more. These five regions, together with the Western Gulf where the high degree of recycling characteristic of the petroleum-based industries inflates calculated treatable discharge, all experience a significant expansion of indicated waste treatment costs as a result of the procedures employed (cf. Table 22, Chapter III, Part II).

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TABLE B.—EVALUATION OF INDUSTRIAL WASTE DISPOSAL PRACTICES, 1968

SIC	\$1,000's in place (1967=100)		O&M ratio	Percent discharge to sewers and to ground
	Capital	Annual O&M		
20X	2,247.4	150.9	6.7	X
201	40,490.0	3,344.8	8.3	70.1
202	2,358.0	96.6	4.1	62.1
203	57,800.0	4,200.0	7.3	47.6
204	2,691.7	192.0	7.1	40.2
2046	2,202.4	137.7	6.3	27.1
205 + 7	.....	.....	....	37.1
206	17,857.0	1,492.5	8.4	42.6
2063	54,270.0	4,229.0	7.8	26.0
208	4,914.0	462.8	9.4	55.7
209	8,997.0	443.9	4.9	39.2
20	193,827.5	14,750.2	7.6	47.7
22X	9,633.9	582.7	6.0	60.5
221	10,851.0	768.0	7.1	25.6
222	9,051.0	625.6	6.9	41.3
223	9,590.0	771.1	8.0	26.2
226	9,635.0	590.9	6.1	33.5
22	48,760.9	3,338.3	6.8	39.1
24	9,652.2	704.2	7.3	9.2
26X	2,958.0	370.0	12.5	....
261	64,390.0	20,510.0	31.9	1.1
262	271,072.0	48,873.0	18.0	4.4
263	180,824.0	31,003.8	17.1	6.1
264	5,979.0	618.8	10.3	29.8
265	.....	.....	....	48.9
266	4,247.0	654.0	15.4	14.4
26	529,470.0	102,029.6	19.3	4.6
28X	3,092.7	256.3	8.3	....
2812	13,950.0	2,247.0	16.1	13.5
2813	247.0	9.5	3.8	4.4
2815	37,882.8	3,370.2	8.9	7.5
2816	6,848.7	397.7	5.8	0.4
2818	105,361.0	11,540.1	11.0	2.8
2819	36,803.0	2,794.0	7.6	20.8

TABLE B.—EVALUATION OF INDUSTRIAL WASTE DISPOSAL PRACTICES, 1968, continued

SIC	\$1,000's in place (1967 = 100)			Percent discharge to sewers and to ground
	Capital	Annual O&M	O&M Ratio	
282	103,220.0	11,293.0	10.9	3.2
283	8,427.2	463.7	4.4	18.7
284	490.8	28.3	5.8	20.1
285	259.0	8.7	3.4	71.0
286	2,782.0	148.1	5.3	4.2
287	10,232.0	1,034.0	10.1	2.1
289	13,628.9	838.2	6.2	7.3
28	343,225.1	34,428.8	10.0	6.9
29X	.....	.....	....	....
29(1)	342,078.5	73,217.5	21.4	2.6
30	2,979.0	287.3	9.6	19.7
31X	.....	.....	....	....
3111	16,972.0	1,704.0	10.0	69.6
				(326) 55.0
32XX	1,807.3	141.7	7.8	(322) 35.0
321	6,191.0	355.6	5.7	6.6
324	2,120.0	145.3	6.9	6.4
325	.....	.....	....	60.0
327	3,170.0	160.5	5.1	9.3
329	6,759.7	762.1	11.3	25.9
32	20,048.0	1,565.2	7.8	15.1
33X	13,878.0	1,318.1	9.5	.....
3310	33,384.0	2,621.2	7.9	2.8
3312	156,635.0	32,384.0	20.7	2.5
332X	1,379.0	66.8	4.8	40.4
3321	4,074.0	320.8	7.9	43.0
3331	1,790.0	70.8	4.0	37.4
3332 and 3	.....	.....	....	9.8
3334	5,202.3	265.1	50.9	5.2
33	216,342.3	37,046.8	17.1	4.2
34	93,614.2	6,151.1	6.6	64.7
35	14,779.6	765.2	5.2	25.7
36	23,849.0	1,527.0	6.4	65.8
37	17,358.0	1,097.6	6.3	28.3
39	885.0	44.5	5.0	43.8

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PLANNED CONSTRUCTION OF MUNICIPAL WASTE TREATMENT FACILITIES

INTRODUCTION

The purpose of this part of the report is to:

- Present results of the 1971 survey of planned construction activities for the period FY 1972 through FY 1976;
- Present an estimate of planned construction activity derived by the facilities evaluation model;
- Compare the 1970 and the 1971 surveys;
- Compare the model and the survey approaches;
- Consider how the construction industry capacity might bear on the interpretation of the two estimates for 1971;
- Summarize other findings of the 1971 survey with regard to federal/State requirements, type of facilities, user charges, and em-

- ployee requirements;
- And, finally summarize the program accomplishments in the municipal treatment sector.

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SURVEY OF PLANNED CONSTRUCTION FOR MUNICIPAL WASTE
TREATMENT FACILITIES

The 1971 survey was conducted to update EPA estimates of the scope and cost of construction of municipal waste treatment facilities, planned through FY 1976, which communities intend to install to meet current water quality standards implementation schedules or other current standards or enforcement requirements.

The survey was directed to 2294 municipalities whose population was greater than 10,000 persons or whose facilities were serving more than 10,000 persons. The response rate was excellent with 95.5 percent of the survey questionnaires returned (cf. Table 1). The survey details and instructions are included in Volume II of this report.

Survey Findings

Summaries and analysis of the various elements of data obtained through the survey from the 2300 cities contacted are presented below.

The estimated total cost of constructing planned waste treatment facilities for the five-year period FY 1972 through FY 1976 for municipalities of or serving 10,000 or more persons is just over \$14.0 billion. This estimate is based on 1971 construction costs of treatment plants, outfalls, interceptors, and pumping stations. When the construction activity for communities less than 10,000 is included, \$18.1 billion in projects is planned over the period FY 1972 through FY 1976. These intentions for FY 1972 through FY 1976 are as follows:

<i>Fiscal year</i>	<i>Billion dollars</i>
1972	5.28
1973-1974	9.28
1975-1976	3.52
Total	18.08

Table 2 presents a summary of the survey portion of the \$18.1 billion estimate. The State-by-State summary of the FY 1972 through FY 1976 intentions shown above is presented in Table 3.

The survey provides an assessment of intended State activities. In recording recognized improvements, individual communities tend to be optimistic in the amount of construction activity that will take place so that the collective expectations of local communities may be greater than the ability of the construction sector to supply these

needed facilities. In later years the figures could be less accurate because many communities do not yet have detailed plans and specifications for these facilities.

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TABLE 1.—SUMMARY OF SURVEY RESPONSES

	Number of municipalities contacted	Number of responses	Percent response	Number of responses indicating needs
Totals	2,294	2,191	95.5	1,435
Region I	174	174	100.0	82
Connecticut	48	48	100.0	20
Maine	17	17	100.0	11
Massachusetts	85	85	100.0	38
New Hampshire	7	7	100.0	7
Rhode Island	13	13	100.0	6
Vermont	4	4	100.0	0
Region II	204	187	91.6	119
New Jersey	103	93	90.2	53
New York	100	93	93.0	65
Puerto Rico	1	1	100.0	1
Virgin Islands	—	—	—	—
Region III	302	288	95.3	190
Delaware	2	2	100.0	2
Maryland	21	21	100.0	18
Pennsylvania	215	201	93.4	120
Virginia	44	44	100.0	33
West Virginia	19	19	100.0	16
Dist. of Columbia	1	1	100.0	1
Region IV	323	317	98.1	247
Alabama	39	39	100.0	26
Florida	85	85	100.0	71
Georgia	41	41	100.0	27
Kentucky	30	25	83.3	19
Mississippi	28	28	100.0	23
North Carolina	41	41	100.0	29
South Carolina	29	29	100.0	24
Tennessee	30	29	96.6	28
Region V	579	579	100.0	321
Illinois	144	144	100.0	68
Indiana	57	57	100.0	42
Michigan	135	135	100.0	59
Minnesota	45	45	100.0	15
Ohio	153	153	100.0	106
Wisconsin	45	45	100.0	31
Region VI	239	214	89.5	174
Arkansas	23	21	91.3	19
Louisiana	32	28	87.5	23
New Mexico	15	14	93.3	13
Oklahoma	29	28	96.5	25
Texas	140	123	87.8	94
Region VII	105	84	80.0	57
Iowa	25	19	76.0	14
Kansas	41	29	70.7	19
Missouri	27	24	88.8	15
Nebraska	12	12	100.0	9
Region VIII	80	80	100.0	50
Colorado	27	27	100.0	17
Montana	10	10	100.0	8
North Dakota	9	9	100.0	8
South Dakota	8	8	100.0	6
Utah	21	21	100.0	10
Wyoming	5	5	100.0	1

TABLE 1.—SUMMARY OF SURVEY RESPONSES, continued

	Number of municipalities contacted	Number of responses	Percent response	Number of responses indicating needs
Region IX	193	175	90.6	126
Arizona	4	4	100.0	4
California	174	156	89.6	107
Hawaii	8	8	100.0	8
Nevada	6	6	100.0	6
American Samoa	—	—	—	—
Tr. Terr. of Pac. Islds.	—	—	—	—
Wake Island	1	1	100.0	1
Region X	95	93	97.8	69
Alaska	2	2	100.0	2
Idaho	11	11	100.0	10
Oregon	34	34	100.0	26
Washington	48	46	95.8	31

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TABLE 2.—ESTIMATED COST OF CONSTRUCTION OF PLANNED MUNICIPAL WASTE TREATMENT FACILITIES FOR MUNICIPALITIES WITH OR SERVING POPULATIONS OF 10,000 OR MORE, FOR PERIOD FY 1972-1976, BASED ON SURVEY COMPLETED IN DECEMBER 1971.

Totals	14,014.5
Alabama	68.1
Alaska	12.3
Arizona	14.0
Arkansas	49.8
California	1,743.2
Colorado	62.3
Connecticut	148.9
Delaware	48.9
Dist. of Columbia	108.7
Florida	556.8
Georgia	106.5
Hawaii	60.7
Idaho	23.4
Illinois	1,113.0
Indiana	476.7
Iowa	173.0
Kansas	44.9
Kentucky	115.6
Louisiana	89.8
Maine	62.3
Maryland	668.3
Massachusetts	495.6
Michigan	1,166.1
Minnesota	260.4
Mississippi	31.7
Missouri	255.2
Montana	22.2
Nebraska	88.4
Nevada	40.9
New Hampshire	89.7
New Jersey	1,249.6
New Mexico	18.5
New York	1,272.8
North Carolina	101.9
North Dakota	4.1
Ohio	909.6
Oklahoma	86.3
Oregon	120.0
Pennsylvania	516.7
Rhode Island	36.2
South Carolina	98.1
South Dakota	6.6
Tennessee	158.9
Texas	389.8
Utah	26.0
Vermont	0
Virginia	308.9
Washington	153.4
West Virginia	34.0
Wisconsin	176.5
Wyoming .....	.9
Guam	3.0
Puerto Rico	145.3
Virgin Islands	0

TABLE 3.—SURVEY RESULTS OF ESTIMATED CONSTRUCTION COST OF SEWAGE TREATMENT FACILITIES
 PLANNED FOR THE PERIOD FY 1972-1976
 [Millions of 1971 Dollars]

	FY-1972	FY-1973 ¹	FY-1974 ¹	FY-1975	FY-1976	Total
Totals	5,278.2	6,080.0	3,198.2	2,236.5	1,289.3	18,082.2
Alabama	33.5	9.6	9.5	7.9	5.1	65.6
Alaska	4.1	26.4	2.3	7.5	—	40.3
Arizona	10.7	8.9	—	6.2	1.4	27.2
Arkansas	12.5	27.7	11.3	10.0	—	61.5
California	280.4	930.9	218.4	369.0	340.8	2,139.5
Colorado	23.3	14.4	8.4	30.0	6.1	82.2
Connecticut	96.2	95.1	53.5	—	—	244.8
Delaware	7.8	8.8	79.0	2.5	5.6	103.7
Dist. of Columbia	62.7	40.9	—	—	—	103.6
Florida	313.0	125.7	89.4	106.3	17.0	651.4
Georgia	36.3	89.6	15.8	—	12.6	154.3
Hawaii	15.0	28.5	4.6	24.1	—	72.2
Idaho	15.7	8.6	7.4	.3	.4	32.4
Illinois	336.7	332.5	240.8	382.9	38.7	1,331.6
Indiana	161.3	207.2	121.7	22.1	27.6	539.9
Iowa	16.8	78.8	72.7	21.8	7.2	197.3
Kansas	19.8	28.8	5.9	3.2	11.6	69.3
Kentucky	46.8	35.0	14.3	39.5	27.1	162.7
Louisiana	68.5	40.6	28.2	17.7	.1	155.1
Maine	25.4	100.5	15.0	35.4	25.0	201.3
Maryland	201.5	204.0	214.6	15.7	36.6	672.4
Massachusetts	206.5	190.8	149.9	80.0	—	627.2
Michigan	331.8	523.2	307.3	100.4	130.0	1,392.7
Minnesota	142.3	112.1	41.5	30.8	12.9	339.6
Mississippi	32.5	17.4	7.4	14.5	18.2	90.0
Missouri	9.2	160.0	71.9	38.1	27.4	306.6
Montana	13.7	2.7	7.8	—	3.0	27.2
Nebraska	1.8	28.7	23.5	24.1	15.7	93.8
Nevada .....	.4	30.7	10.8	1.3	—	43.2
New Hampshire	21.3	36.9	62.8	58.5	10.5	190.0
New Jersey	461.9	554.4	105.6	299.6	6.3	1,427.8
New Mexico	17.8	12.8	.1	—	—	30.7
New York	1,047.1	422.4	140.8	102.0	167.2	1,879.5
North Carolina	36.6	66.5	31.3	18.2	1.1	153.7
North Dakota	1.4	3.7	1.7	—	.3	7.1
Ohio	277.2	250.3	313.3	62.7	156.8	1,060.3
Oklahoma	14.4	24.2	28.5	8.1	39.8	115.0
Oregon	41.5	72.3	9.9	13.0	12.6	149.3
Pennsylvania	187.2	343.3	259.0	105.8	1.2	896.5
Rhode Island	9.9	35.6	25.7	—	—	71.2
South Carolina	31.2	29.5	33.3	18.8	17.8	130.6
South Dakota	9.3	1.7	2.8	3.3	.9	18.0
Tennessee	120.6	31.0	17.4	11.9	7.8	188.7
Texas	127.5	165.5	110.3	34.4	11.5	449.2
Utah	14.5	3.5	2.5	1.4	5.5	27.4
Vermont	5.3	13.5	13.5	6.3	3.7	42.3
Virginia	100.0	243.3	81.1	11.0	61.5	496.9
Washington	38.1	67.8	23.8	52.6	5.8	188.1
West Virginia	38.2	32.5	2.1	23.0	—	95.8
Wisconsin	135.1	97.2	21.3	6.6	3.9	264.1
Wyoming	1.5	2.4	—	—	—	3.9
Guam	2.2	10.5	—	4.1	.7	17.5
Puerto Rico	4.2	48.6	76.0	.8	.5	130.1
Virgin Islands	8.0	2.5	2.5	3.1	3.8	19.9

¹ Separate costs for FY 1973 and FY 1974 estimated from FY 1972/1974 total.

PLANNED INVESTMENT AS DERIVED FROM THE MUNICIPAL WASTE
TREATMENT FACILITIES EVALUATION MODEL

INTRODUCTION

This section reports the results of the Waste Treatment Facilities Evaluation model as applied to the current (1971) *Municipal Waste Inventory*. The model calculates the value of recognized improvement needs (backlog) and the replacement value of capital in place. This part briefly states how the model is constructed. A full explanation can be found in *The Economics of Clean Water*, Volume I, 1970.

The results of the model are then used in an investment scheduling procedure which calculates the level of investment required to obtain the level of treatment of public wastes that have been determined by the States to match in general water quality objectives. Finally, the various elements of the investment requirements are also compared to the results obtained in 1969 when a similar model evaluated capital values and investment needs for 1968.

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WASTE TREATMENT FACILITIES EVALUATION MODEL

This model is a mathematical simulation of investment in public waste handling systems. The model facilitates the calculation of the value of recognized improvements needed in the treatment or operation of waste treatment systems as stated in the *Municipal Waste Inventory*. It is designed to answer questions regarding the current amount of recognized waste treatment needs or backlog.

The model correlates a series of equations that define size (as per capita design flow) to cost (in constant 1957-59 dollars) relationships for basic waste-handling procedures and equipment. Such cost functions are found in papers by Robert Michel¹ and Robert Smith.² The model scans the *Municipal Waste Inventory* for any needs recorded. All community and/or municipal waste facilities are entered into the inventory where either (a) an operational facility, with or without additional abatement needs, is in place; or (b) the need for a facility has been identified where none now exists. (Excluded are unserved communities and dwellings.)

The model calculates the average cost of installing or constructing the particular facilities—sized according to a normal statistical distribution of capacity to indicated load for existing plants in the same State. The costs are stated in terms of constant dollars. (Sewer and Sewage Treatment Plant Construction Cost Indices, supplied by EPA, may be applied to modify price levels.) This procedure supplies the

value of recognized improvements needed in waste treatment or operation of waste treatment systems.

The second part of this modeling technique is a calculation of the current replacement value of facilities in place. The current replacement value was calculated on the basis of costs experienced in building facilities with similar design flow and removal efficiencies.

Table 4 presents these two values calculated for each State and compares the figures with a similar calculation done in 1969. The figures are in September 1969 dollars and June 1971 dollars. The figures for 1969 inflated to June 1971 prices by the Sewage Treatment Cost Index are also indicated.

The differences in existing facilities nationally between the years 1968 and 1971 are presented in Table 5 and are reflected in the two figures for the value of capital in place (\$12,392.0 and \$18,875.0 million in current dollars and \$9,421.7 and \$11,636.5 million in constant 1957-59 dollars).

¹ *Construction Cost of Municipal Wastewater Plants (1967-1969)*, September, 1969.

² *Cost of Conventional and Advanced Treatment of Wastewaters*, 1968.

TABLE 4.—EVALUATION OF CAPITAL IN PLACE AND OF DEFINED NEEDS

	Value of works in place (\$000,000)		Value of needed works	
	1968	1971	1968	1971
Alabama	191.8	224.1	122.8	77.3
Alaska	1.5	5.0	8.3	22.0
Arizona	62.9	99.9	20.4	31.0
Arkansas	147.7	183.7	44.6	17.0
California	1,061.4	2,060.7	377.2	530.3
Colorado	228.9	428.9	43.2	58.6
Connecticut	128.8	181.3	73.4	2.7
Delaware	34.5	19.0	3.5	3.5
Dist. of Columbia	46.4	525.1	28.2	4.0
Florida	431.1	456.3	48.4	238.8
Georgia	281.8	303.9	123.8	201.4
Hawaii	23.2	26.1	25.9	25.0
Idaho	80.0	159.4	33.5	14.5
Illinois	686.1	921.3	194.9	78.5
Indiana	431.9	999.9	139.2	151.4
Iowa	285.9	305.5	44.3	34.4
Kansas	254.6	318.3	82.5	64.7
Kentucky	193.9	267.2	16.3	28.1
Louisiana	193.3	166.6	79.2	41.3
Maine	24.7	26.6	91.8	30.2
Maryland	121.9	478.2	28.3	57.8
Massachusetts	141.0	195.4	209.2	50.6
Michigan	348.2	626.5	135.7	371.5
Minnesota	283.2	415.9	54.4	155.8
Mississippi	151.7	149.9	50.0	44.6
Missouri	316.0	335.0	148.8	87.5
Montana	75.5	76.4	22.6	18.6
Nebraska	171.1	194.3	38.2	15.2
Nevada	40.8	76.4	17.0	5.1
New Hampshire	22.5	23.7	61.5	10.8
New Jersey	420.1	379.7	162.0	54.3
New Mexico	98.8	119.9	10.2	24.4
New York	801.0	1,015.2	276.0	578.6
North Carolina	342.7	401.7	101.7	73.5
North Dakota	77.8	76.4	6.6	14.8
Ohio	668.9	1,205.2	229.9	296.2
Oklahoma	236.9	332.1	31.7	33.5
Oregon	171.7	328.9	64.2	36.2
Pennsylvania	585.4	789.5	362.3	231.3
Rhode Island	52.6	82.8	22.9	9.8
South Carolina	156.1	161.7	66.9	59.4
South Dakota	81.0	72.9	13.8	.4
Tennessee	232.5	328.6	71.8	79.6
Texas	882.0	1,440.7	161.5	459.2
Utah	120.8	191.5	28.0	41.5
Vermont	28.7	32.3	40.8	13.0
Virginia	229.4	309.6	65.6	147.7
Washington	197.6	448.4	90.1	98.7
West Virginia	102.0	157.2	74.9	31.5
Wisconsin	350.9	628.2	124.5	187.5
Wyoming	52.7	53.2	8.8	4.4
Guam	0.	0.	0.	0.
Puerto Rico	47.1	68.5	32.6	132.8
Virgin Islands	0.	0.	3.7	0.
Total	12,392.0	18,874.5	4,417.5	5,080.5
Total	15,316.5 ¹	18,874.5	5,460.0 ¹	5,080.5

¹ 1971 Dollars.

TABLE 5.—PATTERN OF EXISTING FACILITIES

	Number of plants per treatment level		Percent of total plants	
	1968	1971	1969	1971
Primary	2,384	2,119	19.1	17.0
Intermediate	75	8	.6	.2
Secondary	9,951	10,154	80.2	82.2
Tertiary	10	100	.1	.8
Total	12,420	12,381	100.0	100.0

Construction cost per mgd of capacity	Current dollars	
	1969	1971
Primary	380,700	476,471
Intermediate	380,700	682,033
Secondary	654,480	748,740
Tertiary	1,308,960	925,713

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ELEMENTS OF THE INVESTMENT REQUIREMENT

Table 6 summarizes the computed value associated with the various categories of investment needs, as these were listed in the (1971) *Municipal Waste Inventory* and assessed by the evaluation model.

The various categories are:

New plants: preliminary treatment, primary, secondary, tertiary, and lagoons.

Upgrading: same as for new plants while treatment level is the one achieved, i.e., treatment level changes.

Other improvements: modification of existing treatment; addition of nutrient removal processes; addition of color, odor, or taste removal processes; deep ocean outfalls.

The largest categories of investment needs are for upgrading the level of existing treatment and enlargement of an existing plant. Together they constitute \$3443.73 million of the total backlog value and about 3100 individual projects.

A comparison of these figures with those obtained in 1969 (cf. Table 6) shows that there has been a shift away from a need for new plants. Whereas in 1969, 40.2 percent of the backlog value was found in costs of building new plants and 54.3 percent for upgrading or enlarging existing facilities, the recent calculations for 1971 show only 5.1 percent for new plants and an increase to 67.7 percent for upgrading or enlargement. The other three categories have also increased as a percentage of the total.

The actual number of different recognized improvement needs in the categories of Table 6 has decreased while the number of systems expressing those needs has increased from 13,849 in 1968 to 15,012 in 1971. This information is presented in Table 7 along with com-

parisons of population served by those communities having needs over time.

ALTERNATIVE INVESTMENT SCHEDULES

For the immediate future the evaluation model can determine the level of investment required nationally to obtain the level of public waste treatment which is needed to meet general water quality objectives.

The approximate rate at which investment requirements are accumulating and the amount of the current accumulation of need are known. Thus,

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a projection procedure is utilized to find the annual rate of investment that will sustain existing physical capital, meet expansion requirements, minimize price increases, and eliminate the accumulation of investment requirements that currently exists (backlog).

TABLE 6.—COMPUTED VALUES FOR VARIOUS CATEGORIES OF NEEDS OVER TIME
[millions of current dollars]

Need	1969	Percent of total	1971	Percent of total
New plants	1,775.00	40.2	257.66	5.1
Upgrading	1,332.62	30.2	1,745.67	34.3
Enlargement	1,067.50	24.1	1,698.06	33.4
Disinfection	27.68	.6	467.37	9.2
Connection to an existing system	198.28	4.5	396.48	7.8
Other improvements	16.01	.3	515.80	10.1
Total	4,417.55	100.0	5,081.04	100.0

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TABLE 7.—INCREASE IN DEFINED WASTE TREATMENT NEEDS OVER TIME

Kind of need	Number of systems				Population served (000's)			
	1957	1962	1968	1971	1957	1962	1968	1971
New facilities ¹	3,579	3,311	2,334	2,821				
Major upgrading ²	1,441	3,071	3,133	2,564				
Minor upgrading ³	370	374	932	297				
Total number needs	5,390	5,045	6,399	5,682	41,770.3	51,763.3	80,330.6	55,262.3
Total systems	10,511	11,006	13,849	15,012	98,361.9	118,371.9	139,726.7	176,658.9
Percent with needs	51.3	45.8	46.2	37.8	42.5	43.7	57.5	31.2

¹ New plant, replacement, connection.² Enlargement, additional treatment.³ Chlorination, modification.

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The procedure used takes into account both the existing capital stock and the following variables which constitute elements of the investment activity—i.e., growth, recapitalization, and the backlog of accumulated demands. The procedure also assumes a constant rate of inflation in construction costs and a constant rate of growth.

Recapitalization, capital in place, and backlog are derivatives of investment. Recapitalization is calculated as 2.9 percent of capital in place in any year. Growth needs are calculated to amount in any year to 3.3 percent of capital in place. To the extent that the investment covered growth requirements, the value is transferred to capital in place. Values exceeding available investment are added to the backlog of unmet needs. The backlog itself is reduced by any amount that available investments exceed recapitalization and growth elements, or increased as prior demands on a hypothesized investment exceed the amount of available investment.

INVESTMENT SCHEDULES

Using the figures for value of backlog as \$5081 million and for value of capital in place as \$18,875 million obtained from the evaluation model, this procedure indicates that a \$2870.9 million annual outlay is required to reduce accumulated needs within a five-year period in which inflation compounds at 7.5 percent annually.

The 1970 rate of inflation in the construction sector was 15 percent; however, administration efforts to control inflation should bring the rate of price increases in this sector nearer to the historical rate for 1968-1971, which is approximately 7.5 percent and would give the following investment schedule:

FIVE-YEAR BACKLOG ELIMINATION SCHEDULE AT 7.5 PERCENT INFLATION

Year	"Backlog" at year end	Growth	Recapitalization	Investment
1971.....	5,081.0			
1972.....	3,871.2	691.7	588.4	2,870.9
1973.....	2,740.9	768.1	682.2	2,870.9
1974.....	1,706.1	853.0	777.6	2,870.9
1975.....	784.9	947.2	874.6	2,870.9
1976.....	.0	1,051.8	942.0	2,870.9
Total Investment, 1972-1976				14,354.5
"Backlog"				6,147.0
Growth				4,311.8
Recapitalization				3,895.7

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Thus the investment scheduling procedure shows that if this inflation is held down, the total amount of the investment required to eliminate accumulated needs within the next five years would be \$14.3 billion. The breakdown by State is shown in Table 8.

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TABLE 8.—MODEL INVESTMENT SCHEDULE INVESTMENT NEEDED TO REDUCE BACKLOG BY 1976
[Millions of 1971 dollars]

Totals	\$14,354.5
Alabama	201.0
Alaska	28.7
Arizona	86.1
Arkansas	100.5
California	1,550.3
Colorado	258.4
Connecticut	71.8
Delaware	14.4
District of Columbia	215.3
Florida	502.4
Georgia	387.6
Hawaii	43.1
Idaho	86.1
Illinois	488.1
Indiana	617.2
Iowa	172.3
Kansas	215.3
Kentucky	143.5
Louisiana	129.2
Maine	43.1
Maryland	272.7
Massachusetts	143.5
Michigan	760.8
Minnesota	373.2
Mississippi	114.8
Missouri	258.4
Montana	57.4
Nebraska	100.5
Nevada	43.1
New Hampshire	28.7
New Jersey	229.7
New Mexico	86.1
New York	1,004.8
North Carolina	258.4
North Dakota	57.4
Ohio	890.0
Oklahoma	186.6
Oregon	186.6
Pennsylvania	631.6
Rhode Island	43.1
South Carolina	143.5
South Dakota	28.7
Tennessee	244.0
Texas	1,205.8
Utah	129.2
Vermont	28.7
Virginia	330.1
Washington	315.8
West Virginia	114.8
Wisconsin	502.4
Wyoming	28.7
Guam
Puerto Rico	201.0
Virgin Islands

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COMPARISON OF THE 1970 AND THE 1971 ESTIMATES OF PLANNED
CONSTRUCTION ACTIVITY

COMPARISON OF SURVEYS

The 1970's survey projected an estimate of \$12.6 billion for planned construction activity (cf. Table 9) in the municipal waste treatment area. The period covered in the 1970 survey was from December, 1970 through June, 1974, a total of 43 months. Four hundred and fifty municipalities were chosen on the basis of having projects of \$5 million or more. The remaining communities were covered by reviewing State program plants.

The 1971 survey results project an estimate of \$18.1 billion. The difference between the \$12.6 billion estimate in 1970 and the \$18.1 billion estimate in 1971 comes from various sources. Some of the more pertinent are:

1. The time period in the most recent survey is longer, FY 1972 through FY 1976 or a total of 60 months versus 43 months in the earlier summary.

2. The 15 percent inflation rate in the cost of construction in the period between the two surveys.

3. The planned projects were formulated by municipalities to meet water quality standards, which in certain situations may have become more stringent.

4. The increasing availability of up-to-date engineering estimates for projects previously assessed in their rudimentary planning stages. For example, a project which went under construction in New York City earlier in 1971 was estimated by the designers to cost about \$100 million. The lowest bid received on the project was about \$229 million. Experiences such as these have prompted many communities to update their cost estimates.

5. More comprehensive assessing and reporting; 2300 communities in 1971 as opposed to 450 in 1970.

6. Acceleration of construction schedules. The State of California has advised its communities that the State's Clean Water Grant Program is for a five-year period only. All required pollution control facilities are to be initiated prior to the termination of the program or they will not receive State assistance. This required the San Francisco Bay Area, for example, to condense its thirty-year program into five.

7. The necessity of municipalities meeting water quality standards and related implementation plans within the next five years. The enforcement of these requirements is undoubtedly a factor in the shaping of imminent needs and their associated costs.

TABLE 9.—ESTIMATED COST OF CONSTRUCTION OF MUNICIPAL SEWAGE TREATMENT WORKS
FOR THE PERIOD DECEMBER 1970 THROUGH JUNE 1974

[\$ Million]

Totals	\$12,565.2
Alabama	27.0
Alaska	28.1
Arizona	51.0
Arkansas	42.0
California	737.5
Colorado	47.4
Connecticut	229.5
Delaware	62.0
District of Columbia	347.2
Florida	444.2
Georgia	74.0
Hawaii	50.8
Idaho	14.5
Illinois	1,043.6
Indiana	174.8
Iowa	111.9
Kansas	52.7
Kentucky	117.0
Louisiana	132.7
Maine	157.4
Maryland	349.7
Massachusetts	422.6
Michigan	788.8
Minnesota	295.2
Mississippi	34.1
Missouri	268.2
Montana	31.4
Nebraska	49.0
Nevada	47.2
New Hampshire	137.8
New Jersey	1,308.7
New Mexico	19.6
New York	1,721.0
North Carolina	125.3
North Dakota	8.4
Ohio	733.5
Oklahoma	69.8
Oregon	78.6
Pennsylvania	616.4
Rhode Island	37.7
South Carolina	57.6
South Dakota	13.5
Tennessee	88.9
Texas	398.7
Utah	22.6
Vermont	38.0
Virginia	280.1
Washington	216.3
West Virginia	51.4
Wisconsin	190.8
Wyoming	1.7
Guam	9.7
Puerto Rico	93.0
Virgin Islands	14.6

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8. The rise in the number of tertiary treatment facilities required to meet water quality standards.

In the past ten years the surveys which were done to assess "needs" have no consistent definition of their objective³ so that a historical comparison of such "needs" estimates is impossible. A comparison of estimates that take total investment into account are even more disparate. In the past three years the "needs" estimate has risen from \$10.2 billion to \$18.1 billion. Adding the latest survey estimate and the amount of projects funded (\$6.3 billion) in the period between the two surveys gives \$24.4 or a 139 percent increase in these three years (cf. Table 10).

COMPARISON OF THE MODEL WITH SURVEY RESULTS

The evaluation model results in an estimate of \$14.3 billion needed to be invested during the period FY 1972-1976 in order to overcome deficiencies in present facilities and to keep pace with growth, capital replacement, and inflation. On the other hand, the survey result of \$18.1 billion is an aggregation of State and local estimates of their construction activity during this same period. The basic differences between the model approach and the survey approach will be discussed. This will be followed by an *ex post* evaluation of model projections, which compares model projections with actual investment activity. Finally, the projections of the model and the survey will be evaluated in light of potential construction activity during the FY 1972-1976 period.

DIFFERENCE BETWEEN MODEL AND SURVEY APPROACHES

There are several basic methodological differences between the survey and the model:

1. The model uses statistically derived cost function to calculate the cost of planned construction activity, whereas the survey

³ In 1962 the *Conference of State Sanitary Engineers* report said \$2 billion was needed to "eliminate the backlog of unmet waste treatment 'needs' ". In 1966, the JEC *State and Local Public Facility Needs and Financing* report, also from State Conference, stated \$2.6 billion in "needs". In 1969, the FWQA survey of State governments produced \$10.02 billion. In 1970, an EPA survey of State governments and communities indicated a total investment need of \$12.6 billion. In 1971, the same EPA survey reported for communities of served population of 10,000 or more \$14.0 billion or, including all communities, the total "needs" reach \$18.1 billion. Again in 1970, the American League of Cities survey reported over \$30 billion in "needs", although the municipalities in this case did not use consistent reporting requirements and some included costs of facilities other than for waste treatment needs.

TABLE 10.—CHANGES IN STATE SEWAGE TREATMENT INVESTMENT NEEDS EXPRESSED, 1969–1971
(\$ MILLIONS)

	Needs expressed 1969	Projects funded Jan. 1, 1969 to Oct. 31, 1971	Needs expressed Nov. 1971	Gross change in needs	Percent change over 1969
Totals	10,217.1	6,329.4	18,083.0	+14,195.3	+138.9
Alabama	35.0	67.9	65.7	+98.6	+281.7
Alaska	12.0	14.8	40.3	+43.1	+359.2
Arizona	86.0	11.1	27.2	-47.7	-55.5
Arkansas	33.0	18.7	61.5	+47.2	+143.0
California	651.8	309.4	2,139.5	+1,797.1	+275.7
Colorado	133.0	49.2	82.2	-1.6	-1.2
Connecticut	280.5	232.6	244.8	+196.9	+70.2
Delaware	28.0	32.1	103.7	+107.8	+385.0
District of Columbia	355.0	78.6	103.6	172.8	-48.6
Florida	200.0	180.3	651.4	+651.4	+315.9
Georgia	150.0	199.4	154.3	+203.7	+135.8
Hawaii	14.4	11.8	72.2	+69.6	+483.3
Idaho .....	.5	10.6	77.4	+42.5	+8,500.0
Illinois	437.2	261.9	1,331.5	+1,156.2	+264.5
Indiana	152.6	87.9	538.8	+470.1	+308.1
Iowa	33.3	53.3	197.3	+217.3	+652.6
Kansas	61.0	60.8	69.3	+69.1	+113.3
Kentucky	62.6	98.5	162.8	+198.7	+317.4
Louisiana	140.0	61.2	155.0	+76.2	+54.4
Maine	140.9	47.2	201.3	+107.6	+76.4
Maryland	236.9	163.4	672.4	+598.9	+252.8
Massachusetts	438.0	94.3	627.2	+283.5	+64.7
Michigan	253.7	465.4	1,392.6	+1,604.3	+632.4
Minnesota	136.3	99.7	339.6	+303.0	+222.3
Mississippi	40.0	41.0	90.0	+91.0	+227.5
Missouri	390.0	80.4	306.5	-3.1	-.8
Montana	13.5	14.9	27.3	+28.7	+212.6
Nebraska	62.0	28.8	93.9	+60.7	+97.9
Nevada	28.6	19.9	43.1	+34.4	+120.3
New Hampshire	138.0	46.4	190.0	+98.4	+71.3
New Jersey	880.0	208.8	1,427.9	+756.7	+85.3
New Mexico	9.9	14.4	30.8	+38.3	+35.3
New York	1,900.1	1,512.7	1,879.6	+1,492.2	+78.5
North Carolina	69.3	110.9	153.7	+195.3	+281.8
North Dakota	22.0	4.5	7.1	-10.4	-47.3
Ohio	432.5	347.3	1,060.4	+975.2	+225.5
Oklahoma	65.3	74.6	115.0	+124.3	+190.4
Oregon	135.0	64.2	149.2	+78.4	+58.1
Pennsylvania	432.0	237.6	896.5	+702.1	+162.5
Rhode Island	51.5	11.0	71.2	+30.7	+59.6
South Carolina	75.0	49.1	130.6	+104.7	+139.6
South Dakota	27.0	3.0	18.1	-5.9	-21.9
Tennessee	105.5	89.9	188.7	+173.1	+164.1
Texas	525.0	200.1	449.3	+124.4	+23.7
Utah	11.7	5.2	27.4	+20.9	+178.6
Vermont	70.0	15.4	42.3	-12.3	-17.6
Virginia	151.0	107.8	497.4	+454.2	+300.8
Washington	160.0	101.0	188.1	+129.1	+80.7
West Virginia	44.3	10.8	95.8	+62.3	+140.6
Wisconsin	243.7	160.7	264.1	+181.1	+74.3
Wyoming	12.0	1.8	3.9	-6.3	-52.5
Guam	6.2	6.1	17.5	+17.4	+280.6
Puerto Rico	28.9	52.7	130.1	+153.9	+532.5
Virgin Islands	15.4	9.7	19.9	+14.2	+92.2

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relies on individual communities' knowledge of the cost of planned facilities. In some communities well-documented and calculated cost information exist; however, this is not universally true.

2. The model uses statistically estimated growth and replacement factors, which determine the construction required to maintain the nation's capital stock of treatment plants and to provide treatment for additional population and industrial wastes. The growth projections obtained by the survey for an individual community are likely to be overly optimistic when compared to the growth of all communities. The replacement rate (depreciation) is difficult to assess for an individual community because of the lumpiness involved in replacement expenditures.

3. The model also includes a specific inflation factor which adjusts for price increases in construction activities. As noted in the survey discussion, State and local intentions are expressed in 1971 dollars.

A primary purpose of the survey is to give an indication of each local government's construction plans in the municipal waste treatment sector. The survey reflects the summation of local activities which, when viewed in the aggregate, presents an estimate of desired construction activity which may or may not commence during the period FY 1972-1976, e.g. compressing of the twenty-year California program into five years. The purpose of the model is slightly different in that it provides an estimate of the investment activity between 1972 and 1976 that local governments will be required to undertake in order to maintain their current growth and replacement needs and make progress toward constructing those facilities required to meet water quality standards.

HISTORICAL EVALUATION OF MODEL RESULTS

One way to assess the model results is to compare these results with actual past conditions in the municipal waste treatment facilities sector of economy.

The demand model based on physical capital and structured to reflect the dynamics of investment provided good *post hoc* agreement with actual conditions. The "needs" in 1969 were estimated at \$3,201 million in constant dollars (1957-59 = 100). Assuming a growth rate of 3.3 percent in each year since then:

	Growth (\$ millions)
1969	416.5
1970	430.4
1971	444.5

and a replacement rate of existing plants of 3 percent:

	Replacement (\$ millions)
1969	282.7
1970	292.0
1971	307.0

and subtracting those contracts awarded in each year:

	Contracts (\$ millions)
1969	622.0
1970	766.2
1971	876.0

a "needs" reduction of \$91.1 million and a projected 1971 "needs" of \$3,110 million is obtained. This figure compares favorably with the value \$3,132.2 million computed with the model. Also capital in place in 1968 was \$9421.7 million (1957-59 dollars). This value is reduced by 3 percent annual replacement and increased by the value of contract awards in each subsequent year, which

	Replacement (\$ millions)	Investment
1969	282.7	622.0
1970	292.0	766.2
1971	307.0	876.0

projects a 1971 capital in place value of \$10,804.2 million, as compared to a computed value of \$11,636.5 million.

In sum, this *post hoc* projection indicates divergence from "needs" within 1 percent and from capital in place within 8 percent, as compared to a greater than 130 variation percent for the survey.

CONSTRUCTION SUPPLY CAPABILITY

The question of the ability of the construction industry for municipal wastewater facilities to construct the planned investment activity must be considered in projecting the level of activity in this sector. The survey projected \$5.28 billion of grant awards on FY 1972 and \$18.1 for the five-year period FY 1972-1976, while the model on the other hand projected a need of \$14.3 billion with an acreage of \$2.8 billion contracted annually. Furthermore, there exists a backlog of \$3.4 billion in grants that have been obligated but are not yet under construction (cf. Table 11), which must be included in an assessment of construction activity.

TABLE 11.—VALUE OF PROJECTS PENDING CONSTRUCTION AND UNDER CONSTRUCTION
AS OF OCTOBER 31, 1971
[\$ Millions]

	Pending Construction	Under Construction
Totals	3,400.3	4626.9
Alabama	74.5	36.2
Alaska	10.9	17.1
Arizona	5.5	12.3
Arkansas	14.6	19.1
California	117.1	229.0
Colorado	32.7	19.3
Connecticut	34.0	258.1
Delaware	24.7	16.7
District of Columbia	77.8	24.4
Florida	50.9	137.3
Georgia	94.6	157.6
Hawaii	12.4	8.3
Idaho	13.1	1.5
Illinois	137.7	163.3
Indiana	60.4	32.0
Iowa	35.7	20.6
Kansas	46.8	13.8
Kentucky	45.1	80.7
Louisiana	58.9	32.8
Maine	25.3	34.6
Maryland	114.8	148.8
Massachusetts	29.6	100.8
Michigan	328.5	178.1
Minnesota	71.0	40.0
Mississippi	46.1	17.3
Missouri	40.7	108.8
Montana	14.1	2.3
Nebraska	19.5	15.9
Nevada	12.9	7.0
New Hampshire	12.5	45.4
New Jersey	79.9	155.8
New Mexico	10.8	5.3
New York	640.9	1408.3
North Carolina	72.9	50.4
North Dakota	3.5	1.3
Ohio	178.2	206.1
Oklahoma	61.7	32.0
Oregon	9.6	54.5
Pennsylvania	145.3	220.1
Rhode Island	2.5	23.8
South Carolina	28.4	64.6
South Dakota	1.6	2.2
Tennessee	26.8	80.3
Texas	140.7	94.8
Utah	2.5	5.3
Vermont	8.7	10.5
Virginia	73.1	75.7
Washington	64.7	48.8
West Virginia	28.5	4.0
Wisconsin	121.1	49.6
Wyoming .....	.9	.9
Guam	6.1	1.5
Puerto Rico	29.7	39.3
Virgin Islands .....	.2	12.8

To place the projections of planned activity into perspective, the recent trends in construction activity, i.e. the lag in starts and completions, the ability of this sector of the construction industry to expand, and the inflation experienced in this sector will be discussed.

LAGS

Under present conditions it takes over five years, on the average, to complete a sewage project. The time lag between when a project is planned at the State or local level, when a federal grant is obligated, and when construction begins is widening. In 1957, when federal financial assistance for sewage construction was initiated, 55 percent of the value of new starts had been put in place in the same year. But with each increase in aggregate construction activity, the backlog of works under construction and works for which funds have been granted by construction has not yet started has increased.

EXPANSION OF CONSTRUCTION ACTIVITY

Another limiting force for the supply capability is the phased expansion of the wastewater facilities construction sector. This construction sector, like many economic sectors, contains numerous institutional constraints which may inhibit the ability to expand to meet the indicated demand. The recent trends in the expansion of construction activity in the municipal wastewater sector are shown in Table 12, where the six-year growth rate in construction activity is slightly over 28 percent in current dollars or 22 percent in constant dollars. The trend in recent years has been one of increasing activity; nevertheless to reduce the backlog and to keep pace with the planned construction activity indicated by the survey would require an unprecedented increase in construction activity.

If the historical trend in new construction activity in this sector maintains this 28 percent growth pattern (cf. Table 12), then Table 13 shows the projected activity in the next five years to be \$18.9 billion. However, if the inflation rate is held down and the trend is more nearly like the years 1965 to 1970, then the rate of growth in construction activity would be 25 percent and projected starts would amount to \$17.4 billion.

The survey results state that \$18.1 billion in 1971 dollars is planned in construction activity in the next five years. Add to this the value of projects pending construction of \$3.4 billion, and the survey estimates that total new starts in construction will be \$21.5 billion through 1976. Table 13 of growth figures indicates that such activity is highly unlikely. Also the survey states that \$5.28 billion is plan-

ned for 1972 and \$9.28 billion for 1973 to 1974. To accommodate this level of activity the

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TABLE 12.—FEDERALLY ASSISTED STARTS IN CONSTRUCTION OF MUNICIPAL WASTE TREATMENT FACILITIES

Year	Millions	Percent increase, year to year		Net
		Gross	Inflation ¹	
1965	365.0	.....	.....	.....
1966	489.6	34.1	3.9	30.2
1967	397.0	-18.9	2.9	-21.8
1968	671.0	69.0	2.8	66.2
1969	936.9	39.6	7.3	32.3
1970	1,360.7	45.2	7.8	37.4
1971	² 1,700.0	24.9	15.0	9.9
Total	5,950.2			

¹ Source: *Sewer and Sewage Treatment Plant Construction Index*, Environmental Protection Agency.

² Twelve-month estimate.

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TABLE 13.—PROJECTED FEDERALLY-ASSISTED STARTS IN CONSTRUCTION OF MUNICIPAL WASTE TREATMENT FACILITIES

Year	[\$ Millions]	
	28 percent growth	25 percent growth
1971	1,700.0	1,700.0
1972	2,176.0	2,125.0
1973	2,788.0	2,652.0
1974	3,468.0	3,315.0
1975	4,607.0	4,148.0
1976	5,848.0	5,185.0
Total for: 1972-1976	18,887.0	17,425.0

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construction industry would be required to nearly double annually or the build-up in work obligated but not under construction would continue.

On the other hand, the evaluation model estimate of \$14.3 billion plus the \$3.4 billion in pending projects adds up to \$17.7 billion of planned construction activity for the next five years. This estimate assumed 7.5 percent inflation during that period and compares favorably with the historical trend assuming a 25 percent growth rate.

Thus the evaluation model is seen to be a more accurate indicator of investment needed in the municipal waste treatment area because it corresponds to both what has happened in the past and what might reasonably be expected to occur in the future. However, the weaknesses of demand modeling should be noted. It fails to reflect some components of demand which are not known precisely enough to distinguish qualitative shifts readily. Such shifts are the ratio of plant costs to ancillary costs; depreciation rates for interceptors, outfalls,

pumping stations; and the loss of sunk capital through accelerated replacement and inadaptability of existing plants to higher degrees of treatment. Also, the composition of the backlog requirements, if not fully reported in the *Municipal Waste Inventory*, would also bias the backlog calculation.

CONCLUSION

An assessment of needs should estimate the investment intentions of municipalities. In so doing, a precise account of planned construction activity should be taken so as to exclude expectation of such activities which have a low probability of actually being initiated. Such an assessment involves a tally of communities' demands, i.e. activities or projects required to meet environmental regulations and standards. A study of the supply, i.e., of what the industry is capable of constructing, is also involved. Both demand and supply considerations must be included to obtain a reliable projection of the necessary monies for investment in this sector. The preceding analysis demonstrates that the results of the model seems to accommodate both of these interacting forces of supply and demand, thus the figure of \$14.5 billion is likely to represent planned construction activity during the FY 1972-1976 period. Next year a complete analysis of both supply and demand phenomena will be presented.

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ADDITIONAL SURVEY RESULTS FOR COMMUNITIES GREATER THAN 10,000

RELATION OF CONSTRUCTION TO REGULATORY REQUIREMENTS

The responding municipalities were requested to indicate the reason for planning the construction reported. Table 14 shows, in summary form, the cost of constructing required facilities and the associated requirements to be fulfilled. It should be noted that approximately 83 percent of the costs are (nearly) equally distributed among three requirements, because of (a) locally developed plans, (b) State-approved implementation schedules, and (c) federally-approved water quality standards implementation plans.

Approximately \$220 million in construction is to be initiated because of more stringent federally-approved water quality standards, and over \$2.1 billion in construction is required because of enforcement procedures and/or State and federal court orders.

DESCRIPTION OF FACILITIES

Table 15 summarizes the survey results of needed facilities for the five-year period, by description and type. The details are discussed below.

1. *New vs. Modified Works.*—Summaries of the responses on the type of construction planned indicated that approximately 58 percent of the expected expenditures are for the construction of new facilities and 42 percent for modifications and improvements. As shown in Table 15, most of the modifications are for the purpose of increasing plant capacities and treatment levels.

2. *Plants vs. Ancillary Works.*—Approximately 53 percent (or \$7.4 billion) of the cost of needed facilities is for the construction of new or improved plants and 41 percent (or \$5.7 billion) is for ancillary works, such as pumping stations, interceptors, and outfall sewers. The remaining 6 percent is for projects involving individual plant elements (e.g., sludge processing and disposal operations and disinfection) and nutrient removal facilities. Of the approximately \$5.7 billion to be used in the construction of ancillary works, about \$3.7 billion is for interceptor sewers.

3. *Level of Treatment.*—An examination of the costs associated with the various levels of treatment indicates that of the estimated \$7.4 billion for the construction of new and improved plant facilities, approximately 5.5 percent (or \$405 million) is for primary treatment

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TABLE 14.—ESTIMATED COST OF CONSTRUCTION IN ACCORDANCE WITH REGULATORY REQUIREMENTS^{1,2}

Requirements	Estimated cost of facilities to be constructed (\$ billion)	Percent
Locally developed plan ³	3.721	27.0
State approved implementation schedule	3.883	28.2
Federal approved water quality standards implementation plan	3.799	27.6
FY 1971 more stringent federally approved WQS .....	.221	1.6
Federal enforcement procedures or actions	1.251	9.1
State court order .....	.781	5.7
Federal court order .....	.104	.8
Total	13.760	....
Facilities on which no requirement data submitted .....	.254	....
	14.014	....

¹ Based on survey of needs of municipalities with population of 10,000 or more for period FY-72-76.

² Excludes combined sewer overflow control facilities.

³ With few exceptions, most of the projects identified with this requirement are being planned or developed in conformance with anticipated Federal and State Standards.

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TABLE 15.—COST SUMMARY OF NEEDED FACILITIES BY DESCRIPTION AND TYPE¹
[\$ Million]

Description	Type					Total
	New facility	Modification ²	Increase in capacity	Increase in treatment level	Increase in treatment level and capacity	
Primary	108.0	35.5	253.3	1.0	9.0	406.8
Intermediate ..	4.8	2.3	22.6	52.3	14.1	96.1
Secondary	1,512.0	231.2	731.0	876.9	1,297.5	4,648.6
Tertiary	665.1	10.8	118.3	620.6	846.1	2,260.9
Nutrient removal	270.6	1.6	2.4	17.4	33.4	325.4
Plant elements .	281.2	126.3	69.9	31.0	67.6	576.0
Ancillary works.	5,208.0	58.0	331.0	15.2	88.0	5,700.2
Totals ...	8,049.7	465.7	1,528.5	1,614.4	2,355.7	14,014.0

¹ For period FY-1972-76.² No increase in capacity or treatment.

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facilities; 1.3 percent (or \$96 million) for the intermediate levels of treatment; 62.7 percent (or \$4.647 billion) for secondary; and 30.5 percent (or \$2.26 billion) for tertiary treatment facilities. Table 14 shows a State-by-State breakdown of needs for tertiary treatment facilities. It was found that 35 percent of the cost of tertiary needs are reported in the States of Illinois (22 percent) and Maryland (13 percent). California, Florida, Michigan, New York, Ohio, and Virginia each reported needs of over \$100 million.

4. *Nutrient Removal—Phosphate and Nitrate.*—The estimated cost of facilities to be added to existing or proposed plants for nutrient removal is \$325 million. Of this \$148 million is for phosphates and \$177 million is for nitrates. Seventy-five percent of the phosphate removal costs and 45 percent of the nitrate removal costs are projected for municipalities located in the Great Lakes Region. A State-by-State breakdown of needs is presented in Table 16.

5. *Industrial Waste.*—Responding municipalities were requested to give the percentage of the effluent which, based on flow, can be attributed to industrial waste. Based on the number of need items, 46 percent showed no industrial waste component; for 43 percent of the needs, the percentage of industrial wastes (based on flows) ranged from one to 30 percent; the remaining 11 percent were in the 31 percent to 100 percent range. The summary result of applying the obtained percentages to the cost of projects involved indicates that approximately \$2.17 billion of the \$14.0 billion in construction proposed for municipalities serving 10,000 or more persons during the next five-year period is for the purpose of alleviating pollution from industrial sources.

6. *Operation of Proposed Facilities.*—Expected facility operation dates and associated costs for the reporting municipalities are summarized in Table 17. In addition to these, as of November 1, 1971,

there were \$4.6 billion worth of federally-assisted projects under construction and another \$3.4 billion in the preconstruction stages on which grant commitments had been made.

USER CHARGES

Table 18 summarizes the responses to the inquiry regarding the method upon which the user charge is based and the year the present usage rate was established. Fifty-four percent of the municipalities indicated "hydraulic volume" as the basis for charging and 17 percent "both volume and quality". Nearly 29 percent indicated the use of methods other than those identified in the survey.

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TABLE 16.—ESTIMATED COST OF TERTIARY TREATMENT, NITRATE AND PHOSPHATE REMOVAL FACILITIES PLANNED FOR CONSTRUCTION DURING FY-1972-1976, BY MUNICIPALITIES WITH OR SERVING POPULATIONS OF 10,000 OR MORE

[\$ million]

	Tertiary treatment	Nitrate removal	Phosphate removal
Totals	2,260.24	176.79	148.35
Alabama			
Alaska			
Arizona			
Arkansas	14.80		
California	113.46		
Colorado	3.70		
Connecticut	8.20		
Delaware			
District of Columbia	31.68	77.01	
Florida	157.35	.50	.50
Georgia	37.86		
Hawaii			
Idaho			
Illinois	497.59	54.77	57.25
Indiana	85.81	3.06	14.02
Iowa	14.65		
Kansas	7.02		
Kentucky	11.17	.36	
Louisiana			
Maine			
Maryland	292.66		.55
Massachusetts	47.70		
Michigan	112.24	7.15	22.18
Minnesota	11.64		3.14
Mississippi			
Missouri	2.83		
Montana			
Nebraska	7.40		
Nevada			
New Hampshire	6.50		
New Jersey	86.89		
New Mexico	11.85		
New York	108.66	7.78	28.24
North Carolina	45.12		1.62
North Dakota			
Ohio	184.05	3.66	10.20
Oklahoma	37.31		
Oregon	5.27		

TABLE 16.—ESTIMATED COST OF TERTIARY TREATMENT, NITRATE AND PHOSPHATE REMOVAL FACILITIES PLANNED FOR CONSTRUCTION DURING FY-1972-1976, BY MUNICIPALITIES WITH OR SERVING POPULATIONS OF 10,000 OR MORE, continued

[\$ million]

	Tertiary treatment	Nitrate removal	Phosphate removal
Pennsylvania	62.45	12.00	4.86
Rhode Island			
South Carolina			
South Dakota			
Tennessee	5.38		
Texas	89.56		
Utah	15.00		
Vermont			
Virginia	124.20		1.55
Washington .....	.70		
West Virginia			
Wisconsin	16.54	10.50	4.24
Wyoming			
Guam			
Puerto Rico	3.00		
Virgin Islands			

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TABLE 17.—EXPECTED YEAR OF OPERATION OF PROJECTS TO BE INITIATED IN FISCAL YEARS 1972-76 IN MUNICIPALITIES WITH OR SERVING POPULATIONS OF 10,000 OR MORE

Year of facility operation:	Estimated cost of facilities (\$ millions)
FY-1972	120
FY-1973	1,235
FY-1974	2,932
FY-1975	3,026
FY-1976	3,292
FY-1977	2,152
FY-1978 +	1,257
Total	14,014

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TABLE 18.—NUMBER OF MUNICIPALITIES,¹ HAVING CONSTRUCTION NEEDS IN THE FY 72-76 PERIOD, WITH USER CHARGES, AND THE METHOD UPON WHICH CHARGE BASED AND YEAR RATE ESTABLISHED

Year rate established	Basis of use charge					Other
	Hydraulic volume	Quantity of BOD	Quantity of solids	Both BOD and solids	Both volume and quality	
Prior to 1941	6	0	0	0	0	9
1941-1950	17	0	0	0	3	13
1951-1960	148	0	0	1	23	56
1961-1965	121	1	0	1	40	70
1966-1970	407	2	0	3	118	162
1971	150	0	0	3	78	83
No years indicated	30	0	0	0	14	73
Total	879	3	0	8	276	466

¹ With or serving populations of 10,000 or more.

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ADDITIONAL EMPLOYEE REQUIREMENTS

Approximately 12,700 additional employees are reported to be needed in the municipalities surveyed, as a result of the construction

to be initiated through FY 1976. Of these, 16 percent are for professional positions, 65 percent for operations and maintenance needs, and the remaining 19 percent are required to fill administrative support-type jobs. About 5,700 or 45 percent of the employees will be needed in FY 1975 and FY 1976. This information is summarized in Table 19. It is of interest to note that in the March 1972 *EPA Manpower Report to Congress* the number of additional employees needed through FY 1976 was estimated at 13,900. This was based on information from a different set of sources.

PROGRAM ACCOMPLISHMENTS IN MUNICIPAL WASTE TREATMENT FACILITIES

In evaluating the progress being made in the nation's water pollution abatement effort it is important to report trends and current levels in waste production and treatment. The report presents accomplishment data for the years 1968-1972. The emphasis of this report will be upon the municipal sector since this is the area in which the greatest amount of federal activity has been concentrated over the past years.

The data for 1968-1970 was obtained from the General Discharge File maintained by the Office of Water Programs. The records for 1971 and 1972 are based partially on data from the file and projections based on a trend analysis of existing data. The results of this analysis are included in Table 20. The table presents accomplishments in terms of population sewered and increases in wastes treated. The table also indicates the level of treatment and the decrease in population receiving primary treatment. The percentage of population receiving treatment has not significantly increased.

The discussion of program accomplishments will be more extensively analyzed in the next year's cost study. The extent to which the projected expenditures through 1976 will effect these accomplishment measures will be analyzed and presented along with action accomplishments for the period.

TABLE 19.—ESTIMATED NUMBER OF EMPLOYEES NEEDED TO MAN FACILITIES,¹
PROPOSED FOR CONSTRUCTION DURING FY 72-76, AND FISCAL YEAR FACILITIES
EXPECTED TO BE OPERATIONAL

Fiscal year	Categories of employment				Percent
	Professional	Operation and maintenance	Other	Totals	
1972	51	139	36	226	1.8
1973	350	1,207	401	1,958	15.5
1974	494	3,323	687	3,504	27.6
1975	461	1,972	535	2,968	23.4
1976	354	1,343	348	2,045	16.1
1977	189	666	225	1,080	8.5
1978	75	371	130	576	4.6
1979	33	191	34	258	2.0
1980 +	10	38	13	61	.5
Totals	2,017	8,250	2,409	12,676	100.0
Percent	15.9	65.1	19.0	100.0

¹ For municipalities with or serving populations of 10,000 or more.

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TABLE 20.—PROGRAM ACCOMPLISHMENTS

	1968	1969	1970	1971 ¹	1972 ¹
Sewered population (millions, persons)	140	144	148	152	156
Waste strength gross wastes treated by municipal plants (million/pounds/year BOD's)	14,137	14,773	15,438	16,133	16,859
Level of treatment (percent):					
Sewered population untreated	7	7	6	6	5
Sewered population primary	31	30	28	25	24
Sewered population secondary	62	63	66	68	70
Sewered population advanced	<1	<1	<1	<1	<2

¹ Based upon Historical Growth Trends 1962-1970.

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ENVIRONMENTAL AND ECONOMIC BENEFITS AND COSTS RELATED TO VARIOUS WATER POLLUTION ABATEMENT STRATEGIES¹

Attention to the marginal benefits and costs of various treatment levels is necessary to insure that the water pollution goals sought are defensible in terms of their net benefit to society. The subsequent analysis of the marginal costs and benefits to attention levels of treatment suggests:

- Because costs accelerate rapidly as higher levels of treatment are achieved, the total cost of meeting very high levels of treatment approaching zero discharge could be many times those required to meet current water quality standards.
- The improvement in beneficial uses of waters from such expenditures are likely to be modest compared to the costs. All the pollution parameters of concern have not yet been converted to water quality standards so that any current estimates are likely to be low.

- A number of adverse environmental impacts would occur such as higher energy consumption and solid waste problems.
- Large resources devoted to achieving small increases in water quality benefits have the effect of withdrawing resources from other environmental efforts or other national priorities.

ABATEMENT COSTS

Rising Marginal Costs

Although control techniques and costs vary greatly by source, there are basic operational and technical factors which result in similar control costs curves for most sources. These control costs increase rapidly as higher levels of control are achieved.

The principle levels of municipal waste treatment are usually described as:

- secondary treatment* which removes 85–90 percent of oxygen-demanding wastes (BOD) and suspended solids by physical and biological treatment methods;
- chemicals addition to secondary* removes 90–95 percent of BOD and suspended solids along with 80–90 percent of phosphates;

¹ Summary of "Environmental and Economic Benefits and Costs Related to Various Water Pollution Abatement Strategies", paper prepared by EPA and CEQ.

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- tertiary treatment*² which removes 95–99 percent of BOD, suspended solids and other pollutants, ranging in cost and treatment levels from two-stage line clarifications, activated carbon absorption, to reverse osmosis; and
- zero discharge* which removes all pollutants and may be accomplished by complete distillation or wastewater recycling.

Industrial treatment levels are often described similarly, although the types of wastes and abatement levels can be quite different. Also, abatement from industrial wastes and abatement levels can be quite different. Furthermore, abatement from industrial wastes can in part be accomplished by production process changes and improved internal management, as well as, end-of-the-line treatment.

Rising Incremental Costs

Figure 1 is illustrative of cost curves for both municipal and industrial water pollution control. Because industry has more alternatives which can be used to achieve pollutant reduction, the curve is not completely accurate. It is probable that in most industries, the costs of abatement would be less at the lower levels of reduction because process changes and better waste management be employed. But at higher levels of control, additional waste treatment will be required

as represented by the cost curve shown (cf. Figure 1). In other words, the difference between control costs at high levels over those at lower levels will be greater than that shown in Figure 1.

These rapidly accelerating costs are illustrated in Table 1. As the table indicates, the cost of reducing the last increments of pollutants are much greater than lower levels of treatment. For example, a 10 percent increase in treatment—from 85 to 95 percent—would raise investment costs by 50 percent; while another 3 percent increase would raise costs by the same amount.

Total Costs

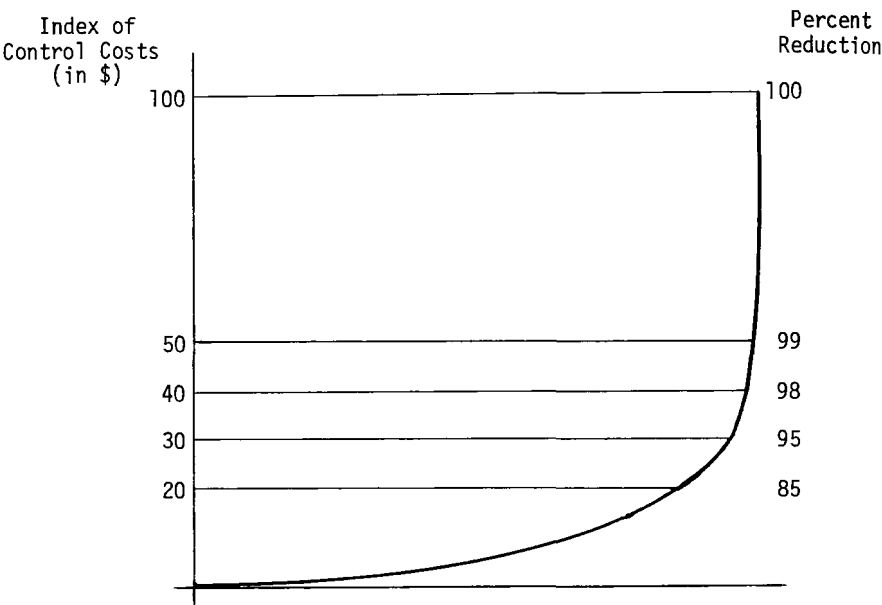
Table 2 illustrates the capital, operating, and annualized costs that would be incurred during 1971–1981 to achieve levels of effluent reductions for municipalities.

Table 3 illustrates the capital, operating, and annualizing costs that would be incurred during 1971–1981 to achieve various levels of effluent reductions for industry.

²In some cases, land disposal of liquid effluents may also be used. This method is approximately equivalent to tertiary treatment. EPA has several studies currently being conducted in this area and is cooperating in a pilot project in Muskegon County, Michigan. Though not applicable throughout the nation, in appropriate areas the costs would seem to be nearly equivalent to the alternative treatment methods.

FIGURE 1

TOTAL CONTROL COSTS AS A FUNCTION OF EFFLUENT CONTROL LEVELS



Source: Interior 1965 Saline Water Conversion Study
Young and Pisano: "Nonlinear Programming Applied to Regional Water Resource Planning".

FWPCA: Cost of Clean Water, 1968, Volume I.

FWQA: Cost of Clean Water, 1970, Volume IV.

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TABLE 1.—INDEX OF POLLUTION CONTROL INVESTMENT COSTS RELATED TO LEVEL OF ABATEMENT

Level of removal (percent)	Increased percent of removal	Cost Index	Cost per increased percent of removal
100	1	500	250
99	1	250	50
98	3	200	17
95	10	150	5
85	—	100	—

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TABLE 2.—MUNICIPAL COSTS
[Dollars in billions]

Level of removal (percent)	Capital investment expenditures ^{1,2}	Operating costs	Total expenditures	Annualized costs in 1981 ³
100 (zero discharge)	59.5	82.3	141.8	10.6
High levels of chemical and physical treatment:				
80 at 95 to 99				
20 at 100	29.0	43.4	72.4	7.0
95 to 99	21.3	33.6	54.9	4.2
85 to 90 (roughly current program) ...	10.6	16.2	26.8	2.0

¹ Assumes investment put in place by 1981.² Includes only treatment costs. Interceptors and other facilities related to treatment and eligible for federal grants would raise each of the figures in this column by \$12.0 billion.³ Depreciation over 25-year life, interest at 6.0 percent, and operating costs in 1981.

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TABLE 3.—INDUSTRIAL COSTS
[Dollars in billions]

Level of removal (percent)	Capital investment expenditures ¹	Operating costs	Total expenditures	Annualized costs in 1981 ²
100 (zero discharge)	35.0	139.7	174.7	10.5
High levels of chemical and physical treatment:				
80 at 95-99 ³				
20 at 100	18.2	66.7	84.9	5.4
95 to 99	14.0	49.9	63.9	4.2
85 to 90 (roughly current program) ...	7.0	27.0	34.0	2.1

¹ Assumes investment put in place by 1981.² Depreciation for 2 years, interest at 8.0 percent, and operating costs in 1981.³ Interpretation of goals in Senate Public Works Committee report.

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It should be noted that the ratio of operating costs to capital costs is roughly four to one for industrial waste treatment while it is about one to one-and-a-half for municipal treatment. In both cases, this illustrates the heavy commitment to operating as well as capital costs that result from higher levels of abatement.

Table 4 summarizes the total costs to society of achieving the various levels of pollutant reduction.

BENEFITS ACHIEVED AT VARIOUS LEVELS OF ABATEMENT

The ultimate goal of any pollution control program is to achieve certain environmental quality objectives. These goals have traditionally been set forth in standards of quality that deal with preventing adverse effects or achieving certain beneficial uses. For example, higher water quality provides such beneficial uses as water supply, recreation, and fish and wildlife. The least costly method meeting these objectives is to tailor effluent reductions to meet those ambient objectives. To the extent the effluent reductions are more stringent than those which are required, excessive costs are incurred need-

lessly. This is particularly true at high control levels where control costs escalate very rapidly.

In order to assess the level of improvements in ambient conditions, it is necessary to understand the general relationship between ambient improvements, their associated benefits, and the costs to achieve them. A study of cost and benefits in the Delaware Estuary performed by the Federal Water Pollution Control Administration illustrates the relationship of benefits to costs.

Dissolved oxygen (mg/l)*	Index of costs of control	Index of recreational benefits
6.5	575	128
5.5	320	115
5.0	150	105
4.0	100	100

* Approximate values, although this factor and others varied by area within the estuary.

These data are presented to indicate the rapidly increasing marginal costs at higher levels of abatement and the lesser increases in benefits at such levels of control. The costs for the highest levels of dissolved oxygen assume control between secondary and tertiary treatment. Full tertiary treatment, i.e. a form of best available technology, would escalate the cost greatly with very little increase in benefits. A total no-discharge requirement would push the costs still higher.

The Delaware study is now nearly a decade old. EPA recognizes the paucity of information concerning economic measures of benefits

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TABLE 4.—TOTAL NATIONAL COSTS¹
[Dollars in billions]

Level of removal (percent)	Ten-year capital expenditures ¹	20-25 year operating costs	Total expenditures	Annualized costs in 1981
100	94.5	220.0	316.5	21.1
80 at 95 to 99				
20 at 100	47.2	110.1	157.3	12.4
95 to 99	35.3	83.5	118.8	8.4
85 to 90 (roughly current program) ...	17.6	43.2	60.8	4.1

¹ Excludes \$12.0 billion costs for intercepting sewers.

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and is making a concerted effort to refine costs and develop methodologies for quantifying benefits. Currently EPA is participating in an effort by the Water Resource Council to develop guidelines for cost-benefit analyses.

The effect of imposing large costs to achieve small increases in

water quality benefits will have the effect of withdrawing resources from other environmental efforts or other national priorities. For example, it will be necessary to devote large sums of money to control air pollution, strip mining, oil spills and to achieve other environmental goals. Also large resources will be necessary to meet other high priority national goals. The extent to which inordinately high amounts of money are devoted to small improvements in water quality will cause other national priorities to suffer.

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4.2 SELECTED REPORTS

4.2a Federal Laws Affecting Rivers and Harbors Works, A Lecture Given by Judge G. W. Koonce, O.C.E. Before the Company Officers Class, the Engineering School, Ft. Humphreys, Va., April 23, 1926

FEDERAL LAWS AFFECTING RIVER & HARBOR WORKS

A lecture given by,
JUDGE G. W. KOONCE, O.C.E.
Before the Company Officers Class
THE ENGINEER SCHOOL
FORT HUMPHREYS, VIRGINIA
April 23, 1926.

I count myself most happy, Gentlemen, to have the privilege of addressing so many of the representatives of that branch of the public service with which I have been identified for practically the entire period of my adult life. On the 11th of November next, I shall have completed practically 40 years of continuous service in the Engineer Department; and it has been my good fortune to have known, personally, and officially, all the heads of that Department from Duane to Taylor, and to have enjoyed intimate acquaintance and association with many other distinguished officers of the Corps of Engineers, whose zealous and unfailing devotion to public duty and whose notable achievements in the conduct of important and useful public works are deserving of the lasting appreciation of the Nation. During these 40 years I have been charged with duties in connection with navigable waterways; and chiefly, with the consideration of questions involving the study, interpretation, and application of laws relating to their improvement and protection.

It is accepted doctrine that both public and private rights attach to navigable waterways, and in this country such waterways are affected by both a National and a State interest. In any discussion of Federal laws enacted for the conservation of the National interest, it would seem appropriate to trace the history of this doctrine, which begins with the common law of England. Originally, by the common law, the King was vested with absolute title and dominion over all tide waters and the land under them within the Kingdom of England, and a subject could acquire a right in either land or water only by grant from the King. By *magna charta*, that famous charter of liberties wrung from King John at Runnimeade, the people at large secured the recognition of two important rights in tide waters, namely, those of navigation and fishery; and this had the effect, substantially, of converting the King's title and dominion over such waters and the soils under

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them into a trust for these public purposes. Recognition was also secured by the people of a right of navigation, above the ebb and flow of the tide, in all rivers which were capable of such use, or in other words, were navigable in fact. Thereafter, title to the land and water in the space between high water mark on each side of a river was vested in the King merely as a prerogative right incident to the power of government, and was held by him in trust for the public easement, or rights of navigation and fishery, the power to regulate and control which was vested in Parliament as representing the people. Upon the settlement of the American Colonies these rights passed to the grantees in royal charters in trust for the communities established. When, as a result of the Revolution, the original thirteen States established their independence they automatically became vested with all the sovereign rights and powers of the government of Great Britain and with the title and the dominion of the navigable waterways and the lands under them within their respective borders. This exclusive control over navigable waters, their shores and beds, resided in the several States up to the ratification of the Constitution of the United States. Prior to ratification the States also possessed the power to regulate commerce between themselves and with foreign Nations, but by such ratification they transferred this portion of their sovereign power to the United States.

Many causes induced the original thirteen states to change from a loose confederation, as it existed during and immediately subsequent to the revolution, into a firmer and more perfect union, but there was none perhaps so potent as the generally recognized necessity for better central governmental regulation and control of in-

terstate trade and traffic. This seems to have inspired the incipient measures, the first concerted movement which resulted in the adoption of the present Constitution of the United States. At the city of Annapolis in the month of September, 1786, a meeting of commissioners appointed by some of the principal States was held, "to take into consideration the trade and commerce of the United States; to consider how far a uniform system in their commercial intercourse and regulations might be necessary to their common interest and permanent harmony; and to report to the several States such an act relative to this great object as, when unanimously ratified by them, would enable the United States in Congress assembled effectually to provide for the same." This meeting which was attended by many able men including James Madison and Alexander Hamilton, without attempting any definite action, adopted an address to the States recommending a future convention with enlarged powers for formulating a constitution. As

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one of the reasons for this recommendation the commissioners say that "in the course of their reflections on the subject, they have been induced to think that the power of regulating trade is of such comprehensive extent, and will enter so far into the general system of the Federal Government, that to give it efficacy, and to obviate questions and doubts concerning its precise nature and limits, may require a correspondent adjustment of other parts of the Federal system." Out of this recommendation came the Constitution of the United States, and thus the great original and moving object of its establishment was to confer on the General Government the power to regulate commerce.

Congress shall have power to regulate commerce with foreign nations, among the several States, and with Indian tribes, is the language of the Constitution, and by this provision there was transferred from the States to the Federal Government the control of all the navigable waters of the country for the purposes of navigation. All other rights and interests in waterways which the States originally possessed were, however, reserved to them. The several States still have proprietorship and sovereignty over the beds and shores of the streams, and water courses within their borders, and within certain limitations the power to regulate the manner and extent of their use. The property rights of a riparian owner in these areas, as between himself and the State, or between himself and other persons, are subject to State authority, and may be such as the legislature may prescribe. It must be said, however, that all State and private rights in the subject are more speculative than substantial,

for while the National Government acquired by the Constitution no property in the shores and beds of watercourses, nor in the waters flowing therein, it did acquire an easement for the benefit of commerce and navigation. This easement is dominant and controlling, and the rights of the State, as well as of the riparian proprietors, to the use and enjoyment of the body of a navigable stream and the soil thereunder in any manner whatever, are subordinate thereto. As expressed by the Supreme Court, whether the title to the submerged lands of navigable waterways is in the State or in the owners of the adjacent upland, it was acquired subject to the rights which the public have in the navigation of such waterways; and whatever the nature of the interest of a riparian owner in the submerged lands may be, his title is a qualified one, a barren technical title, not at his absolute disposal, but to be held at all times subordinate to such use of the lands as may be consistent with or demanded by the public right of navigation. As Congress is vested with supreme authority to assert and to conserve the public right of navigation, it

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is clearly within the power of Congress to determine to what extent and in what way the States and private owners may exercise their property rights both in the soil and in the water, and this is tantamount nearly to absolute Federal ownership. Hence such rights are at best shadowy, of uncertain value, and incapable of definite measurements. They exist undoubtedly, but it would take more than a prophet to foretell what Congress may do regarding them, and no good lawyer would venture an opinion as to their value.

We venerate our Constitution, Gentlemen, as a perfect product of human wisdom perfectly expressed, and so far as it goes in establishing a frame of government, and providing for tenure of office or distribution of duties, it may be cited as an instrument of precise import. But so far as it leaves anything for interpretation and construction, anything for argument, implication, or inference, it seems always to have been "a charter wide withal as the wind," and one as to whose meaning the weather-cock of the hour as well as the wisest of our statesmen and jurists have held and still hold conflicting theories. The power to regulate commerce is probably the largest and most comprehensive of the powers conferred on Congress by the Constitution, and many disputable questions have arisen as to the extent and scope of its application. Its application has been constantly extended by legislative and judicial construction, until in these latter days it has been made to cover almost everything from the manufacture of tomato sauce to the suppression of itinerant sexual immorality. That it conferred upon Congress by implication

authority to regulate navigable waterways has never been questioned, as such waterways have been in all ages the natural media for commercial intercourse. It was a maxim even of the common law, that the public easement of navigation bears a perfect resemblance to public highways. It is a singular fact, however, that in the early days of the Government, it was seriously doubted that the power to regulate, comprehended the right to improve, or in other words, that the improvement of rivers and harbors was a subject of national concern and of constitutional appropriation. In the first Congress an act was passed providing for the future support and maintenance at Federal expense, of lighthouses, buoys, beacons, and public piers, for rendering the navigation of bays, harbors, and ports easy and safe, and thereafter, appropriations were made from time to time for the construction and placing of these instrumentalities. But actual improvement was left to the States, and the strict constructionists of that day continued, for a long period, to draw distinctions between the erection of lighthouses and beacons and the improvement

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of harbors, between the marking of obstructions and removing them. The absurdity of this discrimination became apparent in the course of time, and the principle came to be recognized that it was as logical for the National Government to remove a rock, or a ledge of rocks, from the pathway of vessels as it was to build a lighthouse by which they may descry such rocks and sail safely and easily around them. The first distinct act of Congress for improving navigation was that of May 24, 1824, entitled an act to improve the navigation of the Ohio and Mississippi Rivers. An appropriation of \$75,000 was provided for removing sand bars from the Ohio, and planters, sawyers, and snags from the Mississippi. It is interesting to note that after the lapse of 100 years, the improvement of these two rivers is still being actively prosecuted, and that such improvement still includes the operation of snagboats and dredgeboats.

About this time the luminous decision of Chief Justice Marshall in the case of *Gibbons vs. Ogden* was announced, and this decision scattered into thin air all the curious, not to say absurd, distinctions and differences that had been set up during the preceding 35 years of the Government's existence. It established clearly and indubitably the exclusive power of Congress with respect to the interstate waterways of the country, and the principles declared have been reaffirmed in an unbroken line of judicial decisions, and have been the basis of all subsequent legislative action regarding them. These principles are, perhaps, most concisely yet comprehensively expressed in the

opinion rendered by Mr. Justice Swayne in the case of *Gilman vs. Philadelphia*, 3. Wallace, 724:

"Commerce includes navigation. The power to regulate commerce comprehends the control for that purpose, and to the extent necessary, of all the navigable waters of the United States which are accessible from a State other than those in which they lie. For this purpose they are the public property of the nation, and subject to all the requisite legislation by Congress. This necessarily includes the power to keep them open and free from any obstruction to their navigation, interposed by the States or otherwise; to remove such obstructions when they exist; and to provide, by such sanctions as they may deem proper, against the occurrence of the evil and for the punishment of offenders. For these purposes Congress possesses all powers which existed in the States before the adoption of the National Constitution, and which have always existed in the Parliament in England. It is for Congress to determine when its full power shall be brought

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into activity, and as to the regulations and sanctions which shall be provided."

The sound reasoning and unanswerable conclusions of the court in the case of *Gibbons vs. Ogden* made a profound and convincing impression upon public thought, and thereafter it was generally recognized that the lifting of a snag, the removal of a sand bar, or the building of a breakwater, is a national work, with a national character and a national consequence, and a proper subject of national appropriation. It marks the birth of a permanent Federal policy of river and harbor improvement, a policy limited in scope at first, but which has grown and broadened from year to year with the advance of population and the increasing needs of commercial transportation, until today the projects of navigation improvement range from the bays and broad armed ports where "rich navies ride" to the small streams, creeks, and inlets over which the products of the farm are carried in flatboats and rafts. It is, perhaps, unnecessary to say that the Corps of Engineers have been associated with every feature of these improvements. The making of surveys, the development of plans, and the actual prosecution of the work, have been intrusted to the officers of that Corps from the early days, and our commodious harbors, enlarged channels, artificial canals and slack-water systems are enduring evidences of their energy, training, and skill. The utilization of their services in the conduct and direction of these important civil works has proven most wise and in respect to both the value and economy of accomplishment has resulted in

marked advantage to the Government. It is safe to say, that no better system could have been devised in the beginning, or is conceivable today.

While a broad and systematic policy of river and harbor improvement was early adopted and pursued uninterruptedly in the succeeding years, it seems not to have occurred to the legislative mind that protection of waterways from trespass and obstruction was as vital and important as improvement. It was well understood of course that the power of Congress to regulate and improve navigable waters included the power to keep them open and free from obstructions to their navigation, to remove such obstructions as exist and provide against their recurrence; and that it was for Congress to determine when its full power would be brought into activity. Nevertheless, it is a historic fact that for nearly a century this power which clearly existed in Congress lay dormant and unexercised. In the meantime, while the Government was expending hundreds of millions of dollars to increase the facilities of navigation, interested parties, including States,

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corporations and individuals, were placing obstructions and impediments of all kinds in and across the improved waterways. The necessity for Federal legislation to protect these waterways from impairment and ultimate destruction eventually became urgent. Prior to 1890, the efforts along this line were sporadic, fragmentary, and directed chiefly to the suppression of some obnoxious local practice, or the curing of some special evil. The first general legislation assuring Federal jurisdiction and authority over the protection of navigable waters was enacted in the river and harbor act of September 19, 1890. The proceedings in connection with the origin and ultimate form of this legislation are somewhat peculiar. The Engineer Department had prepared and submitted to Congress a bill covering the entire subject, which was passed by the Senate early in the session, favorably reported by the House Committee, and placed on the House Calendar without further action. It was offered in the Senate as an amendment to the river and harbor bill then pending, but there was much objection to it on the part of Railroad and other interests, and it was excluded on a point of order that it involved general legislation on an appropriation bill which was in violation of an existing rule. When the river and harbor bill was passed and went to conference, the conferees took the Engineer Department bill and with many changes in phraseology and arrangement inserted it as an Amendment to the former bill. As finally enacted the law was crude, ambiguous, and difficult to interpret, and

its administration was in many respects unsatisfactory and ineffectual. To use the language of Attorney General Olney the entire law was infelicitously, not to say clumsily, drawn. Experience soon showed the inadequacy of the law, and the department felt that piece-meal amendment was not desirable, but that its complete revision and enlargement should be secured at the first opportunity. Recital of how this was accomplished involves some personal allusion to myself for which I hope I may be pardoned.

In 1896 when the Committee on Rivers and Harbors had completed the rough draft of its bill I was designated by my chief, Colonel Mackenzie, at the request of the Chairman to go over the bill with the Committee and assist in getting it into final shape for introduction. All afternoon and evening we were engaged in blue-pencilling the measures, completing our labors about 2 o'clock in the morning. As everyone appeared to be in a genial mood, superinduced by the consciousness of work well done, it occurred to me that this was a propitious time for the first step toward securing a modification of our imperfect law. I suggested to the Chairman that the bill needed just one more provision to make it

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perfect, and thereupon prepared and presented for his consideration a provision directing the Secretary of War:

To cause to be prepared a compilation of all general laws that had been enacted from time to time by Congress for the maintenance, protection, and preservation of the navigable waters of the United States, and to submit the same to Congress with such recommendation as to revision, emendation, or enlargement of the said laws as in his judgment would be most advantageous to the public interest.

This was accepted by the Committee and was made section 2 of the act of June 3, 1896. Immediately after the passage of the act I took up the, to me, very agreeable task contemplated by this section. All the previous laws were carefully compiled and studied, and a complete bill was drafted covering all phases of the subject, and embodying such changes and additions as the experience of the department, through a long period of administration, showed to be essential for the effective conservation of the interests of navigation. This bill consisting of 13 sections was submitted to a number of the ablest and most experienced of our engineer officers for consideration and suggestive criticism, and was approved by them. It was transmitted to Congress by the Secretary of War February 10, 1897, and was printed as House Executive Document No. 293, of that session. It was hoped that the bill would be given early consideration and enacted as an independent measure from any appropriation bill, but

it slumbered unnoticed for nearly three years, and when we had about concluded it would never receive any attention whatever, it was taken up and passed in the most unexpected manner. On a day when the river and harbor bill of 1899, which had already been passed by the House, was nearing final action in the Senate, Colonel Mackenzie received a short note from Senator Frye, then Chairman of the Senate Commerce Committee, suggesting that if the department had any special matter it desired included in the pending bill, it be sent to him at once. Without a moment's delay we cut the printed bill from a copy of the House Document, eliminated the enacting clause, changed the section numbers, and dispatched it to Senator Frye with a special memorandum of explanation. He immediately presented it in the Senate as a Committee amendment—it was incorporated in the bill and accepted by Congress without the change of a word and practically without debate or discussion. Thus, Gentlemen, was born sections 9 to 20 of the river and harbor act of March 3, 1899, whose collective provisions have ever since constituted the Federal statute for the protection of navigable waters. It was intended to be, and is, an assertion of police power to protect from physical injury

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those highways of commerce in which the Federal Government has dominion and propriety, and within its comprehensive provisions are embraced all forms and varieties of physical obstructions. An examination and study of the law will impress anyone with the organic and far reaching character of the jurisdiction asserted, and with its evident value both as a preventive and remedial measure. In approaching a discussion of some of the provisions of the law of 1899 applicable only to the navigable waters of the United States, it may be pertinent to inquire what are the navigable waters of the United States, to which they apply. It may be stated as a general as well as an exact proposition that all waters which are in fact navigable, and which are accessible from a State other than that in which they lie, are subject to the dominion and regulation of the National Government. This embraces without question, the harbors, bays, and other bodies of water flowed by the tide, as likewise the Great Lakes and important rivers extending throughout the country. Many of our rivers, however, are of uncertain and variable navigability, and hence all streams denominated rivers are not necessarily to be classed as navigable waters of the United States. As defined by the courts:

A river is navigable *in law* when it is navigable *in fact*, and it is navigable in fact when it affords, in its ordinary condition, a

channel for useful commerce of substantial and permanent character conducted in the customary modes of trade and travel on water. A navigability that is merely theoretical or potential, or one that is temporary, uncertain, precarious and unprofitable, is not sufficient; but to be navigable in fact a watercourse must have practical usefulness to the public as a highway for the transportation of the products of the country—for the safe and convenient passage and repassage of boats employed in such transportation. A river navigable in fact, as thus defined, is a navigable water of the United States, within the meaning of the acts of Congress, when it forms by itself, or by uniting with other waters, a continuous highway over which commerce is or may be carried on with the several States or with foreign countries.

All rivers and watercourses which meet the conditions set forth in this definition come within the protective scope of the law.

Section 9 of the act applies to that class of structures such as bridges and dams which extend entirely across a waterway, and which if built without proper regulation and control may completely block navigation. In this section navigable waters are separated into two classes:

First—Intrastate: A stream which lies wholly within the borders of a single State, but which, by uniting with other waters,

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forms a highway for commerce between that State and another. As to streams in this class it is provided that the designated structures may be built thereover under authority of State law on condition that the location and plans receive the approval of the Chief of Engineers and the Secretary of War.

Second—Interstate: A stream which divides, or extends into, two or more States, and which of itself forms a highway for commerce between the States. For such constructions across streams of this class, the special authorization of Congress, as well as approval of the plans by the same Federal agencies, is required.

This classification while arbitrary is in a measure logical, being based on the relative commercial importance of an intrastate and an interstate stream. The former is usually small with a limited commerce, and it can be bridged or dammed by authority of the State in which it lies without the consent of any other State; the latter, being larger and commercially more important, is of greater National concern, and besides the erection of bridges or dams across such a stream under State authority would often require the concurrent action of two States. Hence, it seemed reasonable for Congress to concede to State legislatures a measure of authority with respect to the former class of streams, while retaining its own exclusive power over the

latter. The essential thing, however, and that which absolutely insures the navigable integrity of both intrastate and interstate streams, is the requirement that before any structure is commenced or built over either, the plans must have received the approval of the Chief of Engineers and the Secretary of War. Both the letter and spirit of this law have been observed by the public generally; all structures embraced within its provisions, erected since its enactment, have been built in accordance with plans which, in the judgment of the department, afford reasonable facilities for navigation, and it may be truly said that no unreasonably obstructive bridges have been erected since its enactment.

Section 10 relates to the construction of works in the nature of wharves, piers, jetties, and the like, which project into, rather than cross, the bodies of water in which they are located; and also to making excavations or fills, or changes of any kind in the condition or capacity of navigable waterways. The first clause of the section positively prohibits the creation of any obstruction to the navigable capacity of any of the waters of the United States unless affirmatively authorized by Congress. This is a provision of very broad application, and its applicability is not limited to streams actually navigable. As the Supreme Court has pointed out in *United States vs. Rio Grande Irrigation Co.*, 174 U.S. 690,

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it is not a prohibition of any obstruction to the navigation, but any obstruction to the navigable capacity, and anything wherever or however done which tends to destroy navigable capacity, is within the terms of the prohibition. It can, therefore, be invoked to prevent the doing of things on unnavigable streams, the effect of which would impair the navigable capacity of a navigable stream. The second clause provides that it shall not be lawful to build any of the structures or do any of the work specified therein, unless the same has been previously recommended by the Chief of Engineers and authorized by the Secretary of War. In one of the early cases it became necessary for the department to consider the question whether the second clause of this section so qualifies the prohibitory provision of the first clause as to confer on the Secretary of War power to authorize obstructions to navigable capacity. In other words, notwithstanding the positive prohibition in the first clause, can the second clause be construed as a declaration by Congress that any work, however destructive it may be to navigable capacity, may be done provided it is recommended by the Chief of Engineers and authorized by the Secretary of War. On this question the Chief of Engineers maintained:

That the essence of the whole section is contained in the first clause, the obvious purpose of which is to prevent the execution of any work or the doing of any act that will obstruct, injure, or destroy the navigable capacity of any navigable water unless expressly authorized by Congress:—that the succeeding clause making it unlawful to build any structure, or to modify the condition or capacity of a navigable water, without the prior recommendation of the Chief of Engineers and authorization of the Secretary of War, was intended to insure the accomplishment of the aforesaid purpose, and not to empower them to authorize obstructive works:—that the effect of this latter clause is to necessitate the submission of every project of the kind to the Chief of Engineers and the Secretary of War, and to commit to them the duty of investigating and determining whether or not the project will obstruct or injure navigability:—that if these officers find as a fact that a projected work will not amount to an obstruction to navigable capacity they may authorize it, but if they find that it will be such an obstruction the affirmative action of Congress must be sought and obtained. This interpretation of the statute subsequently received judicial support, as you may see by referring to the case of *Hubbard vs. Fort*, 188 Fed. 987, in which the court, referring to section 10, says:

“The creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any waters in respect of
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which the United States has jurisdiction is prohibited; and then declares that the building of certain structures and the performing of certain work with reference to navigable waters are forbidden without authority of the Secretary of War: *Held* that the word “affirmatively” was used to distinguish the two kinds of authority referred to, and that the section should be construed to require that the initial authorization to create an obstruction must rest on affirmative Congressional authority and not on a mere permit of the Secretary of War.

* * * * *

The word “authorized” was used in this section in the sense of approve of and formally sanction, and does not confer on the Secretary of War authority to grant original authorization for the construction of any work constituting an obstruction of the navigable waters of the United States.

* * * * *

The permission of the Secretary of War must be based on a finding and declaration that the proposed work *will not obstruct or impair navigability.*”

The administration of this section has imposed an enormous amount of work on the Department and has given rise to many vexatious problems, as my good friend Major Downing is fully aware. It touches more people, affects more interests, and covers more individual activities than any other portion of the statute. It has occasioned much litigation, not only in the way of prosecutions for frequent violations, but for the settlement of disputed questions as to its scope and purpose. It was early established that the legislation did not wholly destroy the power of a State over the construction of docks and wharves and other events within its limits, but that its effect was merely to make the erection of such structures depend upon the concurrent or joint assent of both the Federal and State governments. The permits issued by the Secretary of War under this law, as the agent of the Federal Government, are not complete and exclusive authority to do the things authorized, but merely expressions of Federal consent, and the parties to whom they are issued must before proceeding under such authority, also obtain the assent of the State acting through its constituted agencies. These principles are well illustrated in the cases of *Cummings vs. Chicago*, 188 U.S. 410, and *Montgomery vs. Portland*, 190 U.S. 89. The most notable and important case involving the enforcement of the law from the department standpoint is that of the *Sanitary District vs. United States*, which after long and inexcusable delay covering a period of about 17 years reached final decision by the Supreme Court—about

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a year ago. A study of this decision and the accompanying comprehensive briefs, as reported in 266 U.S. 405, will be very instructive. The harbor line law set forth in section 11 is closely kin to section 10, as the establishment of a harbor line may be considered as of the nature of a general permit for the work and structures embraced in that section. It relieves those interested from applying to the department in each instance for authority to erect structures. The establishment of such a line, however, like the granting of a permit, does not give anyone a vested right in its permanent continuance, but it may be changed from time to time as the Secretary of War may deem necessary to meet the needs of commerce, even though the change may injuriously affect or destroy structures erected by virtue of the original establishment of the line. The decisions of the Supreme Court in the cases of *Philadelphia Company vs. Stimson*, 223 U.S. 605, and *Greenleaf Lumber Co. vs. Garrison*, 237 U.S. 251, leave no room for doubt on this point. One of the most effective features of section 10, and which tends to induce observance of its

requirements, is that in case of a violation it is unnecessary to prove that the act committed has resulted in the impairment of navigation. As the law previously stood, the construction of a wharf, or other trespass on the waterway, without governmental authority, was not unlawful unless navigation was obstructed or impaired thereby, and the burden of proving this to the satisfaction of a jury rested on the Government whenever a prosecution for violation of the law was attempted. Under section 10, as well as section 13 relating to the discharge of deposit of refuse matter in navigable waters, the commission of any of the acts forbidden, not their results, constitute the offense, and the commission subjects the offending party to the prescribed penalty, regardless of whether or not there is any actual injury to navigation. As a matter of fact, however, the Department does not as a rule prosecute where the violation is trivial and results in no material public injury, the practice being to observe the old maxim *de minimis non curat lex*. It may be further remarked that in acting upon applications under these laws, it is the practice of the Department to restrict consideration in respect to any structure that it is proposed to establish in navigable waters to the possible interference with navigation which is likely to ensue. The controlling consideration upon which the Department decides to approve or disapprove any given structure is its effect upon the navigable capacity of the waterway in which it is sought to be located. Questions relating

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to other interests than those having to do with the navigation of the waters or their use in interstate commerce, do not determine the Department's action.

Section 18 is probably the most important and, as a remedial measure, the most effective and valuable of all the provisions of the statute. During the long period while the power to protect navigation was allowed by Congress to lie dormant railroad and highway bridges without number had been built across the navigable rivers, some under State authorization, some under the authority of Congress, some without any authority at all, and practically all without any governmental supervision or regulation as to location or plan. As a consequence they were usually located and built with reference to the accommodation of land traffic and without any regard for the commercial use or needs of the waterway. Congress at last recognized the necessity for the removal of the obstructive features of these bridges, and in the river and harbor act of 1888, vested the Secretary of War with the power to require the owners of obstructive bridges, at their own expense and by their own efforts, to make such changes as were deemed necessary to provide for reasonably free

and unobstructed navigation. This legislation was slightly amended in the act of 1890, and was finally amended and reenacted into the present law. The early law was broad and comprehensive, and the basic principles identical with those of the existing law, but few practical results were accomplished under it. One of the first attempts to enforce it resulted in failure as the lower court held the law unconstitutional and, being a penal statute, no appeal could be taken to the Supreme Court to establish its constitutionality. The result was that only those obeyed the law who were willing to do so. Having these things in mind when I came to revise the law, I added the following proviso which will be found at the end of section 18:

"Provided that in any case arising under the provisions of this section an appeal or writ of error may be taken from the district courts or from the existing circuit courts direct to the Supreme Court either by the United States or by the defendants."

It was contended that section 18 was unconstitutional on two grounds:

1. That conferring on the Secretary of War authority to determine when a bridge is an obstruction to the free navigation of a river, is in violation of the Constitution as delegating legislative and judicial powers to the head of an Executive Department.

2. That the law made no provision for compensating the bridge owner for the expense of making the alterations or changes that

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might be required, and that this was a taking of private property for public use in contravention of the Fifth Amendment of the Constitution.

It is proper to say that this view was shared by many distinguished lawyers. Officials of the Department of Justice with whom I had occasion to confer, repeatedly expressed the opinion that the law would be held invalid, and that radical changes in it would be necessary. Numerous suggestions as to proper amendments were made, but I held to the position that there was only one tribunal that could definitely decide a law of Congress to be unconstitutional, and that was the Supreme Court of the United States; that this was a valid law; and that it ought to be allowed to remain intact until that Court had an opportunity to pass on it. In the Union Bridge Company case, which was the first to reach the Supreme Court, the constitutionality of the law was sustained in a sweeping decision. The reasoning and conclusions of the court in that case effectually disposed of the objections raised, and firmly established the power of Congress to require the alteration of bridges in the manner prescribed in this law, *Union Bridge Co. vs. United States*, 204 U.S. 364.

I have tried to trace for you, Gentlemen, the history of river and harbor legislation,—to indicate the successive steps leading up to the enactment of our law for the protection of navigable waters; and to outline the basic principles on which they rest. It must be confessed that the law is not free from imperfections, but if I were called on to rewrite it today, while I should make many changes in its phraseology, I can conceive of none I would make in its scope or purpose. It is gratifying to know that it has been in force for 27 years, and in all that time there has been no amendment or suggestion of amendment. It has been contested in the courts and the constitutionality of many of its provisions has been questioned, but so far it has withstood all assaults. It is sometimes violated, but what law is not—we learn from the public press that there are occasional infractions of even that respected and popular law, the Volstead act.

The administration of these laws will sooner or later devolve on you gentlemen, but as the most important principles have been settled by judicial and departmental construction you will not meet with so many difficult and vexing problems as have your predecessors.

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