IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

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STATE OF NEW YORK, Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-2599 (NGG)(CLP) ECF Case

[PROPOSED] ORDER

AND NOW, this ____ day of _____, 2012, upon consideration of the motions of defendants Delaware River Basin Commission and its Executive Director (in her official capacity) to dismiss the Complaint of the Delaware Riverkeeper et al. (No. 11-CV-3780), the Complaint of Damascus Citizens for Sustainability (No. 11-CV-3857), and the Amended Complaint of New York State (No. 11-CV-2599), the plaintiffs' opposition thereto, and oral argument by counsel for the parties, it is hereby ORDERED that the motions to dismiss are GRANTED and the Complaint in Nos. 11-CV-3780, the Complaint in No. 11-CV-3857, and the Amended Complaint in No. 11-cv-2599 are each DISMISSED with prejudice as to defendants Delaware River Basin Commission and Carol Collier (in her official capacity).

IT IS FURTHER ORDERED that, upon consideration of the motions for summary judgment of plaintiffs Delaware Riverkeeper et al. (No. 11-CV-3780), Damascus Citizens for Sustainability (No. 11-CV-3857), and New York State (No. 11-CV-2599), the defendants' opposition thereto, and oral argument by counsel for the parties, that the motions for summary

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judgment are DENIED in their entirety as to defendants Delaware River Basin Commission and Carol Collier (in her official capacity).

BY THE COURT:

_____

Garaufis, J.

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service: April 5, 2012
(Corrected)

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case Oral Argument Requested
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

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STATE OF NEW YORK, Plaintiff,	:	No. 11-CV-2599 (NGG)(CLP)
v.	:	ECF Case
THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants,	:	
-and-	:	
AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	

DEFENDANTS DELAWARE RIVER BASIN COMMISSION AND CAROL R. COLLIER'S (SUED IN HER OFFICIAL CAPACITY) RESPONSE TO THE ENVIRONMENTAL GROUP PLAINTIFFS' STATEMENT OF MATERIAL FACTS PURSUANT TO LOCAL RULE 56.1

Pursuant to Local Rule 56.1, Defendants Delaware River Basin Commission ("DRBC") and DRBC's Executive Director Carol Collier (in her official capacity) (together "DRBC Defendants") respectfully submit the following response to the statement of material facts as to which Plaintiffs Delaware Riverkeeper Network, the Delaware Riverkeeper, Riverkeeper, Inc., the Hudson Riverkeeper, National Parks Association, and Damascus Citizens for Sustainability, Inc. (together "Environmental Group Plaintiffs") contends there is no genuine dispute.

1. DRBC Defendants do not dispute the facts set out in Paragraph 1 for purposes of Plaintiffs' Motion for Summary Judgment.

2. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute that the Executive Director made the statement quoted in Paragraph 2. By way of further response, this determination was based on the natural gas activities likely to occur if left *unregulated*. *See* Silver Decl. Ex. A, Determination of the Executive Director, at 2 (May 19,

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2009) ("The Commission intends to promulgate regulations pertaining to the subject matter of this Declaration after public notice and a full opportunity for public comment."); *see also* Tudor Decl. ¶ 27 ("[T]he draft natural gas rule now under consideration by the Commissioners is designed to provide for responsible management of water resources from withdrawal to discharge and to establish standards of planning and design to protect landscape features essential to maintaining existing high water quality in the non-tidal river."); Bein Decl. Ex. O, DRBC Draft Natural Gas Development Regulations § 7.1(a) ("The purpose of this Article is to protect the water resources of the Delaware River Basin during the construction and operation of natural gas development projects. To effectuate this purpose, this Section establishes standards, requirements, conditions and restrictions to prevent, reduce or mitigate depletion and degradation of surface and groundwater resources and to promote sound practices of watershed management including control of runoff and erosion."); *id.* § 7.5(b) (Rev. Nov. 8, 2011) (stating that a goal of the proposed regulations is to "[e]nsure that the project sponsor investigates and mitigates the broad and cumulative effects that natural gas development activities may have on the landscape and water resources associated with the geographic area of each [Natural Gas Development Plan].").

3. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute that the Executive Director made the statements quoted in Paragraph 3.

4. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute that the DRBC made the statements quoted in Paragraph 4. By way of further response, these statements relate to the potential impacts if natural gas activities were left *unregulated*. *See* Silver Decl. Ex. C, Natural Gas Drilling Index Page (Feb. 9, 2012) (noting that, because of the stated potential impacts, DRBC needs to have a role in reviewing natural gas

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drilling projects and is in the process of developing regulations). *See also* DRBC Defendants' response to Paragraph 2.

5. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute the facts set forth in Paragraph 5. DRBC Defendants dispute any implication that the Commissioners determined that the proposed regulations would authorize natural gas development in the Basin. *See* Silver Decl., Ex. A, at 2.

6. DRBC Defendants do not dispute the facts set out in Paragraph 6 for purposes of NYS's Motion for Summary Judgment. By way of further response, the federal member votes on behalf of the United States. *See* DRBC Defendants' response to Paragraph 11 of NYS Local Rule 56.1 Statement.

7. DRBC Defendants do not dispute that they have not, pursuant to NEPA, "prepared an environmental assessment or an environmental impact statement" (defining the terms "environmental assessment" and "environmental impact statement" in accordance with NEPA, its implementing regulations, and the case law interpreting NEPA). By way of further response, the DRBC researched and investigated environmental impacts associated with the extraction and production of natural gas from shale. *See* Tudor Decl. ¶¶ 3-21; *see also* Part II.E of the DRBC Defendants' April 5 Brief (applying the "functional equivalence" doctrine to DRBC).

8. DRBC Defendants object to Paragraph 8 because the facts alleged in it are unsupported by the cited reference.

9. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute that the DRBC made the statement quoted in Paragraph 9. By way of further response, this statement was based on the potential consequences if natural gas activities were

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left *unregulated*. *See* Silver Decl. Ex. B, Statement by the [DRBC] on the Upper Delaware River Being Named by American Rivers to Its "America's Most Endangered Rivers" List, at 1 (June 2, 2010) (noting that the DRBC would not approve natural gas well pad applications for shales until specific regulations were adopted). *See also* DRBC Defendants' response to Paragraph 2.

10. DRBC Defendants do not dispute that, at the December 8, 2010 meeting, the DRBC approved the release of draft regulations for natural gas development in the Basin. DRBC Defendants further do not dispute that the federal member supported releasing the draft regulations. DRBC Defendants further do not dispute that the NYS Commissioner opposed releasing the draft regulations. However, the DRBC Defendants dispute any implication that the NYS Commissioner opposed releasing the draft regulations for any reason other than those recorded in the minutes of the DRBC's December 8, 2010 meeting. *See* Bush Decl. Ex. G, at 6;[1] *see also* DRBC Nov. 1 Brief, at 28. By way of further response, the minutes of the DRBC's December 8, 2010 record no formal vote. *See generally id.*

11. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute that the DRBC published the Draft Natural Gas Development Regulations on December 9, 2010, as described in Paragraph 11.

12. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute the facts alleged in Paragraph 12. DRBC Defendants dispute the relevance of the facts contained in Paragraph 12 for the reasons set forth in Part II.D.6 of DRBC's April 5 Brief.

13. DRBC Defendants do not dispute that the proposed regulations are intended to implement Sections 3.3, 3.6(b), 3.8, 4.1, 5.2, 7.1, 13.1, and 14.2(a) of the Compact. *See* Bein Decl. Ex. O, DRBC Draft Natural Gas Development Regulations § 7.1(b) (Rev. Nov. 8, 2011).

[1] The Bush Declaration was submitted by DRBC Defendants in support of their January 12, 2012 motion to dismiss NYS's Amended Complaint.

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DRBC Defendants dispute that the proposed regulations "will have 'a substantial effect on the water resources of the Basin.'" To the contrary, the purpose of the proposed regulations is "to protect the water resources of the Delaware River Basin during the construction and operation of natural gas development projects." *Id.* § 7.1(a). *See also* DRBC Defendants' response to Paragraph 2.

14. DRBC Defendants do not dispute that the comment period ran from December 9, 2010 through April 15, 2011. By way of further response, throughout 2011, the Commissioners and staff continued to receive informal comments relating to the proposed regulations and natural gas. *See* Tudor Decl. ¶¶ 22-25.

15. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute the facts set out in Paragraph 15. DRN's and NCPA's entire comments are in writing and speak for themselves.

16. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute the facts set out in Paragraph 16. The Riverkeeper's entire comments are in writing and speak for themselves.

17. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute the facts set out in Paragraph 17. NYS Attorney General Schneiderman's entire letter is a writing that speaks for itself.

18. For purposes of Plaintiffs' Motion for Summary Judgment, DRBC Defendants do not dispute the facts set out in Paragraph 18. General DeLuca's entire letter is a writing that speaks for itself.

19. DRBC Defendants do not dispute that the DRBC published revised draft natural gas development regulations on November 8, 2011 and that the revised draft natural gas

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regulations reflect certain modifications as a result of the public notice and comment process engaged in by the Commission. *See* Tudor Decl. ¶ 26. DRBC Defendants dispute Plaintiffs' characterization of the revised draft natural gas regulations as "substantially modified." *Compare* Bein Decl. Ex. I (Dec. 9, 2010 draft regulations) *with* Bein Decl. Ex. O (Nov. 8, 2011 draft regulations). While the DRBC Defendants do not dispute that DRBC has not engaged in a formal comment process in connection with the revised draft regulations, DRBC Defendants dispute the materiality of this fact to Plaintiffs' Motion for Summary Judgment and further dispute any implication that a comment period was legally required.

20. DRBC Defendants do not dispute that they have not, pursuant to NEPA, "prepared an EIS on the Draft Regulations" or "conducted any comprehensive analysis of the indirect, direct, or cumulative impacts of natural gas development on the water resources or ecosystems of the Basin" (defining the terms "EIS" and "indirect, direct, or cumulative impacts" in accordance with NEPA, its implementing regulations, and the case law interpreting NEPA). By way of further response, the DRBC researched and investigated environmental impacts associated with the extraction and production of natural gas from shale. *See* Tudor Decl. ¶¶ 3-21; *see also* Part II.E of the DRBC Defendants' April 5 Brief (applying the "functional equivalence" doctrine to DRBC).

21. DRBC Defendants do not dispute that they have not, pursuant to NEPA, "undertake[n] any environmental impact statement to accompany a report or recommendation on the Draft Regulations" (defining the term "environmental impact statement" in accordance with NEPA, its implementing regulations, and the case law interpreting NEPA). By way of further response, the DRBC researched and investigated environmental impacts associated with the extraction and production of natural gas from shale. *See* Tudor Decl. ¶¶ 3-21; *see also* Part II.E

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of the DRBC Defendants' April 5 Brief (applying the "functional equivalence" doctrine to DRBC).

22. DRBC Defendants do not dispute that they have not performed a Basin-wide cumulative-impact study in connection with the proposed natural gas development regulations. DRBC Defendants dispute, however, that the cumulative impacts of natural gas development and hydraulic fracturing in the Delaware River Watershed are wholly "unknown" and "have not been studied or modeled." *See* Tudor Decl. ¶¶ Tudor Decl. ¶¶ 3-21 (describing the DRBC's research and investigation); NYSDEC, *Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulator Program*, §§ 6.1.1.7, 7.1.1.6 ("NYSDEC dSGEIS") (Rev. Draft Sept. 7, 2011), http://www.dec.ny.gov/energy/75370.html (analyzing "[c]umulative [w]ater [w]ithdrawal [i]mpacts").

23. DRBC Defendants do not dispute that they did not issue, as a part of their notice and comment rulemaking procedures, a document setting forth "a comprehensive range of mitigation measures or alternatives to the Draft Regulations." By way of further response, the DRBC researched and investigated environmental impacts associated with the extraction and production of natural gas from shale, including the "identif[ication of] practices to minimize such impacts" to public health, safety, welfare, and the environment from natural gas development activities. Tudor Decl. ¶ 8; *see also id.* ¶¶ 3-21; Part II.E of the DRBC Defendants' April 5 Brief (applying the "functional equivalence" doctrine to DRBC). The draft regulations contain mitigation measures. *See* Bein Decl. Exs. I and O.

24. DRBC Defendants do not dispute that "[t]he U.S. Government's Official Web Portal" contains a list entitled "U.S. Government Departments and Agencies" that includes the DRBC. By way of further response, the DRBC Defendants dispute that the federal agency

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created by and administering NEPA has made any determination that DRBC is a federal agency. *See* Greczmiel Decl. ¶¶ 6-11. The website listing identified by Plaintiffs in Paragraph 24 is immaterial to the question of whether the DRBC is a federal agency for the reasons set forth in Part II.C.2 of DRBC Defendants' November 1 Brief and Part II.D of DRBC Defendants' April 5 Brief.

25-45. DRBC Defendants incorporate the Federal Defendants' responses to Plaintiffs' alleged facts set forth in Paragraphs 25 through 45. By way of further response, see the Declaration of Kenneth J. Warren submitted pursuant to Federal Rule of Civil Procedure 56(d).

Dated: April 5, 2012

/s/ Kenneth J. Warren
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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service: April 5, 2012
(Corrected)

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case Oral Argument Requested
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

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STATE OF NEW YORK, Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-2599 (NGG)(CLP) ECF Case

DEFENDANTS DELAWARE RIVER BASIN COMMISSION AND CAROL R. COLLIER'S (SUED IN HER OFFICIAL CAPACITY) RESPONSE TO PLAINTIFF NEW YORK STATE'S LOCAL RULE 56.1 STATEMENT OF MATERIAL FACTS

Pursuant to Local Rule 56.1, Defendants Delaware River Basin Commission ("DRBC") and DRBC's Executive Director Carol Collier (in her official capacity) (together "DRBC Defendants") respectfully submit the following response to Plaintiff New York State's ("NYS") statement of material facts as to which NYS contends there is no genuine dispute.

1. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the Delaware River Basin (the "Basin") drains parts of Pennsylvania into the Delaware River.

2. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that, in certain portions of the NYS part of the Basin, the Delaware River provides habitats for wildlife such as the bald eagle, trout and other fish, and mussels, including the endangered dwarf wedge mussel.

3. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the federal government has designated 73.4 miles of the main stem of the Delaware

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River, known as the "Upper Delaware River," as a "Scenic and Recreational River" administered by Defendant National Park Service ("NPS").

4. DRBC Defendants object to Paragraph 4 because the question of whether "New York has a proprietary interest" in the resources listed is one of law rather than fact. *See* Part II.A.1 of the Federal Defendants' January 12, 2012 Brief. It is disputed for the reasons set forth therein.

5. DRBC Defendants dispute that the DRBC and ALL Consulting have estimated that thousands of natural gas wells "will be" developed in the Basin to access gas found in the underlying Marcellus Shale formation. The DRBC's estimate ranges "from a minimum of 0 wells to a maximum of 32,152 wells," depending on the physical, economic and political variables. *See* Bein Decl. Ex. P, *DRBC Natural Gas Well Estimate Summary*, at 2-3; *see also* Bein Decl. Ex. J, Tr. at 5-8 ("The Commission . . . predicts . . . that somewhere between 15,000 and 18,000 horizontal wells *may be developed* . . . ."). The ALL Consulting report – a 128-page document, only a four-page excerpt of which is attached as Exhibit K to the Bein Declaration – is a document that speaks for itself. The full document is available on DRBC's website at http://www.state.nj.us/drbc/library/documents/NGC/IndustryOG/ALL041211.pdf.

6. DRBC Defendants dispute the reference to "[t]hose gas development activities" for the reasons stated in the DRBC Defendants' response to Paragraph 5. The DRBC understands that HVHF technology generally uses 4 to 5 million gallons of water per well, although NYSDEC estimates a range of 2.4 to 7.8 million gallons per well. *See* NYSDEC, *Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulator Program*, 5-93 to -94 ("NYSDEC dSGEIS") (Rev. Draft Sept. 7, 2011), http://www.dec.ny.gov/energy/75370.html. ALL Consulting concluded that "the water . . . use

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requirements for natural gas development would be relatively minor compared to other water and land use within the Basin." ALL Consulting, *Analysis of Delaware River Basin Commission Proposed (Article 7) Natural Gas Development Regulations*, at 18 (April 2011), http://www.state.nj.us/drbc/library/documents/NGC/IndustryOG/ALL041211.pdf. The chemical additives comprise less than 2% of the fluids. NYSDEC dSGEIS, at 5-40, 5-51. The chemicals have varying and in some cases unknown toxicity. *Id.* at 5-63 to -79.

7. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the Executive Director made the statement quoted in Paragraph 7. By way of further response, this determination was based on the natural gas activities likely to occur if left *unregulated*. *See* Silver Decl. Ex. A, Determination of the Executive Director, at 2 (May 19, 2009) ("The Commission intends to promulgate regulations pertaining to the subject matter of this Declaration after public notice and a full opportunity for public comment."); *see also* Tudor Decl. ¶ 27 ("[T]he draft natural gas rule now under consideration by the Commissioners is designed to provide for responsible management of water resources from withdrawal to discharge and to establish standards of planning and design to protect landscape features essential to maintaining existing high water quality in the non-tidal river."); Bein Decl. Ex. O, DRBC Draft Natural Gas Development Regulations § 7.1(a) ("The purpose of this Article is to protect the water resources of the Delaware River Basin during the construction and operation of natural gas development projects. To effectuate this purpose, this Section establishes standards, requirements, conditions and restrictions to prevent, reduce or mitigate depletion and degradation of surface and groundwater resources and to promote sound practices of watershed management including control of runoff and erosion."); *id.* § 7.5(b) (Rev. Nov. 8, 2011) (stating that a goal of the proposed regulations is to "[e]nsure that the project sponsor investigates and mitigates the

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broad and cumulative effects that natural gas development activities may have on the landscape and water resources associated with the geographic area of each [Natural Gas Development Plan].").

8. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the DRBC made the statement quoted in Paragraph 8. By way of further response, this statement was based on the potential consequences if natural gas activities were left *unregulated*. *See* Silver Decl. Ex. B, Statement by the [DRBC] on the Upper Delaware River Being Named by American Rivers to Its "America's Most Endangered Rivers" List, at 1 (June 2, 2010) (noting that the DRBC would not approve natural gas well pad applications for shales until specific regulations were adopted). *See also* DRBC Defendants' response to Paragraph 7.

9. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the DRBC made the statements quoted in Paragraph 9. By way of further response, these statements relate to the potential impacts if natural gas activities were left *unregulated*. *See* Silver Decl. Ex. C, Natural Gas Drilling Index Page (Feb. 9, 2012) (noting that, because of the stated potential impacts, DRBC needs to have a role in reviewing natural gas drilling projects and is in the process of developing regulations). *See also* DRBC Defendants' response to Paragraph 7.

10. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the United States Fish and Wildlife Service ("FWS") and NPS made the statement quoted in Paragraph 10. By way of further response, FWS and NPS "strongly support the Commission's promulgation of new regulations" to avoid or mitigate any adverse effects. *See* Silver Decl. Ex. D, Letter to Carol Collier, DRBC, from Marvin E. Moriarty, FWS, and Dennis Reidenbach, NPS, at 3 (June 25, 2010).

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11. DRBC Defendants dispute that the federal member of the DRBC reports to any federal agencies. The federal member is designated by federal statute, Pub. L. 110-114, § 5019, which does not establish any such reporting relationship. The federal member represents the United States, including all of its agencies. *See* Compact §§ 2.1 and 2.2, *as amended by* Pub. L. 110-114, § 5019.

12. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute the facts alleged in Paragraph 12. By way of further response, no monies for a cumulative impact study have been appropriated by Congress. *See* Gore Decl. ¶¶ 4-11;[1] *see also generally* Office of Management and Budget, *Budget of the United States Government*, *available at* http://www.gpo.gov/fdsys/browse/collectionGPO.action?collectionCode=BUDGET.

13. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that Exhibit F to the Silver Declaration indicates that EPA will study potential impacts of HVHF, listed in Paragraph 13, on drinking water resources. DRBC Defendants object to the balance of Paragraph 13, as it is unsupported by Exhibit F to the Silver Declaration. *See* Fed. R. Civ. P. 56(c)(1), (2).

14. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the EPA made the statement quoted in Paragraph 14. The DRBC Defendants note, however, that NYS asserts that its motion for summary judgment is relying solely on activities in Pennsylvania, NYS Br. 16, making the facts set out in Paragraph 14 immaterial.

15. DRBC Defendants dispute the characterization of the study reported in Exhibit H to the Silver Declaration. DRBC Defendants note that EPA is conducting further sampling and will reach conclusions based on full data. *See* Perry Decl. ¶¶ 27-28.

[1] The Declaration of Richard Gore was submitted by DRBC Defendants in support of their November 1, 2011 motion to dismiss the Complaints of the Environmental Group Plaintiffs.

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16. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the SEAB Shale Gas Subcommittee made the statement quoted in Paragraph 16. By way of further response, the purpose of DRBC's proposed regulations, and existing and proposed state regulations, is to eliminate, reduce, or minimize risk. *See* Perry Decl. ¶¶ 10-19 (regarding Pennsylvania regulation); Pine Decl. ¶¶ 14, 17 (same); NYSDEC dSGEIS, Executive Summary, at 11 ("As with all gas drilling, well construction practices mandated in New York are designed to prevent gas migration. Those practices would also minimize the risk of migration of other formation fluids such as oil or brine."); Bein Decl. Ex. O, DRBC Draft Natural Gas Development Regulations § 7.1(a) (Rev. Nov. 8, 2011) ("The purpose of this Article is to protect the water resources of the Delaware River Basin during the construction and operation of natural gas development projects. To effectuate this purpose, this Section establishes standards, requirements, conditions and restrictions to prevent, reduce or mitigate depletion and degradation of surface and groundwater resources and to promote sound practices of watershed management including control of runoff and erosion.").

17. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the SEAB made the statement quoted in Paragraph 17. By way of further response, see DRBC Defendants' response to Paragraph 16.

18. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that the HVHF process produces wastewater which may contain, without limitation, metals, radioactive substances and dissolved solids, as more fully specified in NYSDEC's dSGEIS, at 5-63 to -79. NYSDEC has estimated the volume to be 216,000 to 2.7 million gallons per well. *Id.* at 5-99.

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19. For purposes of NYS's Motion for Summary Judgment, DRBC Defendants do not dispute that Pennsylvania issued over 1,600 environmental violations to drilling operators in 2008-2010. DRBC Defendants do dispute that "there have been a number of significant water contamination episodes in Pennsylvania, including discharges of hydraulic fracturing wastewater that contaminated the Monongahela River." DRBC Defendants also dispute any implication from the facts alleged in Paragraph 19 that any "environmental violations" or "water contamination episodes" in Pennsylvania are material to the question of whether DRBC Defendants are required to complete an EIS prior to promulgating natural gas regulations. *See* Walters Decl. ¶¶ 6, 12-24 (disputing Dr. Silver's allegation that natural gas development has caused significant pollution discharges to surface waters in Pennsylvania).

20. DRBC Defendants dispute the facts alleged in Paragraph 20. *See* Walters Decl. ¶¶ 6-11 (describing the Upper Delaware drainage area), 25-29 (regarding the alleged decline of the dwarf wedge mussel).

21. DRBC Defendants dispute the premise of the facts alleged in Paragraph 21 that water pollution from HVHF in the Pennsylvania portion of the Basin would pollute NYS's waters, *see* DRBC Defendants' Response to Paragraphs 19-20, and therefore dispute the alleged effects.

22. DRBC Defendants dispute the facts alleged in Paragraph 22. *See* Perry Decl. ¶¶ 20-21 (noting that Dr. Silver fails to acknowledge that PADEP is required to consider the potential impact of well sites on public resources such as state lands and scenic river corridors during every permit review and that the scope of PADEP's consideration is not constrained and may include aesthetic impacts to these resources).

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23. DRBC Defendants do not dispute the general proposition that ozone is an air pollutant that, at sufficient doses, harms human health in many ways, including by causing premature mortality and increased emergency room visits and hospitalizations. DRBC Defendants dispute any implication from the facts set out in Paragraph 23 that the relationship between increases in ozone and increases in harms to human health is either simple or linear. *See* Evans Decl. ¶¶ 11, 27-32. No such simple, linear relationship exists. *See id.* ¶¶ 27-32.

24. DRBC Defendants do not dispute that ozone and ozone precursors travel across state lines that are downwind from the source. DRBC Defendants dispute any implication from the facts set out in Paragraph 24 that NYS is solely a repository of ozone pollution arising from upwind states, such as Pennsylvania, and that sources within NYS are not contributing to ozone pollution within NYS and are not contributing to adverse health effects of its own residents. *See* Evans Decl. ¶¶ 12-26; *see also id.* ¶¶ 27-32 (discussing the lack of a simple, linear relationship between ozone and health effects). DRBC Defendants further dispute that NYS has shown that future sources in Pennsylvania from natural gas development activities will harm New Yorkers. *See id.* ¶ 11.

25. DRBC Defendants dispute the facts alleged in Paragraph 25. The Chinkin Declaration is unreliable, not scientifically valid, and does not support the facts alleged in Paragraph 25 because, among other things, Mr. Chinkin failed to use the proper modeling to take into account the photochemical processes that nitrogen oxides undergo as they travel. Nolan Decl. ¶¶ 16, 31.

26. DRBC Defendants dispute that increased ozone in New York caused by gas drilling and production activities in the Pennsylvania portion of the Basin "would" cause increases in respiratory illness and premature mortality among New Yorkers. *See* Evans Decl. ¶¶

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11, 27-32; *see also* Nolan Decl. ¶ 31 ("Mr. Chinkin's conclusions that natural gas development in Pennsylvania would likely increase ozone levels in [NYS] are not supported by the facts or methodology he employed and are neither reliable nor scientifically valid.").

27. DRBC Defendants dispute the premise of the facts alleged in Paragraph 27, that increased ozone caused by drilling activities in Pennsylvania would result in increases in respiratory illness in individuals covered by New York's Medicaid program. *See* Evans Decl. ¶¶ 11, 27-32.

28. DRBC Defendants do not dispute that, in May 2009, the DRBC's Executive Director issued a Determination, pursuant to the authority granted to her under § 2.3.5(B)(18) of the DRBC's Rules of Practice and Procedure, prohibiting natural gas extraction projects within the Special Protection Waters of the Basin without first applying for and obtaining Commission approval. By way of further response, the May 2009 Determination did not cover wells intended solely for exploratory purposes. *See* Silver Decl., Ex. A, at 2.

29. DRBC Defendants do not dispute that, on May 5, 2010, the Commissioners directed staff "to develop draft regulations in the shales for notice and comment rulemaking." Bein Decl. Ex. C. DRBC Defendants dispute that the Commissioners determined that the proposed regulations would authorize natural gas development in the Basin. *See id.*

30. DRBC Defendants do not dispute the facts set out in Paragraph 30 for purposes of NYS's Motion for Summary Judgment. By way of further response, the federal member votes on behalf of the United States. *See* DRBC Defendants' response to Paragraph 11.

31. DRBC Defendants do not dispute the facts set out in Paragraph 31 for purposes of NYS's Motion for Summary Judgment. The gas development authorized by the proposed

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regulations would be highly regulated. *See* Bein Decl. Exs. I (Dec. 9, 2010 draft natural gas development regulations) and O (Nov. 8, 2011 draft natural gas development regulations).

32. DRBC Defendants do not dispute the facts set out in Paragraph 32 for purposes of NYS's Motion for Summary Judgment. Governor Paterson's entire letter speaks for itself. *See* Bein Decl. Ex. G.

33. DRBC Defendants dispute that any formal agreement occurred, but do not dispute that the federal member expressed the view that publishing the draft regulations was the best course. *See* Bein Decl. Ex. H, at 5-6. By way of further response, the Declaration of Robert Tudor describes the process engaged in by the DRBC to research and investigate environmental impacts associated with the extraction and production of natural gas from shale and to develop draft regulations for consideration by the Commissioners to protect the surface water and groundwater resources of the Basin. *See* Tudor Decl. ¶¶ 3-21 (describing the process prior to the posting of the draft regulations on December 9, 2010).

34. DRBC Defendants do not dispute the facts set out in Paragraph 34 for purposes of NYS's Motion for Summary Judgment. NYS Attorney General Schneiderman's entire comments and letter speak for themselves.

35. DRBC Defendants do not dispute the facts set out in Paragraph 35 for purposes of NYS's Motion for Summary Judgment as a partial recitation of the federal member's response. The federal member's entire response speaks for itself. *See* Bein Decl. Ex. M.

36. DRBC Defendants dispute the facts set out in Paragraph 36 because NYS seeks to characterize the revised dSGEIS, which is a lengthy document that speaks for itself. *See* NYSDEC dSGEIS.

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37. DRBC Defendants dispute that the proposed revised natural gas regulations, if finalized, "would allow for gas development in the parts of the New York City Watershed in the Basin. *See* DRBC Resolution for the Minutes, at 2 (Dec. 8, 2011), Bush Decl. Ex. A ("Until the State of New York notifies the Commission that the State has completed its environmental impact review process with respect to potential adverse impacts associated with high volume hydraulic fracturing for natural gas development, the [DRBC] will postpone consideration of applications for approval of water withdrawals within the State of New York to serve "high volume hydraulic fracturing" as New York State defines that term."); *see also id.* ("[T]he Commission developed its draft natural gas development regulations to be consistent with its practice of allowing each Basin state to adopt and/or impose regulations, conditions or approvals applicable to activities within its borders that are more stringent than the Commission's, and it remains the intent of the Commission to allow each Basin state to do so . . . .").[2] In addition, the draft regulations neither permit nor ban specific drilling projects in the New York City watershed – applications require Commission individual project review. *See also* DRBC Defendants' response to Paragraph 14. By way of further response, the Declaration of Robert Tudor describes the public notice and comment process engaged in by the DRBC after the initial posting of draft regulations on December 9, 2010. *See* Tudor Decl. ¶¶ 22-26; *see also id.* ¶ 26 (noting the DRBC's consideration of NYSDEC's revised dSGEIS). The DRBC Defendants also

[2] The Bush Declaration was submitted by DRBC Defendants in support of their January 12, 2012 motion to dismiss NYS's Amended Complaint.

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note that NYS asserts that its motion for summary judgment relies solely on activities in Pennsylvania, making the facts alleged in Paragraph 37 immaterial.

Dated: April 5, 2012

/s/ Kenneth J. Warren

KENNETH J. WARREN (30895) (*pro hac vice*)
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Attorney for Delaware River Basin Commission and Carol R. Collier in her official capacity

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION,
Plaintiffs,

v.

THE UNITED STATES ARMY CORPS OF ENGINEERS et al.,
Defendants,

-and-

AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION,
Putative Defendant-Intervenors.

No. 11-CV-3780 (NGG)(CLP)

ECF Case

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DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-3857 (NGG)(CLP) ECF Case
STATE OF NEW YORK, Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-2599 (NGG)(CLP) ECF Case

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DECLARATION OF CRAIG EVANS

Pursuant to 28 U.S.C. § 1746, I, Craig Evans, declare as follows:

1. I am an environmental group manager with the Pennsylvania Department of Environmental Protection ("PADEP") and submit this declaration in support of the Defendants' Opposition to Plaintiffs Motions for Summary Judgment.

2. PADEP is the agency with the duty and authority to administer and enforce the Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001; the Solid Waste Management Act, Act of July 7, 1980, P.L. 380, *as amended*, 35 P.S. §§6018.101-6018.1003; the Air Pollution Control Act, Act of January 8, 1960, P.L. 2119, as amended, 35 P.S. §§ 4001-4015; Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177 as amended, 71 P.S. § 510-17; and the rules and regulations promulgated by the Pennsylvania Environmental Quality Board pursuant to these acts.

Personal Background and Qualifications

3. As an environmental group manager I supervise the Air Toxics and Risk Assessment Section in the Division of Permits in the Bureau of Air Quality of PADEP, where I am responsible for statewide coordination of risk assessment

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issues through consistent permitting procedures for sources of air toxics, development of an air toxics guidance policy document for state-wide implementation, the asbestos program, toxics release inventory, National Air Toxics Assessment, implementation of the maximum achievable control technology or MACT standards under the federal clean Air Act, and completion of multi-pathway and inhalation risk assessment studies for sources of air toxics.

4. I am a Registered Professional Engineer in the Commonwealth of Pennsylvania since February 2001.

5. I earned a M.E. Degree in Environmental Pollution Control in December 1997 from the Pennsylvania State University.

6. I also earned a B.S. Degree in Chemical Engineering in May 1982 from the Pennsylvania State University.

7. My publications include: Evans, C. and Altenburg, R., "Relationship between the gravitational constant and several quantum mechanical fundamental constants," *Physics Essays* 21, 2 (2008), pp. 91-95; and Evans, Craig A.; McLeary, Kevin S.; Partridge, George P., Jr.; Huebner, Richard S., "Modeling the Impact of Multicomponent VOCs on Ground Water Using the Stefan-Maxwell Equation," *Journal of the American Water Resources Association*, vol. 40, Issue 2, pp. 409-417.

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Purpose of this Declaration

8. I submit this declaration in support of the Defendants' Opposition to Plaintiffs Motions for Summary Judgment.

9. The purpose of this declaration is to evaluate the statements made in the Declaration of Dr. Joel Schwartz who submitted a declaration for the State of New York.

10. The facts set forth in this Declaration are based upon my personal knowledge, experience, and expert opinion.

Summary of Conclusions

11. While the general discussion related to the scientific nature and health effects of ozone pollution is correct, it is not complete and ignores many of the complexities related to the science of ozone formation and transport. These complexities were ignored and thereby result in a simplified and linear relationship between air contamination sources, ozone formation and transport, and human health effects. Such a linear relationship does not exist in this, or any, case. Failure to address these complexities in paragraphs 10-42 of his declaration renders Dr. Schwartz's methodology flawed and as consequence, his conclusion that increased emissions in Pennsylvania adversely impact the health of New Yorkers is scientifically invalid and unsupported.

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The Nature of Ozone Pollution

12. Dr. Schwartz in general states that "as ozone is a long lived secondary pollutant, increased emissions of ozone precursors in states that are generally upwind of New York, such as Pennsylvania, would result in increased ozone concentrations in New York's air, and would impair the health of New Yorkers." *See* paragraph 3 of Dr. Schwartz's Declaration. *See also* paragraphs 9-13, and 23.

13. Dr. Schwartz's conclusions suggest that the State of New York is solely a repository of ozone pollution, arising from upwind states, and that sources within New York State are not contributing to ozone pollution within that state, or other states, and are not contributing to adverse health effects of its own residents. However, a valid health effects analysis must look at all sources of air pollution wherever they may be.

14. The failure of Dr. Schwartz to consider the fact that air contamination sources within New York State contribute to ozone pollution and adverse health effects to New York residents renders his scientific conclusions incomplete and inaccurate.

15. Dr. Schwartz's conclusions are also contrary to the complex science of ozone formation and are not scientifically accurate.

16. Ozone forms when volatile organic compounds ("VOCs") and nitrogen oxides ("NOx") experience chemical reactions, which are triggered by exposure to

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sunlight and high temperatures, and when ozone forms in large enough quantities, it becomes a component in photochemical smog.

17. VOCs and NOx are emitted by cars, factories, and numerous other human sources, and ozone pollution may start in urban areas with a high concentration of human activity, but it can spread across vast distances.

18. Dr. Schwartz fails to point out that the ozone precursors of NOx and VOCs are being formed across the Northeast Region of the United States, particularly in the Boston-Washington corridor of Interstate 95.

19. These ozone precursors transport in and out of the various states in the Northeast Region based on complex weather patterns that can move in any direction.

20. This means that air masses and pollution can carry from New York into Pennsylvania, and from New Jersey into New York.

21. None of these complexities were discussed at all by Dr. Schwartz. Therefore it is incorrect for Dr. Schwartz to suggest that New York State is sitting as a sole repository of ozone precursors and other pollutants from all other states in the Northeast Region of the United States and is not contributing to the same pollution.

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22. Dr. Schwartz also finds that "because it is the product of a chemical reaction, ozone concentrations can increase downwind as ozone precursors continue to react as they are carried by the wind." *See* paragraph 15 of Dr. Schwartz's Declaration.

23. However, Dr. Schwartz fails to point out that ozone is also destroyed as it encounters nitric oxide in the environment. This means that as the nitric oxide concentrations increase, ozone levels will be reduced. Consequently, it is impossible, using the linear relationship analysis that Dr. Schwartz employs, to validly quantify the level of ozone concentrations in New York State directly from the increased ozone precursor emissions in upwind states, like Pennsylvania.

24. Dr. Schwartz's declaration broadly discusses the general nature of ozone formation and transportation in the atmosphere, and fails to discuss the complexities of that formation and transportation. It is this failure to discuss those complexities that renders his declaration scientifically incomplete and inaccurate.

25. If Dr. Schwartz had considered and discussed these complexities he could not have validly concluded that increased ozone precursor emissions in Pennsylvania would result in increased ozone concentrations in New York's air, and would impair the health of New Yorkers.

26. Dr. Schwartz's conclusion that emissions from air sources in Pennsylvania result in ozone concentrations in New York State is based on a review of health effects literature and does not use a generally acceptable scientific method for

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determining whether emissions from a specific source or sources in Pennsylvania would have an adverse impact on the physical health of the residents of New York. A generally scientifically accepted method, like source-specific modeling, would be able to determine the impact that such emissions would have on public health. Consequently, a general discussion of ozone pollution health effects based on scientific literature is not a generally scientifically acceptable method to determine whether potential emission sources in Pennsylvania would have an adverse impact on the health of the residents of New York State.

Ozone Pollution and Human Health Effects

27. Dr. Schwartz posits that "any exposure to ozone as a result of increased emissions of ozone precursors in upwind states such as Pennsylvania would impact the health of New York State citizens." *See* paragraph 13 of Dr. Schwartz's Declaration. *See also* paragraphs 24 -28, and 43 of Dr. Schwartz's Declaration.

28. Dr. Schwartz assumes a linear relationship between an increase in emissions in Pennsylvania and an increase in ozone concentrations in New York. However, no such scientific linear relationship exists. Because Dr. Schwartz fails to point out the complexity of assessing the impact of all sources of ozone precursors throughout the entire Northeast Region of the United States and ignores other contributing regions across the states, it is impossible for him to validly quantify,

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let alone conclude, a direct relationship of ozone precursors in one state to the ozone concentrations in another state. Such conclusions would need to be reached using source-specific modeling, among other techniques, that Dr. Schwartz failed to use.

29. Dr. Schwartz's conclusions that a linear relationship exists between an increase in emissions in Pennsylvania and an increase in ozone concentrations in New York is based on a review of health effects literature and does not use a generally acceptable scientific method such as source-specific modeling. In my opinion, whether emissions from a specific source or sources in Pennsylvania would lead to a significant increase in ozone concentrations in New York cannot be validly determined on the basis of a scientific literature review.

30. Similarly Dr. Schwartz assumes a linear relationship between an increase in emissions in Pennsylvania and an increase in human health effects in New York. However, no such scientific linear relationship exists. It is not possible to quantify the level of ozone in New York State directly resulting from the increased emissions of ozone precursors in upwind states. This is because New York State is acting as both a source and sink of ozone and ozone precursors and provides pollution to other states such as Pennsylvania through the complex chemical process of ozone formation and changing wind patterns.

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31. Because no such linear relationship exists between an increase in emissions and an increase in concentrations and health effects, Dr. Schwartz's conclusions that an increased number of emergency department visits and hospitalizations for respiratory problems in New York and increased Medicaid expenses has no basis in science or fact. In order for Dr. Schwartz to draw such conclusions he would need to conduct site specific epidemiology studies rather than general literature reviews. Therefore, his conclusions are not based on a generally scientifically acceptable method for determining a relationship between an increase in emissions in Pennsylvania and adverse health effects on residents from New York.

CONCLUSION

32. Dr. Schwartz's declaration in paragraphs 10-42, uses a literature review to broadly discuss and conclude that there is a linear relationship between potential air emission sources in Pennsylvania and increased ozone concentrations, adverse health effects, higher hospitalization rates, and Medicaid expenses in New York. However, no such linear relationship exists. A general literature review is not a generally scientifically accepted method for determining these issues. To render factually accurate and scientifically supportable conclusions on these issues, Dr. Schwartz needed to apply source-specific modeling, epidemiology studies, and

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other scientific-based methods generally accepted by the scientific community. Dr. Schwartz failed to do so.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on Ap 4, 2012

Craig Evans

Craig Evans

Cory Lee Baker

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Cory Lee Baker, Notary Public
City of Harrisburg, Dauphin County
My commission expires October 06, 2013

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM	No. 11-CV-3857 (NGG)(CLP) ECF Case

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ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	
STATE OF NEW YORK, Plaintiff,	:	No. 11-CV-2599 (NGG)(CLP)
v.	:	
	:	ECF Case
THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants,	:	
-and-	:	
AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	

DECLARATION OF EUGENE PINE

Pursuant to 28 U.S.C. § 1746, I, Eugene Pine, declare as follows:

1. I am an Environmental Program Manager in the Bureau of Oil and Gas Planning and Program Management with the Pennsylvania Department of Environmental Protection and submit this declaration in support of the Defendants' Opposition to Plaintiffs Motions for Summary Judgment.

2. The Pennsylvania Department of Environmental Protection is the agency with the duty and authority to administer and enforce the Oil and Gas Act, the

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Pennsylvania Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001; the Coal and Gas Resources Coordination Act, Act of P.L. , *as amended*, 58 P.S. §§ ; the Oil and Gas Conservation Law, Act of 1961, P.L. , as amended, 58 P.S. §§ ; Title 58 Chapter 32 of the Pennsylvania Consolidated Statutes (relating to Development) of the act of February 14, 2012, P.L. 87, No. 13, 58 Pa.C.S. §§ 2301-3504(Act 13), Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177 as amended, 71 P.S. § 510-17; and the rules and regulations promulgated by the Pennsylvania Environmental Quality Board pursuant to these acts.

Personal Background and Qualifications

3. As an Environmental Program Manager I serve as Chief of the Division of Well Plugging and Subsurface Activities, where I am responsible for statewide planning, managing, developing, coordinating and implementing all subsurface drilling, casing, cementing, stimulation, completion, gas storage, well plugging and related technical and administrative activities within the Bureau of Oil and Gas Planning and Program Management, Pennsylvania Department of Environmental Protection (PADEP).

4. I am and have been a Registered Professional Geologist in the Commonwealth of Pennsylvania since March 1994.

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5. I earned a B.S. Degree in Geology in November 1977 from the Pennsylvania State University.

6. I also have completed post-graduate coursework in hydrogeology, aqueous geochemistry and engineering geology at Millersville State University.

Purpose of this Declaration

7. The purpose of this declaration is to evaluate the statements made in the Declaration of Dr. Charles Silver who authored an expert declaration for the State of New York.

8. The facts set forth in this Declaration are based upon my personal knowledge and professional experience.

Summary of Conclusions

9. Dr. Silver alleges that Pennsylvania's well casing technology will not prevent adverse environmental impacts associated with natural gas development. However, Dr. Silver fails to consider Pennsylvania's regulations relating to oil and gas wells effective February 5, 2011. *See* 41 Pa.B. 805. Because Dr. Silver did not consider these regulations and, in particular, the performance-based standards for determining well casing requirements, his conclusion is invalid. Therefore, the alleged impacts discussed in Dr. Silver's Declaration are not substantiated. Dr. Silver's analysis, on paragraphs 33 and 34, and his conclusions that natural gas development in Pennsylvania will likely cause harm to New York are unsupported.

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Evaluation of Well Technology

10. Dr. Silver's declaration, states that "New York is also proposing in its Revised Draft EIS (Revised Supplemental Draft Generic Environmental Impact Statement) that drillers generally be required to install three casings at each high volume hydraulic fracturing (HVHF) well, in contrast to Pennsylvania which generally requires two." In addition, Dr. Silver states that "problems in Pennsylvania have occurred when the intermediate casing was not installed and only two casings were used." *See* paragraphs 33 and 34 of Dr. Silver's Declaration.

11. Two-string unconventional well construction does occur successfully throughout the country. Although Pennsylvania requirements allow two-string casing for unconventional wells in certain circumstances, most, if not all, unconventional wells, including Marcellus wells, drilled today in Pennsylvania will require an intermediate string for effective well control, zonal isolation of non-target hydrocarbons and brines above the target formation, and to facilitate the well bore being drilled to the total measured depth. The two-string construction standard was retained in the regulations because many conventional, non-Marcellus shale, shallow oil and gas wells continue to be drilled in Pennsylvania today and can operate successfully with surface casing and production casing. *See* 25 Pa. Code § 78.83(c).

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12. Based on a review of the New York's Revised Draft EIS, New York expressly allows the waiver of the three string design where appropriate. Revised Draft EIS page 7-52.

13. Dr. Silver's Declaration alleges that intermediate casing extends from the ground surface to below areas that may have shallow gas bearing zones.

14. The function of the intermediate casing is not necessarily limited to isolating shallow gas bearing zones above the target formation. The function of intermediate casing, as defined under Chapter 78 of the PADEP regulations, is to isolate and stabilize the wellbore, and to provide well control. *See* 25 Pa. Code § 78.1. Intermediate casing will be required in Pennsylvania in many, if not most, unconventional wells to facilitate drilling to the target formation and is not necessarily predicated on the presence or absence of shallow gas-bearing zones above the target formation. Pennsylvania's performance-based standards determine the well design that is necessary to protect the environment. The requirement for intermediate casing is determined based on each well's site-specific circumstances. Intermediate casing will be necessary to ensure and maintain the integrity of the well at depths typically encountered at the Marcellus shale in Pennsylvania or deeper.

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15. Dr. Silver refers to problems that occurred in 2011 in Pennsylvania with Chesapeake Appalachia, LLC (Chesapeake) wells. *See* paragraph 34 of Dr. Silver's Declaration.

16. All the wells referred to concerning Chesapeake were drilled before Pennsylvania's new well construction regulations took effect on February 5, 2011. The provisions in the old regulations that allowed well drillers to install deep surface casing strings, a provision that Chesapeake availed itself of, no longer exist. Specifically, pre-February 5, 2011 well construction regulations allowed operators to set surface casing through fresh groundwater and brine producing zones provided there were no water supplies within 1,000 feet of the gas or oil well. This provision allowed drillers to set surface casing approximately 1,000 feet deep. As such, intermediate casing was not necessarily required in all circumstances to prevent collapse of the well bore or provide effective control the well during drilling operations.

17. Dr. Silver fails to recognize that to ensure casings are properly installed, Pennsylvania has specific performance-based standards that are designed to protect the environment. Satisfying them will require, in many instances, the installation of an intermediate casing. Under Pennsylvania's updated regulations, 25 Pa. Code § 78.83(c), surface casing must be set 50 feet below the deepest fresh groundwater or 50 feet into consolidated rock, whichever is deeper, but no more than 200 feet

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below the deepest fresh groundwater except if necessary to set the casing in consolidated rock. As a result, surface casing, generally, cannot be set any deeper than 600 feet in Pennsylvania. Deeper drilling in the Marcellus Shale or other shale formations will trigger the need for more effective well control. Therefore, it would be highly unlikely that an unconventional well, drilled deeper without an intermediate casing, could be drilled in a manner that comported with other Pennsylvania regulatory requirements, such as the requirement to equip the well with one or more strings of casing of sufficient cemented length and strength to attach proper well control equipment and prevent blowouts, explosions, fires and casing failures during installation, completion and operation. *See* 25 Pa. Code § 78.71.

18. Because Dr. Silver's analysis does not take into account Pennsylvania's comprehensive program for regulating gas wells, including well construction regulations, his analysis is flawed and the conclusions that he reaches are not valid.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 4/4/2012

Eugene W. Pine

Eugene Pine

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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

STATE OF NEW YORK,

Plaintiff,

v.

UNITED STATES ARMY CORPS OF ENGINEERS, et al.,

Defendants.

CV-11-2599
(Garaufis, J.)
(Pollak, M.J.)

DELAWARE RIVERKEEPER NETWORK, et al.,

Plaintiffs,

v.

UNITED STATES ARMY CORPS OF ENGINEERS, et al.,

Defendants.

CV-11-3780
(Garaufis, J.)
(Pollak, M.J.)

DAMASCUS CITIZENS FOR SUSTAINABILITY, INC.,

Plaintiff,

v.

UNITED STATES ARMY CORPS OF ENGINEERS, et al.,

Defendants.

CV-11-3857
(Garaufis, J.)
(Pollak, M.J.)

DECLARATION OF HORST GRECZMIEL

I, HORST GRECZMIEL, pursuant to 28 U.S.C. § 1746, declare under the penalty of perjury, as follows:

PERSONAL BACKGROUND

1. I am presently employed as the Associate Director for National Environmental Policy Act ("NEPA") Oversight at the Council on Environmental Quality ("CEQ") in the

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Executive Office of the President, located at 730 Jackson Place, NW, Washington, DC. I have been employed full-time as the CEQ Associate Director for NEPA Oversight since November 1999. I previously served at CEQ on a detail assignment from June 1993 through September 1993, while I was employed at U.S. Coast Guard headquarters in Washington, DC.

2. As the Associate Director for NEPA Oversight, I provide policy oversight of Federal agency implementation of the NEPA, 42 U.S.C. §§ 4321-4335, and the CEQ Regulations for Implementing the Procedural Provisions of the NEPA, 40 C.F.R. Parts 1500-1508 ("CEQ NEPA Regulations"). Specifically, I advise Federal agencies on implementing the requirements of the NEPA and the CEQ NEPA Regulations, and I refer Federal agencies to topical resources and points of contact. Likewise, I routinely advise others, outside the Federal agencies, about the requirements of NEPA implementation, and refer them to topical resources and points of contact. Further, my responsibilities include managing and updating the content displayed on the NEPAnet website, available at www.nepa.gov, to provide information about the Federal Government's Executive Branch implementation of NEPA.

3. Prior to joining CEQ in 1999, I served as an environmental law attorney with Coast Guard Headquarters for approximately seven (7) years, and with United States Army for approximately fifteen (15) years. I worked as a NEPA team leader and reviewer, and was responsible for policy development and litigation involving environmental planning compliance responsibilities.

4. I received my B.A. from Lafayette College, Easton, PA; J.D. from Rutgers - Camden School of Law, Camden, NJ; and LL.M. in environmental law from George Washington University, Washington, DC.

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5. I submit this declaration in support of the Defendants' motions to dismiss. Unless otherwise indicated, I am familiar with the facts set forth herein based on the personal knowledge and expertise that I have gained as the CEQ Associate Director for NEPA Oversight, and my review of the Federal Register notices cited herein. Review and interpretation of such documents developed by CEQ is part of my work as CEQ's Associate Director for NEPA Oversight.

CEQ'S 1973 and 1984 FEDERAL REGISTER NOTICES

INCLUDING DRBC CONTACT INFORMATION

6. In Federal Register notices, dated May 2, 1973, 38 Fed. Reg. 10,856, and August 1, 1973, 38 Fed. Reg. 20,550, CEQ published proposed and final guidelines respectively. The notice for the final guidelines states that "[t]he guidelines will appear in the Code of Federal Regulations in Title 40, Chapter V, at Part 1500. They are being codified, in part, because they affect State and local governmental agencies, environmental groups, industry, and private individuals, in addition to Federal agencies, to which they are specifically directed, and the resultant need to make them widely and readily available." 38 Fed. Reg. at 20,550. CEQ's NEPA guidelines included two appendices that each included a list of entities. Appendix II, titled "Areas of Environmental Impact and Federal Agencies and Federal State Agencies[1] with Jurisdiction by Law or Special Expertise to Comment Thereon," includes a footnote in its title, as indicated by the "[1]" here, stating: "River Basin Commissions (Delaware, Great Lakes, Missouri, New England, Ohio, Pacific Northwest, Souris-Red-Rainy, Susquehanna, Upper Mississippi) and similar Federal-State agencies should be consulted on actions affecting the environment of their specific geographic jurisdictions." 38 Fed. Reg. at 20,557. Appendix III, titled "Offices Within Federal Agencies and Federal-State Agencies for Information Regarding

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the Agencies' NEPA Activities and for Receiving Other Agencies' Impact Statements for Which Comments are Requested," included the Office of the Secretary of the Delaware River Basin Commission. 38 Fed. Reg. at 20,559.

7. In Federal Register notices dated June 9, 1978, 43 Fed. Reg. 25,230, and November 29, 1978, 43 Fed. Reg. 55,978, CEQ published proposed and final regulations respectively to "establish uniform procedures for implementing the procedural provisions of the National Environmental Policy Act." 43 Fed. Reg. at 55,978.

8. Subsequently, on December 21, 1984, CEQ published appendices to those regulations, 49 Fed. Reg. 49,750, including Appendix I, titled "Federal and Federal-State Agency NEPA Contacts," which "identifies the individual within each agency that is responsible for coordinating with the Council [CEQ] on behalf of that agency and for exercising NEPA oversight within that agency. This person can provide basic information about the agency's NEPA activities and about the procedures which the agency has adopted to supplement the Council regulations (40 CFR 1507.3)." 49 Fed. Reg. at 49,750. Appendix I included the Executive Director of the Delaware River Basin. Id. at 49,753. Appendix II, titled "Federal and Federal-State Agencies with Jurisdiction by Law or Special Expertise on Environmental Quality Issues," included the Delaware River Basin Commission in Section IV, "Natural Resources Management," subsection C, "Water Resources Development and Regulation." Id. at 49, 774. Finally, Appendix III, titled "Federal and Federal-State Agency Offices for Receiving and Commenting on Other Agencies Environmental Documents," included the Executive Director of the Delaware River Basin Commission. Id. at 49,781.

9. Per the December 21, 1984, notice, CEQ published these three appendices to "improve public participation and facilitate agency compliance with the National Environmental

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Policy Act (NEPA) and the Council on Environmental Quality's NEPA Regulations." 49 Fed. Reg. at 49,750.

10. Inclusion in any of the appendices described above does not constitute a determination by CEQ that a particular entity is subject to NEPA. CEQ did not state that CEQ had conducted its own analysis and reached a determination regarding NEPA's applicability to any particular entity. When CEQ uses the terms "Federal agency," "Federal-State agency," and "Independent agency" in Federal Register notices, CEQ is not providing a legal determination that any particular statutory or regulatory definition attaches to these terms.

11. Since 1984, CEQ has not updated the information published in the appendices to its NEPA Regulations, 40 C.F.R. Parts 1500-1508. CEQ has, however, provided updated information, including points of contact on the NEPAnet website, available at www.nepa.gov. Inclusion in any portion of the NEPAnet website does not constitute a determination by CEQ that a particular entity is subject to NEPA. CEQ does not state on the NEPAnet website that CEQ has conducted its own analysis and reached a determination regarding NEPA's applicability to any particular entity. Instead, the website is designed to convey the information in appendices I, II, and III in a user-friendly, consolidated form. The website provides consolidated lists of points of contact who are responsible for leading or participating in NEPA reviews, or who assist others with those responsibilities, without distinguishing between the contacts with responsibilities for preparing NEPA reviews and the contacts who can provide assistance. When CEQ uses the terms "Federal agency," "Federal-State agency," and "Independent agency" on the NEPAnet website, CEQ is not providing a legal determination that any particular statutory or regulatory definition attaches to these terms.

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I, Horst Greczmiel, do hereby declare on this 28th day of March, 2012, under the penalty of perjury, and pursuant to 28 U.S.C. § 1746, that the above and foregoing is true and correct to my knowledge, information, and belief.

Horst Greczmiel
Associate Director for NEPA Oversight
Council on Environmental Quality
Executive Office of the President

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case Oral Argument Requested
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

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STATE OF NEW YORK, Plaintiff,	:	No. 11-CV-2599 (NGG)(CLP)
v.	:	ECF Case
THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants,	:	
-and-	:	
AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	

DECLARATION OF KENNETH J. WARREN PURSUANT TO FEDERAL RULE OF CIVIL PROCEDURE 56(d)

Kenneth J. Warren, pursuant to the provisions of 28 U.S.C. § 1746, declares as follows:

1. I am a shareholder in the law firm of Hangley Aronchick Segal Pudlin & Schiller. I represent Defendants Delaware River Basin Commission and its Executive Director, Carol Collier (in her official capacity) (together, "DRBC Defendants"), in the above-captioned cases.

2. I submit this declaration in accordance with Federal Rule of Civil Procedure 56(d) to explain that, in the event that the Court denies the DRBC Defendants' motions to dismiss, DRBC Defendants cannot fully present facts essential to oppose Plaintiffs' motions for summary judgment served on February 13, 2012 without discovery, and to respectfully request a continuance to conduct such discovery.

Relevant Procedural History

3. On August 4, 2011, the Delaware Riverkeeper Network; the Delaware Riverkeeper; Riverkeeper, Inc.; the Hudson Riverkeeper; and the National Parks Conservation

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Association (collectively, the "Riverkeeper") filed a complaint in No. 11-3780 naming the DRBC Defendants.

4. On August 10, 2011, the Damascus Citizens for Sustainability, Inc. ("Damascus") filed a complaint in No. 11-3857 naming the DRBC Defendants.

5. On November 1, 2011, the DRBC Defendants served a motion to dismiss the complaints filed by the Riverkeeper and Damascus (together, the "Environmental Group Plaintiffs") and incorporated by reference applicable arguments made by the Federal Defendants.

6. On November 22, 2011, New York State ("NYS") filed an amended complaint in No. 11-2599, for the first time naming the DRBC Defendants. On January 12, 2012, DRBC Defendants served a motion to dismiss NYS's amended complaint.

7. On February 13, 2012, the Environmental Group Plaintiffs and NYS served motions for summary judgment on the DRBC Defendants.

8. In their brief in opposition to the DRBC Defendants' motion to dismiss and in support of their motion for summary judgment, the Environmental Group Plaintiffs assert, among other things, that they have standing to bring their claims, Envtl. Groups Br. 29-28, and that the DRBC Defendants failed to comply with their alleged duty under the National Environmental Policy Act ("NEPA") to issue a draft environmental impact statement ("EIS"), Envtl. Groups Br. 1. The Environmental Group Plaintiffs support their motion for summary judgment with (a) declarations submitted by seventeen individuals who assert, among other things, that they use and enjoy the area of the Basin, and (b) a Local Civil Rule 56.1 Statement.

9. In its brief in opposition to the DRBC Defendants' motion to dismiss and in support of its motion for summary judgment, NYS asserts, among other things, that it has standing to bring its claims, NYS Br. 12-22, and that authorization of natural gas development

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within the Basin has the potential to cause significant adverse environmental impacts to the Basin's waters resources, NYS Br. 1, 40. NYS supports its motion for summary judgment with the declaration of its counsel and the declarations of the following four individuals who offer expert opinions: Lyle Chinkin, Dr. Joel Schwartz, Dr. Charles Silver, and William Rudge. NYS also supports its motion for summary judgment with a Local Civil Rule 56.1 Statement.

10. The DRBC Defendants, in opposition to Plaintiffs' motions for summary judgment, have submitted declarations from the following six individuals who offer expert opinions: Craig Evans, Sean Nolan, Scott Perry, Eugene Pine, Kenneth Murin, and Gary Walters. The DRBC Defendants' expert declarations rebut many of the facts and opinions contained in NYS's expert declarations, explain why many of the opinions contained in NYS's expert declarations are unreliable and not scientifically valid, and state that additional information is needed with regard to certain aspects of NYS's expert declarants' methodology. For example, in his declaration, Mr. Nolan states that Mr. Chinkin used a proprietary procedure and that further information is needed to determine its scientific validity. Nolan Decl. ¶ 18.

11. Notwithstanding the presence of these declarations in the summary judgment record before the Court, the DRBC Defendants assert that their motions to dismiss should be appropriately granted as a matter of law without an investigation of the facts pursuant to Rule 56.

No Discovery Has Been Had in This Matter

12. No discovery whatsoever has been had by any party to these actions.

13. The conference of the parties for purposes of planning for discovery pursuant to Federal Rule of Civil Procedure 26(f) has not yet been held. Therefore, pursuant to Rule 26(d)(1), except as authorized by rules or by the Court, "[a] party may not seek discovery from any source."

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14. No party has yet served the initial disclosures contemplated by Rule 26(a)(1).

15. DRBC Defendants have not received expert reports from Plaintiffs and have not had an opportunity to cross-examine Plaintiffs' declarants.

Necessary Discovery

16. The Environmental Group Plaintiffs' seventeen declarations and/or NYS's four expert declarations may have been submitted for the limited purpose of demonstrating that Plaintiffs have standing to bring their claims, and *not* in connection with Plaintiffs' motions for summary judgment pursuant to Rule 56. In such event, Plaintiffs improperly placed the facts and opinions set forth in the declarations into a Rule 56.1 statement. But Plaintiffs may contend that the declarations also contain facts material to substantive elements of their claims, including, among others, whether the DRBC's proposed natural gas development regulations constitute a "major" federal action that will "significantly affect" the quality of the human environment for purposes of NEPA.

17. If, contrary to the DRBC Defendants' contention, the Court does not grant the DRBC Defendants' motions to dismiss and instead considers the statements in the declarations proffered by Plaintiffs as material facts, then, in order to discover facts essential to justify its opposition to Plaintiffs' motions for summary judgment, DRBC Defendants request the following discovery:

a. Full expert reports in accordance with Federal Rule of Civil Procedure 26(a)(2) from Mr. Chinkin, Dr. Schwartz, Dr. Silver, and Mr. Rudge, and an opportunity to depose and cross-examine these experts pursuant to Federal Rule of Civil Procedure 26(b)(4) in connection with their qualifications and the bases for and the reliability of their opinions.

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b. Full discovery from the seventeen individuals who submitted declarations on behalf of the Environmental Group Plaintiffs in order to determine the relevant facts known by these individuals and the truth and accuracy of and basis for the assertions made in their declarations.

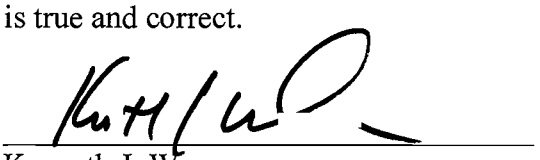
c. Discovery from NYS on the facts and opinions gathered through its development of a supplemental generic environmental impact statement, to the extent not already in DRBC's possession.

d. Such additional discovery as may be necessary as a result of the foregoing discovery.

18. The discovery described above, which would be necessary only if the Court does not grant the DRBC Defendants' motions to dismiss and instead considers the statements in Plaintiffs' declarations to be material facts, would be calculated to supplement the DRBC Defendants' evidence that – at a minimum – genuine issues of material fact exist with respect to the question of whether the DRBC's natural gas regulations constitute a major federal action significantly affecting the quality of the human environment.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 5, 2012



Kenneth J. Warren

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-3780 (NGG)(CLP) ECF Case

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DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-3857 (NGG)(CLP) ECF Case
STATE OF NEW YORK, Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-2599 (NGG)(CLP) ECF Case

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DECLARATION OF SEAN NOLAN

Pursuant to 28 U.S.C. § 1746, I, Sean Nolan, declare as follows:

1. I am a meteorologist with the Pennsylvania Department of Environmental Protection ("PADEP") and submit this declaration in support of the Defendants' Opposition to Plaintiffs' Motions for Summary Judgment.

2. PADEP is the agency with the duty and authority to administer and enforce the Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001; the Solid Waste Management Act, Act of July 7, 1980, P.L. 380, *as amended*, 35 P.S. §§ 6018.101-6018.1003; the Air Pollution Control Act, Act of January 8, 1960, P.L. 2119, as amended, 35 P.S. §§ 4001-4015; Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177 as amended, 71 P.S. § 510-17; and the rules and regulations promulgated by the Pennsylvania Environmental Quality Board pursuant to these acts.

3. I have been employed as a meteorologist in the Air Quality Modeling Section of PADEP for the past 11 years.

4. The Air Quality Modeling Section is responsible for conducting air dispersion modeling and analysis, forecasting the air quality for Pennsylvania; and

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developing attainment demonstration plans for nonattainment areas related to the National Ambient Air Quality Standards under the federal Clean Air Act.

5. My responsibilities and duties at PADEP as a meteorologist include reviewing and interpreting air dispersion modeling to determine compliance in accordance with pertinent state and federal air quality regulations, evaluating data, exhibiting materials and supplying technical support for the Commonwealth of Pennsylvania's State Implementation Plans, forecasting air pollution episodes for various regions across the Commonwealth, and preparing data analysis reports in support of program planning.

Personal Background and Qualifications

6. I earned a Bachelor of Science in Meteorology and Minor in Mathematics from the Pennsylvania State University.

Purpose of this Declaration

7. I submit this declaration in support of the Defendants' Opposition to Plaintiffs' Motions for Summary Judgment.

8. The purpose of this declaration is to evaluate the statements made in the Declaration of Lyle Chinkin who submitted a declaration for the State of New York.

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9. The facts set forth in this Declaration are based upon my personal knowledge and experience, and expert opinion.

Summary of Conclusions

10. Mr. Chinkin's declaration is based on a flawed methodology and as a result, his conclusions are unsupported and unreliable. Mr. Chinkin does not use actual air pollution modeling conducted on actual natural gas development sites to measure impacts on actual downwind receptors. Rather, Mr. Chinkin uses modeling on air parcels that do not involve actual air emission sources or pollutants. The declaration also uses previous modeling conducted by U.S. EPA on a multi-state level for multiple air sources, like factories and cars, and extrapolates those results to one state – Pennsylvania– for one air source – natural gas wells. This approach ignores the complexities of air quality modeling and is not a substitute for source– and site–specific modeling. Additionally, in his analysis Mr. Chinkin uses a proprietary model that is not peer-reviewed and which he does not demonstrate is scientifically valid. Consequently, Mr. Chinkin's analysis on paragraphs 15-39 and his conclusions that natural gas development in Pennsylvania would likely increase ozone levels in New York State are not scientifically supported or reliable.

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Evaluation of Pennsylvania Emissions

11. Mr. Chinkin uses a wind trajectory analysis developed by the National Oceanic and Atmospheric Administration known as Hybrid Single-Particle Lagrangian Integrated Trajectory ("HYSPLIT") model. *See* Chinkin Declaration, paragraphs 15-19.

12. This modeling is based on the travel of an air parcel from Wayne County, PA to parts of New York State. The modeling does not measure the actual emissions from sources, nor does the model account for the chemical transformation of pollutants in the atmosphere. The model merely projects the course of an air parcel.

13. While the analysis displays prevailing wind direction in the 5-year period (2006 to 2010), it does not explain the photochemical processes that the nitrogen oxides are undergoing from Wayne County, PA to the New York City metropolitan area.

14. The best way to illustrate these processes is to run a photochemical model, such as the Community Multi-scale Air Quality ("CMAQ") modeling system or the Comprehensive Air Quality Model with extensions ("CAMx"), which are used by U.S. EPA to model emission impacts and are generally accepted scientific models for determining emissions and their impact.

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15. The CMAQ and CAMx models utilize meteorological data and emissions data (such as that for nitrogen oxide) to produce concentrations of ozone downwind from sources.

16. Because Mr. Chinkin failed to use the proper modeling to take into account the photochemical processes that the nitrogen oxides are undergoing from Wayne County, PA to the New York City metropolitan area, Mr. Chinkin's conclusion that emissions from natural gas development in Wayne County are likely to reach areas in New York State is not scientifically supportable. Mr. Chinkin did not use a valid or generally scientifically accepted method to support his conclusion.

17. Mr. Chinkin also states that his firm, STI, developed a geographic information system-based procedure for aggregating trajectories and calculating spatial probabilities density values that identify where air parcels have spent the most time under conditions of interest. *See* Chinkin Declaration, paragraph 17.

18. Mr. Chinkin did not demonstrate that this proprietary procedure has been peer-reviewed or that it is a generally scientifically accepted method to support his conclusions. Without further information it is not known whether this procedure is a generally scientifically accepted or scientifically valid method for aggregating trajectories and calculating spatial probabilities density values.

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Estimating Emissions from Natural Gas Development in Pennsylvania

19. To estimate emissions from Pennsylvania, Mr. Chinkin relied on New York State Department of Environmental Conservation ("NYSDEC") estimates of air emissions. *See* Chinkin Declaration, paragraph 20.

20. There is nothing in his declaration that fully describes the methodology that the NYSDEC used to estimate emissions. Without discovery on this particular procedure, it is not known whether the procedure for estimating these emissions is a generally scientifically accepted method or that it is reliable or scientifically valid.

21. Mr. Chinkin developed three natural gas well development scenarios based on information provided to him by the New York State Office of the Attorney General ("NYAG"). *See* Chinkin Declaration, paragraph 21.

22. Because there is nothing in Mr. Chinkin's declaration that fully describes the information that the NYAG provided to him, it is impossible on the basis of his declaration to determine whether this information is factually and scientifically correct.

23. To develop well air emission rates, Mr. Chinkin relied on NYSDEC documents and industry estimates. *See* Chinkin declaration, paragraph 27.

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24. There is no discussion related to actual data from natural gas development in Pennsylvania like an emissions inventory, actual emission rates, engine types and sizes.

25. Actual information from Pennsylvania is available on certain of these data points but was not used. Instead, Mr. Chinkin used data estimates, which are not the preferred generally scientifically accepted method for determining this information. The Pennsylvania data has information on engine types, sizes, and technology, which presents an accurate picture of the emissions from Pennsylvania. Mr. Chinkin did not demonstrate the accuracy or scientific validity of his estimates; nor did he demonstrate that the procedure he used is a valid, reliable and generally scientifically accepted method to predict an emissions profile from natural gas development in Pennsylvania.

26. Nor is there any discussion related to technology requirements like "best available technology" that are required under the Pennsylvania air quality permitting program.

27. More specifically, there was no discussion of General Plan Approval and/or General Operating Permit-5, which authorizes the construction or modification of natural gas industry air contamination sources like internal combustion engine(s); dehydrator(s) and associated sources or equipment that meet the best available technology requirements of 25 Pa. Code §§ 127.1 and 127.12(a)(5).

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Calculating and Evaluating Emissions from Natural Gas Development in Pennsylvania

28. To calculate and evaluate emissions from Pennsylvania, Mr. Chinkin relied on MOVES and CAMx models that U.S. EPA used for the Cross-State Air Pollution Rule ("CSAPR") and the Ozone Transport Assessment Group ("OTAG"). *See* Chinkin Declaration, paragraph 29-39.

29. According to the CSAPR modeling, Pennsylvania sources contributed 6.1 to 8.4 parts per billion of ozone to the New York metropolitan area. However, the Pennsylvania sources in this modeling include all sources in Pennsylvania and are not solely focused on sources inside Wayne County. The use of this modeling then overestimates the emissions impact because it takes into account all sources and not just projected source in Wayne County. Consequently, the use of this technique by Mr. Chinkin is not reliable, scientifically valid or a generally scientifically accepted method for determining emissions from one source category.

30. OTAG's work was completed in the 1990s. Fifteen years later, emission control strategies, such as the NOx SIP Call, have been implemented. In addition, some of the types of sources have changed. Therefore, the transport of ozone into the New York metro area has most likely been influenced by the emission reductions that have taken place since the 1990s. This was not taken into account

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in Mr. Chinkin's analysis. Once again this technique tends to overestimate any emissions impact. Consequently, the use of this technique by Mr. Chinkin is not reliable or scientifically valid, nor is it a generally scientifically accepted method for determining emissions from one source category.

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CONCLUSION

31. Mr. Chinkin's declaration does not use actual modeling that was conducted on actual natural gas development sites to measure impacts on actual downwind receptors. The declaration also merely uses previous modeling conducted by EPA on a multi-state level for multiple air sources to determine the impact of one source category. This method is not generally scientifically accepted, reliable or scientifically valid for determining emissions impacts. The estimation techniques used are scientifically suspect and are not generally scientifically accepted methods for determining the quantity of emissions or their impact. Consequently, Mr. Chinkin's conclusions that natural gas development in Pennsylvania would likely increase ozone levels in New York State are not supported by the facts or methodology he employed and are neither reliable nor scientifically valid.

I declare under penalty of perjury that the forgoing is true and correct.

Executed on Ap 4, 2012

Sean Nolan

Cory Lee Baker

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Cory Lee Baker, Notary Public
City of Harrisburg, Dauphin County
My commission expires October 06, 2013

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

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STATE OF NEW YORK, Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-2599 (NGG)(CLP) ECF Case

DECLARATION OF KENNETH F. MURIN

Pursuant to 28 U.S.C. § 1746, I, Kenneth F. Murin, declare as follows:

1. I am an environmental group manager with the Pennsylvania Department of Environmental Protection.

2. The Pennsylvania Department of Environmental Protection ("PADEP") is the agency with the duty and authority to administer and enforce the Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001; the Solid Waste Management Act, Act of July 7, 1980, P.L. 380, *as amended*, 35 P.S. §§6018.101-6018.1003; the Air Pollution Control Act,

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Act of January 8, 1960, P.L. 2119, as amended, 35 P.S. §§ 4001-4015; Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177 as amended, 71 P.S. § 510-17; and the rules and regulations promulgated by the Pennsylvania Environmental Quality Board pursuant to these acts.

Personal Background and Qualifications

3. I have been employed by the PADEP since March 20, 1986. As an environmental group manager, I supervise the Division of Wetlands, Encroachments, and Training for the PADEP, in the Bureau of Waterways Engineering and Wetlands I am responsible for statewide development, implementation and coordination of the wetlands, erosion and sediment control and stormwater management regulatory programs.

4. My current responsibilities include:

- Managing statewide implementation of the Commonwealth's environmental laws and regulations, and corresponding federal requirements relating to Erosion and Sediment Control, the National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Program, Submerged Lands License Agreements, Waterways and Wetlands Programs.

- Directing the development of rules, regulations, policies, and procedures for the Erosion and Sediment Control, the NPDES Stormwater Construction and the Waterways and Wetlands Programs.

- Directing the development of program permitting, compliance, and enforcement policies, procedures, monitoring and data management programs.

- Facilitating the integration and coordination of watershed management for stormwater management, wetland protection and stream restoration efforts.

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- Providing support for the PADEP's regional offices and county conservation districts by providing guidance, policy, direction, training, and other assistance in implementation of regulatory and planning programs.

- Representing the PADEP on various state, federal, and local advisory committees.

5. Prior to my current position I was the Chief of the Division of Waterways, Wetlands and Storm Water Management and prior to that I was a Section Chief in the Division. From 1986 to 1989 I was PADEP field representative in the Northwest Region where I provided technical and program liaison assistance including coordination on erosion and sediment control. In all. I have over 26 years of experience with the PADEP in these matters.

6. In 1979, I earned a Bachelor of Science degree from West Virginia University (WVU) in forest resource management, with an emphasis on agronomy (soil science) that includes soil fertility, soil physics, soil chemistry, soil conservation, and soil taxonomy. While in college I worked for the U.S. Department of Agriculture, Forest Service, George Washington National Forest. I mapped about 22,000 acres of soils in the George Washington National Forest in Warm Springs, Virginia and identified the soils for resource planning.

7. I have participated directly in the development of: the 2002 Comprehensive Stormwater Management Policy, PADEP No. 392-0300-002,

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PA Comprehensive Stormwater Management Policy[1]; the 2006 Pennsylvania Stormwater Best Management Practices Manual PADEP No. 363-0300-002, PA Stormwater BMP Manual[2]; Pennsylvania NPDES Stormwater Discharges Associated with Construction Activities and Municipal Separate Storm Sewer System General Permits, PA NPDES General Permit for Discharges Associated with Construction Activities[3]; the 2010 Erosion and Sediment Control and Stormwater Management rulemaking 40 Pa.B. 4861, 2010 Pennsylvania Bulletin Notice - Erosion and Sediment Control and Stormwater Management Rulemaking[4]; the 2008 Pennsylvania Oil and Gas Erosion and Sediment Control General Permit No. 1, ESCGP-1[5]; and the draft proposed 2012 Oil and Gas Erosion and Sediment Control General Permit No. 2, DRAFT ESCGP-2 Permit11-30-2011[6]; and the 2012 Erosion and Sediment Control Best Management Practices Manual which will be published as final in the Pennsylvania Bulletin on March 31, 2012.

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[1] http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-48415/392-0300-002.pdf

[2] http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-68851/363-0300-002.pdf

[3] http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77555/3930-PM-WM0280%20Sample%20General%20Permit.pdf

[4] http://www.pabulletin.com/secure/data/vol40/40-34/1573.html

[5] http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-67457/04%205500-PM-OG0005%20Sample%20Permit.pdf

[6] http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-86726/ESCGP-2%20Permit11-30-2011-Draft.pdf

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8. I have been qualified to testify as an expert in Pennsylvania Courts and have provided expert testimony and opinions on behalf of the PADEP related to soil science, erosion and sediment control and stormwater management.

Purpose of this Declaration

9. I submit this declaration in support of the Defendants' Opposition to Plaintiffs' Motions for Summary Judgment.

10. The purpose of this declaration is to evaluate the statements made in the Declaration of Dr. Charles Silver who authored an expert declaration for the State of New York.

11. The facts set forth in this Declaration are based upon my personal knowledge and professional experience.

Summary of Conclusions

12. Dr. Silver's discussion in paragraphs 8, 9, 10, 21, 24, 27, 29, 32, 36, 37 and 39, related to potential stormwater pollution associated with natural gas development, the adequacy of Pennsylvania's stormwater regulatory programs, and the potential for stormwater related pollution to New York waters coming from Pennsylvania is based on incorrect factual premises and reaches erroneous conclusions. It ignores the Pennsylvania Clean Streams Law prohibition on pollution of waters of the Commonwealth (35 P.S. § 691.401), and the specific regulatory requirements of Title 25 of the Pennsylvania Code Chapters 93 (relating

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to Water Quality Standards), 96 (relating to Water Quality Standards Implementation) and 102 (relating to Erosion and Sediment Control), which are applicable to all earth disturbance activities, water obstructions and encroachments undertaken in Pennsylvania, including earth disturbance water obstructions and encroachments associated with oil and gas activities. Proper evaluation of the existing legal requirements under Pennsylvania law and Pennsylvania's regulatory programs refutes the conclusion that stormwater associated with increased oil and gas related earth disturbance activities in Pennsylvania would adversely impact the waters of New York State in any material way.

13. Dr. Silver's analysis does not take into account Pennsylvania's stormwater program and regulations. Pennsylvania has a comprehensive program and regulations for stormwater discharges associated with earth disturbance activities, including construction. Consequently, Dr. Silver's analysis and the conclusions that he reaches are not valid or reliable.

14. As PADEP does not agree that an EIS related to stormwater impacts is necessary, there is not a consensus as referenced in paragraph 10 of Dr. Silver's declaration, that an environmental impact analysis should be performed to assess the stormwater related impacts of natural gas development associated with the proposed DRBC rulemaking. Moreover, Pennsylvania has already evaluated the potential stormwater impacts related to earth disturbance, and as a consequence

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requires implementation of best management practices, permits and compliance with water quality standards and antidegradation.

The Regulation of Stormwater Pollution in Pennsylvania

15. Although EPA has undertaken an assessment of the impacts to waters of the United States associated with stormwater pollution, which resulted in the federal regulations authorizing the NPDES stormwater permitting programs, most stormwater discharges associated with oil and gas construction related activities have been exempt from regulation under the federal Clean Water Act, by the United States Congress, by the 2005 Energy Policy Act. *See* 33 U.S.C. § 1362(24). EPA does not require NPDES permits for the discharge of stormwater associated with oil and gas construction activities. *See* http://www.epa.gov/npdes/pubs/oilandgas_epaqa.pdf

16. In response to the federal exemption of stormwater from oil and gas construction activities, in April 2008, Pennsylvania developed an erosion and sediment control general permit pursuant to the authority of the Pennsylvania Clean Streams Law. 38 Pa.B. 1781. See also 36 Pa.B. 7071, 2006 Pa Bulletin Notice[7].

[7] http://www.pabulletin.com/secure/data/vol36/36-46/2270.html

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17. This Pennsylvania state law permit requirement for discharges associated with oil and gas earth disturbance activities was codified in 2010. 25 Pa. Code § 102.5(c).

18. Pennsylvania law requires anyone undertaking 5 acres or more of oil and gas related earth disturbance activity to obtain coverage under the Pennsylvania Erosion and Sediment Control General Permit (ESCGP). 25 Pa. Code § 102.5(c).

19. Pursuant to the settlement agreement of an appeal before the Pennsylvania Environmental Hearing Board, entered into with Damascus Citizens for Sustainability, the Delaware Riverkeeper and the Delaware Riverkeeper Network, among others, on or about May 13, 2012, PADEP will also require any person proposing oil and gas activities, as that term is defined in 25 Pa. Code §102.1, to demonstrate compliance with antidegradation regulations under 25 Pa. Code Chapter 93, prior to the commencement of any earth disturbance activities where: 1) there will be between 1 and 5 acres of earth disturbance over the life of the project; 2) pursuant to Section 201(a) of the Oil and Gas Act, 58 P.S. §601.201(a), the project requires a well permit to drill a well targeting an unconventional formation as defined in 25 Pa. Code §78.1; and 3) the project is located in a watershed that has a designated or existing use of High Quality or Exceptional Value pursuant to Chapter 93 (relating to water quality standards)

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("Small Special Protection Project"). A person may demonstrate compliance, *inter alia*, through submission of an E&S Plan to the PADEP that meets the requirements of Chapter 102. *See Damascus Citizens, et al. v. PADEP and Newfield Appalachia PA, LLC* "Stipulation of Settlement", EHB Docket No. 2010-102-M, dismissed February 13, 2012.[8]

20. In order to obtain coverage under this general permit, the owner or operator of the project must submit an application ("Notice of Intent" or NOI) which must include a site-specific, written Erosion and Sediment Control (E&S) Plan (25 Pa. Code § 102.4(b)), as well as a site-specific, written Post Construction Stormwater Management (PCSM) or Site Restoration Plan (25 Pa. Code§ 102.8). These plans must demonstrate compliance with 25 Pa.Code Chapter 102, and Pennsylvania's "antidegradation" requirements.

21. The ESCGP NOIs, including the associated E&S and PCSM Plans, are reviewed by the PADEP. Before an operator may commence earth disturbance activities, it must have received written acknowledgement of coverage from PADEP under the ESCGP, which can only be authorized after review of the NOI by PADEP.

[8] See Document No. 53, http://ehb.courtapps.com/public/document_shower_pub.php?csNameID=4110#

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22. The E&S and PCSM Plan requirements for the ESCGP coverage are the same requirements that must be met to obtain NPDES permit coverage, when an NPDES permit for discharges associated with construction activities permit is required (for other regulated sectors).

The 2010 Pennsylvania Erosion and Sediment Control and Stormwater Management Rulemaking.

23. The Chapter 102 "Erosion and Sediment Control and Stormwater Management" rulemaking which culminated in the final regulatory revisions which were effective November 19, 2010, was undertaken over the course of several years and involved a complex and thorough regulatory promulgation process. Specifically, PADEP drafted the rulemaking with the input and concurrence of the Pennsylvania Water Resources Advisory Committee and the Agricultural Advisory Board. The draft rulemaking was approved for proposal by the Environmental Quality Board ("EQB") and published for a 90-day public comment period on August 29, 2009, 39 Pa.B. 5131. The EQB received over 1300 comments on the proposed rulemaking from: citizens (86%), environmental groups, nongovernmental groups and academia (3%), industry (8%), government (Federal, State agencies, municipalities and conservation districts) (3%), Pennsylvania State legislators (31 legislators from the House and Senate) and the Pennsylvania Independent Regulatory Review Commission (IRRC). PADEP revised the draft rulemaking in response to comments. The EQB approved the final rulemaking on

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May 17, 2010. Thereafter the Pennsylvania IRRC approved the final rulemaking on June 17, 2010. The Pennsylvania Attorney General approved the rulemaking thereafter which was published as final on August 21, 2010 with an effective date 90 days after publication on November 19, 2010, 40 Pa. B. 4861, 2010 Pennsylvania Bulletin Notice - Erosion and Sediment Control and Stormwater Management Rulemaking[9].

24. The rulemaking record references the significant body of scientific literature supporting the stormwater management approaches codified in the rulemaking, and details Pennsylvania's environmental assessment of the potential pollution associated with construction activities from accelerated erosion and sedimentation as well as uncontrolled "post construction" stormwater. *See* 2010 Pennsylvania Bulletin Notice - Erosion and Sediment Control and Stormwater Management Rulemaking[10].

25. The rulemaking included updates to the erosion and sediment control requirements, and codified post construction stormwater management provisions in place in the Commonwealth since 2002. The post construction requirements are applicable to all activities that require a permit under the Chapter. Pennsylvania's "post construction" stormwater management program is applicable throughout the state, whenever earth disturbance activities trigger a permit requirement (state or

[9] http://www.pabulletin.com/secure/data/vol40/40-34/1573.html
[10] http://www.pabulletin.com/secure/data/vol40/40-34/1573.html

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federal NPDES) – in contrast to the more limited federal program that only mandates post construction stormwater management in urbanized areas. PA Management NPDES MS4 Map[11].

26. Dr. Silver's statement in paragraph 27 of his declaration, that "[W]hile there are no guarantees that these laws [NEPA and SEQR] will achieve those [protective] results, it is my experience that they typically reduce environmental impacts" applies as well to oil and gas development under Pennsylvania's laws and regulations, which include comprehensive stormwater management requirements that are enforceable in Pennsylvania Courts.

27. Pennsylvania's program, reflected in the 2010 Chapter 102 rulemaking, comprehensively regulates all earth disturbance activities associated with natural gas well development, "from initial land clearing for access roads, equipment staging areas and well pads, . . . , and production and final reclamation, [which] have the potential to cause water resource impacts during rain and snow melt events if stormwater is not properly managed" as has been suggested by the NYSDEC as referenced in paragraphs 30 and 31 of Dr. Silver's declaration. Most of the activities that Dr. Silver cites are not unique in their totality to this sector and are associated with other ongoing industrial activities taking place within the basin,

[11]http://files.dep.state.pa.us/Water/Watershed%20Management/WatershedPortalFiles/StormwaterManagement/MS4Permits.pdf

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Pennsylvania and New York now, and which are currently regulated under multiple Pennsylvania regulatory programs, such as the Chapter 102 program.

28. The Pennsylvania Chapter 102 regulations also include riparian buffer requirements applicable to projects, with some exceptions, in or discharging to Pennsylvania's "high quality" and "exceptional value" waters, 25 Pa. Code § 102.14, and require all permit applicants to undertake the evaluation and avoidance or prevention of potential impacts to state and federal threatened or endangered species, 25 Pa. Code § 102.6(a).

29. The Pennsylvania erosion and sediment control and stormwater management 2010 rulemaking and in particular, the riparian buffer provisions therein, were supported by the Delaware Riverkeeper, Citizens for Pennsylvania's Future, the Philadelphia Water Department, the PA Campaign for Clean Water, American Rivers and the Pennsylvania Chapter of the National Association of Water Companies, among others. *See* attached as Exhibit A, letters of support submitted to the Independent Regulatory Review Commission.

30. Dr. Silver is wrong in paragraph 32 of the declaration, where he states that Pennsylvania does not require comprehensive regulatory measures. As described above, Pennsylvania has a comprehensive and protective stormwater regulatory program that applies to all earth disturbance activities in Pennsylvania and is protective of all Commonwealth waters, not just the Delaware River.

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31. Paragraph 32 of the declaration contains the additional statement that references NYSDEC's recommended stormwater pollution measures related to spill prevention and good housekeeping and material management. Dr. Silver incorrectly fails to acknowledge that these are components of Pennsylvania's existing program. *See* 25 Pa. Code § 102.5(l), and also Pennsylvania's Oil and Gas regulations found at 25 Pa. Code Chapter 78.

32. Dr. Silver states in paragraphs 36 and 37 of his declaration that Pennsylvania does not have adequate protective measures; that the Pennsylvania environmental regulations are not based upon environmental review and include less stringent measures to prevent pollution. These statements are all unsubstantiated and are wrong. As described in paragraphs 12 - 27 of this declaration, Pennsylvania has promulgated updated erosion and sediment control, and stormwater management regulations at 25 Pa. Code Chapter 102, that are applicable to oil and gas activities and which require compliance with Pennsylvania's water quality standards and antidegradation requirements, although uncontaminated storm water discharges from oil and gas exploration, production, processing or treatment operations, or transmission facilities are exempt from regulation under the federal Clean Water Act NPDES program requirements. This Chapter 102 rulemaking was based upon environmental review as well as

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substantial comment from the public, academia, government, non-governmental organizations, and industry.

33. Paragraph 37 of Dr. Silver's declaration includes statements that: "Pennsylvania's regulation of natural gas development . . . include less stringent measures to prevent pollution discharges" and . . . that Pennsylvania does not require drilling companies "to implement comprehensive stormwater pollution prevention measures . . ." These statements in Dr. Silver's declaration are wrong and suggest a general lack of familiarity with Pennsylvania's regulatory programs. Despite the federal exemption from Clean Water Act regulatory requirements, Pennsylvania has required ESCGP permits – which each have included E&S and PCSM best management practices - since 2008. Prior to the 2005 Energy Policy Act exemption, Pennsylvania had regulated oil and gas related earth disturbance activities under the NPDES Program for Stormwater Discharges Associated with Construction Activities.

CONCLUSION

34. Dr. Silver's declaration ignores or reflects a critical lack of familiarity with Pennsylvania's stormwater regulatory programs. His broad conclusion that there is potential for stormwater sources in Pennsylvania to pollute New York waters is therefore fundamentally flawed and not based upon a reliable methodology. The portions of Dr. Silver's declaration that assert threats associated

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with a supposed lack of Pennsylvania regulation are incorrect and are contradicted by Pennsylvania laws, regulations, permitting programs and policies.

I declare under penalty of perjury that the foregoing is true and correct.

Executed On April 4, 2012

Kenneth F. Murin

Kenneth F. Murin

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EXHIBIT A

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PA Campaign for Clean Water * ALLARM * Alliance for a Sustainable Future * Ambler Environmental Advisory Council * American Rivers* Aquashicola Pohopoco Watershed Conservancy * Black Hole Creek Watershed Association * Blacklegs Creek Watershed Assn. * Blue Mountain Preservation * Brandywine Conservancy * Brodhead Watershed Association * Bucks County Chapter, Trout Unlimited * Buffalo Creek Watershed Alliance * Carroll Citizens for Sustainable Growth * Center for the Celebration of Creation * Center for Healthy Environments and Communities * Chesapeake Bay Foundation * Chestnut Ridge Chapter, Trout Unlimited * Clean Water Action * Clean Water Fund * Clearwater Conservancy * Coalition for Responsible Growth & Resource Conservation * Conodoguinet Creek Watershed Assn. * Cooks Creek Watershed Association * Cumberland Valley Trout Unlimited * Delaware Nature Society * Delaware River Greenway Partnership * Delaware Riverkeeper Network * Ecological Associates * Ecology Mission Group, Central Baptist Church * Elk Creeks Watershed Association * Friends of the Little Aughwick Creek * Friends of Poquessing Watershed * GreenTreks Network * Green Valley Coalition * Green Valleys Association * Heritage Conservancy * Juniata Valley Audubon Society * League of Women Voters of Pennsylvania * Lehigh Valley Audubon Society * Little Juniata River Association * Little Lehigh Watershed Coalition * Little Mahoning Creek Watershed Association * Loyalhanna Watershed Association * Loyalsock Creek Watershed Association * Middletown Township Land Conservancy * Montgomery County Land Trust * Muncy Creek Watershed Association * Peach Bottom Concerned Citizens Group * Penn Future * Pennsylvania Council of Churches * Pennsylvania Environmental Defense Foundation * Pennsylvania Forest Coalition * Pennsylvania Trout Unlimited * Penns Valley Conservation Association * Pine Creek Valley Watershed Association * Radnor Racquet Club * Responsible Drilling Alliance * Save Our Allegheny Ridges * Sierra Club, Allegheny Group * Sierra Club, Kittatinny Group * Sierra Club, Moshannon Group * Sierra Club, Otzinachson Group * Sierra Club, Pennsylvania Chapter * Sierra Club, Southeastern Penna. Group * South Branch Tunkhannock Creek Watershed Coalition * Three Rivers Waterkeeper * Tinicum Township Board of Supervisors * Upper Providence for Open Space * Valley Forge Chapter, Trout Unlimited * White Clay Wild & Scenic Program * Wissahickon Valley Watershed Association * York Conservation Alliance

June 9, 2010

Independent Regulatory Review Commission
333 Market Street
Harrisburg PA 17120

RE: Docket Number #2783

The undersigned organizations strongly urge you to approve the Environmental Quality Board's proposed revisions to the Chapter 102 regulations, including the section that would mandate 150 foot buffers for new development along Exceptional Value (EV) and High Quality (HQ) streams.

Requiring developers to maintain a buffer of trees and plants alongside our state's best streams is a smart, low-cost solution to protect these important natural resources and the communities and businesses that depend on them. Because buffers take advantage of Pennsylvania's

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existing natural resources, they deliver big benefits at little or no cost to taxpayers and businesses.

Buffers benefit our state by:

- **Keeping drinking water safe:** By filtering pollutants out of runoff before it reaches our rivers and streams, buffers help reduce the cost of treating our drinking water. According to the EPA, every dollar invested in protecting the sources of our drinking water saves $27 in drinking water treatment costs.
- **Reducing the risk of flood damage:** Buffers keep new development away from the stream's edge, reducing damage when flooding happens. In addition, with fewer structures near the water's edge, runoff can be reduced and the volume of flood waters minimized.
- **Increasing property values:** Studies have shown that stream buffers increase property values and the prices that buyers are willing to pay for properties. This in turn increases the local tax base and tax revenues for Pennsylvania's municipalities.
- **Protecting our streams:** Buffers help filter nutrients out of runoff, protecting our streams from excess nitrogen and phosphorus. They shade streams, helping cool them, and provide food for fish and other aquatic organisms. They reduce erosion and scouring, helping preserve stream banks and stream bottoms from damage.
- **Saving Pennsylvania money:** Buffers can help reduce the cost for municipalities of stormwater management by using existing natural resources more effectively. This helps save tax dollars.

With tourism and recreation serving as major drivers of Pennsylvania's economy, and EV and HQ streams among the top destinations for anglers and eco-tourists, it is critical that we protect the resources these industries depend on. In 2008, Pennsylvania's tourism industry provided $18 billion in wages to more than 600,000 residents. Fishing activities alone generate $4.7 billion per year in revenue for the state—supplying 43,000 jobs.

Requiring buffers on streams is not a new concept. **Over 192 municipalities in a dozen counties in Pennsylvania already have ordinances in place that require buffers on their streams and rivers.** One third of these communities already require buffers of at least 100 feet for new developments, and some require as much as 300 foot buffers for EV and HQ streams.

However, to be truly effective, buffers must be required on the full length of a stream. Just one municipality in the middle of a watershed without a buffer rule can undermine the protection afforded to that township and its downstream neighbors from pollution and flood damage. The best way to protect our most sensitive streams is with a statewide requirement.

Several of our neighboring states also require buffers on their streams. New Jersey requires 300 foot buffers on its C-1 streams (the equivalent of our EV streams). The state of Maryland requires 200 foot buffers on the Chesapeake Bay and tidal reaches of the streams that drain into it.

Experience in Pennsylvania municipalities with existing buffer ordinances indicates that they have no negative effect on development activity in those communities. A survey of seven municipalities in Chester, Monroe and Northampton counties found that enactment of 100 foot buffer ordinances did not slow development in these municipalities. 77 NPDES stormwater construction permits were granted in these municipalities in the year after adoption of their buffer ordinance while only 63 were issued in the year before adoption of the ordinances.

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Protecting the clean streams that fuel our economy and safeguard our health is a wise investment in the future of our commonwealth. We strongly urge you to help ensure our streams and the communities they support are protected by approving the changes DEP has proposed to Chapter 102.

Sincerely,

Myron Arnowitt
PA Campaign for Clean Water

Julie Vastine
Alliance for Aquatic Resource Monitoring

Susan Curry
Alliance for a Sustainable Future

Susan Curry
Ambler Environmental Advisory Council

Liz Garland
American Rivers

Al Barney
Aquashicola Pohopoco Watershed Conservancy

Becky Sanguedolce
Black Hole Creek Watershed Association

Mike Duffalo
Blacklegs Creek Watershed Association

Frank O'Donnell
Blue Mountain Preservation

Wesley R. Horner
Brandywine Conservancy

Patricia Kennedy
Brodhead Watershed Association

Joe Mihok
Bucks County Chapter, Trout Unlimited

Ben Hoskins
Buffalo Creek Watershed Alliance

Deana Weaver
Carroll Citizens for Sustainable Growth

Joy Bergey
Center for the Celebration of Creation

Conrad Volz
Center for Healthy Environments and Communities, Graduate School of Public Health, University of Pittsburgh

Harry Campbell
Chesapeake Bay Foundation

Scott Hoffman
Chestnut Ridge Chapter, Trout Unlimited

Brady Russell
Clean Water Action

Tom Hoffman
Clean Water Fund

Jennifer Shuey
ClearWater Conservancy

Anne Harris Katz
Coalition for Responsible Growth and Resource Conservation

Gil Freedman
Conodoguinet Creek Watershed Assn

Scott Douglas
Cooks Creek Watershed Association

James Hutcheson
Cumberland Valley Trout Unlimited

Michael Riska
Delaware Nature Society

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Marion M. Kyde
Delaware River Greenway Partnership

Maya van Rossum
Delaware Riverkeeper Network

Scott Fiegel
Ecological Associates LLC

Chuck Marshall
Ecology Mission Group, Central Baptist Church

Melanie Ryan Hesse
Elk Creeks Watershed Association

Derrick Winegardner
Friends of the Little Aughwick Creek

Donna Smith-Remick
Friends of Poquessing Watershed

Barry Lewis
GreenTreks Network

Joyce Losee
Green Valley Coalition

John Hoekstra
Green Valleys Association

Clifford C. David, Jr
Heritage Conservancy

Stan Kotala
Juniata Valley Audubon Society

Olivia Thorne
League of Women Voters of Pennsylvania

Peter Saenger
Lehigh Valley Audubon Society

Bill Anderson
Little Juniata River Association

Mary Anne Stinner
Little Lehigh Watershed Coalition

Mike Holiday

Little Mahoning Creek Watershed Association

Drew Banas
Loyalhanna Watershed Association

Carol Kafer
Loyalsock Creek Watershed Association

Steve Wood
Middletown Township Land Conservancy

Dulcie Flaharty
Montgomery County Land Trust

Bruce Smay
Muncy Creek Watershed Association

Maria Payan
Peach Bottom Concerned Citizens Group

Jan Jarrett
Penn Future

The Rev. Sandra L. Strauss
Pennsylvania Council of Churches

Ron Evans
Pennsylvania Environmental Defense Foundation

Richard Martin
Pennsylvania Forest Coalition

Dave Rothrock
Pennsylvania Trout Unlimited

Ann Glaser
Penns Valley Conservation Association

Ingrid E. Morning
Pine Creek Valley Watershed Association

Lloyd Goodman
Radnor Racquet Club

Drake Saxton
Responsible Drilling Alliance

Laura Jackson

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Save Our Allegheny Ridges

Marilyn Skolnick
Sierra Club, Allegheny Group

Mark Fiorini
Sierra Club, Kittatinny Group

Gary Thornbloom
Sierra Club, Moshannon Group

Jack Miller
Sierra Club, Otzinachson Group

Barbara Benson
Sierra Club, Pennsylvania Chapter

Pat Beaudet
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Ellie Hyde
South Branch Tunkhannock Creek
Watershed Coalition

Patrick Grenter
Three Rivers Waterkeeper

Linda McNeill, Township Manager
Tinicum Township Board of Supervisors

Jane Ferry

Upper Providence for Open Space

Pete Goodman
Valley Forge Chapter, Trout Unlimited

Linda Stapleford
White Clay Wild & Scenic Program

Robert B. Adams
Wissahickon Valley Watershed Association

Jane Heller
York Conservation Alliance

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PA Campaign for Clean Water
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American Rivers
Thriving By Nature

June 10, 2010

Independent Regulatory Review Commission
333 Market Street
Harrisburg PA 17120
RE: Docket Number 2783

American Rivers' Clean Water program requests the Independent Regulatory Review Commission to approve Pennsylvania Environmental Quality Board's proposed revisions to Chapter 102 regulations, especially the section mandating 150 foot vegetated buffers for new development along Exceptional Value (EV) and High Quality (HQ) streams.

Across the nation, American Rivers advocates developing resiliency for our communities by assuring healthy rivers and clean water using 21st century approaches that capitalize on natural infrastructure. Buffers are one of the most simple and cost effective means toward assuring communities thrive now and in a future impacted by climate change. Requiring the maintenance of at least 150 foot buffers of natural vegetation alongside Pennsylvania's streams will benefit communities and place the state amongst leaders of smart planning.

Buffers provide: 1) an aesthetic benefit that adds value to properties, 2) a water quality benefit by filtering pollutants and stabilizing soils prone to run-off, and 3) a flood reduction benefit by slowing runoff that creates erosion and property damage.

Buffers are a water management strategy that are simple and inexpensive to implement and add economic benefits including improved property values, reduced costs at drinking water treatment facilities because of reduced pollutant loads, and reduced burdens on wastewater treatment systems that are expensive to maintain and upgrade. While buffers save taxpayers money they also help municipalities address water management programs that are essential to healthy rivers that benefit our citizens and those downstream.

Programs promoting buffers exist in many states and are growing in popularity within Pennsylvania. Requirements in some Pennsylvania municipalities require 300 feet buffers along high quality streams. But, these progressive municipalities will not fully reap the benefits of buffers if requirements are not implemented throughout watersheds. Any portion of river corridor that is unprotected by a buffer can degrade the river quality, community health and municipal planning of neighboring stream segments. A statewide requirement of 150 foot buffers for exceptional value and high quality streams is necessary for all communities to fully reap the economic and environmental benefits of vegetated buffers.

Again, American Rivers urges you to adopt smart strategies for Pennsylvania's rivers and communities and adopt the proposed Chapter 102 provisions for buffers.

Thank you,

Liz Garland, Associate Director

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NATIONAL ASSOCIATION OF WATER COMPANIES
PENNSYLVANIA CHAPTER

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May 27, 2010

Independent Regulatory Review Commission
333 Market Street, 14th Floor
Harrisburg, PA 17101
irrc@irrc.state.pa.us

RE: Erosion and Sediment Control and Stormwater Management #7-440 (#2783)

Dear Commissioners:

The National Association of Water Companies (NAWC) www.nawc.org/ represents all aspects of the private water service industry including ownership of regulated drinking water and wastewater utilities and the many forms of public-private partnerships and management contract arrangements. The Pennsylvania Chapter consists of 10 member companies that provide safe and adequate drinking water service to approximately 3.1 million Pennsylvanians in 485 communities over 38 counties. In addition, three of our member companies provide wastewater service to approximately 155,000 Pennsylvanians in 24 communities over 7 counties.

The NAWC **supports** the final rulemaking amending the existing erosion and control regulations found at Title 25, Chapter 102. The purpose of Chapter 102 is to protect surface waters of the Commonwealth from sediment and stormwater pollution through the utilization of Best Management Practices (BMPs) that minimize accelerated erosion and sedimentation during earth disturbance activities, and manage post construction stormwater runoff after earth disturbance activities.

Specifically, the final-form rulemaking includes revisions to: (1) definitions; (2) agriculture plowing and tilling and animal heavy use areas; (3) erosion and sediment control planning requirements; (4) permit application requirements and permit fees; (5) post construction stormwater management (PCSM) including long-term operation and maintenance; (6) antidegradation implementation; (7) general requirements; (8) riparian buffer requirements; and (9) permit-by-rule.

The NAWC believes this final rulemaking utilizes a balanced approach to controlling accelerated erosion, sedimentation, and stormwater from earth disturbances and thanks you for considering our comments on this most important regulation to our industry and customers. If you should

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need any additional information or have any questions, please do not hesitate to contact me.

Very truly yours,

David Lewis
Chair

CC: Jim Smith
Environmental Quality Board
Dana K. Aunkst
Senator Mary Jo White
Senator Ray Musto
Representative Bud George
Representative Scott Hutchinson

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The ARAMARK Tower
1101 Market Street
Philadelphia, Pennsylvania 19107-2994

BERNARD BRUNWASSER

Water

June 8, 2010

RECEIVED
JUN 14 2010
INDEPENDENT REGULATORY REVIEW COMMISSION

Independent Regulatory Review Commission
333 Market Street, 14th Floor
Harrisburg, PA 17101

Re: Docket Number #2783 [EQB 7-440: Erosion and Sedimentation Control]
Docket Number #2806 [EQB 7-446: Wastewater]

Dear Sir/Ms.:

As a major Southeastern Pennsylvania drinking water supplier, the Philadelphia Water Department (PWD) supports the Pennsylvania Department of Environmental Protection proposed regulatory changes to Chapters 95 and 102. Managing point and non-point source pollution is a critical component of the proven multi-tiered approach to watershed protection. These changes align with the City's comprehensive Source Water Protection Program and our mission to protect and enhance the quality of our drinking water supply for future generations.

PWD strongly encourages the Independent Regulatory Review Commission to approve the Environmental Quality Board's proposed revisions for Chapter 95 and Chapter 102.

Specifically, the changes proposed to Title 25 Pa. Code Chapter 102 Erosion and Sediment Control and Stormwater Management regulations will improve stormwater management in Pennsylvania. Improved stormwater management upstream of Philadelphia will help reduce harmful pathogens (eg cryptosporidium), nutrients and sediment in our drinking water supply. New requirements to establish forested riparian buffers on Exceptional Value and High Quality streams that are not meeting designated uses are especially critical for drinking water supply protection.

The proposed changes to Title 25 Pa. Code Chapter 95 Wastewater Treatment Requirements (to address the discharge of wastewaters containing high Total Dissolved Solids (TDS)) will help protect ecology and our drinking water from potential harm that might occur due to natural gas extraction from the Marcellus Shale which underlay roughly half of our watershed. Adjusting the proposal to accommodate the Commonwealth's existing facilities makes good regulatory sense.

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PWD's core mission is to ensure safe, high quality drinking water to all of our customers and this effort begins with our pledge to be good stewards of our region's water resources. Indeed, the quality of our tap water is ultimately linked to the health, vitality, and quality of our watersheds and rivers.

Sincerely,

David A. Katz
Deputy Commissioner
Environmental Policy & Planning

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION,
Plaintiffs,

v.

THE UNITED STATES ARMY CORPS OF ENGINEERS et al.,
Defendants,

-and-

AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION,
Putative Defendant-Intervenors.

No. 11-CV-3780 (NGG)(CLP)

ECF Case

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DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

STATE OF NEW YORK, Plaintiff, v. UNITED STATES ARMY CORPS OF ENGINEERS, *et al.*, Defendants.	No. 1 1-Civ.-02599 (NGG) (CLP) ECF Case

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DECLARATION OF SCOTT PERRY

Pursuant to 28 U.S.C. § 1746, I, Scott Perry, declare as follows:

1. I am the Deputy Secretary for the Pennsylvania Department of Environmental Protection's Office of Oil and Gas Management and submit this declaration in support of the Defendants' Opposition to Plaintiffs Motions for Summary Judgment.

2. The Pennsylvania Department of Environmental Protection is the agency with the duty and authority to administer and enforce the Oil and Gas Act, 58 P.S. §§ 601.101 *et. seq.*, The Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001; the Coal and Gas Resources Coordination Act, 58 P.S §§ 501-518; the Oil and Gas Conservation Law, 58 P.S §§ 401-419; Title 58 Chapter 32 of the Pennsylvania Consolidated Statutes (relating to Development) of the act of February 14, 2012, P.L. 87, No. 13, 58 Pa.C.S. §§ 2301-3504 (Act 13), Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177 as amended, 71 P.S. § 510-17; and the rules and regulations promulgated by the Pennsylvania Environmental Quality Board pursuant to these acts.

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Personal Background and Qualifications

3. As a Deputy Secretary for the Office of Oil and Gas Management, I am responsible for the statewide oil and gas conservation and environmental programs that facilitate the safe exploration, development and recovery of Pennsylvania's oil and gas reservoirs in a manner that will protect the Commonwealth's natural resources and the environment. My office develops and implements policy and programs for the regulation of oil and gas development and production pursuant to the Oil and Gas Act, the Coal and Gas Resource Coordination Act, the Oil and Gas Conservation Law, and The Clean Streams Law. The Office of Oil and Gas Management oversees the oil and gas permitting and inspection programs; develops statewide regulations and standards; conducts training programs for industry; and works with the Interstate Oil and Gas Compact Commission and the Oil and Gas Technical Advisory Board.

4. I have been licensed to practice law in the Commonwealth of Pennsylvania since November 2000.

5. I earned my Juris Doctorate in May 2000 from Willamette University College of Law.

6. I earned my Bachelor of Arts Degree in December 1995 from the Pennsylvania State University.

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Purpose of this Declaration

7. The purpose of this declaration is to evaluate the statements made in the Declaration of Dr. Charles Silver who authored an expert declaration for the State of New York.

8. The facts set forth in this Declaration are based upon my personal knowledge and experience.

Summary of Conclusions

9. Dr. Silver does not acknowledge that Pennsylvania conducted an extensive public process in developing new statutory and regulatory programs for the development of the Commonwealth's natural gas resources or that Pennsylvania has considered and adopted comprehensive measures to ensure environmental protection. Therefore, Dr. Silver's allegation that Pennsylvania failed to conduct a comprehensive environmental review of its natural gas development regulations is unsubstantiated. Because Dr. Silver failed to acknowledge or consider Pennsylvania's robust and comprehensive regulatory structure for the development of unconventional wells Dr. Silver's analysis, in paragraphs 37, 46, 13, 30-32, 9d of his Declaration, and his conclusions are invalid.

Pennsylvania Comprehensive Environmental Review

10. Dr. Silver alleges that Pennsylvania regulations of natural gas development were promulgated without benefit of an environmental review analogous to New

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York's State Environmental Quality Review Act. *See* paragraph 37 of Dr. Silver's Declaration.

11. Dr. Silver's Declaration fails to acknowledge the extensive environmental review given to Pennsylvania's oil and gas law and regulations, does not comport with facts contained in New York's own Revised Draft EIS (Revised Supplemental Draft Generic Environmental Impact Statement), and fails to acknowledge the substantial role Pennsylvania's experiences and subsequent laws and regulations played in the very development of New York's Revised Draft EIS.

12. Pennsylvania's existing strong and comprehensive oil and gas laws and regulations have recently undergone extensive environmental review by independent organizations, experts in the field of oil and gas development, and the public. *See* State Review of Oil and Natural Gas Environmental Regulations, "Pennsylvania Hydraulic Fracturing State Review," http://www.strongerinc.org/reviews/reviews.asp (last visited March 27, 2012); Marcellus Shale Advisory Commission, Final Report, http://files.dep.state.pa.us/PublicParticipation/MarcellusShaleAdvisoryCommission/MarcellusShaleAdvisoryPortalFiles/MSAC_Final_Report.pdf (last visited April 2, 2012); the act of February 14, 2012, P.L. 87, No. 13, 58 Pa.C.S. §§ 2301-3504 (Act 13).

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13. Pennsylvania's oil and gas regulations have undergone extensive environmental review by the independent State Review of Oil and Natural Gas Environmental Regulations program (STRONGER). STRONGER is a non-profit, multi-stakeholder organization whose purpose is to improve state oil and gas regulatory programs. As part of a STONGER review, stakeholders from state and federal regulatory agencies, industry and environmental organizations, and other individuals who have expertise in oil and gas development compare the state's regulations against a set of peer reviewed guidelines. The review group shares innovative techniques and environmental protection strategies and identifies opportunities for program improvement. *See* State Review of Oil and Natural Gas Environmental Regulations, "Pennsylvania Hydraulic Fracturing State Review," http://www.strongerinc.org/reviews/reviews.asp (last visited March 27, 2012).

14. Pennsylvania's oil and gas regulations have undergone four different STRONGER reviews. No other state has been reviewed more. The most recent review was conducted in September, 2010 and focused specifically on Pennsylvania's regulation of hydraulic fracturing. In contrast, New York's regulations have only been reviewed by STRONGER once, in September 1994.

15. The STRONGER review, which Bradley J. Field, Director of New York DEC's Division of Mineral Resources participated in, concluded that

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Pennsylvania's Oil and Gas Program was "over all, well-managed, professional and meeting its program objectives." *See* State Review of Oil and Natural Gas Environmental Regulations, "Pennsylvania Hydraulic Fracturing State Review," http://www.strongerinc.org/reviews/reviews.asp (last visited March 27, 2012).

16. Following the STRONGER review, the Pennsylvania Department of Environmental Protection (PADEP) finalized enhanced well construction regulations on February 5, 2011. *See* 41 Pa.B. 805, http://www.pabulletin.com/secure/data/vol41/41-6/239.html (last visited April 3, 2012). These new regulations also underwent extensive public review. PADEP published the rules for initial public comment on January 30, 2010, for additional comment on July 10, 2010 and held five public hearings across the Commonwealth. Approximately 2,000 people commented on the regulations before they were finalized.

17. After PADEP's well construction regulations were finalized, Governor Corbett issued Executive Order 2011-11 and established the Marcellus Shale Advisory Commission. The Commission consisted of 30 members representing the interests of environmental, conservation, industry, local and state government. The Commission conducted 21 public meetings, heard testimony from 60 different experts, received direct comment from over 100 citizens who attended the meetings, and received over 650 letters and emails from the public. *See* DEP,

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Marcellus Shale Advisory Commission, http://www.portal.state.pa.us/portal/server.pt/community/marcellus_shale_advisory_commission/20074 (last visited March 27, 2012).

18. The Commission's work represents a comprehensive evaluation of all aspects of unconventional shale gas development and resulted in a report outlining 96 different recommendations, approved unanimously by the Commission, forming a comprehensive, strategic plan for the responsible development of this resource.

19. The ultimate result of the Marcellus Shale Advisory Commission's work is Act 13 of 2012. 58 Pa.C.S §§ 2301-3504. Signed into law on February 14, 2012, this comprehensive piece of legislation encompasses six different chapters, including Chapter 32 (relating to Development) which consolidates and amends the Oil and Gas Act and contains the statutory requirements for the development of oil and gas resources and enhanced environmental protections.

20. Dr. Silver's Declaration alleges that adverse visual impacts may occur in New York as a result of natural gas development on the Pennsylvania side of the Delaware River. *See* paragraph 46 of Dr. Silver's Declaration.

21. Dr. Silver fails to acknowledge that PADEP is required to consider the potential impact of well sites on public resources such as state lands or along scenic river corridors during every permit review. *See* 58 P.S. § 601.205(c); 58

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Pa.C.S. § 3215(c). As part of the permit application process, the applicant must identify whether the proposed well site may impact a public resource and if so, describe how the applicant will mitigate any potential impacts to the public resource. The scope of PADEP's consideration is not constrained and may include aesthetic impacts to these resources.

22. The factual assumptions that Dr. Silver uses to characterize natural gas activities are not accurate and, in some instances, are not consistent with New York's Revised Draft EIS. For example, Dr. Silver states that the Marcellus Shale is "typically" more than 4,000 feet below the surface and requires "as much as" 10 million gallons of water to hydraulically fracture. *See* paragraph 13 of Dr. Silver's Declaration.

23. As noted in the Revised Draft EIS, at the Northeastern Pennsylvania/New York border, the Marcellus is approximately 7,000 feet deep (Revised Draft EIS page 6-325) and the "typical" Marcellus well requires approximately 4.2 million gallons of water for hydraulic fracturing purposes. Revised Draft EIS page 6-10. The Revised Draft EIS goes on to state that at full build out, Marcellus water use in New York will increase all fresh water consumption by only 0.24%. Revised Draft EIS page 6-10.

24. Dr. Silver alleges that New York, through its Revised Draft EIS, has analyzed potential adverse impacts to surface waters and groundwater from

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stormwater runoff, spills and releases associated with natural gas development employing high volume hydraulic fracturing (HVHF). He also alleges that Pennsylvania has not considered comprehensive measures to prevent pollution. *See* paragraphs 30-32 of Dr. Silver's Declaration.

25. Not only has Pennsylvania considered comprehensive measures to prevent pollution through its statutory and regulatory revisions, discussed above, but many recommendations included in New York's Revised Draft EIS were developed with language already in place in Pennsylvania. *See* Revised Draft EIS pages 7-37 and 7-38. A few examples illustrate this duplication:

a. Pennsylvania's new well construction regulations require a coiled tubing rig or a hydraulic workover unit (AKA a "snubbing unit") with appropriate blowout prevention equipment to be employed during post completion cleanout operations in horizontal unconventional formations. *See* 25 Pa. Code § 78.72(j).

b. Pennsylvania's regulations require that an individual with a current certification from a well control course accredited by the International Association of Drilling Contractors, or other organization approved by the PADEP, must be present on the well site. *See* 25 Pa. Code § 78.72(h).

c. Pennsylvania's regulations identify specific testing requirements for blow-out preventers. *See* 25 Pa. Code § 78.72(f).

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d. Pennsylvania's regulations prohibit the operator from disturbing any string of casing after it has been cemented in place for a minimum of 8 hours. *See* 25 Pa. Code § 78.85(c). The Revised Draft EIS mimics this requirement but allows the NYSDEC to waive the 8 hour timeframe. *See* Revised Draft EIS page 7-57.

26. Pennsylvania's Act 13 of 2012, 58 Pa.C.S. §§ 2301-3504, prescribes strict new well pad operations, including new provisions for the handling and storage of materials on well sites and containment practices to prevent spills and ensure the protection of waters of the Commonwealth. Such provisions include the following:

a. Section 3215(d.1) gives PADEP the authority to establish additional protective measures for the storage of hazardous chemicals and drilling materials within 750 feet of blue lined streams, springs, or bodies of water identified on the most current 7 ½ minute topographic quadrangle map of the United States Geological Survey.

b. Section 3215(f) limits the use of certain storage facilities containing specific substances in the floodway, flood fringe and floodplain.

c. Section 3215(f) gives PADEP the authority to establish best practices for the storage and handling of all water, chemicals, fuels, hazardous materials or solid waste on a well site in a floodplain.

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d. Section 3218.2 requires that unconventional well sites be designed and constructed to prevent spills to the ground surface or spills off the well site. Operators must now employ containment practices on well sites that (1) are instituted during drilling and hydraulic fracturing operations, (2) are sufficiently impervious and able to contain spilled material or waste until it can be removed or treated, and (3) are compatible with the waste material or waste stored or used within the containment. This section also gives PADEP the authority to promulgate regulations regarding additional containment practices.

e. Section 3218.2 provides that storage facilities containing additives, chemicals, oil or fuels must have sufficient containment capacity to hold the volume of the largest container stored in the area plus 10% to allow for precipitation, unless the container is equipped with individual secondary containment.

27. Dr. Silver states the following: "EPA has also recently concluded in a draft report that natural gas development employing HVHF was likely responsible for shallow and deep groundwater contamination in Pavillion, Wyoming, where elevated concentrations of methane, benzene, toluene, ethylbenzene, xylene, diesel, and various chemicals used in hydraulic fracturing were found." *See* paragraph 9d of Dr. Silver's Declaration.

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28. Dr. Silver's synopsis of the study is not accurate. First, it is important to note that the EPA report is a draft report released for public comment and will undergo a scientific peer-review process led by a panel of independent scientists. Second, HVHF was not being utilized in Pavillion. Third, EPA concluded that shallow groundwater was being impacted by poor waste management practices at the surface by legacy gas and oil development (disposal of produced water in unlined pits) – not hydraulic fracturing. Fourth, the groundwater zone tested by EPA was also a gas producing formation that was intentionally hydraulically fractured to produce gas. More precisely, EPA drilled a groundwater monitoring well to a formation that was not utilized for drinking water purposes, but was intentionally hydraulically fractured to produce gas. *See* footnote 8 of Dr. Silver's Declaration, "Investigation of Ground Water Contamination Near Pavillion, Wyoming," page 33. Also, Ken Salazar, the current Secretary of the Interior and former Senator, has said that "the jury is still out" on the validity of the EPA Pavillion study. He further said that "we'll see what happens with this Pavillion study" and he affirmed that "fracking can be done and is being done safely." Further, James B. Martin, EPA's Region 8 Administrator in Denver, told the House Science, Space and Technology Committee's Energy and Environment Subcommittee, "It should be noted that fracturing in Pavillion is taking place in and below the drinking water aquifer and in close proximity to drinking water

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wells - production conditions different from those in many other areas of the country." These comments mimic those of EPA Administrator Lisa Jackson. *See* United States Environmental Protection Agency, EPA Testimony Statements: Congressional Hearings Held Before The House and Senate Committees for 2011 and 2012 (Jim Martin's testimony to the Committee on Science, Space, and Technology Subcommittee on Energy & the Environment), http://www.epa.gov/ocir/hearings/index.htm (last visited April 4, 2012); *see also* United States Environmental Protection Agency, Groundwater Investigation: Pavillion, http://www.epa.gov/region8/superfund/wy/pavillion/ (last visited April 4, 2012).

29. To conclude, Pennsylvania has recently adopted a new law to enhance its comprehensive regulation of natural gas development to ensure the protection of environmental resources. This new law was part of an extensive public review process to evaluate and enhance Pennsylvania's regulation of unconventional well development. The law contains comprehensive measures to prevent pollution. Specifically, the law ensures that Pennsylvania considers the impact that an unconventional well will have on public resources and strict new requirements for containment of materials on well sites. Accordingly, Dr. Silver's contention that unconventional well development in Pennsylvania will cause environmental harm in New York is unsubstantiated.

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I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 4, 2012

Scott Perry

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EXHIBIT A

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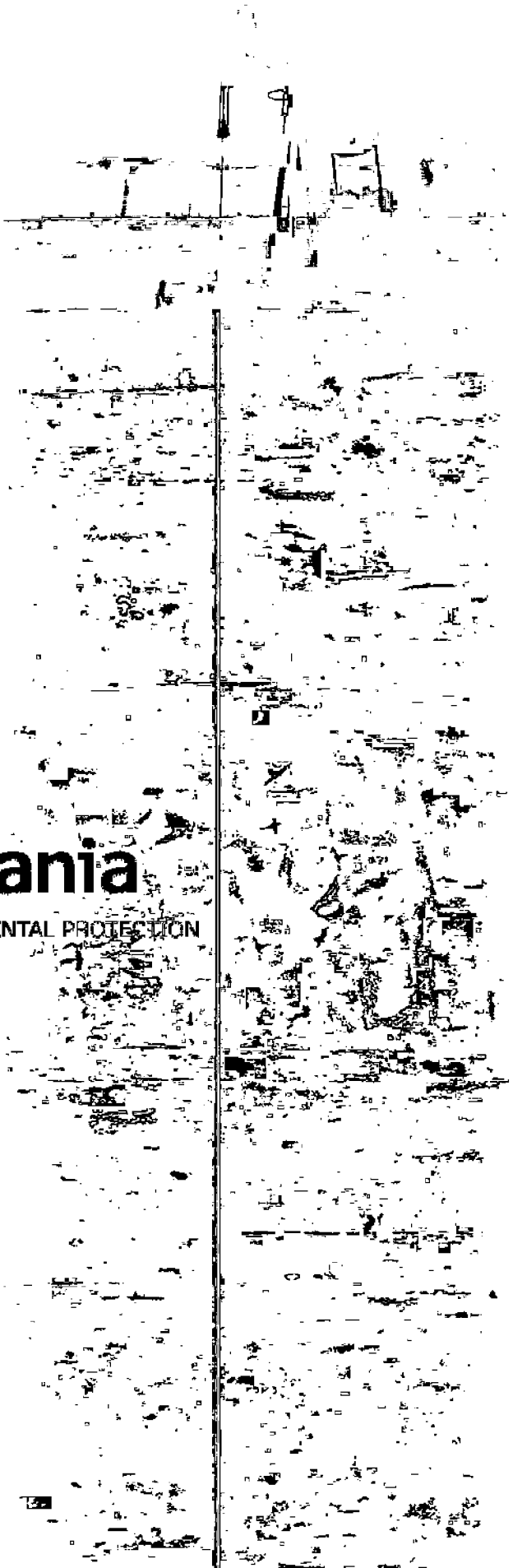
Pennsylvania Hydraulic Fracturing State Review

September, 2010



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STRONGER
State Review of Oil & Natural Gas Environmental Regulations

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INTRODUCTION

In 1990, the Interstate Oil Compact Commission (IOCC) and the U.S. Environmental Protection Agency (USEPA) jointly published a Study of State Regulation of Oil and Gas Exploration and Production Waste, which contained guidelines for the regulation of oil and gas exploration and production wastes by the IOCC member states (the "1990 Guidelines"). The published guidelines, developed by state, environmental and industry stakeholders, provided the basis for the State Review Program, a multi-stakeholder review of state exploration and production (E&P) waste management programs against the guidelines. The purposes of the State Review Process are to document the successes of states in regulating E&P wastes and to offer recommendations for program improvement. In 1994, the guidelines were updated and revised (the "1994 Guidelines) by the IOCC, now named the Interstate Oil and Gas Compact Commission (IOGCC).

In 1999, administration of the State Review Program devolved to a non-profit, multi-stakeholder organization named State Review of Oil and Natural Gas Environmental Regulations, Inc. (STRONGER). STRONGER again revised, expanded and updated the Guidelines, which were accepted by the IOGCC and published in June 2000 as Guidelines for the Review of State Oil and Natural Gas Environmental Regulatory Programs (the "2000 Guidelines"). In 2005, STRONGER again revised, expanded and updated the Guidelines.

In 2009, STRONGER formed a Hydraulic Fracturing Workgroup consisting of stakeholders to review issues associated with hydraulic fracturing and develop guidelines for state regulatory programs to address identified issues. After several meetings and a round of public comment, the workgroup submitted to STRONGER a set of guidelines that represented the consensus of the workgroup. In 2010, STRONGER distributed the workgroup's guidelines for state regulation of hydraulic fracturing. Those guidelines were used as the basis of this review.

In May 2010, the Pennsylvania Department of Environmental Protection (DEP) volunteered to have its hydraulic fracturing program reviewed by STRONGER. The Pennsylvania oil and gas regulatory program has undergone three prior reviews. The report of the initial review of the Pennsylvania oil and gas regulatory program was published in 1992. The reports of two follow-up reviews, conducted after both the Pennsylvania regulations and the guidelines were revised, were published in 1997 and 2004.

The current review began with a questionnaire that was sent to the Bureau of Oil and Gas Management (BOGM). The questionnaire had been prepared by the STRONGER Board. STRONGER intended the questionnaire to capture the status of the Pennsylvania program relative to the 2010 Hydraulic Fracturing Guidelines. The BOGM prepared a response to the questionnaire, which was then sent to the review team.

In July and August 2010 a seven-person team appointed by STRONGER conducted a review to evaluate the DEP program compared to the 2010 Hydraulic Fracturing Guidelines. The review team consisted of three team members and four official observers. The three team members were: Lori Wrotenbery, Oil and Gas Conservation Division of the Oklahoma Corporation Commission; Wilma Subra, Subra Co., New Iberia, Louisiana; and Jim Collins, Independent

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Petroleum Association of America. The official observers were: Tom Au, Pennsylvania Chapter of the Sierra Club; Steve Rhoads, East Resources; Brad Field, Division of Mineral Resources of the New York Department of Environmental Conservation; and Dave Rectenwald, U.S. Environmental Protection Agency.

The review team conducted a meeting, the in-state portion of the review, in the conference facilities of the DEP, in Harrisburg, Pennsylvania on July 15, 2010. Mr. Scott Perry, Director of BOGM, presented an overview of hydraulic fracturing requirements in Pennsylvania. Mr. Perry and Mr. Gene Pine, also of the BOGM, Mr. Steve Socash of the Bureau of Waste Management, and Ms. Susan Weaver of the Bureau of Watershed Management responded to questions from the team members and official observers. In addition to the four DEP representatives who participated in the review, there were eight environmental, six industry and five state attendees who observed the proceedings and offered questions for consideration by the review team. Following the meeting and after reviewing the written materials provided by the BOGM, the team members compiled this review report.

This is the report of the review of the Pennsylvania program against the 2010 Hydraulic Fracturing Guidelines of STRONGER. Appendix A is a glossary of all acronyms used in the report. Appendix B contains Pennsylvania's written response to the STRONGER questionnaire.

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EXECUTIVE SUMMARY

An in-depth review of the Pennsylvania hydraulic fracturing regulatory program has been completed by a multi-stakeholder review team. The review team has concluded that the Pennsylvania program is, over all, well-managed, professional and meeting its program objectives. The review team also made recommendations for improvements in the program.

Program Strengths

During the 2010 review of Pennsylvania's regulation of hydraulic fracturing, the review team and observers were granted full access to DEP staff, and all questions were answered in a responsive and open manner. During the review, the review team identified strengths of the Pennsylvania program, which also are noted in several of the report's findings. The following offers an overview of some of the Pennsylvania program's strengths.

1. Comprehensive Water Planning Process

In 2002, the Water Resources Planning Act was enacted, It requires entities withdrawing more than 300,000 gallons of water over a 30-day period to register their water withdrawal. By registering water uses, DEP began the process of tracking this activity outside the Susquehanna and Delaware River basins, where interstate commissions have jurisdiction.

As a result of the development of the Marcellus shale, in 2008 BOGM began requiring water management plans to identify where water would be withdrawn and the volumes of withdrawal. The purpose of this inquiry is to ensure that water quality standards are maintained and protected. By law, DEP cannot issue permits for an activity that will violate the laws it administers. Because large withdrawals of surface water can, individually or cumulatively, impact water quality, DEP must assure that excessive withdrawals do not occur. DEP follows water withdrawal guidance promulgated by the Susquehanna River Basin Commission (SRBC) to ensure uniform statewide evaluation. The Delaware River Basin Commission (DRBC) also has a role in evaluating impacts within that river basin. The DRBC is in the process of promulgating regulations to address Marcellus shale well drilling within its jurisdiction.

Studies are underway by Pennsylvania universities, such as the University of Pittsburgh, that are attempting to provide for the greater use of water impacted by acid mine drainage (AMD) for hydraulic fracturing. In addition, Pennsylvania State University is conducting a study of groundwater before and after hydraulic fracturing operations. Industry has been testing wastewater from hydraulic fracturing flowback to establish a baseline of chemical quality through time. BOGM is expanding the Penn State study to additional producing areas and is participating in the other studies.

The review team commends DEP for taking steps to ensure that demands on water resources related to hydraulic fracturing operations are addressed through a comprehensive water planning process.

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2. Baseline Water Sampling and Groundwater Studies

The Pennsylvania Oil and Gas Act includes a provision that an oil and gas well operator is presumed to be responsible for pollution of a water supply if it occurs within six months of drilling and is within 1,000 feet of the well. One of the defenses against this presumption is a pre-drilling survey that documents baseline water quality. Proposed changes to the regulations will require results of such testing to be provided to the landowner and to DEP.

The review team commends Pennsylvania for encouraging the baseline groundwater quality testing that is done in the vicinity of wells.

3. PPC Planning Process

Regulations at 25 Pa. Code §§ 78.55 and 91.34 require operators to identify potential risks and plan for the possibility of an accident occurring at the well site through a Prevention, Preparedness and Contingency (PPC) plan. The first objective in preparing and implementing a PPC plan is for the operator to review its operations and identify all pollutional substances and wastes, both solid and liquid, that will be used or generated, and identify the methods for control and disposal of those substances or wastes. The second objective of the PPC plan involves recognizing that accidents and unexpected conditions do occur. Such accidents or conditions would require an immediate response to mitigate any detrimental effects. Planning the actions to be taken should prevent polluting substances from reaching the waters of the Commonwealth.

As part of the PPC plan operators must list the chemicals or additives utilized and the different wastes generated during hydraulic fracturing. The PPC plan includes Material Safety Data Sheets (MSDS), cleanup procedures, toxicological data and waste chemical characteristics. The approximate quantities of each material and the method of storage (sack, barrels, tanks, etc.) may be specified.

PPC plans are to be available at the well site and must be submitted to DEP upon request. When new operators apply for permits in Pennsylvania, BOGM staff request a copy of the operator's PPC plan prior to permit issuance, as is the case with all Marcellus Shale well operators.

The review team commends DEP for requiring PPC plans and for requiring MSDS as part of the PPC plan.

4. Waste Identification, Tracking and Reporting Process

Hydraulic fracturing waste characterization requirements are provided through the residual waste program implemented by the DEP Bureau of Waste Management. This Bureau provides a reporting mechanism for generators of waste hydraulic fracturing fluids through use of its Form 26R, *Chemical Analysis of Residual Waste, Annual Report by the Generator.* This form was recently modified to incorporate a comprehensive list of required analytical parameters for wastewater produced from the drilling, completion and production of Marcellus or other gas wells. For impoundments and tanks, the chemical analysis must represent the volume of wastewater stored in the impoundment or tank. If large volumes of water, wastewater or other

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fluids are added to an impoundment, a new chemical analysis must be performed that is representative of the impoundment.

Hydraulic fracturing waste generation, transportation and disposal tracking requirements are integrated into DEP's residual waste regulations. Requirements found at 25 Pa, Code Chapter 287 specify the reporting, recordkeeping and waste stream analytical requirements for generators of hydraulic fracturing wastes. Form 26R, described above, provides the analytical and reporting requirements for generators of hydraulic fracturing wastes. This form also requires information on the processing or disposal facilities that will accept the waste. 25 Pa. Code Chapter 299 provides standards for the transportation of residual waste to a commercial or centralized facility. These include requirements for transportation, accident prevention and contingency planning, emergencies, wastes from accidents and spills, recordkeeping and reporting, and appropriate signage on vehicles. Waste haulers are required to be permitted and are subject to the requirements of the DEP Waste Transportation and Safety Program.

Information pertaining to waste volumes and the location of disposal or recycling facilities are submitted annually to BOGM as part of the operator's annual production and waste report.

The review team commends DEP on the use of Form 26R which contains the analyses and reporting requirements for hydraulic fracturing wastes transported off-site and for its annual production and waste reporting requirements that include volumes and disposition of waste hydraulic fracturing materials.

5. Increase in Staffing Levels

In 2009, BOGM increased its well permit fees for the first time since the Oil and Gas Act was enacted in 1984. Pennsylvania's oil and gas program is now completely funded by well permit fees. The increase in permit fees allowed DEP to increase the size of its permitting, compliance and enforcement staff. BOGM's orphan and abandoned well plugging program continues to be completely funded by a surcharge on operator's well permit fees. BOGM added 37 oil and gas staff in 2009, and opened a new office in Williamsport to serve the needs of the north central region that will continue to see increased Marcellus Shale activity. In addition, in 2010 the Governor directed BOGM to hire an additional 68 staff to respond to the continued growth of Marcellus Shale development. This year BOGM opened a new office in Scranton dedicated to oversight of oil and gas drilling in the northeastern counties.

The total complement of staff regulating oil and gas well development in Pennsylvania is 196 people. This number includes inspectors, permitting, enforcement and management staff, and administrative and legal staff.

The review team supports DEP's efforts to increase staff levels to deal with increased drilling activities. Increasing staff levels was a recommendation in the 2004 report of the prior review of the Pennsylvania program. The review team finds that recommendation is being implemented.

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Program Recommendations

The following are the primary areas where recommendations are made by the review team for improvements of the Pennsylvania hydraulic fracturing program. Discussion and findings for these recommendations can be found in the various sections of the report. Readers are encouraged to review the specific discussion and finding for each recommendation

1. Pending Rulemaking

DEP has developed proposed rulemaking to amend 25 Pa. Code Chapter 78 to strengthen its regulatory requirements. On May 17, 2010, the Environmental Quality Board adopted the amendments as Proposed Rulemaking and published the changes on July 10, 2010 for a 30-day public comment period.

The Proposed Rulemaking requires that operators prepare a casing and cementing plan and keep it on site during well construction for review by DEP. The Proposed Rulemaking also requires that a cement job log, that documents the actual procedures and specifications of the cementing operation, be maintained by the operator. The Proposed Rulemaking also addresses blow-out prevention equipment requirements, centralizers, areas where alternate methods are required, lost circulation, and intermediate and production casing.

The review team recommends that DEP finalize its Proposed Rulemaking in a manner that provides at least the levels of protection that were presented by the BOGM during the review.

2. Baseline Surveys

The Pennsylvania Oil and Gas Act includes a provision that an oil and gas well operator is presumed to be responsible for pollution of a water supply if it occurs within six months of drilling and is within 1,000 feet of the well. One of the defenses against this presumption is a pre-drilling survey that documents baseline water quality. Proposed changes to the regulations will require results of such testing to be provided to the landowner and to DEP.

The review team discussed whether pre-drilling testing should extend beyond the vicinity of the vertical portion of a well to the full aerial extent of the hydraulically fractures horizontal laterals. The review team recommends that the Commonwealth consider whether there are areas or situations in which risk factors, such as the absence of confining rock layers or the presence of potential pathways for fluid movement into groundwater, establish a basis for encouraging more extensive baseline groundwater quality testing.

The review team also noted that DEP has not required operators to identify potential conduits for fluid migration (such as active and abandoned wells) in the area of hydraulic fracturing. The review team recommends that DEP consider whether there are areas or situations in which wells (active and abandoned) in the vicinity of hydraulic fracturing operations provide pathways for fluid movement into groundwater. In such areas or situations, DEP should require operators to identify and eliminate these potential pathways for fluid movement into groundwater before conducting hydraulic fracturing operations.

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3. Casing and Cementing Plans

The Proposed Rulemaking requires that operators prepare a casing and cementing plan and keep it on site during well construction for review by DEP. The Proposed Rulemaking also requires that a cement job log, that documents the actual procedures and specifications of the cementing operation, be maintained by the operator. The casing and cementing plan is not required to be provided with the well drilling permit application for review.

The review team recommends that the depth of surface casing be added to the well drilling permit application so that BOGM can assure that groundwater protection concerns are addressed.

4. Chemical Information Availability

As part of the PPC plan operators must list the chemicals or additives utilized and the different wastes generated during hydraulic fracturing. The PPC plan includes Material Safety Data Sheets (MSDS), cleanup procedures, toxicological data and waste chemical characteristics. The approximate quantities of each material and the method of storage (sack, barrels, tanks, etc.) may be specified.

Though PPC plans should be available at the well site and must be submitted to DEP upon request, the PPC plan requirements do not clearly identify the mechanisms or procedures by which information on chemical constituents used in fracturing fluids would be made available to medical personnel in the event of a medical emergency related to hydraulic fracturing. The review team recommends that the Commonwealth of Pennsylvania adopt provisions necessary to assure that information on chemical constituents used in fracturing fluids is available to medical personnel in the event of a medical emergency related to hydraulic fracturing.

5. Prior Notification of Hydraulic Fracturing Operations

The Pennsylvania Oil and Gas Act requires well operators to notify DEP at least 24 hours prior to the commencement of drilling. The Department's proposed well construction regulation requires 24-hours notice prior to cementing the surface casing unless cementing will begin within 72 hours of drilling. There is no specific requirement for notification prior to hydraulic fracturing nor is this notice contemplated in the revised regulations. BOGM receives information on the hydraulic fracturing operations as part of the completion report on a well.

The review team recommends that DEP require notification prior to hydraulic fracturing operations. DEP should have the opportunity to conduct inspections at critical stages, including during hydraulic fracturing and flowback.

6. Pit Construction

BOGM regulations at 25 Pa. Code 78.56 and 57 specify the requirements for the temporary storage of pollutional substances and wastes, including stimulation fluids and the associated flow back. These substances must be contained in pits or tanks that are structurally sound, protected from unauthorized acts, and constructed and maintained with sufficient capacity to contain all

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pollutional substances and wastes that are used or produced during drilling, altering, hydraulic fracturing, completing and plugging the well.

Two feet of freeboard must be maintained in pits and open tanks. The sub-base of any pit must be free of rocks or debris and the pit must be lined with an impermeable liner that is of sufficient strength and thickness to maintain the integrity of the liner. The liner must be designed, constructed and maintained so that the physical and chemical characteristics of the liner are not adversely affected by the waste, and the liner must be resistant to physical, chemical and other failure during transportation, handling, installation and use.

Liners or secondary containment around tanks or other facilities storing pollutional substances are not required, but are recommended.

The review team recommends that, during the next round of rulemaking, procedures for inspecting pit construction or a certification process for pit construction, that includes pit bottom preparation and liner placement, should be considered. The review team further recommends that secondary containment requirements be established for tanks used in hydraulic fracturing operations.

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HYDRAULIC FRACTURING

I. BACKGROUND

Hydraulic fracturing has been used in Pennsylvania since the 1950s. Since the 1980s, nearly all wells drilled in Pennsylvania have been fractured. Although thousands of wells have been fractured in Pennsylvania, DEP has not identified any instances where groundwater has been contaminated by hydraulic fracturing. DEP and Pennsylvania State University are currently conducting various groundwater studies and investigations to determine whether there are adverse impacts associated with hydraulic fracturing.

While there have not been any identified instances of groundwater being affected by hydraulic fracturing, there are a number of surface and subsurface control issues associated with the practice. These include water withdrawal; Prevention, Preparedness and Contingency (PPC) plans; pits, tanks and centralized impoundments; and hydraulic fracturing wastewater management.

II. GENERAL

As a result of the development of the Marcellus shale, in 2008 BOGM began requiring water management plans to identify where water would be withdrawn and the volumes of withdrawal. The purpose of this inquiry is to ensure that surface water quality standards are maintained and protected.

Wastewater generated by hydraulic fracturing operations is managed four different ways in Pennsylvania:

1) Reused to fracture additional wells;
2) Treated and discharged to surface water;
3) Injected into underground disposal wells; and
3) Transported to out-of-state facilities.

DEP has encouraged source reduction and recycling through the distribution of its Operators Manual, and has noticed, particularly with operators in the Marcellus shale, the increased recycling and reuse of all fluids associated with drilling, completion and stimulation activities. The wastewater treatment industry is offering mobile and cost-effective treatment methods that frequently make recycling and reuse economically preferable to disposal and reduce demands on water resources.

Recently DEP has developed a total dissolved solids (TDS) strategy that is applicable to new and expanded discharges of wastewater to surface water. Discharges from gas exploration and production (E&P) activities are required to meet effluent limits of 500 mg/l TDS, 250 mg/l chlorides, and 10 mg/l barium and strontium. This requirement to treat gas activity discharges to drinking water standards is included in regulations recently adopted as final by the Environmental Quality Board (EQB) and approved by the Independent Regulatory Review Commission (IRRC).

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DEP has not accepted primacy for the Underground Injection Control (UIC) program. Therefore, USEPA administers the UIC program in Pennsylvania. There are seven Class II disposal wells in Pennsylvania, of which only one is a commercial well. There are applications for at least 20 additional disposal well injectivity reviews presently before USEPA.

Subsurface control issues associated with hydraulic fracturing include planning and preparation activities associated with well drilling, completion, stimulation, production and plugging. Well construction practices that assure the structural integrity of the well are essential in containing hydraulic fracturing fluids within the wellbore. In addition, adequate reporting requirements are a necessary component of the regulatory program.

DEP has developed proposed rulemaking to amend 25 Pa. Code Chapter 78 to strengthen its regulatory requirements. On May 17, 2010, the EQB adopted the amendments as Proposed Rulemaking and published the changes on July 10, 2010 for a 30-day public comment period.

The Proposed Rulemaking requires that operators prepare a casing and cementing plan and keep it on site during well construction for review by DEP. The Proposed Rulemaking also requires that a cement job log, that documents the actual procedures and specifications of the cementing operation, be maintained by the operator. The Proposed Rulemaking also addresses blow-out prevention equipment requirements, centralizers, areas where alternate methods are required, lost circulation, and intermediate and production casing.

BOGM indicated that there are plans for Phase II revisions to 25 Pa. Code Chapter 78. This proposed rulemaking will address, among other things, water management plan requirements and surface facilities.

BOGM has expanded its Naturally Occurring Radioactive Materials (NORM) survey activities, which were reviewed in 1997, to include E&P wastes from Marcellus shale operations.

BOGM has recently begun implementation of the Risk Based Data Management System (RBDMS) which is used by most oil and gas producing states. Use of RBDMS will assist data management efforts and make information more readily available to DEP staff and the public.

Finding 9.2.1.

The review team recognizes and supports DEP actions to update and improve its rules.

Recommendation 9.2.1.

The review team recommends that DEP finalize its Proposed Rulemaking in a manner that provides at least the levels of protection that were presented by the BOGM during the review. (STRONGER Guidelines Section 9.2.)

Finding 9.2.2.

The review team supports DEP's efforts to redesign its data management system in a manner to increase the availability and accessibility of data to DEP staff and the public.

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STANDARDS

Current BOGM standards for all well casing and cementing practices require that the operator conduct casing and cementing activities to accomplish the following:

(1) Allow effective control of the well at all times,

(2) Prevent the migration of gas or other fluids into sources of fresh groundwater,

(3) Prevent pollution or diminution of fresh groundwater, and

(4) Prevent the migration of gas or other fluids into coal seams.

BOGM is in the process of revising its well casing and cementing standards to add greater specificity to the above narrative standards. The proposed regulations include several important revisions. The structural integrity of the well is essential to containing hydraulic fracturing fluid within the well bore. To achieve this, operators will be required to develop and maintain at the well site a casing and cementing plan that describes the casing to be used, the proposed depths to which it will be set, the proposed placement of centralizers (which will now be required), the volume of cement to be used, and the proposed cement additives.

As a companion to the casing and cementing plan, operators will also be required to maintain a cement job log that documents the actual procedures and specifications of the cementing operation. Cementing operation requirements have also been modified to require a true eight-hour wait-on-cement time where the operator is not permitted to disturb the cement while it sets.

BOGM well casing regulations are also being significantly revised. The amendments will prohibit the use of surface casing as production casing if cement is not circulated behind the surface casing and returned to the surface, in which case an additional string of casing will have to be installed in a well unless the well is only used to produce oil, does not present a threat to groundwater, or if the operator of a gas well demonstrates that all gas and fluids will be contained in the well. If cement is circulated behind the surface casing and returned to the surface, an additional string of casing will not be required provided that the well bore pressure does not exceed 80% of the hydrostatic pressure at the surface casing seat and a pressure test on the casing seat demonstrates that no gas can escape the well. Additionally, new pressure testing requirements will apply to specific casing strings.

Casing that is attached to a blow out preventer with a pressure rating of 3,000 psi or greater will be required to be pressure tested. Pressure testing will also be required for used or welded casing. A passing pressure test is defined as holding 120% of the maximum anticipated working pressure to which the casing will be exposed for 30 minutes with no more than a 10% decrease in pressure.

The Pennsylvania Oil and Gas Act includes a provision that an oil and gas well operator is presumed to be responsible for pollution of a water supply if it occurs within six months of drilling and is within 1,000 feet of the well. One of the defenses against this presumption is a

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pre-drilling survey that documents baseline water quality. Proposed changes to the regulations will require results of such testing to be provided to the landowner and to DEP.

BOGM identifies and manages risk on an ongoing basis. Risk is identified through bi-weekly conference calls with regional managers, quarterly staff meetings and training sessions. Risk is managed on a case-by-case basis through well permit conditions and inspections. Risk is managed more broadly through permit forms and instructions, technical guidance documents, and via development, implementation and enforcement of regulations.

Regulations at 25 Pa. Code §§ 78.55 and 91.34 require operators to identify potential risks and plan for the possibility of an accident occurring at the well site through a Prevention, Preparedness and Contingency (PPC) plan. The first objective in preparing and implementing a PPC plan is for the operator to review its operations and identify all pollutional substances and wastes, both solid and liquid, that will be used or generated, and identify the methods for control and disposal of those substances or wastes. The second objective of the PPC plan involves recognizing that accidents and unexpected conditions do occur. Such accidents or conditions would require an immediate response to mitigate any detrimental effects. Planning the actions to be taken should prevent polluting substances from reaching the waters of the Commonwealth.

As part of the PPC plan operators must list the chemicals or additives utilized and the different wastes generated during hydraulic fracturing. The PPC plan includes Material Safety Data Sheets (MSDS), cleanup procedures, toxicological data and waste chemical characteristics. The approximate quantities of each material and the method of storage (sack, barrels, tanks, etc.) may be specified.

As noted above, the operator's PPC plan specifies the actions that must be taken if an accident or spill should occur. Regulations promulgated pursuant to the Pennsylvania's Clean Streams Law require immediate notification to DEP if a discharge or spill threatens waters of the Commonwealth or has the potential to damage property.

PPC plans are to be available at the well site and must be submitted to DEP upon request. When new operators apply for permits in Pennsylvania, BOGM staff request a copy of the operator's PPC plan prior to permit issuance, as is the case with all Marcellus Shale well operators.

The operator will also anticipate risk during the development of the casing and cementing plan described above. The proposed regulations themselves embody the identification and management of risk by DEP. One of the unique features of the new regulations is the inclusion of a provision that allows BOGM to designate "areas of alternative methods," which require additional measures to be employed to drill a well in an environmentally protective manner. This provision allows BOGM to react to conditions on the ground faster than the normal rulemaking procedure, thus identifying and managing risk more appropriately and efficiently.

Blow out preventers are required when well head pressures or natural open flows are anticipated at the well site that may result in a blow-out. This requirement would apply to hydraulic fracturing and post-fracturing cleanout operations as these operations occur under pressure at the surface. The proposed regulations require a second set of BOP actuators in instances where the

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pressure rating exceeds 3,000 psi. These secondary devices are not associated with the rig hydraulic system and are to be located away from the rig so that the BOP can be operated if control of the well has been lost.

BOGM regulations pertaining to pits and tanks have been subject to previous STRONGER reviews. BOGM regulations at 25 Pa. Code §§78.56 and 57 specify the requirements for the temporary storage of pollutional substances and wastes, including stimulation fluids and the associated flow back. These substances must be contained in pits or tanks that are structurally sound, protected from unauthorized acts, and constructed and maintained with sufficient capacity to contain all pollutional substances and wastes that are used or produced during drilling, altering, completing and plugging the well.

Two feet of freeboard must be maintained in pits and open tanks. The sub-base of any pit must be free of rocks or debris and the pit must be lined with an impermeable liner that is of sufficient strength and thickness to maintain the integrity of the liner. The liner must be designed, constructed and maintained so that the physical and chemical characteristics of the liner are not adversely affected by the waste, and the liner must be resistant to physical, chemical and other failure during transportation, handling, installation and use.

Liners or secondary containment around tanks or other facilities storing pollutional substances are not required, but are recommended.

Pits must be closed within nine months after the completion of well drilling. Free liquid must be removed from the pit and the chemical constituencies of cuttings or residual waste that will be encapsulated in the pit must not exceed regulatory standards.

BOGM's contingency planning has been reviewed previously by STRONGER. As described above and in accordance with 25 Pa. Code § 78.55, prior to generation of waste, the well operator must prepare and implement a PPC plan for the control and disposal of fluids, including top-hole water, brines, drilling fluids, additives, drilling mud, stimulation fluids, flowback, well servicing fluids, oil, production fluids and drill cuttings from the drilling, alteration, production, plugging or other activity associated with oil and gas wells.

Hydraulic fracturing waste characterization requirements are provided through the residual waste program implemented by the DEP Bureau of Waste Management. This Bureau provides a reporting mechanism for generators of waste hydraulic fracturing fluids through use of its Form 26R, *Chemical Analysis of Residual Waste, Annual Report by the Generator.* This form was recently modified to incorporate a comprehensive list of required analytical parameters for wastewater produced from the drilling, completion and production of Marcellus or other gas wells. For impoundments and tanks, the chemical analysis must represent the volume of wastewater stored in the impoundment or tank. If large volumes of water, wastewater or other fluids are added to an impoundment, a new chemical analysis must be performed that is representative of the impoundment.

The source reduction and recycling policies of DEP, including the provision related to toxicity reduction, have been previously reviewed by STRONGER and are equally applied to hydraulic

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fracturing activities. BOGM has been proactive in encouraging operators and generators of hydraulic fracturing fluid wastes, as well as other wastes associated with the drilling, completion and stimulation phases of well drilling, to develop and expand source reduction and recycling opportunities. Hydraulic fracturing fluids are being increasingly recycled for use at subsequent hydraulic fracturing operations at other wells. This reduces the amount of fresh water employed in the hydraulic fracturing process. BOGM inspectors have also instructed operators to improve, modify and/or better maintain their spill containment measures, which serve to reduce the amount of waste, such as contaminated soil and vegetation, generated at the well site.

Additionally, well servicing companies that perform hydraulic fracturing operations are developing more environmentally friendly, or more "green," substitutes for certain additives employed in the hydraulic fracturing operation. This evolving process is supported by DEP.

DEP allows only water and sand to be used in the hydraulic fracturing of coalbed methane wells since the coalbeds are shallower than other gas producing formations and are sometimes used as a source of drinking water. This requirement is imposed through the use of an alternate method during well permitting.

Finding 9.2.1.1.

The review team finds that one of the defenses against the presumption of liability for water supply contamination within 1,000 feet of a newly drilled well is a pre-drilling survey that documents baseline groundwater quality.

Recommendation 9.2.1.1.

The review team recommends that DEP identify a standardized methodology to ensure that sampling and analysis for gas content in water is done consistently. (STRONGER Guidelines Section 9.2.1.)

Finding 9.2.1.2.

The review team commends Pennsylvania for encouraging the baseline groundwater quality testing that is done in the vicinity of wells.

Recommendation 9.2.1.2.

The review team discussed whether pre-drilling testing should extend beyond the vicinity of the vertical portion of a well to the full aerial extent of the hydraulic fractured horizontal laterals. The Commonwealth should consider whether there are areas or situations in which risk factors, such as the absence of confining rock layers or the presence of potential pathways for fluid movement into groundwater, establish a basis for encouraging more extensive baseline groundwater quality testing. (STRONGER Guidelines Section 9.2.1.)

Finding 9.2.1.3.

The review team commends BOGM for proposing regulations that require the results of baseline groundwater quality testing be provided to DEP and landowners.

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Finding 9.2.1.4.

The review team noted that DEP has not required operators to identify potential conduits for fluid migration (such as active and abandoned wells) in the area of hydraulic fracturing.

Recommendation 9.2.1.4.

DEP should consider whether there are areas or situations in which wells (active and abandoned) in the vicinity of hydraulic fracturing operations provide pathways for fluid movement into groundwater. In such areas or situations, DEP should require operators to identify and eliminate these potential pathways for fluid movement into groundwater before conducting hydraulic fracturing operations. (STRONGER Guidelines Section 9.2.1.)

Finding 9.2.1.5.
The review team commends DEP for requiring the PPC plan.

Recommendation 9.2.1.5.

The review team recommends that DEP finalize its Proposed Rulemaking to include the requirement to keep a copy of the PPC plan at the well site during drilling and completion activities so that specific chemical information can be obtained during an investigation. (STRONGER Guidelines Section 9.2.2.)

Finding 9.2.1.6.

The review team commends DEP for requiring MSDS as part of the PPC plan.

Recommendation 9.2.1.6.

The review team recommends that the Commonwealth of Pennsylvania adopt provisions necessary to assure that information on chemical constituents used in fracturing fluids is available to medical personnel in the event of a medical emergency related to hydraulic fracturing. (STRONGER Guidelines Section 9.2.2.)

Finding 9.2.1.7.

Under the Proposed Rulemaking operators will be required to develop and maintain on site a casing and cementing plan. BOGM can require the casing and cementing plan to be submitted for approval prior to drilling. However, no casing information is required to be submitted with the well permit application.

Recommendation 9.2.1.7.

The review team recommends that the depth of surface casing be added to the well permit application so that BOGM can assure that groundwater protection concerns are addressed. (STRONGER Guidelines Section 9.2.1.)

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Finding 9.2.1.8.

The review team understands that proposed amendments to 25 Pa. Code Chapter 78 will prohibit the use of surface casing as production casing if cement is not circulated behind the surface casing and returned to the surface, in which case an additional string of casing will have to be installed in a well unless the well is only used to produce oil, does not present a threat to groundwater, or if the operator of a gas well demonstrates that all gas and fluids will be contained in the well. If cement is circulated behind the surface casing and returned to the surface, an additional string of casing will not be required provided that the well bore pressure does not exceed 80% of the hydrostatic pressure at the surface casing seat and a pressure test on the casing seat demonstrates that no gas can escape the well.

Recommendation 9.2.1.8.

The review team recommends that the proposed amendments, when finally adopted, should clearly address hydraulic fracturing of wells with open hole completion to assure that the annular space above the packer does not fill with fluid to the point that groundwater could be impacted. The operator should make a demonstration through monitoring of the annulus or other acceptable method that fluid does not escape the well bore. (STRONGER Guidelines Section 9.2.1.)

Finding 9.2.1.9.

The review team understands that pits must be lined with impermeable liners.

Recommendation 9.2.1.9.

The review team recommends that, during the next round of rulemaking, procedures for inspecting pit construction or a certification process for pit construction, that includes pit bottom preparation and liner placement, should be considered for pits used to store flowback fluids from hydraulic fracturing. (STRONGER Guidelines Section 9.2.1.)

Finding 9.2.1.10.

The review team understands that there is no requirement for secondary containment around tanks.

Recommendation 9.2.1.10.

The review team recommends that secondary containment requirements be established for tanks used in hydraulic fracturing operations. (STRONGER Guidelines Section 9.2.1.)

Finding 9.2.1.11.

The review team understands that DEP allows only water and sand to be used in the hydraulic fracturing of coalbed methane wells, and that this requirement is imposed through the use of an alternate method during well permitting.

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Finding 9.2.1.12.

The review team finds that DEP maintains a complaint tracking system that categorizes complaints by type.

Recommendation 9.2.1.12.

The review team recommends that DEP determine a way to track complaints and investigations related to hydraulic fracturing. (STRONGER Guidelines Section 9.2.1.)

REPORTING

The Pennsylvania Oil and Gas Act requires well operators to notify DEP at least 24 hours prior to the commencement of drilling. The Department's proposed well construction regulation requires 24-hours notice prior to cementing the surface casing unless cementing will begin within 72 hours of drilling. There is no specific requirement for notification prior to hydraulic fracturing nor is this notice contemplated in the revised regulations. While there is no mandated notification before hydraulic fracturing, BOGM inspectors are aware of planned activities at the sites they inspect.

BOGM regulations currently require a completion report to be filed within 30 days of completion of well drilling. Information provided on this report includes: a perforation record, a stimulation record including fluid type and amount, propping agent information, average injection rate, open flow before and after treatment, rock pressure and well service company name. The proposed regulations will additionally require a complete list of the chemicals used to fracture the well along with the volume of recycled flowback water used. DEP is evaluating the need to require the exact proportions of the hydraulic fracturing chemicals as part of revision to the proposed regulations.

Information pertaining to waste volumes and the location of disposal or recycling facilities are submitted annually to BOGM as part of the operator's annual waste and production report.

In addition, the Pennsylvania Worker and Community Right to Know Act, 35 P.S. §§ 7301-7320 provides: "Every employer shall make readily available, in every work area, the Material Safety Data Sheet for every hazardous substance or hazardous mixture to which the employees working in said work area may be exposed. The Material Safety Data Sheets shall be made available in such a manner and in such numbers as to give every employee in that work area easy and unhindered access to the Material Safety Data Sheets without permission or intervention of management or any supervisor."

No confidential hydraulic fracturing information is currently submitted to DEP. In the event that confidential proprietary information (CPI) is submitted, Pennsylvania's Right to Know Law contains provisions to protect this information.

The Proposed Rulemaking changes reporting requirements to mandate the electronic reporting of production.

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Finding 9.2.2.1.

The review team commends DEP on the use of Form 26R, which contains the analyses and reporting requirements for hydraulic fracturing wastes transported off-site, and for its annual production and waste reporting requirements that include volumes and disposition of waste hydraulic fracturing materials.

Finding 9.2.2.2.

The review team understands that notification of hydraulic fracturing operations occurs after the operation is concluded.

Recommendation 9.2.2.2.

The review team recommends that DEP require notification prior to hydraulic fracturing operations. DEP should have the opportunity to conduct inspections at critical stages including during hydraulic fracturing and flowback. (STRONGER Guidelines Section 9.2.2.)

Finding 9.2.2.3.

The review team commends DEP for acquiring and disseminating production information electronically.

STAFFING AND TRAINING

In 2009, BOGM increased its well permit fees for the first time since the Oil and Gas Act was enacted in 1984. Pennsylvania's oil and gas program is now completely funded by well permit fees. The increase in permit fees allowed DEP to increase the size of its permitting, compliance and enforcement staff. BOGM's orphan and abandoned well plugging program continues to be completely funded by a surcharge on operator's well permit fees. BOGM added 37 oil and gas staff in 2009, and opened a new office in Williamsport to serve the needs of the north-central region that will continue to see increased Marcellus Shale activity. In addition, in 2010 the Governor directed BOGM to hire an additional 68 staff to respond to the continued growth of Marcellus Shale development. This year BOGM opened a new office in Scranton dedicated to oversight of oil and gas drilling in the northeastern counties.

The total complement of staff regulating oil and gas well development in Pennsylvania is 196 people. This number includes inspectors, permitting and management staff, and administrative and legal staff.

With the recent increase in staffing and the recognition that Marcellus Shale well development relies on techniques not traditionally used in Pennsylvania, training programs have been developed to provide ongoing training of new and veteran inspectors. Recent training has been provided on well stimulation techniques, hydraulic fracturing fluid composition and additives, hydraulic fracturing operations and equipment, vertical and horizontal cement evaluation techniques, vertical and horizontal logging in the Marcellus from open hole evaluation to hydraulic fracture monitoring, Marcellus hydraulic fracture design and operations, flowback operations and fluids, water disposal issues, and hydraulic fracturing pressures and forces.

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Training programs on well construction and completion practices, safety, well site inspection, and well plugging are being developed and will be offered on an ongoing basis.

In addition to formal training sessions, bi-weekly conference calls and quarterly management meetings offer the opportunity to share new information between staff on a timely basis.

Finding 9.2.3.1.

The review team commends Pennsylvania for developing a mechanism to fully fund its oil and gas regulatory program.

Finding 9.2.3.2.

The review team supports DEP's efforts to increase staff levels to deal with increased drilling activities.

Finding 9.2.3.3.

The review team commends DEP for its training program for new hires and refresher training for existing staff.

Finding 9.2.3.4.

The review team supports DEP training about how to utilize the PPC plan to properly deal with spills during and after hydraulic fracturing.

PUBLIC INFORMATION

With the enormous public interest in the development of the Marcellus Shale, there have been numerous opportunities for dissemination of educational information regarding well construction and hydraulic fracturing. Testimony has been given to the Pennsylvania Legislature on these subjects several times. Public speaking events and conferences have allowed for dozens of additional outreach opportunities. Correspondence by letter, email and phone has been prolific, and BOGM staff has answered all inquiries.

The well construction and TDS regulation developments described above have also provided an opportunity for DEP to receive and respond to thousands of comments from the public. BOGM maintains a website that has provided information regarding the chemicals used at Marcellus wells since 2007. This list has recently been updated, and a description of the hydraulic fracturing process has been added.

Finding 9.2.4.1.

The review team recognizes and commends DEP's comprehensive efforts to proactively address public concerns about hydraulic fracturing.

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III. WATER AND WASTE MANAGEMENT

In 2002, the Water Resources Planning Act was enacted that requires entities withdrawing more than 300,000 gallons of water over a 30-day period to register their water withdrawal. By registering water uses, DEP began the process of tracking this activity outside the Susquehanna and Delaware River basins, where interstate commissions have jurisdiction.

As a result of the development of the Marcellus shale, in 2008 BOGM began requiring water management plans to identify where water would be withdrawn and the volumes of withdrawal. The purpose of this inquiry is to ensure that water quality standards are maintained and protected. By law, DEP cannot issue permits for an activity that will violate the laws it administers. Because large withdrawals of surface water can, individually or cumulatively, impact water quality, DEP must assure that excessive withdraws do not occur.
DEP follows water withdrawal guidance promulgated by the Susquehanna River Basin Commission (SRBC) to ensure uniform statewide evaluation. The Delaware River Basin Commission (DRBC) also has a role in evaluating impacts within that river basin. The DRBC is in the process of promulgating regulations to address Marcellus shale well drilling within its jurisdiction.

Pennsylvania has many water sources that are impacted by acid mine drainage (AMD). Use of this water for hydraulic fracturing purposes is encouraged by BOGM. DEP provides funding to watershed groups that treat AMD-impacted water. BOGM promotes the sale of this water for hydraulic fracturing purposes to generate revenues for watershed groups so that additional AMD-impacted water can be restored.

Studies are underway by Pennsylvania universities, such as the University of Pittsburgh, that are attempting to provide for the greater use of AMD-impacted water for hydraulic fracturing. In addition, the Pennsylvania State University is conducting a study of groundwater before and after hydraulic fracturing operations. Industry has been testing wastewater from hydraulic fracturing flowback to establish a baseline of chemical quality through time. BOGM staff is expanding the Penn State study to additional producing areas and are participating in the other studies.

Wastewater generated by hydraulic fracturing operations is managed four different ways in Pennsylvania:

1) Reused to fracture additional wells;
2) Injected into underground disposal wells;
3) Transported to out of state facilities, and;
4) Treated and discharged to surface water.

The vast majority of the wastewater generated by conventional well drillers is treated at centralized waste treatment facilities that discharge to surface waters. These facilities have been operating in Pennsylvania for many years. A small percentage of this wastewater can be taken to Class II disposal wells; however, Pennsylvania only has seven such wells and only one of those is a commercial well.

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Wastewater generated by Marcellus shale operators can be taken to some of these same facilities. Increasingly, flowback is being reused to fracture additional wells. According to the SRBC:

- The average recovery of hydraulic fracture fluids injected is 13.5%.
- Of the amount recovered, approximately 60% is reused and 40% is disposed of after treatment.
- The disposal quantity represents approximately 4% of the total amount withdrawn for hydraulic fracturing operations.
- Operators that reuse the flowback water employ various on-site treatment practices ranging from filtering out sediment to removing barium and strontium.

The wastewater that is to be disposed must be taken to facilities that are approved to receive it. These facilities include publically owned treatment works (POTW) and centralized treatment facilities. Some newer centralized treatment facilities have no discharge to surface waters and sell all of the treated water back to operators.

In 2008 and 2009, TDS levels exceeded drinking water standards along the Monongahela River, which is a major source of drinking water. In early September 2009, excessive levels of TDS, primarily from mining discharges, were a primary factor in an environmental disaster in Dunkard Creek that wiped out 26 miles of stream in Greene County. High TDS concentrations led to the death of at least 16 species of freshwater mussels and 18 species of fish. These concentrations, coupled with other factors such as temperature and nutrient levels, lead to the colonization and growth of golden algae and an inhospitable environment for aquatic life. These algae released toxins into the water that wiped out aquatic life, including endangered mussels. Dunkard Creek is an example of what can happen if TDS is not controlled, and the loss of this public resource was an environmental and economic disaster.

To address the TDS issue, DEP issued the Permitting Strategy for High TDS Wastewater Discharges on April 11, 2009. This strategy allowed the department to effectively manage the new and increasing demands for assimilative capacity in surface waters. As part of this strategy, the department proposed revisions to its 25 Pa Code Chapter 95 Wastewater Treatment Requirements to codify key treatment discharge limitations. DEP's new TDS rule will promote reuse of wastewater. Under the new regulations, new and expanded facilities that accept oil and gas wastewater for treatment must meet strict discharge limits of 500 mg/l for TDS, 250 mg/l for chlorides, 10 mg/l for barium and 10 mg/l for strontium on a monthly average. This regulation was approved as a final regulation at the Environmental Quality Board (EQB) May 17, 2010 meeting.

Hydraulic fracturing waste generation, transportation and disposal tracking requirements are integrated into DEP's residual waste regulations. Requirements found at 25 Pa Code Chapter 287 specify the reporting, recordkeeping and waste stream analytical requirements for generators of hydraulic fracturing wastes. Form 26R, described above, provides the analytical and reporting requirements for generators of hydraulic fracturing wastes. This form also requires information on the processing or disposal facilities that will accept the waste. 25 Pa. Code Chapter 299 provides standards for the transportation of residual waste to a commercial or centralized facility. These include requirements for transportation, accident prevention and contingency planning,

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emergencies, wastes from accidents and spills, recordkeeping and reporting, and appropriate signage on vehicles. Waste haulers are required to be permitted and are subject to the requirements of the DEP Waste Transportation and Safety Program.

Information pertaining to waste volumes and the location of disposal or recycling facilities are submitted annually to BOGM as part of the operator's annual waste and production report.

The DEP internet home page prominently features a link to "Report an Incident" that provides phone numbers for the public to call if they observe a pollution event occurring. These phone lines are staffed 24 hours a day and designated DEP staff are on call to respond to emergencies at all times. Complaint reports are generated and transmitted to the appropriate DEP office for follow-up investigation. The new amended regulations will require an operator to notify DEP of the receipt of a complaint within 10 days, whether or not the complaint has been resolved. If an emergency related to an oil or gas well is reported, BOGM inspectors are dispatched immediately.

DEP supports complete reuse of flowback and produced water for hydraulic fracturing. There are no additional permit requirements needed to re-use flowback water at another well site. The transportation of water, wastewater and recycled water by truck or by pipeline does not require a permit beyond those already established for stream crossings and waste transporters.

Finding 9.3.1.

The review team commends DEP for developing a comprehensive water planning process and for providing notice to municipalities and counties of the water management plans.

Recommendation 9.3.1.

The review team recommends that DEP provide the opportunity for broader public comment during the water management planning process. (STRONGER Guidelines Section 9.3.)

Finding 9.3.2.

The review team finds that DEP encourages the use of AMD-impacted water and POTW effluent for hydraulic fracturing purposes and evaluates the potential impacts of this practice on streams as part of the water management planning process.

Finding 9.3.3.

The review team understands that interstate river basin commissions have a role in approval of water management plans.

Recommendation 9.3.3.

The review team recommends that DEP work closely with the river basin commissions to incentivize the use of AMD-impacted waters and other wastewater resources through streamlined permitting and inter-basin transfers. (STRONGER Guidelines Section 9.3.)

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Finding 9.3.4.

The review team commends DEP for their willingness to evaluate incidents and make improvements to the program.

Finding 9.3.5.

The review team commends DEP on the use of its web site to provide information on filing complaints.

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Appendix A

Acronyms

AMD	Acid Mine Drainage
ANPR	Advanced Notice of Proposed Rulemaking
BOGM	Bureau of Oil and Gas Management
BOP	Blow-Out Preventer
CBM	Coal Bed Methane
CPI	Confidential Proprietary Information
DEP	Department of Environmental Protection
DRBC	Delaware River Basin Commission
E&P	Exploration and Production
IOCC	Interstate Oil Compact Commission
IOGCC	Interstate Oil and Gas Compact Commission
IRRC	Independent Regulatory Review Commission
MSDS	Material Safety Data Sheets
NORM	Naturally Occurring Radioactive Materials
POTW	Publicly Owned Treatment Works
PPC	Prevention, Preparedness and Contingency
RBDMS	Risk Based Data Management System
RTKL	Right to Know Law
SRBC	Susquehanna River Basin Commission
STRONGER	State Review of Oil and Natural Gas Environmental Regulations, Inc.
TAB	Oil and Gas Technical Advisory Board
TDS	Total Dissolved Solids
UIC	Underground Injection Control
USEPA	U.S. Environmental Protection Agency

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Appendix B

June 23, 2010
Hydraulic Fracturing Questionnaire

(Note: Written responses to questions should be brief (i.e., 1 paragraph in length). Additional information may be requested by the review team during the in-state portion of the review.)

General [X.2]

Has the state evaluated potential risks associated with hydraulic fracturing, taking into account factors such as depth of the reservoir to be fractured, proximity of the reservoir to fresh water resources, well completion practices, well design, and volume and nature of fluids?

Yes. The Bureau of Oil and Gas Management (BOGM) continuously evaluates the potential for hydraulic fracturing to impact fresh water resources. Information on the potential impacts of fracing is collected through permitting, inspections and complaint tracking – including a compilation of water supply impacts that is publically available on BOGM's Technical Advisory Board website. Information is shared among BOGM staff through bi-weekly conference calls with regional program managers and central office staff, quarterly meetings with all BOGM management,

These evaluations have resulted in several changes to the way BOGM implements the laws and regulations governing many aspects of fracing.
The potential impacts to fresh water from hydraulic fracturing activities include:

1) Pollution through diminution of water resources

2) Surface spills – during transport to the well site and container leaks/mishandling at the site

3) Leaking pits or tanks

4) Communication with an abandoned well during well stimulation

5) Fracturing coalbed methane wells with substances other than freshwater and sand

   (BOGM prohibits the use of chemicals to fracture CBM wells through the alternative methods approval process.)

6) Defective casing or cementing that permit hydraulic fracturing to occur in unintended zones or formations

7) Direct communication between the target formation and fresh groundwater

It is important to note that while BOGM recognizes the theoretical possibility that hydraulic fracturing under some remote circumstance could impact fresh water sources, BOGM is not aware of this event ever occurring. Additionally, the Bureau of Watershed Management has reviewed their complaint database and conducted interviews with regional staff that investigate

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groundwater contamination related to oil and gas activities, and has concluded that no groundwater pollution or disruption of underground sources of drinking water have been attributed to hydraulic fracturing of deep gas formations.

In an effort to further evaluate the potential impacts of fracing on fresh water sources, BOGM will be engaging in a comprehensive evaluation of groundwater resources before, during and after well drilling and completion activities throughout Pennsylvania. This study will compliment a similar study currently being conducted by Penn State. This study is still in the early stages of development. A sampling protocol has been developed and test parameters have been identified. Sampling locations have yet to be determined.

Has the state developed standards to prevent the contamination of groundwater and surface water from hydraulic fracturing?

Yes. The standards related to spills, pits and tanks, and well construction are described in the appropriate sections below.

Hydraulic Fracturing Standards [X.2.1]

Describe how state standards for casing and cementing meet anticipated pressures associated with hydraulic fracturing to protect other resources and the environment.

Current BOGM standards for all well casing and cementing practices require that the operator conduct casing and cementing activities to accomplish the following:

(1) Allow effective control of the well at all times.

(2) Prevent the migration of gas or other fluids into sources of fresh groundwater.

(3) Prevent pollution or diminution of fresh groundwater.

(4) Prevent the migration of gas or other fluids into coal seams.

BOGM is in the process of revising its well casing and cementing standards that will add greater specificity to the narrative standards required above.

Following an Advanced Notice of Proposed Rulemaking ("ANPR") procedure and several meetings with BOGM's Technical Advisory Board, these regulations were approved by the DEP Environmental Quality Board as proposed rulemaking and were published for a second round of public comment on July 10. The comment period is 30 days and DEP will hold four public hearings across the state. After the comment period and public hearings are complete, BOGM will make appropriate revisions to the regulation and present the revisions to TAB at its August 2010 meeting.

Regarding well casing and cementing standards, the regulations propose several important revisions. The structural integrity of the well is essential to containing hydraulic fracturing fluid

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within the well bore. To achieve this, operators will be required to develop and maintain on site a casing and cementing plan that describes the casing to be used the proposed depths to which it will be set, the proposed placement of centralizers (which are now required), the volume of cement to be used and the proposed cement additives.

As a companion to the casing and cementing plan, operators will also be required to maintain a cement job log that documents the actual procedures and specifications of the cementing operation. Cementing operations have also been modified to require a true 8 hour wait on cement time where the operator is not permitted to disturb the cement while it sets.

BOGM well casing regulations have also been significantly revised. The amendments will prohibit the use of surface casing as production casing and require an additional string of casing to be installed in a well unless the well is only used to produce oil that does not present a threat to groundwater or if the operator of a gas well demonstrates that all gas and fluids will be contained in the well. Additionally, new pressure testing requirements will apply to specified casing strings.

Casing that is attached to a blow out preventer with a pressure rating of 3,000 psi must be pressure tested. Pressure testing will also be required for used as well as welded casing. A passing pressure test is defined as holding 120% of the maximum anticipated working pressures to which the casing will be exposed for 30 minutes with no more than a 10% decrease in pressure.

Discuss how the program identifies and, where deemed appropriate, manages risks associated with potential conduits for fluid migration in the area of hydraulic fracturing.

The program identifies and manages risk on an ongoing basis. Risk is identified through bi-weekly conference calls with regional managers, quarterly staff meetings and training sessions. Risk is managed on a case by case basis through well permit conditions and inspections. Risk is managed more broadly through permit forms and instruction revisions, technical guidance documents, and via development, implementation and enforcement of regulations.

Operators are required to identify potential risks and plan for the possibility of an accident occurring at the well site through a prevention, preparedness and contingency plan (PPC). As part of developing the PPC plan the operator must review its operations and identify all pollutional substance and wastes, both solid and liquid, that will be used or generated, and identify the methods for control and disposal of those substances or wastes. The second objective of a PPC plan involves recognizing that accidents and unexpected conditions do occur that would require an immediate response to mitigate any detrimental effects from those accidents or conditions, and planning the actions to be taken to prevent pollution substances from reaching the waters of the Commonwealth.

The operator also anticipates risk as part of developing a casing and cementing plan described above. The proposed regulations themselves embody the identification and management of risk by DEP. One of the unique features of the new regulations not previously discussed is the inclusion of a provision that allows BOGM to designate areas of alternative methods which require additional measures to be employed to drill a well in an environmentally protective

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manner. This provision allows BOGM to react to conditions on the ground faster than the normal rulemaking procedure thus identifying and managing risk more appropriately and efficiently.

Describe program requirements that address actions to be taken in response to unanticipated operational or mechanical changes encountered during hydraulic fracturing that may cause concern.

As described above, the operator's PPC plan specifies the actions that must be taken if an accident or spill should occur. Regulations promulgated pursuant to Pennsylvania's Clean Streams Law require immediate notification to DEP if a discharge or spill threatens waters of the Commonwealth or has the potential to damage property.

Blow out preventers are required when well head pressures or natural open flows are anticipated at the well site that may result in a blow-out. This would include hydraulic fracturing and post frac cleanout operations as these operations occur under pressures at the surface. The proposed regulations require a second set of BOP actuators in instances where the pressure rating exceeds 3000 psi that are not associated with the rig hydraulic system to be located away from the rig so that the BOP can be operated if control of the well has been lost.

Briefly describe how surface controls associated with hydraulic fracturing, such as dikes, pits or tanks, meet Sections 5.5 and 5.9 of the guidelines.

BOGM regulations pertaining to pits and tanks have been subject to previous STRONGER reviews. BOGM regulations at 25 Pa. Code 78.56 and 57 specify the requirements for temporary storage of pollutional substances and wastes – including stimulation fluids and the associated flow back. These substances must be contained in pits or tanks that are structurally sound, protected from unauthorized acts and constructed and maintained with sufficient capacity to contain all pollutional substances and wastes which are used or produced during drilling, altering, completing and plugging the well.

Pits and open tanks must maintain 2 feet of freeboard. The subbase of any pit must be free of rocks or debris and the pit must be lined with an impermeable liner that is of sufficient strength and thickness to maintain the integrity of the liner. The liner shall be designed, constructed and maintained so that the physical and chemical characteristics of the liner are not adversely affected by the waste and the liner is resistant to physical, chemical and other failure during transportation, handling, installation and use.

Liners or secondary containment around tanks or other facilities storing pollutional substances are not required but are recommended practices.

Pits must be closed within 9 months of completion of well drilling. Free liquid must be removed from the pit and the chemical constituencies of any cuttings or residual waste that will be encapsulated in the pit must not exceed regulatory standards.

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Briefly describe how contingency planning and spill risk management procedures related to hydraulic fracturing meet Section 4.2.1 of the guidelines.

BOGM's contingency planning has been reviewed previously by STRONGER. As described above and per 25 Pa. Code § 78.55, prior to generation of waste, the well operator shall prepare and implement a PPC plan for the control and disposal of fluids, including top-hole water, brines, drilling fluids, additives, drilling muds, stimulation fluids, well servicing fluids, oil, production fluids and drill cuttings from the drilling, alteration, production, plugging or other activity associated with oil and gas wells.

Briefly discuss how hydraulic fracturing waste characterization requirements, including, as appropriate, testing of fracturing fluids, are consistent with Section 5.2 of the guidelines.

Hydraulic fracturing waste characterization requirements are provided through the Residual Waste Program implemented by the DEP Bureau of Waste Management. This Bureau provides a reporting mechanism for generators of waste hydraulic fracturing fluids via its Form 26R, *Chemical Analysis of Residual Waste, Annual Report by the Generator*. This form was recently modified to incorporate a comprehensive list of required analytical parameters for wastewater produced from the drilling, completion and production of Marcellus or other gas wells. For impoundments and tanks, the chemical analysis must represent the volume of wastewater stored in the impoundment or tank. If large volumes of water, wastewater or other fluids are added to an impoundment, a new chemical analysis must be performed that is representative of the impoundment.

Briefly describe how the waste management hierarchy contained in Section 5.3 of the guidelines (source reduction, recycling, treatment and disposal), including the provisions relating to toxicity reduction, are promoted for hydraulic fracturing.

The toxicity reduction policies of DEP have been previously reviewed by STRONGER and are equally applied to hydraulic fracturing activities. BOGM has been proactive in encouraging drilling operators and the generators of hydraulic fracturing fluid wastes, as well as other wastes associated with the drilling, completion and stimulation phases of well drilling, to develop and expand source reduction and recycling opportunities. Hydraulic fracturing fluids are being increasingly recycled for use at subsequent fracing operations at other wells, which reduces the amount of fresh water employed in the stimulation process. BOGM inspectors have instructed operators to improve, modify and/or better maintain their spill containment measures, which has reduced the amount of waste generated at the well pad.

Additionally, well servicing companies that perform hydraulic fracturing operations at well sites are developing more environmentally-friendly, or more "green" substitutes for certain additives employed in the fracing operation. This evolving process is supported by DEP.

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Briefly describe how the tracking of hydraulic fracturing waste disposed at commercial or centralized facilities meets the requirements of Section 5.10.2.3 of the guidelines.

As a residual waste, hydraulic fracturing waste generation, transportation and disposal tracking requirements are integrated into DEP's Residual Waste regulations. 25 Pa Code Chapter 287 specifies the reporting, recordkeeping and waste stream analytical requirements for generators of hydraulic fracturing wastes. Form 26R, described above, provides the analytical and reporting requirements for generators of hydraulic fracturing wastes. This form also requires information on the processing or disposal facilities that will accept the waste. 25 Pa. Code Chapter 299 provides standards for transportation of residual waste to a commercial or centralized facility. These include requirements for transportation to permitted facilities, accident prevention and contingency planning, emergencies, wastes from accidents and spills, recordkeeping and reporting, and appropriate signage on transportation vehicles. Waste haulers are required to be permitted and are subject to the requirements of the Department's Waste Transportation and Safety Program.

Finally, records pertaining to waste volumes and the location of disposal or recycling facilities are submitted annually to BOGM as part of an operator's annual waste and production reporting responsibilities.

Briefly describe how procedures in place for receipt of complaints related to hydraulic fracturing are consistent with Section 4.1.2.1.

The DEP home page prominently features a link to "Report an Incident" that provides phone numbers for the public to call if they observe a pollution event occurring. These phone lines are staffed 24 hours per day and designated DEP staff are on call to respond to emergencies at all times. Complaint reports are generated and transmitted to the appropriate DEP office for follow up investigations. If an emergency related to an oil or gas well is reported, BOGM inspectors are dispatched immediately on site.

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Reporting Associated with Hydraulic Fracturing [X.2.2]

Describe any required notification prior to, and reporting after completion of, hydraulic fracturing operations.

The Oil and Gas Act requires operators to notify DEP 24 hours prior to commencement of well drilling. The Department's proposed well construction regulations requires 24 hours notice prior to cementing the surface casing unless cementing will begin within 72 hours of drilling.

BOGM regulations currently require a completion report to be filed within 30 days of completion of well drilling. Information provided on this report includes: a perforation record, a stimulation record including fluid type and amount, propping agent information, average injection rate, open flow before and after treatment, rock pressure and well service company name. The proposed regulations will require a complete list of the chemicals used to frac the well along with the volume of recycled flowback water used. The Department is evaluating the need to require the exact proportions of the fracing chemicals as part of revisions to the proposed regulations.
There is no specific requirement for notification prior to fracing nor is this notice contemplated in the revised regulations.

Is notification sufficient to allow for the presence of field staff to monitor hydraulic fracturing activities?

While there is no mandated notification requirement, BOGM inspectors are aware of planned activities at the sites they inspect. BOGM welcomes any recommendation the STRONGER review team may have with this issue.

Describe reporting requirements for hydraulic fracturing activities and whether they include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded.

BOGM regulations currently require a completion report to be filed within 30 days of completion of well drilling. Information provided on this report includes: a perforation record, a stimulation record including fluid type and amount, propping agent information, average injection rate, open flow before and after treatment, rock pressure and well service company name. The proposed regulations will require a complete list of the chemicals used to frac the well along with the volume of recycled flowback water used. DEP is evaluating the need to require the exact proportions of the fracing chemicals as part of revisions to the proposed regulations.

Describe any mechanisms for disclosure of information on chemical constituents used in hydraulic fracturing fluids to the state in the event of an investigation or to medical personnel in the event of a medical emergency.

BOGM regulations at 25 Pa. Code §§ 78.55 and 91.34 require operators to develop and implement a preparedness, prevention and contingency plan (PPC).

The first objective in preparing and implementing PPC plan is for the operator to review their operations and identify all pollutional substance and wastes, both solid and liquid, that will be

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used or generated, and identify the methods for control and disposal of those substances or wastes.

As part of the PPC plan operators must list the chemicals or additives utilized and the different wastes generated during hydraulic fracturing. The PPC plan includes Material Safety Data Sheets, cleanup procedures, toxicological data and waste chemical characteristics. The approximate quantities of each material and the method of storage (sack, barrels, tanks, etc.) should be specified.

PPC plans should be available the well site and must be submitted to DEP upon request. When new operators apply for permits in Pennsylvania, BOGM staff request a copy of the operator's PPC plan prior to permit issuance as was the case with all Marcellus Shale well operators.
In addition, the Pennsylvania Worker and Community Right to Know Act, 35 P.S. §§ 7301-7320 provides: "Every employer shall make readily available, in every work area, the Material Safety Data Sheet for every hazardous substance or hazardous mixture to which the employees working in said work area may be exposed. The Material Safety Data Sheets shall be made available in such a manner and in such numbers as to give every employee in that work area easy and unhindered access to the Material Safety Data Sheets without permission or intervention of management or any supervisor."

Briefly describe how hydraulic fracturing information submitted that is of a confidential business nature, is treated consistent with Section 4.2.2 of the guidelines?

No confidential hydraulic fracturing is currently submitted to DEP. In the event that CBI is submitted, Pennsylvania's Right to Know Law contains provisions to protect this information.
The Right-to-Know Law, 65 P.S. §§ 67.101-67.3104 ("RTKL"), outlines when a Commonwealth agency must provide a "public record" to a person requesting a record under the RTKL. A "public record" is defined very broadly, with the two following relevant exceptions: (1) records that constitute or reveal a trade secret or confidential proprietary information, see 65 P.S. 67.102, 67.708(11); and (2) records exempt from being disclosed under any other Federal or State law or regulation, 65 P.S. 67.102.

Section 102 defines confidential proprietary information ("CPI") and trade secret as follows:

> "Confidential proprietary information." as "[c]ommerical of financial information received by an agency: (1) which is privileged or confidential; and (2) the disclosure of which would cause substantial harm to the competitive position of the person that submitted the information."
>
> "Trade Secret." Information, including a formula, drawing, pattern, compilation, including a customer list, program, device, method, technique or process that: (1) derives independent economic value, actual or potential, from not being generally known to and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use; or (2) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

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Section 707(b) of the RTKL outlines the procedure for production of records containing CPI or a trade secret. Under this section, a party that submits a record to a Commonwealth agency may include a written statement indicating that the record contains CPI or a trade secret. If the party has submitted a written statement with the record stating that it contains CPI or a trade secret, when a requester seeks that record the agency shall notify the party of the request. The party claiming CPI or a trade secret may then provide input on the release of the record. The agency then either denies the request or releases the record and must notify the party claiming CPI or a trade secret of its decision. If the Commonwealth agency denies the request for a record containing CPI or a trade secret, it bears the burden of demonstrating that the record is exempt from public access by the preponderance of the evidence.

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Staffing and Training [X.2.3]

Briefly discuss if, in addition to the personnel and funding recommendations found in Section 4.3 of the guidelines, state staffing levels sufficient to receive, record and respond to complaints of human health impacts and environmental damage resulting from hydraulic fracturing.

In 2009, BOGM increased its well permit fees for the first time since the Oil and Gas Act was enacted in 1984. Pennsylvania's oil and gas program is now completely funded by well permit fees. The increase in permit fees also allowed DEP to increase the size of its permitting, compliance and enforcement staff. Additionally, BOGM's orphan and abandoned well plugging program continues to be completely funded by a surcharge on operator's well permit fees. BOGM added 37 oil and gas staff in 2009 and opened a new Oil and Gas Office in Williamsport to serve the needs of a region that has and will continue to see increased Marcellus Shale activity over the next few years. In addition, in 2010 the Governor directed BOGM to hire an additional 68 staff in response to the continued dramatic growth of the Marcellus Shale development. This year BOGM also opened a new office in Scranton dedicated to oversight of oil and gas drilling in the northeastern counties.

The total complement of staff regulating oil and gas well development in Pennsylvania is 196 people. This number includes administrative and legal staff in addition to inspectors, permitting and management staff.

Describe staff training to stay current with new and developing hydraulic fracturing technology.

With the recent increase in staffing and the recognition that Marcellus Shale well development relies on techniques not traditionally used in Pennsylvania, training program have been developed to provide for ongoing training of new and veteran inspectors. Recent training to BOGM staff has been provided as follows:

1. **June 1-2, 2010 Ramada Inn, State College, PA: DEP technical services staff and inspectors.**
Conducted by Range Resources and Chesapeake Energy. Topics included well stimulation techniques, frac fluid composition/additives, frac operations and frac equipment.

2. **May 19-20, 2010, DEP Southwest Regional Office, Pittsburgh, PA: DEP technical services staff.**
Conducted by Schlumberger and Universal Well Services. Topics included (a) vertical and horizontal cement evaluation techniques; (b) an overview of vertical and horizontal logging solutions in the Marcellus - from open hole evaluation to hydraulic frac monitoring (both by Schlumberger); and (c) Marcellus fracs (Universal Well Services).

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3**. February 10-12, 2010, Universal Well Services, Meadville, PA: DEP technical services staff and inspectors.**
Conducted by Universal Well Services and Eastern Reservoir Services. Topics included frac design, fluids, and operations, flowback operations and fluids, water disposal issues, and training on pressure and forces.

Training programs tailored to well construction and completion practices, along with other training programs on safety, well site inspection, well plugging, etc. is also being developed and will be offered on an ongoing basis.

In addition to formal training sessions, bi-weekly conference calls and quarterly management meetings offer the opportunity to share information between regional staff on a more timely basis.

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Public Information [X.2.4]

Briefly describe how the state agency provides for dissemination of educational information regarding well construction and hydraulic fracturing to bridge the knowledge gap between experts and the public as provided in Section 4.2.2.2 of the guidelines. This is especially important in areas where development has not occurred historically and in areas where high volume water use for hydraulic fracturing is occurring.

Given the enormous interest in the development of the Marcellus Shale, opportunities for dissemination of educational information regarding well construction and hydraulic fracturing have been significant. Testimony has been given to the Pennsylvania Legislature on these subjects several times by Secretary Hanger, Deputy Secretaries Roberts and Hines as wells as by Bureau Directors Perry and Aunkst. Public speaking events and conferences attended by the above as wells as regional program managers and other BOGM staff have allowed for dozens of further engagement opportunities. Correspondence by letter, email and phone has been prolific and BOGM staff has answered all inquiries.

The well construction and TDS regulation developments described above have also provided an opportunity for DEP to receive and respond to thousands of comments by the public. Finally, BOGM maintains a website that has provided information regarding the chemicals used at Marcellus wells since 2007. This list has recently been updated and a description of the fracing process has also been added.

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Water and Waste Management Associated with Hydraulic Fracturing [X.3]

Fundamental differences exist from state to state, and between regions within a state, in terms of geology and hydrology. Describe how the state evaluated and addressed, where necessary, the availability of water for hydraulic fracturing in the context of all competing uses and potential environmental impacts resulting from the volume of water used for hydraulic fracturing.

Fracing can require large volumes of fresh water. Withdrawal of water from surface and groundwater sources has the potential to reduce stream flow to the point that thermal or other sources of pollution can occur. In 2002 the Water Resources Planning Act was enacted and required entities withdrawing more than 300,000 gallons over a 30 day period to register their water withdrawal. By registering water use, DEP began the process of tracking this activity outside the Susquehanna and Delaware River basins.

As a result of the development of the Marcellus Shale, in 2008 BOGM began requiring water management plans to identify where water would be withdrawn and the volumes of withdrawal. The purpose of this inquiry was to ensure that water quality standards are maintained and protected. By law, DEP cannot issue permits for an activity that will violate the laws it administers. Because large volume withdraws on surface water can, individually or cumulatively, impact water quality DEP must assure that excessive withdraws do not occur.
DEP follows water withdrawal guidance promulgated by the Susquehanna River Basin Commission to ensure uniform statewide evaluation of water withdrawals. The Delaware River Basin Commission also has a role in evaluating impacts within that river basin. The DRBC is in the process of promulgating regulations to address Marcellus Shale well drilling within its jurisdiction.

Describe how the availability and use of alternative water sources for hydraulic fracturing, including recycled water, is encouraged.

Unfortunately, Pennsylvania has many water sources that are impacted by acid mine drainage. Use of this water for hydraulic fracturing purposes is encouraged by DEP. DEP provides funding to watershed groups that treat AMD impacted water and DEP promotes the sale of this water for fracing purposes so that additional AMD impacted water resources can be restored.
Studies are underway by Pennsylvania Universities, such as the University of Pittsburgh, that are attempting to provide for the greater use of AMD impacted water for fracing and BOGM staff are participating in these endeavors. BOGM welcomes any recommendation the STRONGER review team may have with this issue.

Briefly describe how waste associated with hydraulic fracturing is managed consistent with Section 4.1.1. and Section 7 of the guidelines.

Wastewater generated by hydraulic fracturing operations is managed four different ways in Pennsylvania: 1) Treatment and discharge to surface water; 2) Underground injection wells; 3) Reused to frac additional wells and; 4) Transported to out of state facilities.

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The vast majority of the wastewater generated by traditional well drillers is treated at centralized waste treatment facilities that discharge to surface waters and have been operating in Pennsylvania for many years. A small percentage of this wastewater can be taken to Class II UIC wells. However, Pennsylvania only has 8 such wells and only 1 of those is a commercial disposal well.

Wastewater generated by Marcellus Shale operators can be taken to some (but not all) of these same facilities. Increasingly however, flowback is being reused to frac additional wells. Per the Susquehanna River Basin Commission:

The average recovery of fluids injected is 13.5%. Of the amount recovered, approximately 60% was reused and 40% was disposed of for treatment. The disposal quantity represents approximately 4% of the total amount withdrawn for hydraulic fracturing operations. Operators that reuse the flowback water employ various forms of onsite treatment ranging from filtering out sediment to removing barium and strontium.

The wastewater that must be disposed can only be taken to facilities that are approved to receive it. These facilities and include POTW's and centralized treatment facilities. Newer centralized treatment facilities have no discharge and instead sell the treated water back to operators. DEPs new Total Dissolved Solids (TDS) rule will further promote reuse and effective treatment of this wastewater.

TDS are comprised of inorganic salts, organic matter and other dissolved materials in water. They can be naturally present in water or the result of runoff, mining practices, oil and gas practices or industrial or municipal uses and treatment of water. TDS discharges contain minerals and organic molecules that can provide benefits such as nutrients, when moderately present, but also may contain contaminants such as toxic metals and organic pollutants. It is the inorganic TDS that are of concern and oil and gas wastewater is exceptionally contaminated with TDS. Pursuant to this new regulation, new and expanded facilities (net TDS load increase) that take oil and gas wastewater for treatment must meet strict discharge limits of 500 mg/l for TDS, 250 mg/l for chlorides, 10 mg/l for barium and 10 mg/l for strontium on a monthly average.

The problem of TDS is a very real threat to Pennsylvania's waterways. In 2008 and 2009, TDS levels exceeded drinking water standards along the Monongahela River which is a major source of drinking water. In early September 2009, excessive levels of TDS primarily from mining discharges were a primary factor in the environmental disaster in Dunkard Creek that wiped out 26 miles of the stream in Greene County. High TDS concentrations led to the death of at least 16 species of freshwater mussels and 18 species of fish. These concentrations, coupled with other factors such as temperature and nutrient concentrations, lead to colonization and growth of golden algae and an inhospitable environment for aquatic life. These algae released toxins to the water column that literally wiped out aquatic life, including endangered mussels. Dunkard Creek is an example of what can happen if TDS is not controlled, and the loss of this important public resource was an environmental and economic tragedy.

Recognizing the importance of addressing the TDS issue, the department took action and issued the Permitting Strategy for High TDS Wastewater Discharges on April 11, 2009. This strategy

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presented an approach that allowed the department, until the proposed regulation is finalized and approved, to effectively deal with the increasing demand for assimilative capacity in the surface waters to accept increasing new loads of TDS from current and new facilities. As a major part of this strategy, the department proposed revisions to its 25 Pa Code Chapter 95 Wastewater Treatment Requirements to eventually codify key treatment discharge limitations. This regulation was approved as a final regulation at the Environmental Quality Board's May 17, 2010 meeting and approved at the June 17, 2010 meeting.

Discuss how the state encourages the efficient development of adequate capacity and infrastructure for the management of hydraulic fracturing fluids, including the transportation, recycling, treatment and disposal of source water and hydraulic fracturing wastes.

The new TDS rule described above will promote the development of new treatment capacity for non-discharge treatment systems or treatment systems that discharge water that meets Safe Drinking Water Act standards for TDS. Treatment costs for these technologies are expected to decline as competition increases to provide services now that uncertainty regarding the passage of the rule has been lifted.

DEP fully supports complete reuse of flowback and produced water to frac additional wells. There are no additional permit requirements needed to re-use flowback at another well site and transportation of recycled water – either by truck or by pipeline - is not subject to permitting requirements beyond those already established for stream crossings and waste transporters.
BOGM welcomes any recommendation the STRONGER review team may have with this issue.

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3857 (NGG)(CLP) ECF Case

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STATE OF NEW YORK, Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	No. 11-CV-2599 (NGG)(CLP) ECF Case

DECLARATION OF ROBERT TUDOR

Robert Tudor declares as follows:

1. I am Robert Tudor, Deputy Executive Director of the Delaware River Basin Commission ("DRBC" or "Commission"), a position I have held since October 2001. My responsibilities include management of the agency's scientific, regulatory, planning and water resources management activities and programs, including supervision of three branch managers and 42 full-time employees.

2. I make this declaration in support of Defendants Delaware River Basin Commission and Carol R. Collier's (Sued in Her Official Capacity) Memorandum of Law in Opposition to Plaintiffs' Motions for Summary Judgment and Reply Memorandum of Law in Support of Their Motions to Dismiss in Civil Action No. 11-cv-3780, Civil Action No. 11-cv-3857 and Civil Action No. 11-cv-2599.

3. Upon the Commission's direction, I led an interdisciplinary team to research and investigate environmental impacts associated with the extraction and production of natural gas from shale and to develop draft regulations for consideration by the Commissioners to protect the surface water and groundwater resources of the Basin. The team, which continues to meet pending action by the Commission to approve regulations, consists of DRBC Branch Managers, Supervisors and select staff that bring engineering, geology, biology, planning and legal expertise to the above charge.

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4. Starting in late 2009 this cross-branch team met weekly to formulate strategic direction and report out task-specific progress. Broadly speaking, the team's activities included (a) benchmarking of impact assessment techniques, best management practices and regulatory approaches for natural gas development through research and dialogue with regulators, scientists and engineers across the country; (b) analysis of potential impacts specific to the Delaware River Basin and formulation of regulatory strategies to address them; and (c) gathering input from stakeholders through informal meetings and a formal public comment process that engaged all interested parties, including but not limited to industry operators, lessors, chambers of commerce, elected officials, business associations, environmental organizations and water and wastewater utilities. These categories of activities – benchmarking, analysis and solicitation of stakeholder input – were dominant in the sequence listed, but all – including soliciting input from the full range of stakeholders – occurred in all phases of the rule development and rule revision process.

Benchmarking Impact Assessment, Best Practices, and Regulatory Approaches In-Basin and Across the Nation

5. Our initial focus was on identifying lessons learned from other parts of the country subject to oil and gas exploration and production before discovery of a commercially viable Marcellus Shale "play" in the northeast. Another purpose of this process was to increase the staff's understanding of environmental and economic trade-offs associated with this activity.

6. An early resource for understanding the geographic scope of shale gas plays nationally was an Energy Information Administration map titled, "Lower 48 states shale plays."[1]

7. The benchmarking process helped staff to identify all vectors of potential impact to surface and groundwater from natural gas development – well siting and site clearing, well pad activities, use of open pits, well construction, well stimulation (hydraulic fracturing), pipelines, pad site restoration, and aging wells. This process facilitated development of a detailed comparison of best practices and regulatory approaches employed across governmental jurisdictions.

8. Staff's research also was useful in identifying novel and creative approaches for assuring environmentally sensitive development of the resource. A case in point was the State of Colorado Oil and Gas Conservation Commission Rules and Regulations, 2 CCR 404-1-216 ("Rule 216"), providing for use of a comprehensive drilling plan ("CDP") to identify foreseeable oil and gas activities in an area, facilitate discussion of potential impacts to

[1]DRBC relied on a November 2008 version of this map (on file with DRBC Secretary). The version accessed on the EIA web site on April 3, 2012 is marked "Updated May 9, 2011." *See* http://www.eia.gov/oil_gas/rpd/shale_gas.pdf.

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public health, safety, welfare, and the environment from these activities and identify practices to minimize such impacts.[2] The CDP concept was pivotal in influencing the staff regulatory conceptual framework, because it offered an approach that involved area-wide rather that site-by-site (or well pad by well pad) decision making, as well as an opportunity to infuse cumulative impact considerations into the fabric of the rule. Staff deemed such considerations to be particularly important in the Delaware Basin for two reasons: (a) the Marcellus Shale underlies much of the basin's headwaters region ("Upper Basin"), in which the main stem and tributaries are characterized by exceptionally high water quality and 70-percent forest land cover; and (b) the entire non-tidal river is impressed with a Special Protections Water "no measurable change" water quality management objective (*see* DRBC *Water Quality Regulations,* §10.3A.2.).

9. A partial list of reference documents identified and studied during the rulemaking process is attached as Exhibit "A".

10. While some members of the cross-branch team were documenting practices and technology around the country, others were closely scrutinizing existing state regulations in the basin states of Pennsylvania and New York, and the State Environmental Quality Review (SEQR) process and concurrent rulemaking by the New York State Department of Environmental Conservation (NYSDEC).

11. Regulation of shale gas development in both Pennsylvania and New York was in a fluid and dynamic mode during DRBC's rule development process. Staff analyzed the states' standards and their respective proposed standards relative to one another and to other states with shale gas regulatory programs across the country, as well as to the body of existing regulations of the Commission. An important focus for this component of the investigation was NYSDEC's draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program ("dSGEIS") (NYSDEC, September 2009) and later, the revised dSGEIS (NYSDEC, September 2011). Staff also followed closely two Pennsylvania rulemakings during 2009 and 2010 that addressed point and non-point source discharges associated with natural gas development activities. One of these rules in final form established water quality standards for Total Dissolved Solids (TDS) and oil and gas industry treatment standards for TDS and chlorides,[3] both of which constituents are present in high concentrations in hydraulic fracturing wastewaters; and the other amended Pennsylvania's erosion and sediment control and stormwater management regulations

[2] *See Comprehensive Drilling Plans Under COGCC's Amended Rules,* State of Colorado Oil & Gas Conservation Commission, December 2008. Available at: http://www.ourcolorado.org/what-we-do/energy/oil-gas/cogcc-fact-sheet-cdps-121808.pdf

[3] The draft rule was published on November 7, 2009 (39 Pa.B. 6467) and the final rule on August 21, 2010 (40 Pa.B. 4835).

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applicable to natural gas well pad sites.[4] In addition to reviewing the EIS documents and draft state agency regulations, DRBC staff monitored stakeholders' views on the states' draft documents.[5]

12. Early in the information-gathering stage of research, impact assessment and formulation of a conceptual framework for the Commission's draft natural gas regulations, the staff reached out to key stakeholders for their perspective and to learn of any regional-scale assessment products they might have developed. Attached as Exhibit "B" is a list of stakeholder meetings, well pad site tours, workshops and conferences in which members of the staff participated between 2008, when interest in natural gas development first appeared in the basin, through February of 2012.

13. As early as October of 2008 Commission staff met informally with representatives of environmental organizations the Delaware Riverkeeper Network (DRN), Catskill Mountainkeeper and Natural Resources Defense Council to discuss the concerns of these organizations and their members related to natural gas development. DRN staff met with Commission staff on February 11, 2010 to deliver a presentation containing detailed recommendations for natural gas regulatory requirements that in DRN's view would assure no significant impact to waters of the Delaware Basin. Notably, no discussion of interest in or need for a cumulative impact assessment occurred at this time. On May 6, 2010 Commission and DRN staff met again on the subject of Commission regulations.

14. On May 21, 2010, staff met with a tri-county coalition consisting of representatives from Delaware County, NY, Sullivan County, NY and Wayne County, PA who welcomed the arrival of a new industry. This group offered a PowerPoint presentation on the economic impacts of natural gas development and a forest impact assessment for the region.[6]

15. As the attached list of workshops, conferences, meetings and site visits amply demonstrates, the occasions described in the two preceding paragraphs were among many

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[4] *See* 39 Pa.B. 5131 (Aug. 29, 2009) (proposed rule, among other things, to update erosion and sediment control requirements, incorporate the Federal Clean Water Act "Phase II" NPDES permit requirements for stormwater discharges associated with construction activities, include post construction stormwater management requirements, establish riparian forest buffer provisions, and include provisions for a permit-by-rule option; and 40 Pa.B. 4861 (Aug. 21, 2010) (final rule, amending 25 Pa. Code Ch. 102, Erosion and Sediment Control and Stormwater Management).

[5] For instance, on the TDS issue, staff reviewed a report of the University of Pittsburgh's nonpartisan Institute of Politics, entitled, "Total Dissolved Solids Benchmarking Survey for submission to the Chapter 95 Task Force, a subcommittee of the Pennsylvania Department of Environmental Protection Water Resources Advisory Committee." February 2010. As to NYSDEC's dSGEIS, among other primary and secondary sources of comment, staff accessed the web site SourceWatch, for "Editor's Picks: Top 17 Flaws" in the dSGEIS identified by environmental advocacy organizations. Accessed September 13, 2011 at: http:/www.sourcewatch.org/index.php?title=2011_SGEIS_Flaws%28%NY%29.

[6] *See* Robin Wildermuth, MF, ACF, "Surface Impact Assessment of Gas Development in the NWPOA Region (undated). Mr. Wildermuth's firm is Woodland Management Services, Inc.

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in which staff members gathered the input of interested parties and co-regulators throughout the rule development process. Between late 2009, when I convened the cross-branch team, and December 9, 2010, when the Commission's draft rule was released for public comment, team members attended approximately one dozen meetings with industry representatives, eight with stakeholder groups including environmental NGOs, academics, local officials, and lessors; and seven with technical and managerial personnel of basin state and federal agencies, expressly to gather intelligence that would inform the scope and substance of the regulations. *See* Exhibit "B".

16. During the Commission's regularly scheduled public meetings between 2008 and 2010, in addition to conducting the Commission's other business, the Commissioners and staff regularly heard oral comment from diverse stakeholders on the full range of their concerns associated with natural gas development in the basin. This comment was offered during a segment of the business meetings that is routinely devoted to informal "Public Dialogue." The Commission's meeting Minutes and associated records show that during the September 24 and December 10 meetings in 2008, four of the Commission's five public meetings in 2009,[7] and all five of the meetings in 2010,[8] citizens availed themselves of the opportunity to address the Commissioners on the potential impacts of shale gas development. On some of these occasions, the sessions accounted for the majority of the meeting time. Notably, 23 speakers on natural gas-related issues were heard during Public Dialogue on July 11, 2009; 15 on March 3, 2010, and 82 on July 14, 2010. During the sessions when fewer individuals were heard, the Commissioners allowed each of them a generous amount of time.[9] These sessions afforded the rule drafters and decision-makers enormous exposure to the natural gas issues the Commission was being asked to address.

Issue-Specific Analysis

17. Another purpose of the weekly natural gas team meetings was to identify basin-specific analyses that would ground the rule. Staff focused on acquiring an understanding of the likely industry "footprint" in the basin: geographic scope of activity, number of wells and well pads within that scope, pace of development on an annual basis over a twenty-year time horizon, amount of water use by day, month and year, amount of hydraulic fracturing wastewater to be recycled and/or treated and discharged, wastewater treatment capacity of the region, etc. These analyses were assigned to staff with the appropriate technical expertise, and individual work products were vetted by the team. In addition, staff's

[7] The four meetings referred to were held on March 11, May 6, October 22, and December 9, 2009. The fifth was in large part devoted to the four-hour public hearing on a proposed water withdrawal by Chesapeake Energy PA, LLC to support natural gas drilling in the basin, a proposal that was subsequently withdrawn. Many commenters at the Chesapeake hearing spoke to natural gas development in the basin generally rather than addressing the specific proposed project. *See* hearing transcript of July 15, 2009 on file with the Commission Secretary.

[8] The five meetings took place on March 3, May 5, July 14, September 15, and December 8, 2010.

[9] Meeting records, including audio recordings of each session, are on file with the Commission Secretary.

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analytical findings were vetted by peers as part of the staff members' participation in conferences, workshops, and deliberations with state and federal partners. The net result of these activities was a strong platform for formulation of the regulatory approach and, ultimately, for the regulations advanced to the public on December 8, 2010.

18. Basin-specific analyses, with responsible team members noted, are listed below. A table showing the academic credentials of the Commission's professional staff is provided as Exhibit "C":

    a. Build-out Analysis: Calculation of the land area expected to be disturbed by natural gas well-drilling and production activity and the number of wells expected to be drilled annually in the Marcellus Shale within the Delaware Basin over a 20-year period. (Kovach, Sanchez)

    b. Water Use and Wastewater Generation: Estimate of the amount of water required on a daily basis to fracture the wells projected to be constructed over the build-out period; and estimate of the amount of natural gas wastewater expected to be generated by natural gas well stimulation and natural gas production in the basin over the build-out period. (Engle)

    c. Identification of High-Value Water Resource Landscapes ("HVWRLs"): Identification of HVWRLs (defined as landscape features essential to maintaining existing high water quality in the non-tidal river) for areas of the basin overlying the Marcellus Shale, using land cover data. (Sanchez)

    d. Hydraulic Fracturing Wastewater Analytical Analysis: Analysis of chemical constituents of spent hydraulic fracturing fluid (flowback water) from 19 Marcellus wells, based on data furnished by the Marcellus Shale Coalition, to determine the adequacy of existing DRBC regulatory thresholds and appropriate monitoring protocols. (Yagecic)

    e. Naturally Occurring Radioactive Materials (NORMs): Evaluation of the potential impacts associated with natural gas industry wastewater and solid waste containing NORMs. (Yagecic)

    f. Monitoring to Assure "No Measureable Change" in Special Protection Waters: Evaluation of best approaches for site-specific and ambient monitoring (constituents, monitoring locations, and techniques) to determine impacts of natural gas development activity in the basin when and if undertaken. (Fikslin, Yagecic)

19. The rule development team did not conduct these analyses in isolation. Staff consulted frequently with academic scientists, NGOs and industry experts. For example, as shown in

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Exhibit B, at meetings in July and September of 2010 the Commission's Monitoring Advisory Committee conferred on approaches to water quality monitoring in connection with natural gas-related activities.[10] Site-specific and ambient monitoring requirements were included in the Commission's draft and revised draft regulations.[11]

20. The North Atlantic Division Commander of the U.S. Army Corps of Engineers, who represents the federal government on the Commission, convened a two-day "Federal Coordination Summit" in October 2010 to focus federal agency attention and leverage the agencies' talent on issues associated with the potential environmental impacts of natural gas development in the Marcellus Shale. One objective of the meeting was to provide direction on the development of a cumulative impact assessment across the Marcellus Shale "fairway" (including the Delaware Basin, Susquehanna Basin, and Ohio Basin), in a process to be led by the U.S. Geological Survey (USGS). The two-day meeting also afforded the Commission staff an opportunity to obtain feedback on the draft regulations prior to their release to the public in December of 2010. Representatives from 20 different federal, state and other agencies participated.

21. Among the recommendations to emerge from two-day summit was formation of an interagency team to provide guidance to the U.S. Commissioner on Delaware Basin issues, to serve as an information conduit between agencies and to facilitate the formation of sub-teams for special projects. The formation of one such team was recommended to focus on the appropriate scope for the Marcellus Shale impact analysis to be developed by the USGS. It is my understanding that this team was created and is active. However, the Commission staff are not participants.

Rulemaking Public Process

22. The Commission's draft rule was posted on the Commission's web site on December 9, 2010. The public comment process that accompanied its release was designed to capture stakeholder input from all those who wished to offer it. A web-based system developed by the National Park Service was used to gather written comments electronically. The Commission also accepted comments by fax, U.S. Postal Service, private delivery service (UPS, FedEx) and hand delivery. The comment period ran for more than four months, from publication of the rule on December 9, 2010 through April 15, 2011. Public hearings

[10] The Commission engages qualified representatives from state and federal government agencies, industry, municipalities, academia, public health, and environmental/watershed organizations to inform the body's policy decisions. Advisory committee meetings are open to the public. The complete membership of the MAC is posted on the Commission's web site at http://www.state.nj.us/drbc/about/advisory/monitoring/committee.html. Plaintiff the Delaware Riverkeeper (Maya K. van Rossum) is currently a member, although she was not a member of this committee at the time of the cited meetings, in 2010.

[11] *See* Section 7.5(h)(2) of the December 9, 2010 draft regulations and Sections 7.4(e)(3)-(4) and 7.4(k) of the November 8, 2011 revised draft regulations.

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were conducted at three locations on two dates – Liberty, New York in the Upper Basin and Honesdale, Pennsylvania in the central portion of the basin on February 22, 2011, and Trenton, New Jersey in the lower portion of the basin on February 24, 2011. Afternoon and evening sessions were held at each location.

23. The Commission received approximately 69,000 written submissions on the draft rule.[12] Oral comment during the six hearing sessions ran to approximately 18 hours.[13]

24. Following publication of the draft rule, the interdisciplinary team continued to gather information on evolving industry practices through technical workshops, meetings, conferences and site visits, many of which are listed in Exhibit "B". Staff also met with stakeholder groups to answer questions about the draft rule and accept informal feedback on it. Exhibit "B" lists several of such meetings, including one with Plaintiffs DRN and Damascus Citizens for Sustainability ("DCS") on February 17, 2011.

25. Throughout 2011, the Commissioners and staff continued to accept informal comment on the rule and other topics related to natural gas during the Public Dialogue portion of the Commission's regularly scheduled business meetings.[14] As in 2008, 2009 and 2010, comments from citizens on the subject of natural figured prominently. Records on file with the Commission Secretary show that during the public meeting of September 21, 2011, the Commission heard from 70 speakers on this topic.

26. In reliance on the input the Commission received formally during the comment period and informally afterward, including consideration of NYSDEC's revised dSGEIS, released in a preliminary form in July of 2011 and in "final" form in September of 2011, the technical

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[12] Detail about the types of submissions (individual letters, multi-party sign-on letters, petitions, etc.), links to all of those submitted by organizations or public officials are provided on the Commission's web site at http://www.state.nj.us/drbc/programs/natural/draftregs-dec2010_comments.html. Instructions also are provided there for accessing any submissions not posted on the site.

[13] Transcripts for each of the public hearing sessions are available on the Commission's web site at http://www.state.nj.us/ drbc/library/documents/EDD5-19-09.pdf.

[14] The Commission's public meetings in 2011 took place on March 2, May 5, July 13, September 21, and December 8, 2011. The meeting of May 5, 2011 consisted largely of a public hearing on a withdrawal from Oquaga Creek in Broome County, New York proposed under the Commission's existing regulations by the company XTO Energy to support XTO's future natural gas projects in the region. The Commission has not acted on the proposal. By a Resolution for the Minutes on December 8, 2011, the Commissioners decided unanimously that, "Until the State of New York notifies the Commission that the State has completed its environmental impact review process with respect to potential adverse impacts associated with high volume hydraulic fracturing for natural gas development, the … Commission will postpone consideration of applications for the approval of water withdrawals within the State of New York to serve 'high volume hydraulic fracturing' as New York State defines that term." *See* complete resolution at http://www.state.nj.us/drbc/library/documents/ResForMinutes12-8-2011.pdf. This December 2011 action partially reversed the Commissioners' Resolution for the Minutes of May 5, 2010, which placed a moratorium on natural gas well pad projects targeting shale formations in the basin pending the adoption of new regulations, but provided that water withdrawal projects to support natural gas development would be processed "in due course." The official Minutes for the meeting of May 5, 2010 are available at: http://www.state.nj.us/drbc/library/ documents/5-05-10_minutes.pdf.

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staff revised and in my view improved the Commission's December 2010 draft rule substantially. The revised draft, posted on the Commission's web site on November 8, 2011, reflects the work of highly qualified people to: assemble the most current information possible about an evolving industry that is new to our region; identify the potential adverse impacts of this industry on the environment; inventory and consider the regulatory approaches used both within and beyond the Delaware Basin to prevent such impacts; determine the basin-specific effects of natural gas development that the Commission must address; craft effective strategies for protecting and preserving the high quality water resources of the Delaware Basin as that development activity proceeds; and throughout this process, listen carefully to the concerns of the many interest groups with a stake in the Commission's final action.

27. The draft rule may yet undergo changes to enhance its effectiveness and administration. The regulations will never be perfect and I fully expect that these rules will continue to evolve with continued input from all stakeholders. However, the draft natural gas rule now under consideration by the Commissioners is designed to provide for responsible management of water resources from withdrawal to discharge and to establish standards of planning and design to protect landscape features essential to maintaining existing high water quality in the non-tidal river.

28. The facts set forth in this Declaration are based upon my personal knowledge and experience as the Commission's Deputy Executive Director.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on 4/5/12

Robert Tudor
Deputy Executive Director
Delaware River Basin Commission

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EXHIBIT "A"
PARTIAL LIST OF DRBC STAFF REFERENCES USED IN BENCHMARKING FOR NATURAL GAS RULE DEVELOPMENT
(In Chronological Order)

1. *Natural Gas Drilling – Facts and Issues.* League of Women Voters of Tarrant County, January 2007. Available at: http://www.stwresources.com/_pdf/tarrant-county-drilling-facts.pdf

2. *Potential Development of Natural Gas Resources in the Marcellus Shale—New York, Pennsylvania, West Virginia, and Ohio*. National Park Service, December 2008. Available at: http://www.nps.gov/frhi/parkmgmt/upload/GRD-M-Shale_12-11-2008_high_res.pdf

3. *Rapid Impact Assessment Report—Impact Assessment of Natural Gas Production in the New York City Water Supply Watershed.* Hazen and Sawyer, September 2009. Available at: http://www.nyc.gov/html/dep/pdf/natural_gas_drilling/rapid_impact_assessment_091609.pdf

4. *Modern Shale Gas Development in the United States, A Primer*. U.S. Department of Energy, Office of Fossil Energy and National Energy Technology Laboratory, April 2009. Available at: http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf

5. *State Oil and Natural Gas Regulations Designed to Protect Water Resources.* U.S. Department of Energy, Office of Fossil Energy and National Energy Technology Laboratory, May 2009. Available at: http://www.energyindepth.org/wp-content/uploads/2009/03/oil-and-gas-regulation-report-final-with-cover-5-27-20091.pdf

6. *Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program – Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low Permeability Gas Reservoirs.* NYSDEC, September 30, 2009. Available at: http://www.dec.ny.gov/energy/75370.html

7. *Landscape Conservation Cooperatives – Responding to National-scale Stressors Northeast Region*. U.S. Fish and Wildlife Service, November 2009. Available at: http://www.fws.gov/northeast/science/pdf/LCCfactsheetR5_new.pdf

8. *Addressing the Environmental Risks from Shale Gas Development – Briefing Paper 1.* Worldwatch Institute – Natural Gas and Sustainable Energy Initiative, July 2010. Available at: http://www.worldwatch.org/system/files/pdf/natural_gas_BP1_july2010.pdf.

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9. *Developing the Marcellus Shale: Environmental Policy and Planning Recommendations for the Development of the Marcellus Shale Play in Pennsylvania.* Pennsylvania Environmental Council, July 2010. Available at: http://marcellus.pecpa.org/wp-content/uploads/2011/06/Developing-the-Marcellus-Shale.pdf

10. *Management Practices for Marcellus Shale Development: A Resource for Stakeholders.* Pinchot Institute for Conservation, September 17, 2010. Available at: http://www.pinchot.org/gp/Marcellus_Shale

11. *Ohio Hydraulic Fracturing State Review.* State Review of Oil and Natural Gas Regulations, Inc. (STRONGER), January 2011. Available at: http://www.strongerinc.org/documents/Final%20Report%20of%202011%20OH%20HF%20Review.pdf

12. Supporting documents for *Workshop: Assessing the Environmental Effects of the Marcellus Shale Gas Development: The State of the Science.* Pinchot Institute for Conservation, DRBC, and Philadelphia Academy of Science. April 1, 2011. Available at: http://www.pinchot.org/gp/EffectsofMarcellusShale

13. *Natural Gas Drilling in the Marcellus Shale: Potential Impacts on the Tourism Economy of the Southern Tier.* Prepared by Andrew Rumbach (then a Ph.D. candidate, Cornell University Dept. of City & Regional Planning) for the Southern Tier Regional Planning Commission, with support from the Appalachian Regional Commission. Posted April 14, 2011 at: http://www.stcplanning.org/usr/Program_Areas/Energy/Naturalgas_Resources/STC_RumbachMarcellusTourismFinal.pdf

14. *The Secretary of Energy Advisory Board Shale Gas Subcommittee Ninety-Day Report.* August 11, 2011. Available at: http://www.shalegas.energy.gov/resources/081111_90_day_report.pdf

15. *Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program – Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low Permeability Gas Reservoirs.* NYSDEC, September 7, 2011. Available at: http://www.dec.ny.gov/energy/75370.html. (DRBC staff also used the *Preliminary Revised dSGEIS*, which NYSDEC made available in July 2011.)

16. *Fact-Based Regulation for Environmental Protection in Shale Gas Development,* Energy Institute – University of Texas at Austin, February 2012 (Preliminary). Available at: http://www.geosynthetica.net/news/PDFs/2012/ei_shale_gas_regulation120215.pdf

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EXHIBIT "B"

DRBC STAFF INFORMATION-GATHERING, STAKEHOLDER OUTREACH AND INTER-AGENCY COORDINATION MEETINGS

DATE	ENTITY	TYPE	SUBJECT	DRBC PARTICIPANTS
DRBC INFO. GATHERING PRIOR TO ISSUANCE OF DRAFT REGULATIONS				
Meetings with Natural Gas Industry Representatives				
7/1/2008	CHESAPEAKE ENERGY	Meeting	Industry/Pre-application	CP, PB, WM
7/8/2008	CWS&S	Meeting	Industry/Pre-application	CP, GC, PB, WM
7/22/2008	STONE ENERGY	Site Inspection	Industry/Pre-application	DK, GC
7/23/2008	STONE ENERGY	Meeting	Industry/Pre-application	CP, DK, GC, WM
8/21/2008	STONE ENERGY	Meeting	Industry/Pre-application	CP, CRC, GC, WM
10/3/2008	CHESAPEAKE ENERGY	Meeting	Industry/Pre-application	CP, DK, WM
11/10/2008	STONE ENERGY	Meeting	Industry/Pre-application	CP, CRC, DK, RT, WM
11/19/2008	CHESAPEAKE ENERGY	Site Tour	Industry/Informational	DK
2/24/2009	POGAM, CHESAPEAKE, EAST RESOURCES	Meeting	Industry/Pre-application	CP, DK, WM
3/16/2009	RETTEW	Meeting	Industry/Pre-application	CP, DK, WM
3/20/2009	ELEXCO	Meeting	Industry/Pre-application	CP, DK, WM
4/2/2009	URS	Meeting	Industry/Pre-application	CP, CRC
6/17/2009	XTO SAIC	Meeting	Industry/Pre-application	CP, DK
6/23/2009	PENNSWOOD	Meeting	Industry/Pre-application	CP, DK, WM
9/4/2009	NEWFIELD ENERGY	Meeting	Industry/Pre-application	DK, EE
11/13/2009	STONE ENERGY	Meeting	Industry/Pre-application	CP, DK, EE, WM
11/30/2009	NEWFIELD ENERGY	Meeting	Industry/Pre-application	CP, CRC, DK, EE, KN
1/26/2010	NEWFIELD	Meeting	Industry/Pre-application	CP, DK, EE
4/9/2010	HESS	Meeting	Industry/Pre-application	CP, CRC, DK, EE, WM
4/26/2010	HRG	Meeting	Industry/Pre-application	CP, DK, EE, WM
5/19/2010	STONE ENERGY	Meeting	Industry/Pre-application	CP, CRC, DK, EE, WM
6/14/2010	AQUA PA	Meeting	Industry/Pre-Application	CP, DK, EE, WM
6/25/2010	NEWFIELD	Meeting	Industry/Pre-application	CP, CRC, PB, WM
6/28/2010	DRAGON SPRINGS	Meeting	Industry/Pre-application	CP, DK, WM
7/9/2010	HESS	Meeting	Industry/Pre-application	CP, CRC, KW, PB, WM
7/9/2010	INDUSTRY	Meeting	Industry/Pre-application	CP, CRC, DK, EE, JRS, KN, KE, PB, RT, WM
Meetings and Workshops with Member State and Federal Agency Staff				
10/8/2008	NYSDEC	Conference Call	Permit Coordination	CP, DK, WM
9/8/2008	USGS	Meeting	Marcellus Information Exchange	CP, DK, GC, RM
10/21/2008	EPA	Conference Call	Marcellus Information Exchange	CP
12/2/2008	NYS Attorney General	Conference Call	Permit Coordination	CP
12/16/2008	PADEP	Meeting	Permit Coordination	CP, CRC, DK, WM
12/17/2008	NYSDEC	Meeting	Permit Coordination	CP
2/10/2009	EPA	Conference Call	Marcellus Information Exchange	CP, DK
12/4/2009	PADEP	Meeting	Permit Coordination	CP, CRC, WM
3/30/2010	EPA	Meeting	Marcellus Information Exchange	CP, DK, JRS, KN, WM
4/7/2010	PA GEOLOGICAL SURVEY (John Harper)	Conference	Marcellus Education	EE

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DRBC STAFF INFORMATION-GATHERING, STAKEHOLDER OUTREACH AND INTER-AGENCY COORDINATION MEETINGS

DATE	ENTITY	TYPE	SUBJECT	DRBC PARTICIPANTS
7/28/2010	DRBC MONITORING ADVISORY COMMITTEE	Meeting	Status of Regulation Development and Monitoring Expectations	JY, TF, RL, RM, ES
8/11/2010	NYSDEC REGION 3 NEW PALTZ	Meeting	Permit Coordination	CP, CRC, EE, WM
8/12/2010	PADEP	Meeting	Permit Coordination	CP, CRC, EE, WM
9/13/2010	DRBC MONITORING ADVISORY COMMITTEE - Special Mtg	Meeting	Monitoring for natural gas development.	JY, TF, RL, RM, ES
9/30/2010	NORTHEAST REGIONAL WATER SECURITY SEMINAR	Conference	Several presentations on impacts of NG development including by SRBC	JY, TF
10/6-7/2010	DRBC Federal Agency Summit	Conference	Marcellus Information Exchange	Key staff
11/9/2010	NYSDEC	Conference Call	Permit Coordination	AS, CP, DK, EE, JC, JRS, KN, WM
11/17/2010	DNREC, FEDS, NJDEP, NYSDEC, PADEP	Conference Call	Permit Coordination	CP, CRC, DK, EE, JC, JRS, KW, RT, WM
Meetings With Non-Industry Stakeholders (Other than States)				
10/8/2008	DRN, CATSKILL MOUNTAINKEEPER, NRDC	Meeting	Marcellus Information Exchange	CP, DK, WM
2/11/2010	DRN	Meeting	Natural Gas Regulations	CRC
4/9/2010	RON BISHOP, Ph.D., Prof. of Biochemistry, SUNY ONEONTA	Meeting	Marcellus Information Exchange	CP, DK, EE, PB
4/16/2010	DCS, TEMPLE, MAYOR TILLMAN OF DISH, TX	Meeting	Marcellus Information Exchange	CP, CRC, EE, PB
5/6/2010	DRN	Meeting	Natural Gas Regulations	CP, CRC, DK, EE, RT, WM
5/10/2010	COMMON WATERS LAND PRIORITIZATION GROUP http://www.pinchot.org/gp/NLT_Model	Meeting	Upper Basin Landscape Prioritization	PV, FS, TF, NS, KR, KN, JRS
5/25/2010	DELAWARE, SULLIVAN, & WAYNE COUNTIES	Meeting	Marcellus Information Exchange	CP, CRC, RT, WM
6/2/2010	DRBC, USGS, ACADEMY OF NATURAL SCIENCES Ad hoc workgroup	Meeting	Monitoring for natural gas development.	JY, TF
6/2/2010	TEMPLE UNIVERSITY - Dr. Michael Boufadel and Dr. Jeffrey Featherstone	Meeting	Cumulative Risk Assessment for Extraction of Natural Gas from Marcellus Shale.	JY, TF, KN, JRS, CP, RM, RL, ES
7/20/2010	ENVIRONMENTAL NGO INTEREST GROUPS	Meeting	Marcellus Information Exchange	DK, JRS, RT, TF, WM
8/27/2010	NWPOA - LANDOWNER	Meeting	Marcellus Information Exchange	CP, CRC, EE, KN, RT
10/26/2010	WRF - NATGAS & WATER UTILITIES	Conference	Marcellus Education	CP
10/27/2010	WRF - NATGAS & WATER UTILITIES	Conference	Marcellus Education	CP
DRBC PUBLISHES DRAFT REGULATIONS 12/09/10				
1/14/2011	HALIBURTON	Meeting	Industry/Pre-application	CP, CRC, DK, EE, GC, JC, KN, RT, WM
2/7/2011	INDUSTRY	Meeting	Marcellus Information Exchange	EE
3/4/2011	INDUSTRY	Meeting	Industry/Pre-application	CP, CRC, DK, EE, JRS, KN, PB, RT, WM
5/18/2011	CHESAPEAKE TOUR	Site Tour	Marcellus Education	TF, GC, NS, KJW, RG, KN, WJM, JC, USACE
6/16/2011	CHESAPEAKE TOUR	Site Tour	Marcellus Education	RL, CP, EE, JRS, JP (Commr)
11/7/2011	CHESAPEAKE TOUR	Site Tour	Marcellus Education	RT, Rep. Holt
7/21/2011	INDUSTRY (MSC, XTO, MGCF)	Meeting	Industry/Pre-application	CRC, DK, EE, GC, JC, JRS, KN, RT, TF, WM
2/23/2011 2/24/2011	U.S. EPA	Workshop	Workshop on technical - analytical methods for Hydraulic Fracturing Study	TF
3/29/2011 3/30/2011	U.S. EPA	Workshop	Technical workshop on water resource maangement for Hydraulic Fracturing Study	EE
5/17/2011	NEW BRUNSWICK, PADEP, SRBC	Meeting	Marcellus Information Exchange	CP, EE
8/23/2011	NJ DEPT OF HEALTH, ENVIRONMENTAL CHEMISTRY LABORATORY SVCES.	Meeting	Analytical methods and support for NG monitoring.	TF, GC, RM, NS
8/25/2011	PSU - COOPERATIVE EXTENSION	Webinar	Marcellus Education	CP

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DRBC STAFF INFORMATION-GATHERING, STAKEHOLDER OUTREACH AND INTER-AGENCY COORDINATION MEETINGS

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EXHIBIT "C"

CREDENTIALS OF DRBC PROFESSIONAL STAFF (AS OF 4/2012)

EMPLOYEE	TITLE	LICENSE	DEGREE	DISCIPLINE	SCHOOL	EXPERIENCE (YEARS)
	Water Resources		BS	Forestry	Univ New Hampshire	
Barr	Asst		MS	Forest Economics	Univ Washington	7
	Water Resources			Environmental	Delaware Valley Coll	
Blum	Specialist		BS	Science	Science/Agr	16
			BA	Comp Literature	Yale College	
	Comm Secretary/		MRP	City/Reg Plan	Cornell Univeristy	
Bush	Asst Gen Counsel	Esquire/AICP	JD	General Law	Univ VA	22
Cavallo	Geologist	PG	BS	Geology	SUNY-Binghamton	30
		PP/AICP	BA	Env Biology	Smith College	
Collier	Executive Director	Sr Certified Ecologist	MRP	Reg Planning	Univ Penn	35
Damiani	Geologist/Hydrologist	PG	BS	Geology	Temple University	9
Engle	Geologist/Hydrologist	PG	BA	Natural Science/Geology	Lock Haven Univ	19
			BS	Biology	Upsala University	
			MS	Biological Sci	Univ Delaware	
Fikslin	Branch Head		PhD	Ecology	Rutgers University	34
Gore	Chief Adm Officer		BA	Bus Admin	Penn State University	41
			BA	Speech	Syracuse University	
Heinicke	Systems/Data Mgr		MA	Computer Info	LaSalle University	23
Kovach	Geologist/Hydrologist	PG	BS	Geology	Temple University	15
			BS	Biology	Lafayette College	
Limbeck	Watershed Scientist		MS	Zoology	Univ Arkansas	29
			BS	Biology	Northeastern Univ	
			MS	Microbiology	Rutgers University	
MacGillivray	Env Toxicologist		PhD	Env Sciences	Univ Massachusetts	18
	Water Resources/		BS	Geo-Env Engr	Penn State University	
McAleer	Civil Engineer	PE	BS	Civil Engineering	Drexel University	11
			BS	Civil Engineering	Newark College Engr	
Muszynski	Branch Head	PE	MS	Civil Engineering	Newark College Engr	37
			BE	Civil Engineering	City College NY	
			MS	Env Engineering	MIT	
Najjar	Branch Head	PE	PhD	Env Science	Rutgers University	33
			BS	Biology	Susquehanna Univ	
O'Hara	Communications Asst		BA	English	Susquehanna Univ	9
	Supervisor,		BS	Env Engineering	Wilkes University	
Pindar	Compliance Section	PE	MS	Env Engineering	Drexel University	12
			BS	Engineering	Unv Nac Del-Argentina	
			MS	Civil Engineering	Univ Minnesota	
Quinodoz	Engr/Scientist IV		PhD	Civil Engineering	Univ Illinois	31
Reavy	GIS Specialist		BS	Earth Science	Penn State University	20
			BA	Government	Lehigh University	
Rupert	Communications Mgr		MBA	Business Adm	Lehigh University	30
			BS	Geogrphy/Biolgy	Univ Miami	
			MCRP	Urban Planning	Rutgers University	
Sanchez	River Basin Planner		PhD	Env Policy	Rutgers University	28
Sayers	Supervisor, IT/Water Charging Section		BS	Env Studies	Univ Hertfordshire	14
	Supervisor,		BS	Civil Engineering	Tufts University	
Shallcross	Operations Section	PE	MS	Civil/Water Res Eng	Tufts University	19
			BS	Natural Resources	Cornell University	
			MS	Applied Statistics	Univ Calif-Santa Barbara	
Silldorff	Aquatic Biologist		PhD	Stream Ecology	Univ Calif-Santa Barbara	22
Sosi	Head, Fiscal Section	CPA	BS	Accounting	Glassboro State Coll	29
	Supervisor, Project		BE	Civil Engineering	Cooper Union	
Stoller	Review Section	PE, PP, BCEE	MS	Civil Engineering	New York University	41
			BS	Civil Engineering	Yonsei Univ (Korea)	
	Supervisor,		MS	Env Engr	Rutgers University	
Suk	Modeling Section		PhD	Env Engr	Rutgers University	22
			BS	BioResource Engr	Rutgers University	
Tessieri	Water Res Engr	PE, CFM	BS	Env Engr	Rutgers University	12
			BS	Env Science	Rutgers University	
Tudor	Deputy Exec Director	CPM	MS	Marine Biology	Univ Connecticut	35
			BA	Political Scnc	SUNY-Binghamton	
V'Combe	Watershed Planner	PP/AICP	MCRP	Env Planning	Rutgers University	19
Walsh	Water Resources/ Civil Engineer	EIT	BS	Civil Engineering	Penn State University	6
	Supervisor, Monitoring/Assessmt		BS	Env Engineering	Penn State Univ	
Yagecic	Section	PE	MS	Civil Engineering	Univ Illinois	23

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION, Plaintiffs, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and- AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	No. 11-CV-3780 (NGG)(CLP) ECF Case
DAMASCUS CITIZENS FOR SUSTAINABILITY, INC., Plaintiff, v. THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants, -and-	No. 11-CV-3857 (NGG)(CLP) ECF Case

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AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	
STATE OF NEW YORK, Plaintiff,	:	No. 11-CV-2599 (NGG)(CLP)
v.	:	ECF Case
THE UNITED STATES ARMY CORPS OF ENGINEERS et al., Defendants,	:	
-and-	:	
AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	

DECLARATION OF GARY WALTERS

Pursuant to 28 U.S.C. § 1746, I, Gary Walters, declare as follows:

1. I am the Chief of the Assessment Section of the Division of Water Quality Standards of the Pennsylvania Department of Environmental Protection (PADEP) and submit this declaration in support of the Defendants' Opposition to Plaintiffs' Motions for Summary Judgment.

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2. The Pennsylvania Department of Environmental Protection (PADEP) is the agency with the duty and authority to administer and enforce the Pennsylvania Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1-691.1001; Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177 as amended, 71 P.S. § 510-17; and the rules and regulations promulgated by the Pennsylvania Environmental Quality Board pursuant to these acts. PADEP is the agency in Pennsylvania responsible for implementing section 303 of the federal Clean Water Act, 33 U.S.C. § 1313.

Personal Background and Qualifications

3. I have been employed by the Pennsylvania Department of Environmental Protection since 1997 in positions of increasing responsibility in the field of water pollution biology and water resources after receiving a Master of Science Degree in Biology from Clarion University of Pennsylvania. Since 2010, I have been Chief of the Assessment Section of the Division of Water Quality Standards. In this position I supervise five staff that develop monitoring strategies and methods to evaluate monitoring data to determine attainment of protected water quality uses, pursuant to the Pennsylvania Clean Streams Law and the federal Clean Water Act.

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Purpose of this Declaration

4. The purpose of this declaration is to evaluate the statements made in the Declarations of Dr. Charles Silver and William Rudge, who authored expert declarations for the State of New York.

5. The facts set forth in this Declaration are based upon my personal knowledge and experience.

Summary of Conclusions

6. With respect to New York's concerns for the New York City Watershed, Dr. Silver's and Mr. Rudge's Declarations take insufficient account of geography. No surface waters in Pennsylvania flow into the reservoir watersheds, and only a very minor portion of water, only one small subbasin, flows from Pennsylvania into the interior of New York in the upper Delaware basin. Therefore, there is no potential for pollution to New York City reservoirs from natural gas development activities in Pennsylvania. Moreover, Dr. Silver and Mr. Rudge fail to take into account Pennsylvania's water quality regulations that provide environmental protection to all Pennsylvania waters, including boundary waters shared with New York. Because of their failure to consider geography or Pennsylvania's water quality regulations, Mr. Rudge's analysis, in paragraphs 13 and 22, and Dr. Silver's analysis, in paragraphs 21-23, 29 and 42 are seriously flawed and their conclusions

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that natural gas development in Pennsylvania will likely cause harm to New York are not valid.

Evaluation of the Upper Delaware Drainage Area

7. Mr. Rudge posits that "portions of Pennsylvania within the Delaware River Basin drain to the Upper Delaware River. If the Upper Delaware River were polluted by natural gas development activity from Pennsylvania there is a potential for harm to the State's portion of that River and its fish and wildlife...." *See* paragraph 22 of Mr. Rudge's Declaration.

8. There is only one area of land in the upper Delaware River basin where water from Pennsylvania flows into New York's interior. Sherman Creek basin lies within both Pennsylvania and New York. Headwaters for this basin are located in both Wayne County, PA and Broome County, New York. Water originating in the Pennsylvania portion of the basin flows across the state line into New York, at Hale Eddy, prior to flowing into the West Branch Delaware River in New York. These 12.3 square miles within Pennsylvania, out of a total of 3,413.2 square miles of the entire upper Delaware River basin, represent 0.4% of the entire basin shared with New York. The Pennsylvania portion of the Sherman Creek basin is the only water that can reach the interior of New York in the upper basin. *See* Map of Upper Delaware River Basin, Exhibit A.

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9. Dr. Silver's declaration broadly discusses how New York DEC might prohibit horizontal drilling and high volume hydraulic fracturing (HVHF) within the Delaware Basin. Specifically, the prohibition might apply to the Delaware portion of the New York City Watershed, which includes the Cannonsville, Neversink, Pepacton, and Rondout Reservoirs and their drainage areas. *See* paragraph 29 of Mr. Silver's Declaration.

10. The three New York City water supply reservoirs in the upper Delaware River basin, Cannonsville, Neversink, and Pepacton, collect surface water from a catchment that is entirely in the State of New York, no part of which is bounded by Pennsylvania. The "catchment" is the land area, upstream of the reservoirs, from which surface water is collected. The closest of the three reservoirs to the PA/NY state line at the West Branch Delaware River (Wayne County, Pa and Delaware County, NY) is the Cannonsville Reservoir which is 10 miles upriver of the state line on the West Branch Delaware River. The Neversink Reservoir is 43.4 miles upriver on the Neversink River and Pepacton Reservoir is 34.2 miles upriver on the East Branch Delaware River. There is no land area that drains from Pennsylvania to any of these three water supply reservoirs. Unless water was pumped from Pennsylvania to these reservoirs, which is not the case here, there is no potential for pollution from Pennsylvania surface waters to the New York City Watershed.

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See Drainage Basin Maps of Cannonsville, Neversink and Pepacton Reservoirs, Exhibit B.

11. The fourth mentioned reservoir, Rondout, lies within the Hudson River watershed, which is entirely within the state of New York and as a result, does not receive any surface runoff from Pennsylvania, despite the addition of water from the three Delaware River basin reservoirs through the Delaware and Neversink tunnels.

12. Dr. Silver alleges that natural gas development has caused significant pollution discharges to surface waters in Pennsylvania. *See* paragraph 21 of Dr. Silver's declaration.

13. Dr. Silver and Mr. Rudge fail to acknowledge that no drilling is being conducted in the upper Delaware River Basin, and therefore no pollution caused by drilling could have occurred in this basin. Moreover, they fail to consider that if drilling were to occur in this basin, under Pennsylvania's water quality regulations there may be no new discharges of wastewater into waters of the Commonwealth from any source associated with fracturing, production, field exploration drilling or well completion of natural gas wells except in accordance with strict treatment requirements. New discharges may only be authorized after treatment at a wastewater treatment facility and such discharge is strictly limited by regulation for pollutants of concern to levels that meet drinking water standards. For

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example, the discharge must be treated such that it may not contain more than 500 mg/l of TDS as a monthly average, nor more than 250 mg/l chlorides. *See* 25 Pa. Code section 95.10(b); *see also* 40 Pa.B. 4835 (August 21, 2010).

14. Under section 303(d) of the federal Clean Water Act, Pennsylvania is responsible for reporting to the U.S. Environmental Protection Agency (EPA) a list of water quality-limited (impaired) waters that require Total Maximum Daily Loads (TMDLs). This list is submitted to EPA for approval along with reporting that satisfies section 305(b) and 314 of the federal Clean Water Act. Together, the reporting is commonly referred to as the "Integrated Report." *See* http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556/integrated_water_quality_report_-_2010/682562

15. Within the Integrated Report, the list of impaired waters is commonly referred to as the "303(d) list" or "Category 5". A water segment is listed on Category 5 if available data and information indicate that at least one "designated use" is not being supported or is threatened, and a TMDL is needed. In Pennsylvania, designated water uses are imbedded in regulations which classify surface waters taking into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

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16. Out of an approximate 86,000 total stream miles in Pennsylvania, only 46.5 stream miles are listed on Category 5 for the source of "Petroleum Activities." These listed stream miles all lie within the Allegheny River basin and are primarily the result of wells drilled prior to regulation in the 1970s. Most of the wells were drilled in the early 20th century and are abandoned. None of these miles were listed as a result of activities in Marcellus Shale gas development. The abandoned wells from an earlier era produce discharges that include metals and acidity and are similar to discharges from abandoned mines.

17. The Allegheny River basin has an historical and present day heavy industrial sector. Chemicals associated with Marcellus Shale gas development activities and produced waters, however, have not been demonstrated to be the source of any impairment in the basin.

18. Dr. Silver alleges that levels of TDS exceeded federal and state drinking water standards in Pennsylvania's Monongahela River in October 2008 and that these exceedances represent "significant pollution problems" associated with natural gas development. *See* paragraphs 22 and 23 of Dr. Silver's declaration.

19. The Monongahela River in Pennsylvania was never placed on Category 5 of the Integrated Report for the cause of Total Dissolved Solids (TDS). Monitoring data in Fall 2008 showed exceedances of the applicable water quality criteria for TDS. Although monitoring data for TDS in the Fall of 2008 exceeded the

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applicable water quality criteria, no other exceedances were documented since that timeframe. Also, additonal monitoring and data analysis demonstrated that the source for that Fall data of high TDS was based on mine drainage. *See* "Evaluation of High TDS Concentrations in the Monongahela River," prepared for Marcellus Shale Committee by Tetra Tech NUS, Inc., Foster Plaza 7, 661 Andersen Drive, Pittsburgh, Pennsylvania 15220, January 2009. http://marcelluscoalition.org/wp-content/uploads/2010/06/Tetra_Tech_TDS_Report.pdf

20. The Monongahela River is listed for "other inorganics" on Category 5 of the Integrated Report. "Other inorganics" refers to high sulfates, relating to the mining industry and not to the natural gas industry.

21. Dr. Silver further alleges that bromide concentrations in the Monongahela River recorded at elevated levels during 2008 represent "significant pollution problems" associated with natural gas development. *See* paragraphs 22 and 23 of Dr. Silver's declaration.

22. Dr. Silver's reference to the recording of elevated concentrations of bromide is too vague and no such data is included in the report provided in footnote 30 of his Declaration.

23. Mr. Paul Handke's report, "Trihalomethane Speciation and the Relationship to Elevated Total Dissolved Solid Concentrations Affecting Drinking Water

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Quality at Systems Utilizing the Monongahela River as a Primary Source During the Third and Fourth Quarters of 2008," did not conclude that bromide found in the Ohio River basin were attributed directly to Marcellus Shale gas development. Bromide is known to be found in industrial chemicals and agricultural chemicals. Also, according to Mr. Handke's report, lower than average river flows in 2008 may have contributed to increased concentrations of bromide. The report concludes that the sources of bromide contributing to the seasonal increases in brominated trihalomethanes (THMs) are unknown.

24. Pennsylvania monitors bromide monthly on the Monongahela River at its water quality network stations (WQNs). Concentrations have remained relatively constant at low levels. *See* Monongahela River WQN Bromide Concentrations, Exhibit C.

25. Mr. Rudge posits that water pollution has been implicated as a major cause of decline of the dwarf wedge mussel in the upper Delaware River basin. *See* paragraph 13 of Mr. Rudge's Declaration. *See also* paragraph 42 of Dr. Silver's Declaration.

26. New York's 2010 Integrated Report lists the West Branch Delaware, Lower, Main Stem, which is immediately below the Cannonsville Reservoir, as impaired due to hydrologic modifications associated with flow management.

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27. According to the United States Fish and Wildlife Service (USFWS) 1993 Dwarf Wedge Mussel *Alasmidonta heterodon* Recovery Plan, the four primary factors for the decline of the dwarf wedge mussel are: impoundments, pollution, riverbank alteration and siltation. A 2005 study by USFWS found that natural events, such as flooding following extreme weather events have also imperiled the dwarf wedge mussel (USFWS. 2005. Dwarf Wedge mussel *Alasmidonta heterodon* 5-year Review: Summary and Evaluation.)

28. Since there is currently no Marcellus Shale gas activity in the upper Delaware River basin, that industry cannot be responsible for the existing decline of the dwarf wedge mussel in the upper basin.

29. Dr. Silver's and Mr. Rudge's failure to consider Pennsylvania's protective water quality regulatory program and the geography of the Pennsylvania and New York border region in the upper Delaware basin render their conclusions invalid and unreliable.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 4-4-2012

Gary Walters

Gary Walters

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EXHIBIT A

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Upper Delaware River Basin

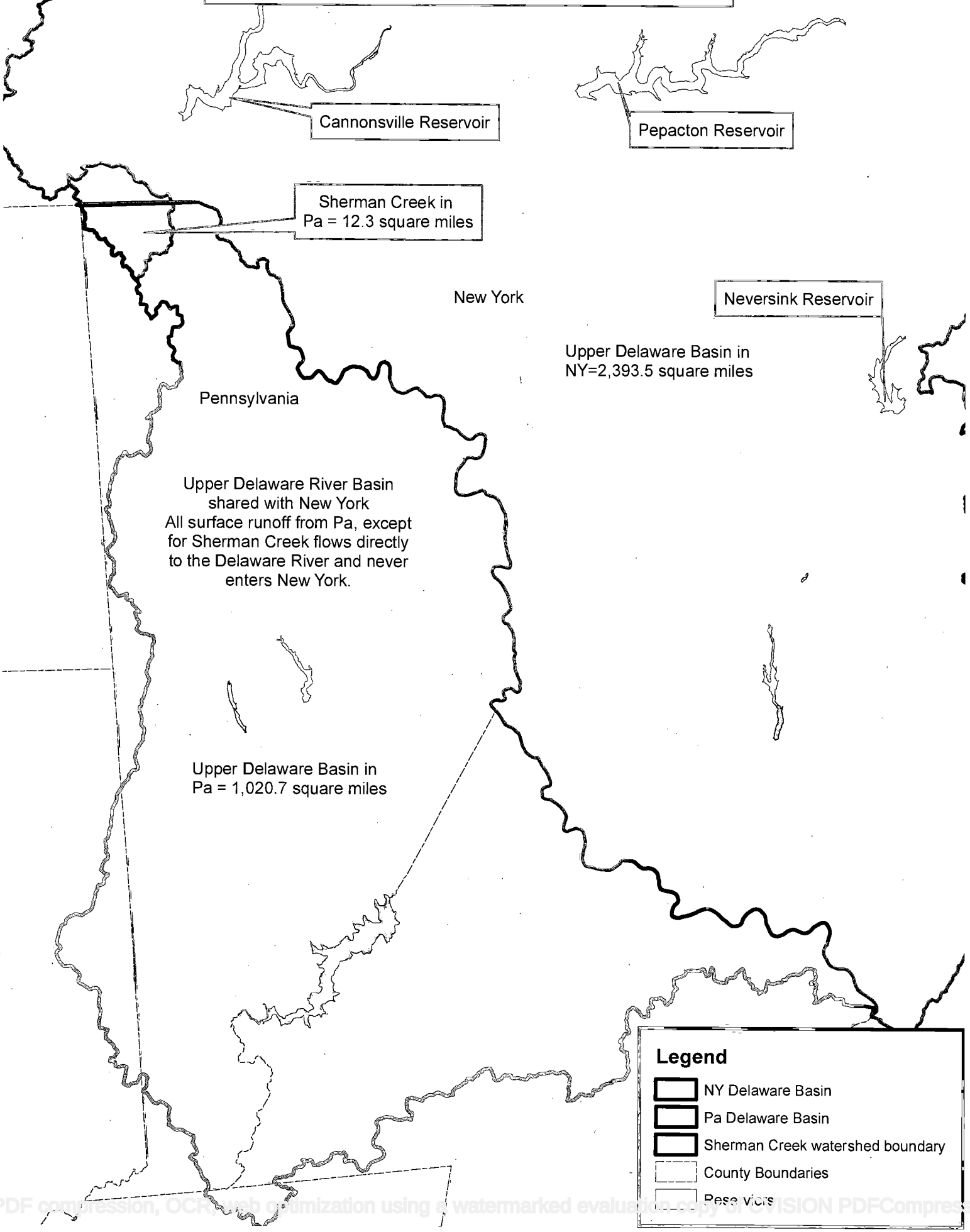

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EXHIBIT B

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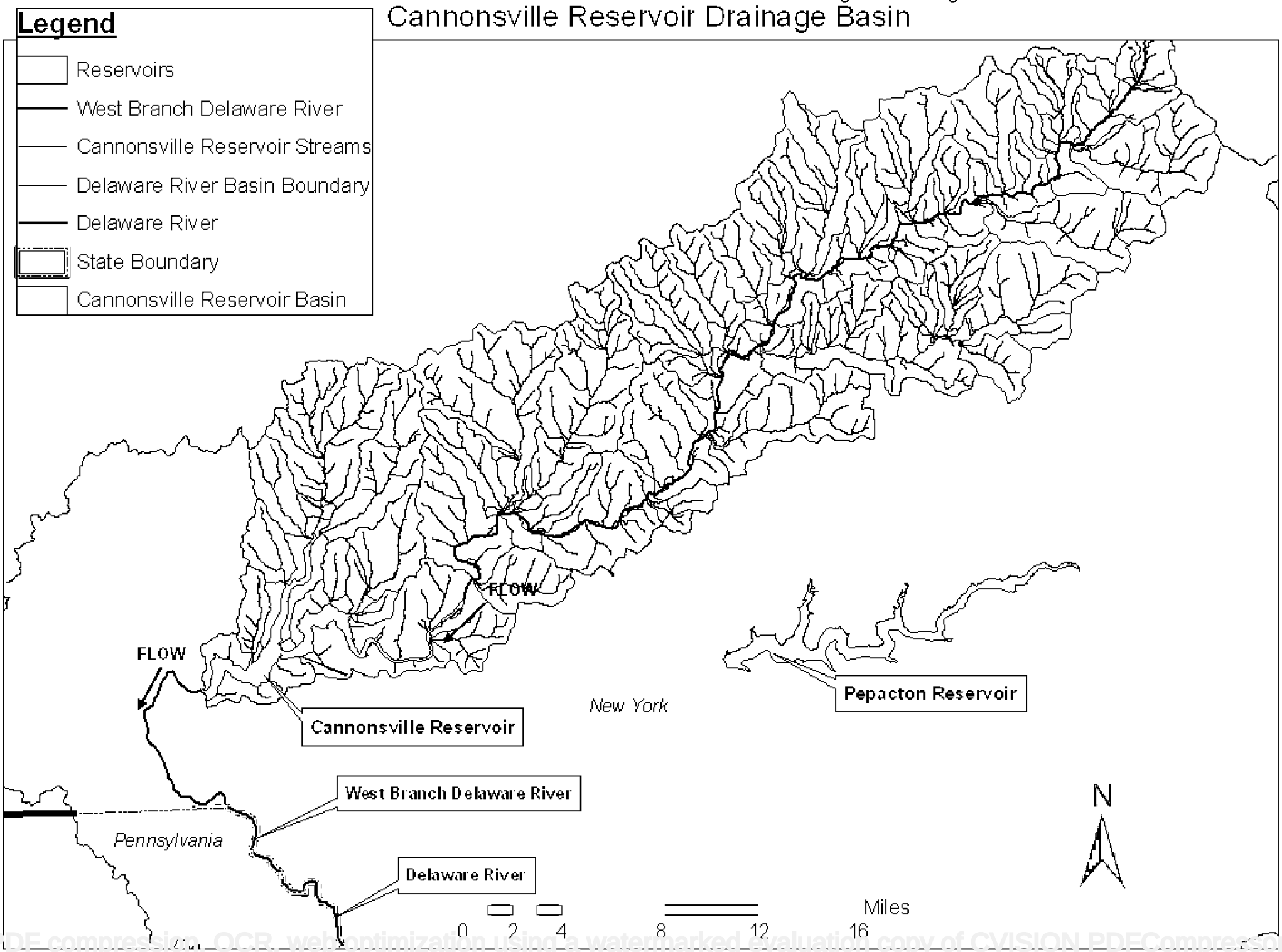

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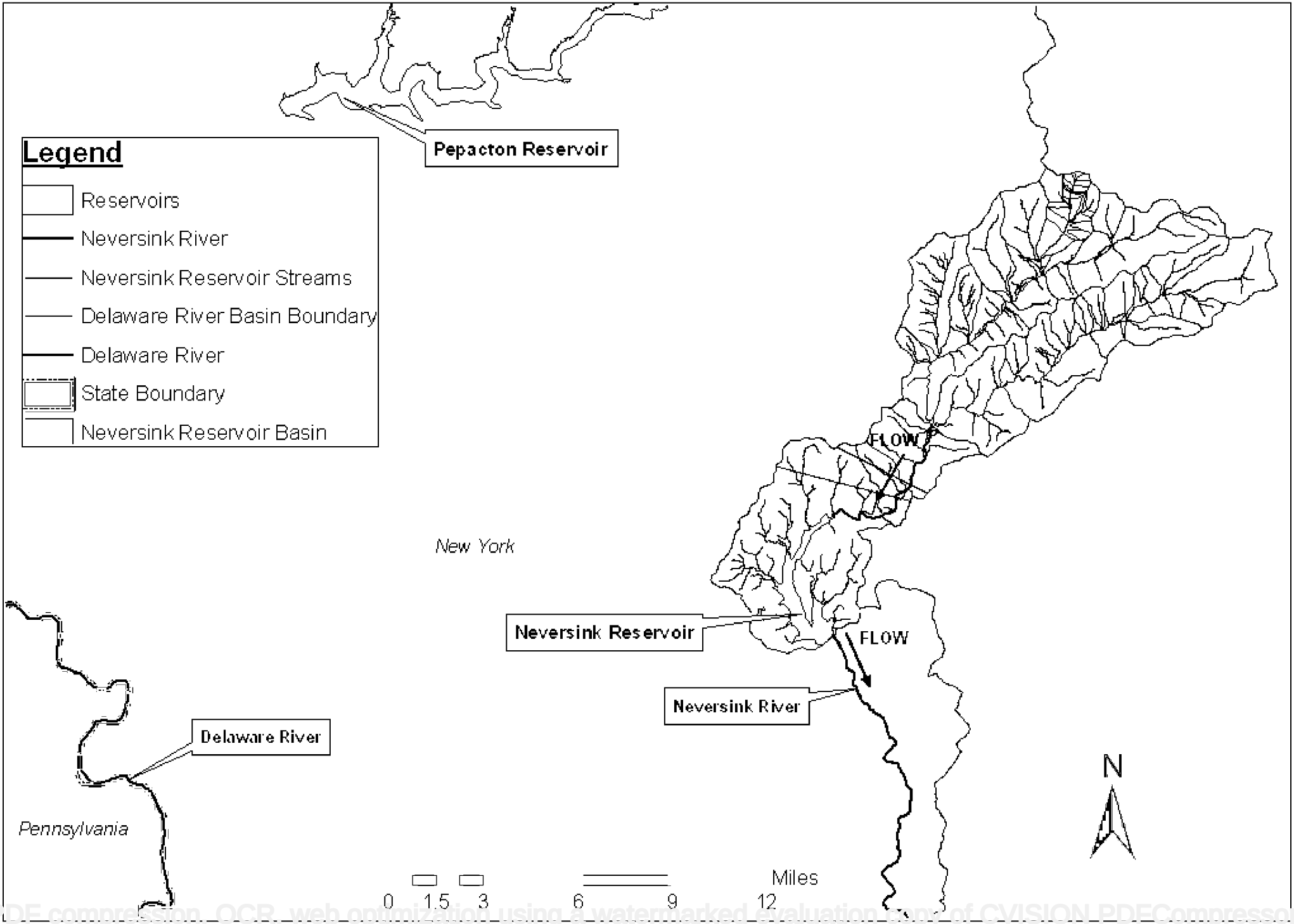
Neversink Reservoir Drainage Basin



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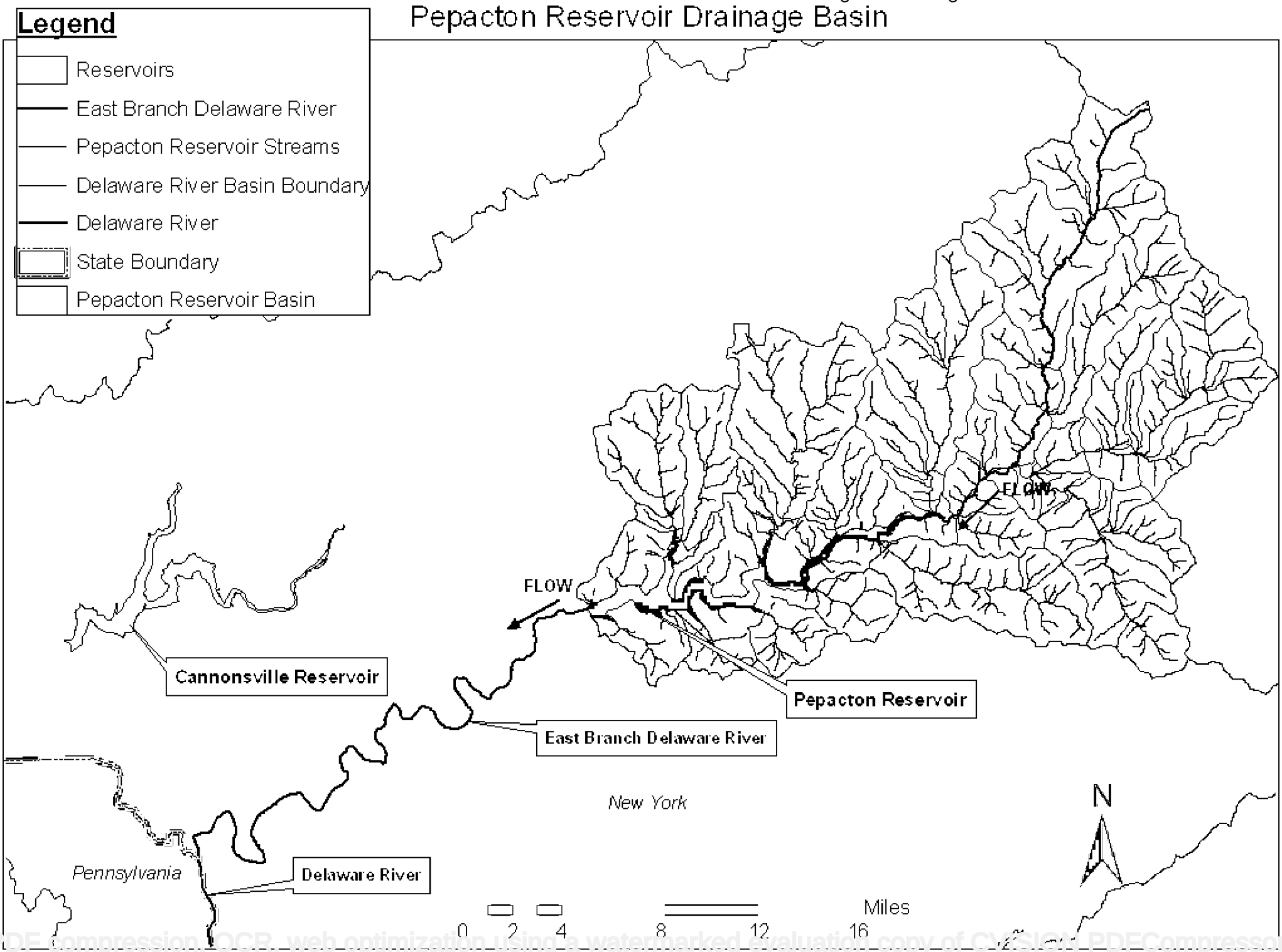

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EXHIBIT C

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Monongahela River WQN Bromide Concentrations

WQN Station 701 at Elizabeth, Pa

Date	Amount	Units
11/18/2010	127.9	µg/L
12/15/2010	59.3	µg/L
01/20/2011	110.6	µg/L
02/14/2011	<50*	µg/L
03/08/2011	<50*	µg/L
04/27/2011	<50*	µg/L
05/25/2011	<50*	µg/L
06/08/2011	60.84	µg/L
07/19/2011	97.12	µg/L
08/03/2011	106	µg/L
09/14/2011	<50*	µg/L
10/17/2011	56.52	µg/L
12/13/2011	<50*	µg/L
Average**	**70.64**	µg/L

* Indicates quantity is below method detection limit.

** Values of <50 µg/L set at the detection limit of 50 µg/L.

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WQN Station 702 at Charleroi, Pa

Date	Amount	Units
10/05/2009	<200*	µg/L
11/05/2009	233	µg/L
12/01/2009	96.6	µg/L
01/21/2010	<50*	µg/L
03/09/2010	56.4	µg/L
04/05/2010	<50*	µg/L
05/05/2010	<50*	µg/L
08/03/2010	235.8	µg/L
09/09/2010	115.9	µg/L
10/04/2010	216	µg/L
11/08/2010	124.5	µg/L
12/06/2010	<50*	µg/L
01/03/2011	151.27	µg/L
02/03/2011	80.94	µg/L
03/03/2011	<50*	µg/L
04/28/2011	<50*	µg/L
05/11/2011	<50*	µg/L
06/15/2011	92.7	µg/L
07/18/2011	74.32	µg/L
08/03/2011	93.7	µg/L
09/12/2011	<50*	µg/L
10/12/2011	<50*	µg/L
12/06/2011	<50*	µg/L
01/23/2012	<50*	µg/L
Average**	**88.39**	µg/L

* Indicates quantity is below method detection limit.

** Values of <50 µg/L set at the detection limit of 50 µg/L.

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WQN Station 725 at Port Marion, Pa

Date	Amount	Units
11/17/2010	122.1	µg/L
12/16/2010	69.37	µg/L
01/24/2011	93.3	µg/L
02/24/2011	<50*	µg/L
03/28/2011	<50*	µg/L
04/28/2011	<50*	µg/L
05/25/2011	<50*	µg/L
06/23/2011	63.5	µg/L
07/28/2011	<50*	µg/L
08/17/2011	56.11	µg/L
09/20/2011	<50*	µg/L
10/20/2011	<50*	µg/L
11/03/2011	<50*	µg/L
12/08/2011	<50*	µg/L
01/12/2012	<50*	µg/L
Average**	**60.3**	µg/L

* Indicates quantity is below method detection limit.

** Values of <50 µg/L set at the detection limit of 50 µg/L.

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WQN Station 732 at Pittsburgh, Pa

Date	Amount	Units
11/17/2010	135.8	µg/L
12/16/2010	<50*	µg/L
01/24/2011	72.4	µg/L
02/24/2011	<50*	µg/L
03/28/2011	<50*	µg/L
04/28/2011	<50*	µg/L
05/25/2011	<50*	µg/L
06/23/2011	53.36	µg/L
07/28/2011	77.6	µg/L
08/17/2011	122.95	µg/L
09/20/2011	<50*	µg/L
10/20/2011	<50*	µg/L
11/03/2011	<50*	µg/L
12/08/2011	<50*	µg/L
Average**	**65.15**	µg/L

* Indicates quantity is below method detection limit.

** Values of <50 µg/L set at the detection limit of 50 µg/L.

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW YORK

Date of Service:
April 5, 2012

DELAWARE RIVERKEEPER NETWORK, the DELAWARE RIVERKEEPER, RIVERKEEPER, INC., the HUDSON RIVERKEEPER, and NATIONAL PARKS CONSERVATION ASSOCIATION,
Plaintiffs,

v.

THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*,
Defendants,

-and-

AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION,
Putative Defendant-Intervenors.

No. 11-CV-3780 (NGG)(CLP)

ECF Case

Oral Argument Requested

DAMASCUS CITIZENS FOR SUSTAINABILITY, INC.,
Plaintiff,

v.

THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*,
Defendants,

-and-

AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION,
Putative Defendant-Intervenors.

No. 11-CV-3857 (NGG)(CLP)

ECF Case

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STATE OF NEW YORK, Plaintiff,	:	No. 11-CV-2599 (NGG)(CLP)
v.	:	ECF Case
THE UNITED STATES ARMY CORPS OF ENGINEERS *et al.*, Defendants,	:	
-and-	:	
AMERICAN PETROLEUM INSTITUTE, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, and US OIL & GAS ASSOCIATION, Putative Defendant-Intervenors.	:	

DEFENDANTS DELAWARE RIVER BASIN COMMISSION AND CAROL R. COLLIER'S (SUED IN HER OFFICIAL CAPACITY) MEMORANDUM OF LAW IN OPPOSITION TO PLAINTIFFS' MOTIONS FOR SUMMARY JUDGMENT AND REPLY MEMORANDUM OF LAW IN SUPPORT OF THEIR MOTIONS TO DISMISS

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Cabinet Mountains Wilderness/Scotchman's Peak Grizzly Bears v. Peterson,
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Delaware Water Emergency Group v. Hansler,
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Greenpeace Action v. Franklin,
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Hanly v. Mitchell,
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Hess v. Port Authority Trans-Hudson Corp.,
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Izaak Walton League of America v. Schlesinger,
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Karst Environmental Education & Protection, Inc. v. EPA,
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Pennhurst State School & Hospital v. Halderman,
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Roanoke River Basin Association v. Hudson,
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Shahid v. Brooklyn Legal Services Corp.,
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Sierra Club v. Alexander,
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42 U.S.C. § 4332 43

42 U.S.C. §§ 4321-4347 1

Pub. L. 87-328, 75 Stat. 688 (Sept. 27, 1961) ..... passim

Fed. R. Civ. P. 56(d) 50

Fed. R. Evid. 702 5

STATE STATUTES AND CODES

N.J. Admin. Code § 7:14A-2.3(b) 38

25 Pa. Code ch. 78 49

25 Pa. Code ch. 901 38

58 Pa. Cons. Stat. §§ 2301-3504 49

Pa. Legis. Serv. Act 2012-13 (H.B. 1950) 49

OTHER AUTHORITIES

107 Cong. Rec. S10,813 June 29, 1961 31

Bruce A. Ackerman et al., *The Uncertain Search for Environmental Quality* (The Free Press 1974) 24

Delaware River Basin Compact, http://www.state.nj.us/drbc/regs/compa.pdf ..... passim

Felix Frankfurter and James M. Landis, *The Compact Clause of the Constitution – A Study in Interstate Adjustments*, 34 Yale L.J. 685 (1925) 23, 24

NYSDEC, *Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulator Program*, Executive Summary 19 (Rev. Draft Sept. 7, 2011), http://www.dec.ny.gov/energy/ 75370.html 47, 48, 50

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I. INTRODUCTION

Through the present actions, Plaintiffs seek an order requiring various federal executive agencies and/or the Delaware River Basin Commission ("Commission" or "DRBC") to prepare an environmental impact statement ("EIS") pursuant to the National Environmental Policy Act of 1969 ("NEPA"), 42 U.S.C. §§ 4321-4347, in conjunction with DRBC's proposed natural gas regulations. On November 1, 2011, the DRBC and its Executive Director (collectively the "DRBC Defendants") and the various federal agencies and their executive officers (collectively the "Federal Defendants") filed motions to dismiss. As of that date, New York State ("NYS"), the Plaintiff in No. 11-2599, had not brought claims against the DRBC Defendants because, as NYS's original complaint correctly alleged, Congress expressly exempted the DRBC from the Administrative Procedure Act ("APA"), the statutory mechanism for bringing NEPA claims. (NYS Compl. ¶ 3).

In their brief in support of their November 1, 2011 motion to dismiss the claims in 11-3780 and 11-3857 (the "November 1 Brief"), the DRBC Defendants demonstrated that all claims against them should be dismissed because (1) Plaintiffs have no private right of action to enforce NEPA against the DRBC, and (2) the DRBC is a small, regional, federal-interstate compact agency with limited resources, not a "federal agency" subject to NEPA. The DRBC Defendants also showed that DRBC's Executive Director is not a proper party, and they incorporated by reference the arguments made by the Federal Defendants, including, among others, lack of standing and ripeness.

On November 22, 2011, NYS amended its complaint to add the DRBC Defendants as parties and to enhance its averments regarding standing. On January 12, 2012, the DRBC Defendants served a motion to dismiss NYS's Amended Complaint (the "January 12 Brief") on the grounds asserted in the November 1 Brief and additional grounds pertinent to NYS's control

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over activities within its borders and its obligations and actions as a signatory party to the Delaware River Basin Compact ("Compact"). The January 12 Brief focused on the allegations in the Amended Complaint regarding potential harms to New York City's ("NYC's") water supply, a very serious harm if it were to occur, but one that NYS is in a position to prevent regardless of any actions the DRBC may take.

NYS responded to the motions to dismiss and filed a motion for summary judgment in which it again dramatically changes direction. Buried on page 16 of its brief in support of its motion for summary judgment ("NYS Brief"), NYS asserts (emphasis added): "The argument that New York suffers no injury arising from drilling in the New York City watershed or elsewhere in New York in light of NYS DEC regulatory authority within the State . . . is not on point, *since New York is not relying on harm arising from activities in New York for purpose of these motions*." The New York City watershed lies entirely within NYS, upstream from any areas of the Delaware River and its tributaries allegedly threatened by activities in Pennsylvania. Consequently, NYS has taken the issue of harm to the NYC water supply off the table. No other Plaintiff has submitted expert declarations. Consequently, this case has been dramatically limited.

Notwithstanding the narrowing of this case, Plaintiffs' claims should be dismissed and their motions for summary judgment denied for lack of jurisdiction or for the substantive reasons set forth in the briefs of Defendants. To avoid unnecessary repetition, the DRBC Defendants incorporate their arguments in their November and January 12 Briefs, and the arguments in the Federal Defendants' briefs of January 12, 2012 and April 5, 2012 to the extent applicable to the DRBC Defendants.

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II. ARGUMENT

A. Plaintiffs Lack Standing To Bring The Claims In Their Complaints

As the DRBC Defendants previously asserted, Plaintiffs lack standing to bring NEPA claims against the DRBC Defendants with respect to DRBC's proposed regulations because of the speculative nature of the harms alleged. Notwithstanding Plaintiffs' responses and declarations, the alleged harms remain speculative.

1. Plaintiffs Must Establish The Elements Of Standing Pursuant To *Summers v. Earth Island Institute*

NYS and the Plaintiffs in Nos. 11-3780 and 11-3857 ("Environmental Group Plaintiffs") each cite a number of cases for their asserted proposition that, when NEPA violations are alleged, Article III's standing requirements are lowered. NYS Br. 15, 19-20, 21; Envtl. Groups Br. 32. But these NEPA cases predate *Summers v. Earth Island Institute*, 555 U.S. 488 (2009), which is controlling and which Plaintiffs utterly ignore.[1]

In *Summers*, the United States Supreme Court addressed the question of "whether respondents have standing to challenge the regulations in the absence of a live dispute over a concrete application of those regulations," *id.* at 490, and held the following:

> [D]eprivation of a procedural right without some concrete interest that is affected by the deprivation – a procedural right *in vacuo* – is insufficient to create Article III standing. Only "a person who has been accorded a procedural right to protect *his concrete interests* can assert that right without meeting all the normal standards for redressability and immediacy."

Id. at 496 (quoting *Lujan*, 504 U.S. at 555, n.7 (1992).

[1] The single post-*Summers* case they cite for the proposition is *Friends of Hamilton Grange v. Salazar*, No. 08-5220, 2009 WL 650262, at *14-15 (S.D.N.Y. Mar. 12, 2009), decided only nine days after *Summers*, which cites *Summers* and resolves the standing issue in favor of the defendant following the analysis in *Summers* set out herein.

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The *Summers* Court contrasted two types of claims – one challenging the planned salvage-timber sale at a specific location in which the environmental group plaintiffs would have had standing, and one generally challenging a Forest Service regulation in which they did not have standing. Prior to a partial settlement, the plaintiffs had alleged that one of the organization's members had "repeatedly visited" a particular location where a salvage-timber sale was planned (the "Burnt Ridge site"), "had imminent plans to do so again," and "his interests in viewing the flora and fauna of the area would be harmed if the Burnt Ridge Project went forward without incorporation of the ideas he would have suggested if the Forest Service had provided him an opportunity to comment." *Id.* at 494. If that dispute had remained live, all parties agreed that the plaintiffs would have had standing. *Id.*

However, the project-specific claim was settled and the remaining claim "identified no other application of the invalidated regulations that threatens imminent and concrete harm to the interests of their members." *Id.* at 495. The latter claim is akin to Plaintiffs' claims in this case. Plaintiffs have identified no particular drilling permitted by the (draft) natural gas regulations that will cause their alleged injuries. *See id.* ("It is a failure to allege that *any* particular timber sale or other project claimed to be unlawfully subject to the regulations will impede a specific and concrete plan of Bensman's to enjoy the National Forests."). Of course, they cannot, given that the DRBC has yet to publish final natural gas regulations and the location of drilling sites, all of which are influenced by physical, environmental, economic, and regulatory factors is, at this time, wholly speculative.

2. NYS's Expert Declarations Do Not Satisfy The *Daubert* Standard And/Or Are Based On Disputed Issues of Material Fact

Both NYS and Environmental Group Plaintiffs have submitted declarations in support of their assertions regarding standing. Under *Summers*, standing should be denied because of the

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absence of a critical factual predicate – project-specific harms. But if the Court reaches the four declarations submitted by NYS setting out the expert opinions of Lyle Chinkin, Joel Schwartz, Charles Silver, and William Rudge, they must be excluded from the Court's consideration because the data and methodologies used by NYS's experts are unreliable and are inadequate to support their conclusions. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), teaches that "when an expert opinion is based on data, a methodology, or studies that are simply inadequate to support the conclusions reached, . . . Rule 702 mandate[s] the exclusion of that unreliable opinion testimony." *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 266 (2d Cir. 2002). The proponent of the expert testimony bears the burden of establishing its admissibility by a preponderance of the evidence. *Daubert*, 509 U.S. at 592 n.10. [2]

In response to the four expert declarations submitted by NYS, the DRBC Defendants have submitted expert declarations from Pennsylvania Department of Environmental Protection

[2] The principles of *Daubert* apply in the summary judgment context, just as at trial. *See Raskin v. Wyatt Co.*, 125 F.3d 55, 66 (2d Cir. 1997) ("The principles governing admissibility of evidence do not change on a motion for summary judgment."). "Under *Daubert* . . . , the district court functions as the gatekeeper for expert testimony." *Id.* The Supreme Court has identified relevant factors to consider, which focus on the methodology employed by the expert. *See Daubert*, 509 U.S. at 593-94. They arise out of Federal Rule of Civil Procedure 702, pursuant to which the district court must determine "whether the proffered testimony has a sufficiently 'reliable foundation' to permit it to be considered." *Campbell v. Metro. Property & Casualty Ins. Co.*, 239 F.3d 179, 184 (2d Cir. 2001) (quoting *Daubert*, 509 U.S. at 597). "In this inquiry, the district court should consider the indicia of reliability identified in Rule 702, namely, (1) that the testimony is grounded on sufficient facts or data; (2) that the testimony 'is the product of reliable principles and methods'; and (3) that 'the witness has applied the principles and methods reliably to the facts of the case.'" *Amorgianos*, 303 F.3d at 265 (quoting Fed. R. Evid. 702). "When an expert opinion is not supported by sufficient facts to validate it in the eyes of the law, or when indisputable record facts contradict or otherwise render the opinion unreasonable, it cannot support a jury's verdict." *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 242 (1993). "[N]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the *ipse dixit* of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered." *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

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("PADEP") officials Craig Evans, Kenneth Murin, Sean Nolan, Scott Perry, Eugene Pine, and Gary Walters, which describe the unreliability (and therefore inadmissibility) of NYS's experts' opinions and, at a minimum, show that genuine issues of material fact underlie NYS's expert opinions. As shown by the PADEP Declarations, PADEP has experience administering comprehensive natural gas regulations. The conflicting expert opinions, as set out in the declarations, are as follows:

- NYS's Chinkin Declaration concludes that "natural gas development in the Pennsylvania portion of the [Basin] would likely increase ozone levels in [NYS]". (Chinkin Decl. ¶¶ 3, 6.) Mr. Nolan evaluated Mr. Chinkin's declaration and concluded that Mr. Chinkin's methodologies used to model air quality – and hence his conclusions – are flawed. (Nolan Decl. ¶ 10.)

- NYS's Schwartz Declaration concludes that "increased emissions of ozone precursors in states that are generally upwind of New York, such as Pennsylvania, would result in increased ozone concentrations in New York's air, and would impair the health of New Yorkers." (Schwartz Decl. ¶¶ 3, 13.) Mr. Evans evaluated Dr. Schwartz's declaration and concluded that it "ignores many of the complexities related to the science of ozone formation and transport," thereby resulting "in a simplified and linear relationship between air contamination sources . . . and human health effects" that "does not exist in this, or any, case." (Evans Decl. ¶ 11.)

- NYS's Silver Declaration asserts that there is "broad consensus . . . that natural gas development employing HVHF has the potential to cause significant adverse environmental impacts and that an environmental impact analysis should be performed to asses those impacts and mitigate them." (Silver Decl. ¶¶ 8, 10.) Mr. Murin evaluated Dr. Silver's declaration and explains that "there is not a consensus as referenced in Dr. Silver's declaration." (Murin Decl. ¶ 14.)

- Dr. Silver also opines on the potential for water pollution associated with natural gas development to harm NYS. Mr. Murin evaluated this aspect of the Silver Declaration, as well, and concluded that they are "based on incorrect factual premises," ignore relevant Pennsylvania regulations, and "reach[] erroneous conclusions." (Murin Decl. ¶¶ 12-13.) Mr. Walters explains that Dr. Silver's declaration, in its concern for the NYC water supply, "take[s] insufficient account of geography" and of Pennsylvania's regulations; Mr. Walters demonstrates that "there is no potential for pollution to [NYC] reservoirs from natural gas development activities in Pennsylvania." (Walters Decl. ¶6.) Additionally, Mr. Perry demonstrates that "Dr. Silver's allegation that Pennsylvania failed to conduct a comprehensive environmental review of its natural gas regulations is unsubstantiated." (Perry Decl. ¶ 9.) Mr. Perry also shows that Dr. Silver "failed

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to acknowledge or consider Pennsylvania's robust and comprehensive regulatory structure for the development of unconventional wells." (*Id.*) Likewise, Mr. Pine concluded that "Dr. Silver fails to consider Pennsylvania's regulations relating to oil and gas wells" in asserting that Pennsylvania's well-casing technology will not prevent adverse environmental impacts. (Pine Decl. ¶ 9.)

- NYS's Rudge Declaration concludes that various natural resources in NYS "are at risk of injury because of the federal agencies' failure to perform environmental review pursuant to [NEPA]." (Rudge Decl. ¶ 3.) Mr. Walters establishes that Mr. Rudge's opinions suffer flaws similar to those affecting Dr. Silver's opinions: Mr. Rudge takes "insufficient account of geography" relevant to the connection between Pennsylvania's and NYS's water resources, and he "fail[s] to take into account Pennsylvania's water quality regulations that provide environmental protection to all Pennsylvania waters." (Walters Decl. ¶ 6.)

As discussed in detail in the declarations submitted by the DRBC Defendants, the NYS expert declarations in many respects do not meet the *Daubert* standard, and in other respects state "facts" that are disputed and cannot be resolved on summary judgment.

First, the opinions of Mr. Chinkin and Dr. Schwartz relating to *air pollution*, are based on estimation and modeling techniques that are not generally accepted in the relevant scientific community or otherwise reliable or scientifically valid:

- The methodology used by Mr. Chinkin to estimate the air pollution in NYS that would be caused by natural gas drilling in Pennsylvania "does not use actual air pollution modeling conducted on actual natural gas development sites to measure impacts on actual downwind receptors. . . . This method is not generally scientifically accepted, reliable or scientifically valid for determining emissions impacts. The estimation techniques used are scientifically suspect and are not generally scientifically accepted methods for determining the quantity of emissions or their impact. Consequently, Mr. Chinkin's conclusions that natural gas development in Pennsylvania would likely increase ozone levels in New York State are not supported by the facts or methodology he employed and are neither reliable nor scientifically valid." Nolan Decl. ¶ 31.[3]

- "Dr. Schwartz . . . uses a literature review to broadly discuss and conclude that there is a linear relationship between potential air emission sources in Pennsylvania and increased ozone concentrations, adverse health effects, higher

[3] As set forth in the next section, but equally applicable to the *Daubert* analysis, Mr. Chinkin's opinion also suffers from the flaw that it is based on a "Natural Gas Well Estimate Summary" that is, itself, essentially speculation. *See infra* Part II.A.3.

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> hospitalization rates, and Medicaid expenses in New York. However, no such linear relationship exists. A general literature review is not a generally scientifically accepted method for determining these issues." Evans Decl. ¶ 32.

The opinions of these experts do not conform to *Daubert*'s standards and should be excluded.

Second, the opinions of Dr. Silver and Mr. Rudge, relating to *water pollution*, are based on too thin a factual foundation to be reliable:

- "Because of their failure to consider geography or Pennsylvania's water quality regulations, Mr. Rudge's analysis, in paragraphs 13 and 22, and Dr. Silver's analysis, in paragraphs 21-23, 29 and 42 are seriously flawed and their conclusions that natural gas development in Pennsylvania will likely cause harm to New York are not valid." Walters Decl. ¶ 6.

- The expert opinion of Dr. Silver "ignores or reflects a critical lack of familiarity with Pennsylvania's stormwater regulatory programs." Murin Decl. ¶ 34; *see also* Perry Decl. ¶ 9 ("Dr. Silver's allegation that Pennsylvania failed to conduct a comprehensive environmental review of its natural gas development regulations is unsubstantiated."); Pine Decl. ¶ 9 ("Dr. Silver fails to consider Pennsylvania's new regulations relating to oil and gas wells . . . . Because Dr. Silver did not consider these regulations . . . his conclusions are invalid. Therefore, the alleged impacts discussed in Dr. Silver's Declaration are not substantiated. Dr. Silver's analysis . . . and his conclusions that natural gas development in Pennsylvania will likely cause harm to New York are unsupported.").

Thus, the conclusions of these experts should not be considered by the Court.[4]

3. Even If Considered By The Court, Plaintiffs' Declarations Do Not Establish That, Absent A NEPA Analysis By DRBC, They Will Suffer Actual Or Imminent Injury

In light of the physical, economic, political, and transactional variables that will affect the quantity and location of natural gas wells, Plaintiffs' declarations – including NYS's expert declarations and the Environmental Group Plaintiffs' members' declarations – do not establish

[4] If, contrary to the DRBC Defendants' evidence showing that the expert opinions proffered by NYS are unreliable, the Court finds that genuine issues of fact remain as to the reliability of NYS's expert opinions, then the Court should hold an evidentiary hearing. *See, e.g., Malletier v. Dooney & Bourke, Inc.*, 525 F. Supp. 2d 558, 581 (S.D.N.Y. 2007) ("The failure to hold a *Daubert* hearing may be an abuse of discretion when the admissibility ruling is tantamount to a ruling on summary judgment and there are substantial disputed issues of fact that are pertinent to the reliability inquiry.").

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that Plaintiffs will suffer actual or imminent injury caused by DRBC's publication of natural gas regulations absent prior completion of an EIS.

NYS relies on the DRBC's "Natural Gas Well Estimate Summary" for its "future injury in fact" argument. *See* NYS Br. 15-16 (citing Chinkin Decl. ¶¶ 22-24). The Chinkin Declaration relies, for its upper and lower estimates of the number of wells to be drilled per year, on the "Natural Gas Well Estimate Summary" developed by the DRBC. Chinkin Decl. ¶¶ 23-26. But the "Natural Gas Well Estimate Summary" states a broad range of the number of wells that may be drilled upon promulgation of final regulations by the DRBC, starting with zero. It notes multiple uncertainties and only "a few specific known facts." *See* DRBC Natural Gas Well Estimate Summary, at 1 (Jan. 27, 2012), Bein Decl. Ex. P. The "Estimate Summary" assumes that "NYS will not allow such drilling to occur," but does not take into account "[t]he effect on natural gas well development in the [Basin] of other regulations that may be adopted by NYSDEC and other agencies of the Basin states, the DRBC and municipalities," as those regulations "remain[ed] uncertain." *Id.* at 2. That is, importantly, the "Estimate Summary" made no effort to determine, for example, in which areas drilling might be prohibited pursuant to the DRBC's proposed natural draft regulations. It therefore does not provide relevant information on the number of wells that will be installed if the proposed DRBC regulations are adopted in their present form, let alone their location.

Similarly, while the Environmental Group Plaintiffs have proffered declarations regarding the leasing of their neighbors' land for drilling or of exploratory drilling on their neighbors' land, *see, e.g.*, Swartz Decl. ¶¶ 11-12; Kowalchuck Decl. ¶¶ 6-7; Yeaman Decl. ¶ 16; Westfall Decl. ¶ 6; Arrindel Decl. ¶ 4, they also have not – and cannot – establish that drilling likely to harm them or their property is "actual or imminent, not conjectural or hypothetical,"

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Lujan, 504 U.S. at 560, in any of these locations. These declarants, too, ignore any effect the DRBC's proposed natural gas regulations would have on any future drilling, the likelihood that industry may decide that drilling is not economically viable, and the possibility that gas may not be found at the locations discussed. *See* DRBC Natural Gas Well Estimate Summary, at 2 (noting the uncertainty associated with the physical, economic and political variables, as well as the degree of success of natural gas companies in obtaining and maintaining leases from mineral rights holders).

In summary, *Summers* controls the standing analysis in this case. Plaintiffs have established no "actual or imminent" injury that would be caused by DRBC's publication of final natural gas regulations absent an EIS. As of this date, there is no production well project that has been approved and no natural gas extraction from shale formation is taking place in the Basin. NEPA does not afford Plaintiffs a "concrete interest" sufficient to base standing on the procedural injury alone, and their declarations are insufficient to establish that DRBC's publication of natural gas regulations absent prior publication of an EIS would cause "actual or imminent" injury to their concrete interests.[5] Their claims should be dismissed.

[5] Relatedly, while "threatened rather than actual injury can satisfy Article III standing requirements," *Friends of the Earth v. Gaston Copper Recycling Corp.*, 204 F.3d 149, 160 (4th Cir. 2000), *see* Envtl. Groups Br. 31, the allegedly threatened injury in this case does not rise above the speculative and so cannot satisfy Article III's requirements. In *Gaston Copper Recycling*, the plaintiffs had "produc[ed] evidence that Gaston Copper is polluting [an environmental group member's] nearby water source, [the environmental group] has shown an increased risk to its member's downstream uses." *Id.* Gaston Copper Recycling was *actually polluting*, by discharging pollutants into the water. *Id.* at 157 ("The record is replete with evidence that Gaston Copper is fouling its receiving waters."). To the contrary, here, the DRBC has not yet approved any production well drilling – it hasn't even published final regulations – and so the question of whether there will be drilling that threatens the Plaintiffs, or where that drilling might be, is wholly speculative.

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B. The Doctrine Of Non-Statutory Review Cannot Substitute For A Cause Of Action In This Case

The Environmental Group Plaintiffs, confronted with the absence of a statutory cause of action against the DRBC Defendants for alleged NEPA violations, now attempt to maintain their claims under the doctrine of non-statutory review. Envtl. Groups Br. 15.[6] But that narrow doctrine does not provide them with a right of action at this stage of the DRBC's administrative action. As explained in detail in the DRBC Defendants' November 1 Brief, and as this Court has stated, "not all federal laws give rise to a private right of action that permits private parties to enforce federal laws by filing suit in federal court." *Shahid v. Brooklyn Legal Servs. Corp.*, Mem. Op., No. 03-3029 (E.D.N.Y. Nov. 10, 2003) (Garaufis, J.), *aff'd*, No. 03-9323 (2d Cir. 2004). Permitting judicial review at this time would negate the multiple circuit court holdings that NEPA is one of the statutes that does not provide a private right of action.

The narrow doctrine of non-statutory review relied on by Plaintiffs grew out of *Leedom v. Kyne*, 358 U.S. 184 (1958). In *Kyne*, the National Labor Relations Board directly violated an express provision of its organic statute, the National Labor Relations Act, which prohibited the Board from including professional employees in certain collective bargaining units without their affirmative vote. The Supreme Court held that the district court had jurisdiction to vacate the Board's determination to include the professional employees without first conducting a vote "because [it was] made in excess of [the Board's] powers." *Id.* at 188, 190-91. The Court emphasized that in *Kyne* (as distinguished by the Court from an earlier case in which review had

[6] NYS likewise urges application of the doctrine "as an alternative if the Court should find it does not have authority under the Compact or under any of the other statutory theories set out in the motion of the nongovernmental plaintiffs." NYS Br. 48. The arguments in this section apply equally to NYS. NYS alleges that Section 3.3(c) of the Compact provides a private right of action for the NEPA claim it asserts against the DRBC. For the reasons set out in Part II.A of the DRBC's January 12 Brief, at 6-9, Section 3.3 does not provide a right of action.

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been found *not* to be available), "absence of jurisdiction of the federal courts would mean a sacrifice or obliteration of a right which Congress has given professional employees, for there is no other means, within their control, to protect and enforce that right." *Id.* at 190 (internal quotations and citation omitted) (quoting *Switchmen's Union of N. Am. v. Nat'l Mediation Bd.*, 320 U.S. 297 (1943)).

The *Kyne* exception to the rule of non-reviewability of agency action where Congress has precluded review of that action "is intended to be of extremely limited scope." *Griffith v. FLRA*, 842 F.2d 487, 497 (D.C. Cir. 1988).[7] In a case decided after *Kyne*, the Supreme Court clarified that a reading of *Kyne* "authorizing judicial review of any agency action that is alleged to have exceeded the agency's statutory authority" is too broad. *Bd. of Governors of Fed. Reserve Sys. v. MCorp Fin., Inc.*, 502 U.S. 32, 43 (1991). In this case, as in *MCorp*, because Plaintiffs are not wholly deprived of an opportunity for meaningful judicial review of the DRBC's challenged actions, because the Compact precludes judicial review before the DRBC issues a project approval, and because the Commission acted within the scope of its organic (authorizing) statute – the Compact, the doctrine of non-statutory review is inapplicable here.

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[7] In *Griffith v. FLRA*, 842 F.2d 487, 494 (D.C. Cir. 1988), the court of appeals for the D.C. Circuit explained that a non-constitutional procedural error "differ[ent] both in kind and in severity from the essentially jurisdictional error asserted in *Kyne*" should not be a subject of non-statutory review. There, the plaintiff sought non-statutory review of a decision of the Federal Labor Relations Authority erroneously applying a "but for" test to determine whether an employee could secure back pay under the Federal Labor Relations Act. *Id.* at 493-94. Notwithstanding the plaintiff's claim that "this construction is 'clearly wrong and . . . egregiously out of step with settled law under the Back Pay Act," the court found that, "[t]hough not the only possible construction of the statutory language, it is surely a colorable one," and, thus, "even assuming that the *Leedom* exception can be triggered by an error in interpreting a statute other than the agency's organic act, the FLRA's interpretation is not the sort of plain error the doctrine requires." *Id.* at 494. Taken together with the "unusually clear congressional intent generally to foreclose review," *id.* at 490, the appellate court held that "the district court correctly concluded that it was without jurisdiction to review the appellant's non-constitutional claims," *id.* at 494.

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1. Plaintiffs Will Have The Opportunity For Meaningful And Adequate Review Of DRBC Action If And When The Commission Approves A Natural Gas Development Project

Fundamental to the *Kyne* exception is the absence of any present or future right to judicial review of an administrative agency action. Here, there is no question that Plaintiffs will have the opportunity for full judicial review of the DRBC's natural gas regulations – and the process used to enact them – at such time as the Commission approves a natural gas development project (after having issued final regulations, assuming that it does so). Following *MCorp*, then, non-statutory review would be inappropriate.

The Supreme Court clarified the limited scope of *Kyne* in *MCorp*, noting: "[C]entral to our decision in *Kyne* was the fact that the Board's interpretation of the Act would wholly deprive the union of a meaningful and adequate means of vindicating its statutory rights." *Id.* In *MCorp Financial*, to the contrary, the Court explained:

> The cases before us today are entirely different from *Kyne* because [the Financial Institutions Supervisory Act] expressly provides MCorp with a meaningful and adequate opportunity for judicial review of the validity of the source of strength regulation. If and when the Board finds that MCorp has violated that regulation, MCorp will have, in the Court of Appeals, an unquestioned right to review of both the regulation and its application.

Id. at 43-44.

Analogously, Section 3.8 of the Compact expressly provides for judicial review of project-specific determinations by the Commission; Commission approvals of projects are judicially reviewable at the time they are made. Plaintiffs will have the opportunity to obtain judicial review of both the substance of the regulations, as and if adopted, and the procedures used in their adoption at the time the Commission approves or disapproves natural gas development projects subject to the regulations (assuming Plaintiffs then meet the prerequisites of standing and the like). Thus, if not allowed to challenge the proposed regulations now,

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Plaintiffs will not be deprived of an opportunity for meaningful review of the regulations and the process used in drafting them.

2. The Compact Clearly Evidences An Intention To Preclude Judicial Review At This Stage

The text and structure of the Compact's judicial review provisions clearly indicate the intent of Congress and the legislatures of the Basin states to preclude judicial review in connection with the promulgation of draft regulations, but to allow it in connection with docket (*i.e.*, permit) approvals. In the several instances where Congress and the state legislatures of the signatory parties wanted determinations or actions of the Commission to be immediately appealable, the Compact so provides. No such right of action is created for appeals from draft regulations. Instead, regulations can be challenged at the time project approvals are issued, not separately and certainly not when, as here, the regulations are in draft. Plaintiffs' contention that "[t]here is no evidence of a legislative intent to preclude DRBC's noncompliance with NEPA from non-statutory review" at this stage of administrative action, Envtl. Groups Br. 17, is mistaken.

"Whether and to what extent a particular statute precludes judicial review is determined not only from its express language, but also from the structure of the statutory scheme, its objectives, its legislative history, and the nature of the administrative action involved." *Block v. Cmty. Nutrition Inst.*, 467 U.S. 340, 345 (1984). While the courts require "clear and convincing evidence" of congressional intent to preclude review, *Abbott Labs. v. Gardner*, 387 U.S. 136, 141 (1967), *abrogated on other grounds by Califano v. Sanders*, 430 U.S. 99 (1977), as applied that standard is not high. "[T]he Court has found the standard met, and the presumption favoring judicial review overcome, whenever the congressional intent to preclude judicial review is 'fairly

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discernible in the statutory scheme.'" *Block*, 467 U.S. at 351 (quoting *Ass'n of Data Processing Service Orgs., Inc. v. Camp*, 397 U.S. 150, 157 (1970)). As the *Block* Court explained:

> In the context of preclusion analysis, the 'clear and convincing evidence' standard is not a rigid evidentiary test but a useful reminder to courts that, where substantial doubt about the congressional intent exists, the general presumption favoring judicial review of administrative action is controlling. That presumption does not control in cases . . . [where] the congressional intent to preclude judicial review is 'fairly discernible' in the detail of the legislative scheme.

Id. "[T]he presumption favoring judicial review of administrative action may be overcome by inferences of intent drawn from the statutory scheme as a whole." *Id.* at 349.

There can be no "substantial doubt" about the intent of the Compact's signatory parties to provide for judicial review of regulations only after they are finalized and applied. As explained in the DRBC's November 1 Brief, the Compact expressly provides for judicial review with respect to some, but not all, DRBC action. *See* Nov. 1 Br. 13-15 (discussing specific provisions). The Compact specifically provides for review after the DRBC has published final regulations and has begun issuing project approvals pursuant to Compact § 3.8 ("Any determination of the commission hereunder shall be subject to judicial review in any court of competent jurisdiction."). In contrast, the Compact provides no opportunity for challenges while regulations are being developed. The timing of review provided in the Compact appropriately affords affected parties an opportunity to seek judicial review after a project is well-defined and the potential impact on parties is discernible, but before any construction takes place.[8] The express exemption of DRBC actions from review under the APA, together with the grant of

[8] In contrast, in *Abbott Laboratories*, the Court noted that "this is . . . a case in which the impact of the regulations upon the petitioners is sufficiently direct and immediate as to render the issue appropriate for judicial review at this stage," for the "regulation requires an immediate and significant change in the plaintiffs' conduct of their affairs with serious penalties attached to noncompliance." *Id.* at 152-53.

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review directly under the Compact for certain DRBC actions but not others, evidences a clear and controlling legislative intent to preclude judicial review at this time. [9]

3. Although The Court Need Not Reach The Issue, The DRBC Acted Within The Scope Of Its Delegated Authority

Because Plaintiffs have a right to full judicial review at a later time, because Congress and the legislatures of the Basin states expressly provided for judicial review of the DRBC's decisions on projects, and because any DRBC regulations can be reviewed in conjunction with decisions on projects when concrete, factual circumstances have been established, the doctrine of non-statutory review is inapplicable. In *MCorp*, *supra*, the Supreme Court relied on similar factors to vacate the judgment of the court of appeals applying the doctrine of non-statutory review. If, however, unlike the *MCorp* Court, this Court were to reach the question of whether the DRBC acted beyond the scope of its delegated authority, it is clear that the DRBC had authority to promulgate the draft natural gas regulations.

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[9] Judicial review at this stage would be contrary to the Compact's detailed structure. Review at the time of a Commission "determination" pursuant to Section 3.8 of the Compact (*i.e.*, at the time the Commission approves or disapproves a request for a permit) is expressly authorized by the Compact. The Compact's scheme is thus less restrictive than other statutory schemes approved by courts. *Cf., e.g.*, *Natural Res. Def. Council v. Johnson*, 461 F.3d 164, 172 (2d Cir. 2006) (analyzing the detailed judicial review structure imposed by the Federal Food, Drug, and Cosmetic Act and concluding that, "[d]espite the absence of an overarching judicial review provision, both the language and the statutory scheme of Section 346a indicate that the district court lacked jurisdiction to adjudicate actions such as those brought by the NRDC Appellants"); *United States v. Fausto*, 484 U.S. 439, 448 (1988) ("The comprehensive nature of the CSRA, the attention that it gives throughout to the rights of nonpreference excepted service employees, and the fact that it does not include them in provisions for administrative and judicial review contained in Chapter 75, combine to establish a congressional judgment that those employees should not be able to demand judicial review for the type of personnel action covered by that chapter."); *United States v. Erika, Inc.*, 456 U.S. 201, 208 (1982) ("Conspicuously, the statute fails to authorize further review for determinations of the amount of Part B awards. In the context of the statute's precisely drawn provisions, this omission provides persuasive evidence that Congress deliberately intended to foreclose further review of such claims.").

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The Compact grants the DRBC the authority to "develop and effectuate plans, policies and projects relating to the water resources of the basin," Compact § 3.1; to "[e]stablish standards of planning, design and operation of all projects and facilities in the basin which affect its water resources," *id.* § 3.6(b); and to "[m]ake and enforce reasonable rules and regulations for the effectuation, application and enforcement of this compact," *id.* § 14.2(a). The promulgation of draft regulations to control the effect of natural gas development on the Basin's water resources fits squarely within this delegated authority, and Plaintiffs have not asserted otherwise. Plaintiffs do not contend that DRBC violated any provision of its Compact, regulated beyond the scope set out in the Compact, or violated any of Plaintiffs' constitutional rights. Indeed, the thrust of Plaintiffs' Complaints is that the DRBC should perform additional studies to determine whether its proposed regulations should be made more stringent. Thus, the issue of scope of authority, if considered by the Court, also weighs against recognizing a non-statutory cause of action in this case.[10]

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[10] *Izaak Walton League of Am. v. Schlesinger*, 337 F. Supp. 287 (D.D.C. 1971), *vacated pursuant to settlement*, 2 Envtl. L. Rep. 20,388, cited by NYS, does not warrant a contrary conclusion in this case. The court's NEPA analysis in that case dealt with the question of whether a NEPA analysis must be performed prior to issuance of an interim operating license for a nuclear power station, not with the question of whether a NEPA analysis must accompany draft regulations that must be finalized and adopted before any natural gas activities may take place. More importantly, the *Izaak Walton* court found that review would not otherwise be available to the plaintiffs. *See id.* at 293 ("[T]he [c]ourt may never be afforded the opportunity to pass on the issue of whether the AEC failed to comply with the statutory mandate of NEPA."). And, of course, this vacated district court opinion from the District of Columbia predates the Supreme Court's decision in *MCorp* significantly narrowing the circumstances in which courts will imply a private right of action not provided by Congress, and it is not precedential in this Court.

Cases cited by the Environmental Group Plaintiffs are also distinguishable. *See, e.g., Aid Association for Lutherans v. U.S. Postal Service*, 321 F.3d 1166 (D.C. Cir. 2003) (non-statutory review used when plaintiffs alleged that the Postal Service exceeded its authority under the Postal Reorganization Act in promulgating certain postal regulations *outside the scope of the authority delegated to it* by Congress); *Dart v. United States*, 848 F.2d 217, 219, 227 (D.C. Cir. 1988) (non-statutory review used where Secretary of Commerce "had *no authority* to reverse the administrative law judge's decision" and impose sanctions against an exporter, where the Export

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In summary, because the DRBC has not acted outside the scope of its authority, and because Plaintiffs will have an opportunity for meaningful review of the DRBC's process in promulgating the regulations if and when they are finalized and the DRBC has issued approvals based on them, this case does not warrant non-statutory review.

4. Permitting Non-Statutory Review Here Would Allow An End-Run Around The Jurisprudence That No Private Right Of Action To Enforce NEPA Exists

Finally, permitting judicial review of DRBC's decision not to perform a NEPA analysis prior to promulgating draft natural gas regulations under the banner of "non-statutory review" would provide an end run for all potential plaintiffs around the well-established rule that NEPA itself does not provide a private right of action for failure to comply with its procedural requirements. *See* DRBC Nov. 1 Br. 12-13. As NYS alleged in its original complaint, it did not name the DRBC as a defendant because Congress expressly exempted the DRBC from the Administrative Procedure Act, the statutory mechanism for bringing NEPA claims. (NYS Compl. ¶ 3.) If Plaintiffs in this case do not need a statutory right of action to bring their claims that a purported federal agency failed to undertake the allegedly requisite NEPA analysis, then why would any plaintiff in any case? *See, e.g.*, *Karst Envtl. Educ. & Prot., Inc. v. EPA*, 475 F.3d 1291, 1297-98 (D.C. Cir. 2007) ("Because Karst has failed to allege that either EPA or HUD engaged in final agency action [in funding and permitting a transit park], [and therefore, because the prerequisites for bringing a NEPA claim under the APA are not met,] we shall affirm the district court's dismissal of the complaint against those two agencies."); *Noe v. Metro Atlanta*

Administration Act gave him authority only to "affirm, modify, or vacate" an ALJ's decision) (emphasis added); *American School of Magnetic Healing v. McAnnulty*, 187 U.S. 94 (1902). (non-statutory review used where "the complainants had the legal right, under the general acts of Congress relating to the mails, to have their letters delivered at the post[]office as directed" and the Postmaster General ordered that the letters not be delivered when he had *no statutory authority* to do so).

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Rapid Transit Auth., 644 F.2d 434, 439 (5th Cir. 1981) (assuming a NEPA violation in the context of construction of rapid transit system and dismissing NEPA claims for lack of a private right of action). Such a decision would be contrary to the jurisprudence of numerous courts of appeals. *See Weiss v. Inc. Village of Sag Harbor*, 762 F. Supp. 2d 560, 579 n.11 (E.D.N.Y. 2011) (noting that "although this issue has not yet been addressed by the Second Circuit, other circuit courts have held that there is no private right of action under . . . NEPA").[11]

C. The DRBC's Executive Director Does Not Have The Authority To Grant The Requested Relief And Is Therefore Not A Proper Party To This Action

In their November 1 Brief, at 18-19, the DRBC Defendants demonstrated that the Executive Director should be dismissed because she has no authority to conduct an EIS or otherwise execute the relief that Plaintiffs seek. Rather, under the Compact, only the DRBC Commissioners have that authority. The DRBC Defendants also cited two recent cases from the District of New Jersey dismissing the Executive Director from the lawsuits. Plaintiff Delaware Riverkeeper Network is also a plaintiff in these New Jersey cases.

In response, Plaintiffs assert that the Executive Director has been (or may be in the future) delegated authority by the Commissioners to take various actions on behalf of the DRBC. From this premise, Plaintiffs incorrectly contend that the Executive Director has the authority to cause DRBC to prepare an EIS or to prevent the DRBC from promulgating final regulations absent preparation of an EIS, and is therefore a proper party to this litigation. NYS Br. 49-50; Envtl. Groups Br. 19-20. In the case of each of the aspects of the Executive Director's authority cited by Plaintiffs, however, the Commissioners expressly delegated that authority to her. The Executive Director's delegated authority to run the day-to-day operations of the Commission

[11] *See also* DRBC Nov. 1 Brief, at 13 n.6 (explaining that the *Cort v. Ash* factors support the conclusion that NEPA does not create a private right of action).

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does not encompass preparing an EIS or delaying the Commissioners' promulgation of final regulations. Indeed, the Commission has determined not to prepare EISs in conjunction with rulemaking. *See* Riverkeeper Compl. ¶ 78. Therefore, the Executive Director is not a proper party to these actions and the claims against her should be dismissed.

The Environmental Group Plaintiffs assert that "Section 2.3.5 of the RPP [Commission's Rules of Practice and Procedure] grants the Executive Director discretionary authority to determine which projects will have a substantial effect on water resources of the Basin and will therefore require Commission approval regardless of project size." Envtl. Groups Br. 19. Section 2.3.5 provides, in relevant part, the following:

> Except as the Executive Director may specially direct by notice to the project owner or sponsor, . . . a project in any of the following classifications will be deemed not to have a substantial effect on the water resources of the Basin and is not required to be submitted under Section 3.8 of the Compact . . . .

RPP § 2.3.5(A). This section pertains expressly to projects, not to regulations or EISs. It and other provisions of the RPP authorize the Executive Director to require the sponsor of a particular project to seek Commission approval in circumstances where the existing Commission rules would not automatically require submission of an application. In no way does this section pertain to the process of drafting regulations, nor does it grant the Executive Director authority to prepare a NEPA analysis in conjunction with draft or final regulations. This decision lies exclusively with the Commissioners who serve as the governing body of the Commission. Compact §14.1(b). Therefore, RPP §2.3.5(A) does not provide an appropriate basis for naming the Executive Director as a party to these actions.

The Environmental Group Plaintiffs next assert that "[t]he RPP further provides that the Executive Director may 'require such additional information as may be needed' to permit

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adequate Commission consideration of proposed changes to the comprehensive plan . . . ." Envtl. Groups Br. 19-20 (quoting RPP § 2.1.6). However, this delegation of authority is limited by the terms of RPP § 2.1.6 to the context in which "[p]roposals for changes and additions to the Comprehensive Plan [are] submitted by any agency of the signatory parties or any interested person, organization or group." The purpose of this provision is to ensure that when changes to the Comprehensive Plan are *not* initiated by Commission staff, the Commission is given sufficient information to understand and evaluate the proposal. This delegation of authority is unrelated to the current dispute, which involves proposed regulations originating with the Commission, and is therefore is not an appropriate basis for keeping the Executive Director as a party to these actions.

New York State relies on section 7.1(d) of the proposed natural gas regulations as support for its argument regarding the authority of the Executive Director. NYS Br. 50. That section of the proposed regulations, *if enacted as drafted* (which as noted throughout the DRBC's briefing, is wholly speculative), would thereafter delegate some authority to the Executive Director to grant "approvals of natural gas development projects . . . in accordance with Section 3.8 of the Compact." However, no final regulation or other delegation *currently* exists giving the Executive Director the authority to grant similar approvals under Section 3.8 of the Compact. Only the Commissioners have that authority. Compact § 14.1(b). Speculation as to what additional authority the Executive Director may be delegated if the proposed or other regulations are enacted is not a basis for concluding that she has present authority to grant approvals, let alone perform an EIS.

In summary, as in the recent cases cited by the DRBC in their November 1 Brief dismissing the Executive Director as a defendant, *see* Nov. 1 Br. 18-19, the Executive Director is

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not a proper party to this action because the Executive Director does not have the authority to take the action requested. *Cf. Wainscott v. Dallas County, Texas*, 408 F. App'x 813, 817 (5th Cir. 2011) (dismissing member of state bail bond board because he had no independent authority to direct the actions of the board and because only the board as a whole had the ability to suspend plaintiff's license).

D. The Commission Is Not A Federal Agency

In their November 1 Brief, the DRBC Defendants demonstrated that the DRBC is not a "federal agency" as that term is used in NEPA, and therefore the DRBC is not subject to NEPA's procedural requirements. The language of the Compact, the Compact's legislative history, the nature of DRBC as a federal-interstate compact agency – a new experimental institutional mechanism enabling states and the federal government to manage regional water resources through "cooperative federalism" – and the decisions of courts holding DRBC not to be a federal agency all support this result.

In response, Plaintiffs contend that in the Compact, Congress determined that DRBC is a federal agency. In fact, as shown in the DRBC Defendants' November 1 Brief, at 23-30, and as further discussed below, the language of the Compact compels the opposite conclusion. Plaintiffs further contend that, because DRBC regulations are in part published in the Code of Federal Regulations ("CFR"), DRBC must be a federal agency. As explained below, Compact § 14.2(a) requires all rulemaking notices to be filed in accordance with the law of *each* of the respective signatory parties applicable to administrative regulations generally and not just the Federal Register or CFR. Finally, Plaintiffs contend that the White House Council on Environmental Quality ("CEQ") has determined that DRBC is subject to NEPA. As a declaration from CEQ's Associate Director states, no such determination has ever been made. Indeed, if the Court holds that the DRBC is a federal agency (which it should not, for the reasons

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set forth in this section), then sovereign immunity would apply to it and, for the reasons set forth in Section I of the Federal Defendants' brief in support of their motion to dismiss, the Plaintiffs' claims against the DRBC should be dismissed for lack of subject matter jurisdiction. In sum, none of Plaintiffs' arguments seeking to demonstrate that the Commission is a federal agency has any merit.

1. Principles Of Cooperative Federalism Weigh Heavily Against Classifying The Commission As A Federal Agency For NEPA Purposes

Plaintiffs ignore the context in which Congress and the legislatures of the Basin states enacted the Compact. The Compact was not developed on an empty foundation. The seminal article by Felix Frankfurter and James M. Landis, *The Compact Clause of the Constitution – A Study in Interstate Adjustments*, 34 Yale L.J. 685 (1925), the recommendations of the Interstate Commission on the Delaware River Basin ("INCODEL"), and the Syracuse Report all support the decision of Congress and the legislatures of the Basin states to enact an interstate compact with federal participation to jointly administer the water resources of the Basin. *See* Nov. 1 Br. 21-23. This innovative entity created by the Compact reconciled the conflict between the expanding exercise of federal authority under the Commerce Clause and traditional spheres of state authority and independence protected by the principles of federalism embedded in the Constitution. In enacting the Compact, the signatory parties respected the states' traditional authority in areas such as land and water use by giving the Basin states majority control over the Commission while reserving certain rights for the federal government.

Plaintiffs' response that the Compact creates a federal agency, rather than a new type of federal-interstate compact agency, falls into the trap of "dual federalism," against which Frankfurter and Landis warned. *See* Nov. 1 Br. 22-23. Prior to the New Deal, the respective authorities of the federal government and state governments were viewed as exclusive and non-

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overlapping; the role of courts was to keep each government within its own sphere. *See South Carolina v. United States*, 199 U.S. 437, 448 (1905), *overruled*, 469 U.S. 528 (1985). But as the Supreme Court upheld New Deal programs and affirmed the extensive power of Congress to regulate activity under the Commerce Clause, the line between federal and state spheres became blurred. By 1937, the Supreme Court adopted the concept of cooperative federalism, a means for federal and state governments to work together to carry out a common public purpose. *See Carmichael v. S. Coal & Coke Co.*, 301 U.S. 495, 526 (1937). The DRBC, formed through an innovative use of the Constitution's Compact Clause, is an experiment in cooperative federalism. Indeed, as noted in the DRBC Defendants' November 1 Brief, at 22-23, Professor Bruce Ackerman has described the Commission as "one of the most sophisticated forms of 'cooperative federalism' yet attempted – the epitome of the American effort to obtain the advantages of decentralized decision making while simultaneously avoiding the perils of provincialism." Bruce A. Ackerman et al., *The Uncertain Search for Environmental Quality* 4 (The Free Press 1974).

Plaintiffs' contention that the Commission must be characterized as a federal agency is based on the mistaken assumption that the new category of agency that the Compact created, a federal-interstate compact agency with regional reach, must be a traditional form of governmental institution. To Plaintiffs, the fact that the Compact agency is a combination of federal and state entities is of no relevance. The fact that the states constitute a majority of the Commission and therefore control the Commission likewise carries no weight for them. And the absence of any federal funding, *see* Gore Decl. ¶¶ 4-11,[12] federal responsibility for Commission debts, *see* Compact § 15.1(g), and federal employees, *see* Compact § 15.1(n), are likewise to

[12] The Declaration of Richard Gore was submitted by DRBC Defendants in support of their November 1, 2011 motion to dismiss the Complaints of the Environmental Group Plaintiffs.

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Plaintiffs of no moment. But, the work of Frankfurter and Landis, of INCODEL, of the authors of the Syracuse Report, and of the Supreme Court in cases such as *Carmichael*, *supra*, laid a new constitutional foundation. In forming the Commission, Congress and the legislatures of the Basin states exhibited far more creativity in building upon that new foundation than Plaintiffs acknowledge. They created a federal-interstate compact agency that is neither a federal agency nor a state agency, but is rather its own distinct entity, an experiment in cooperative federalism.

2. Plaintiffs' Interpretation Of The Compact Would Improperly Commandeer State Processes And Would Unduly Interfere With The Legitimate Activities Of The Basin States

(a) Congress May Not Compel States To Implement NEPA

Viewing the Commission as a federal agency rather than as a federal-interstate compact agency subject to state majority control would subject the state signatory parties to myriad federal requirements. A host of statutes addressed to the federal government's management of its own agencies would become directives to the states when performing their duties as signatory parties. *See* Nov. 1 Br. 30 (citing statutes). And none of these activities would be federally funded. An experimental, nimble institution employing fewer than fifty people, *see* Gore Decl. ¶ 17, and designed to meet regional needs would become ossified, crushed and impoverished under the weight of federal regulations imposing far more procedural and other requirements than the Commission can fulfill with its existing financial resources and personnel. Such a result would upset the balance Congress and the state legislatures established in the Compact and intrude on the states' own regulatory processes.

In *New York v. United States*, 505 U.S. 144 (1992), the Supreme Court examined a provision of the Low-Level Radioactive Waste Policy Amendments Act of 1985, 42 U.S.C. § 2021(b) *et seq.* One provision of that Act required each state to either take title to the radioactive waste generated within its borders or regulate that waste in the manner set forth in the

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Act. The Court held that this command to the states would improperly "'commandeer' state governments into the service of federal regulatory purposes." *Id.* at 175. "[T]he Constitution has never been understood to confer upon Congress the ability to require the States to govern according to Congress' instructions." *Id.* at 162. Even assuming that the federal government could regulate generators of waste directly, Congress could not mandate the states to do so and thus create a means for Congress to avoid political accountability for its own decisions. *See also Printz v. United States*, 521 U.S. 899, 925 (1997) ("[T]he Federal Government may not compel the States to implement, by legislation or executive action, federal regulatory programs.").

Requiring the Commission to implement NEPA would impose upon the Commission procedures that Congress could not mandate the Basin states to follow. That can be constitutionally permissible only if the states consented to such a mandate in the Compact.[13] As the next section shows, no such consent was given.

(b) The Compact Did Not Provide The Basin States With Clear Notice That Future Rules Applicable To Federal Agencies Would Apply To The Commission

Although the States can theoretically consent to following rulemaking procedures applicable to federal agencies, the Basin states have not done so. By entering into the Compact, the Basin States did not agree that all future laws applicable to federal agencies would automatically apply to the Commission. The consent of states may only be found if they had clear notice of their obligations.

In *Pennhurst State School & Hospital v. Halderman*, 451 U.S. 1 (1981), the Supreme Court held that cooperative federalism programs embodied in federal-state contracts must ensure

[13] Nothing restricts Congress from funding a NEPA study and directing an actual federal executive agency to perform it. Likewise, Congress could utilize its spending power to offer states or the Commission the option to accept federal funds to perform an EIS. But Congress may not directly mandate states to follow specific rulemaking procedures.

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that states voluntarily enter into the contract with "knowing acceptance" of its terms. This principle is designed to prevent states from unexpected "postacceptance or 'retroactive' conditions." *Id.* at 25; *see also id.* at 17; *Arlington Cent. Sch. Dist. Bd. of Educ. v. Murphy*, 548 U.S. 291 (2006) (notice must be sufficient for state officials to "clearly understand" the conditions of the contract); *Barnes v. Gorman*, 536 U.S. 181 (2002) (a recipient of federal funding must be on notice of the conditions Congress is imposing). A compact is in part a contract from which the states may not withdraw. *See, e.g.*, *Green v. Biddle*, 21 U.S. 1 (1823); *Alabama v. North Carolina*, 130 S. Ct. 2295 (2010). As discussed in Part II.D.3, below, not only does the Compact fail to provide clear notice that the Commission would be considered a federal agency for purposes of future legislation pertaining to federal agencies, but its language is overwhelmingly to the contrary.

Clear notice is particularly important where, as here (and as in *Pennhurst*), a party seeks a statutory interpretation that would extend federal authority over areas of traditional state responsibility. In *Rapanos v. United States*, 547 U.S. 715 (2006), the Supreme Court reviewed the U.S. Army Corps of Engineers' effort to assert jurisdiction under the Clean Water Act over wetlands separated from waters that were navigable in fact. In rejecting the Corps' approach, the *Rapanos* plurality stated: "As we noted in *SWANCC*, the Government's expansive interpretation would 'result in a significant impingement of the State's traditional primary power over land and water use.'" *Id.* at 737-38 (quoting *Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng'rs*, 531 U.S. 159, 174 (2001)). The Court plurality continued:

> We ordinarily expect a 'clear and manifest' statement from Congress to authorize an unprecedented intrusion into traditional state authority. *See BFP v. Resolution Trust Corporation*, 511 U.S. 531, 544 (1994) [if a law is to be read to "radically read jus[t] the balance of state and national authority" "those charged with the

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> duty of legislating [must be] reasonably explicit."]. The phrase 'waters of the United States' hardly qualifies.

Id. at 738; *see also Medtronic, Inc. v. Lohr*, 518 U.S. 470, 485 (1996); *Gregory v. Ashcroft*, 501 U.S. 452, 469-70 (1991) (courts will presume that Congress did not intend "to intrude on state governmental functions" absent clear statement to the contrary).

As discussed in Part II.D.3, below, the Compact established the Commission as a "regional agency of the signatory parties." Compact §§ 11.1, 11.2. To be sure, Congress can always seek to amend the Compact. *See, e.g.*, Compact § 15.1(q). But nowhere does the Compact state that the Commission is automatically subject to and required to implement automatically post-1961 laws applicable to federal agencies without amendment of the Compact. Consequently, the Compact does not provide the clear notice to the states that the Supreme Court requires.

3. The Compact's Statutory Language Created A Federal-Interstate Compact Agency, Not A "Federal Agency" Within The Meaning Of NEPA

In the Compact, Congress and the legislatures of the four Basin states clearly identified the administrative need for a new regional agency that would combine the portions of authorities of the five sovereigns and therefore not be an agency of any one of them. The interest of multiple sovereigns in joint participation in Basin activities is first stated in the Compact's introductory clauses, including, among others, the following:

> "Whereas the signatory parties recognize the water and related resources of the Delaware River Basin as regional assets vested with local, State and National interests, for which they have a joint responsibility;"
>
> "Whereas the water resources of the basin are presently subject to the duplicating, overlapping, and uncoordinated administration of some forty-three State agencies, fourteen interstate agencies, and nineteen federal agencies which exercise a multiplicity of power

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> and duties resulting in a splintering of authority and responsibilities;" and
>
> "Whereas, [INCODEL] . . . has recommended that an interstate Compact with Federal participation be consummated to this end."

Although Congress might have responded to the "uncoordinated administration" of "functionally inter-related" water resources, Compact § 1.3(c), by giving an existing federal agency the final decision-making authority, this approach would have infringed on each state's traditional role in managing water resources within its borders. Congress and the states instead agreed upon a form of "cooperative federalism" respectful of the proper roles of the federal government and the states. As stated in Section 1.3(b) of the Compact (emphasis added): "The water resources of the basin are subject to the sovereign right and responsibility of the signatory parties, and it is the purpose of this compact to provide for a *joint exercise of such powers of sovereignty* in the common interests of the people of the region."

The administrative structure created for the "joint exercise" of state and federal powers is described throughout the Compact as a "regional agency," never directly as a "federal agency." For example, Section 11.1 of the Compact, part of an article entitled "Intergovernmental Relations," explains the relationship between the Commission and federal agencies:

> Section 11.1 Federal Agencies and Projects. For purposes of avoiding conflicts of jurisdiction and of giving full effect to the commission as a *regional agency of the signatory parties*, the following rules shall govern federal projects affecting the water resources of the basin . . . ." (emphasis added).

Sections 11.1(a) and (b) require federal agencies to consult with the Commission when planning water resources projects and to expend money for such projects only after the projects are incorporated in the Commission's comprehensive plan. Section 11.2 applies similar rules to state and local agencies. Plainly, Section 11.1 distinguishes the Commission from federal agencies and requires them to coordinate their activities with the Commission.

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The Compact describes the Commission as "an agency and instrumentality of the governments of the respective signatory parties" and as "a body politic and corporate." Compact § 2.1. This language defines the Commission as neither a "federal agency" nor a "state agency." Rather, it signifies that the signatory parties created a distinct entity. The Commission does not derive its authority from the federal government or the states acting as independent sovereigns, but rather from the states and federal government acting together.

The Commission is unlike a federal agency controlled by the federal government, insofar as a majority vote of the Commission's signatory parties is determinative when unanimity among them is absent. *Id.* § 2.5. The federal government has only one of the five votes. *Id.* § 2.2. In addition, unlike the federal government which exercises powers nationally, the Commission's powers are limited to the Basin, unless it obtains the consent of a state outside the Basin to act in that state. *Id.* § 2.7. A federal agency would not ordinarily need state consent.

In their analysis of the Compact, Plaintiffs do not address these and other provisions of the Compact that refute their conclusion. Instead, Plaintiffs focus on selected provisions of the Reservations Section of the Compact, Section 15.1. Section 15.1 enumerates the conditions and reservations that Congress enacted when Congress "consented to" the Compact under the Compact Clause of the U.S. Constitution, art. I, § 10, cl. 3, and joined the Compact as one of the five signatory parties. *See* Pub. L. 87-328, 75 Stat. 688 (Compact preamble).

As an initial matter, the fact that Congress found it necessary to reserve certain powers for the federal government underscores that Congress neither viewed the new federal-interstate compact agency as a federal agency nor one that was subject to its control. Where Congress creates a federal agency, the agency is part of the federal government and federal reservations are unnecessary. But even apart from the Reservations added by Congress, the Compact contained

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provisions reserving certain authority to the federal government (*see, e.g.*, Compact § 1.4 reserving navigation and other matters for federal administration), thereby recognizing that the Commission and the federal government are distinct.

Nevertheless, when enacting the Compact, Congress was faced with the new task of creating a regional body with federal participation. *See* DRBC Nov. 1 Br. 28-29. As one member of Congress emphasized, the Compact created "a new, unique creature without any precedent." 107 Cong. Rec. S10,813, 10,976 (June 29, 1961); *see also* Nov. 1 Br. 30-32 (discussing legislative history). As a result, Congress took pains to clarify that the United States did not assume obligations by virtue of Commission activities, that the United Sates reserved some functions as its own, and that the Commission was not bound by most laws governing the fundamental operation of federal agencies. In particular:

- Reservation 15.1(b) provides in pertinent part that jurisdiction to impose charges with respect to commercial navigation "is reserved to the Federal Government."
- Reservation 15.1(c) provides that "nothing contained in the Compact shall be deemed to restrict the executive powers of the President in the event of a national emergency."
- Reservation 15.1(e) reserves authority to the President and Congress over Federal funds budgeted and approved for or by the Commission.
- Reservation 15.1(f) states that DRBC issued bonds are to be free or exempt from federal taxation to the same extent as *state* bonds.
- Reservation 15.1(g) establishes that the Compact does not "obligate the United States legally or morally to pay the principal or interest on any bonds issued by the Commission."
- Reservation 15.1(h) exempts federal executive agencies from furnishing technical services to the Commission except as the agencies may agree or the President directs, and exempts the United States from furnishing

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administrative services or facilities except as the President may direct.

- Reservation 15.1(k) preserves the authority of officers and agencies of the United States relating to water pollution while also affirming the authority of the Commission to control, prevent or abate water pollution.

- Reservation 15.1(m) exempts the Commission from key statutes governing federal government operation, including the Federal Tort Claims Act, Administrative Procedure Act and Tucker Act.

- Reservation 15.1(n) provides that officers and employees of the Commission (other than the United States member and his alternate advisors and personnel employed by him under direct federal appropriation) are not "for any purpose" officers or employees of the United States and are not entitled to federal employee benefits.

- Reservation 15.1(o) restricts the participation of federal agencies in projects within the Basin but clarifies that this restriction does not apply to the Commission. *See also* Compact § 3.6 (authorizing the Commission to undertake projects within the Basin).

- Reservation 15.1(s) grants authority to the President, where the national interest requires, to suspend the Commission's Comprehensive Plan, but only as the plan affects the powers of federal officers, agencies, or instrumentalities.

By limiting the Commission's powers over areas such as navigation that were traditionally under federal and not state control, preserving key elements of the federal government's authority, declaring that the federal government is not obligated for the Commission's debts or employee benefits, classifying Commission employees as non-federal employees, and exempting the Commission from the APA and other statutes, the signatory parties treated the Commission as a new federal-interstate compact agency with regional reach, and not as a federal agency. Congress also avoided the Constitutional problems that might have resulted from placing authority over exclusive federal functions in the hands of a state-dominated agency.

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In the face of these provisions, Plaintiffs contend that the Compact clearly states that the Commission is a federal agency. But contrary to Plaintiffs' assertions, the Compact contains no affirmative statement of an intent to create a federal agency and does not otherwise provide clear notice to that effect. There is no indication in the Compact that the Basin states would have consented or did consent to such a regime. The statutory language discussed above shows that the opposite is true.

Plaintiffs point to Sections 15.1(s) and 15.1(o) of the Compact, which use the phrases "authority for any Federal agency other than the commission," Compact § 15.1(o), and "any officer, agency or instrumentality of the United States other than the commission," *id.* § 15.1(s). These references do not constitute a clear statement of federal agency status or signify that, by entering into the Compact, all future laws applicable to federal agencies would apply to the Commission. Rather, in both of these provisions, Congress chose to treat the Commission in a manner *different* from actual federal agencies. As noted above, Section 15.1(o) restricts the participation of federal agencies in projects within the Basin but clarifies that this restriction does not apply to the Commission. Likewise, Section 15.1(s) grants authority to the President to suspend the Commission's Comprehensive Plan to the extent the Plan affects the power of federal agencies, but clarifies that the Commission may otherwise act without interference from the President. These provisions are fully consistent with Congress's efforts to ensure that the Commission would *not* be treated as a federal agency. Plaintiffs' effort to transform a clarification that the Commission is not to be treated as a federal agency into a clear statement that the Commission is a federal agency is unavailing.

Importantly, in the very few circumstances where Congress wanted to require the Commission to follow the same requirements as are applicable to federal agencies, Congress said

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so. Section 15.1(i) requires the Commission to comply with the Davis-Bacon Act, 40 U.S.C. § 276a-j (now codified at 40 U.S.C. §§ 3141-3148), an act applicable to federal agencies. Likewise, Section 15.1(j) requires the Commission to comply with the Walsh Healey Public Contract Act, 41 U.S.C. § 35 *et seq.* If Congress had established the Commission as a federal agency, these statutes would apply to the Commission by their own terms, without any need for these provisions. Subjecting DRBC to these limited provisions was a political compromise to secure sufficient support for the Compact. None of these provisions indicates the intent of Congress to place responsibilities including, among others, those subject to traditional state administration into a federal agency; clearly notifies the states that the Commission would be treated as a federal agency; or affords the states the opportunity to object or withdraw. Thus, the language of the Compact overwhelmingly supports the conclusion that the Commission is *not* a federal agency for purposes of post-Compact statutes like NEPA.

4. Pursuant To The Supreme Court's Decision In *Hess*, A Compact Among Sovereigns Creates An Entity Distinct From Any One Of The Compacting Governments

Not only does Plaintiffs' position conflict with the Compact's statutory language and its innovative cooperative federalism approach, Plaintiffs' logic is likewise in stark contrast to the Supreme Court's reasoning in *Hess v. Port Authority Trans-Hudson Corp.*, 513 U.S. 30 (1994). In *Hess*, the Supreme Court examined whether the Port Authority of New York and New Jersey was cloaked with the immunity from suit provided to its member states by the Eleventh Amendment. New York and New Jersey had formed the Port Authority pursuant to a compact approved by Congress under the Compact Clause of the Constitution. As such, the bi-state entity was a "creation of three discrete sovereigns: two states and the federal government." *Id.* at 40.

The Court emphasized the differences between the Port Authority and a typical state agency. Most significantly, the states forming the Port Authority lacked financial responsibility

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for the Port Authority's debts. The Court also looked to the language of the compact and noted the use of terms such as "joint or common agency," "body corporate and politic" and "municipal corporate instrumentality of the two states for the purpose of developing the port and effectuating the pledge of the states in the compact." Based on these factors, the Court held that the Port Authority was an independent agency distinct from the sovereigns creating it. *Id.* at 52. As the Court further stated: "Compact Clause entities formed to deal with 'broad region-wide problems' should not be regarded as an 'affirmation of a narrow concept of state sovereignty' but as 'independently functioning parts of a regional and of a national union.'" *Id.* at 40.

In her dissent, Justice O'Connor argued that the states' control of the Port Authority was a more important factor than the inability of Port Authority debts to impact state treasuries. Justice O'Connor noted that the states controlled the Port Authority through their ability to appoint and remove the Port Authority's governing personnel and their ability to veto the entity's undertakings. Justice O'Connor concluded that the states' real and immediate control and oversight of the Port Authority imbued it with their sovereign immunity. *See id.* at 62-63.

In the present case, the factors cited by both the *Hess* majority and dissent support the conclusion that the Commission is not a federal agency. Like the "joint or common agency" and "body corporate and politic" in *Hess*, the Commission is described in the Compact as "an agency and instrumentality of the governments of the respective signatory parties" and as a "body politic and corporate." Compact § 2.1. One of the Commission's purposes is the "joint exercise of such powers of sovereignty in the common interests of the people of the region." *Id.* § 1.3(b). This Compact language is similar to the language of the *Hess* compact which the Supreme Court held to create a common agency distinct from its members.

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Like the compacting parties in *Hess,* the signatory parties have no liability for Commission debts. Section 12.3 of the Compact states in pertinent part: "The commission shall have no power to pledge the credit of any signatory party, or of any county or municipality or to impose any obligation for payment of the bonds on any signatory party or county or municipality." Similarly, any financial contribution to the Commission requested from the signatory parties is "subject to such review and approval as may be required by their respective budgetary processes." *Id.* § 13.3(c). In fact, through its budgetary processes, Congress has declined to appropriate monies to the Commission. As discussed in the DRBC's November 1 Brief, at 24-25, the federal government has funded the Commission in only one out of the past seventeen years. *See also* Gore Decl. ¶¶ 4-11 and Exs. A and B. Finally, Congress added the following provision during its enactment of the Compact: "Nothing contained in the Compact shall be construed to obligate the United States legally or morally to pay the principal or interest on any bonds issued by the Delaware River Basin Commission." Compact § 15.1(g). Thus the federal government has neither financial control of nor financial responsibility for the Commission. Under the factors identified by in *Hess*, the Commission is not a federal agency.

Even if the factor of control emphasized by the *Hess* dissent were considered, the Commission should still not be classified as a federal agency. The federal government does not control the Commission. It has only one of five votes. Compact § 2.5. Because Commission decisions are made by majority vote, *id.*, the votes of the Basin states are sufficient to overcome the federal vote and thereby direct the Commission. Although the Compact authorizes the President to modify the Commission's comprehensive plan for the limited purpose of preserving the powers of federal agencies, *id.* § 15.1(s), the President has no authority to modify the comprehensive plan's provisions as they may affect other public or private persons or entities.

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Thus, this reservation does not alter the power of the states to determine the actions of the Commission. Indeed, the reservation authorizing the President to protect the authority of federal agencies to act where the national interest so requires is a strong indication that the federal government and Commission are distinct. In sum, *Hess* strongly supports the conclusion that the Commission is not a federal agency under NEPA.

5. Courts Have Not Treated The Commission As A Federal Agency

The DRBC Defendants' November 1 Brief, at 32-34, discusses the court's rulings in *M&M Stone v. Pennsylvania Department of Environmental Protection*, No. 07-04784, 2008 U.S. Dist. LEXIS 76050, at *51-52 n.16 (E.D. Pa Sept. 29, 2008) (holding that "Defendant Commission is not an arm of the federal government" and concluding that the DRBC was not entitled to sovereign immunity), *Delaware Water Emergency Group v. Hansler*, 536 F. Supp. 26, 35-36 (E.D. Pa. 1981), *aff'd*, 681 F.2d 805 (3d Cir. 1982) ("That DRBC is a federal agency for purposes of NEPA is very doubtful."), and *Badgley v. City of New York*, 606 F.2d 358 (2d Cir. 1979) (discussing the Commission as a compact among four Basin states and approved by Congress). The DRBC Defendants incorporate that discussion here.

6. As A Federal-Interstate Compact Agency, The Commission Publishes Its Regulations In The Administrative Codes Of All Of Its Signatory Parties

Plaintiffs point to the fact that most DRBC regulations are codified in the Code of Federal Regulations as evidence the DRBC is a federal agency. Plaintiffs ignore Section 14.2(a) of the Compact, which provides that DRBC regulations "shall not be effective unless and until filed in accordance with the law of the respective signatory parties applicable to administrative rules and regulations generally." The DRBC's rules are published in the New York Register, the Delaware Register of Regulations, New Jersey Administrative Code § 7:14A-2.3(b), the Pennsylvania Bulletin, and the Pennsylvania Code (25 Pa. Code ch. 901), in addition to the

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Federal Register and Code of Federal Regulations. The DRBC is no more a federal agency than it is an agency of New York, Delaware, New Jersey or Pennsylvania. In reality, it is an agency distinct from all of the governments that created it. The publication of DRBC regulations in the Registers or Administrative Codes of all of the signatory parties demonstrates that the Commission is promulgating regulations for the signatory parties jointly, and not for any one of them.

7. The President's Council On Environmental Quality Has Not Classified The Commission As A Federal Agency

In their November 1 Brief, at 35-36 and 39-40, the DRBC Defendants refuted the allegations in Plaintiffs' Complaints that the White House Council on Environmental Quality ("CEQ"), the federal agency charged with administering NEPA, had determined that the DRBC is a federal agency. Plaintiffs nevertheless persist in their assertion that CEQ's lists identifying DRBC points of contact for agencies performing NEPA analyses evidence a CEQ decision that the DRBC is itself a federal agency. Plaintiffs are incorrect.

In his declaration, Horst Greczmiel, Associate Director for NEPA oversight at CEQ, identifies the various CEQ appendices published in the Federal Register upon which Plaintiffs rely and states in part as follows: "Inclusion in any of the appendices described above does not constitute a determination by CEQ that a particular entity is subject to NEPA." Greczmiel Decl. ¶ 10. Likewise, the updated CEQ website information does not, according to Mr. Greczmiel, "distinguish[] between the contacts with responsibilities for preparing NEPA reviews and the contacts who can provide assistance." *Id.* ¶ 11. Mr. Greczmiel further states: "When CEQ uses the terms "Federal agency," "Federal-State agency," and "Independent agency" on the NEPAnet website, CEQ is not providing a legal determination that any particular statutory regulatory definition attaches to these terms." *Id.*

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The DRBC Defendants' November 1 Brief analyzes the various appendices and website listings at issue, and concludes that CEQ has not classified DRBC as a federal agency. Mr. Greczmeil's declaration removes any doubt that DRBC is correct.

8. The Federal Government Does Not Control The Commission

Plaintiffs contend that the federal government is not an equal partner with the Basin States because the federal government retains various powers. NYS Br. 36. Plaintiffs' theory seems to be that, in their view, the United States controls the Commission and therefore the Commission is a federal agency. The majority voting power of the Basin states as provided in § 2.5 of the Compact is alone sufficient to rebut Plaintiffs' theory. The other provisions of the Compact cited by Plaintiffs likewise provide them with no support.

Control of navigable waters is a traditional function of the federal government. In Section 1.4 of the Compact, the signatory parties left this power (along with power to regulate interstate and international commerce) with the federal government. This decision does not place the federal government in control of the Commission, but rather recognizes the power of the federal government to act on its own. Likewise, Congress's power to withdraw from the Compact or modify its terms derives from the Compact clause of the Constitution, art. I, § 10, cl. 3. Congress can always modify an interstate compact by amending the legislation approving the compact. If this authority renders the Commission a federal agency, then even every interstate compact agency would be a federal agency. Plainly that is not the case. *See New York v. Atl. States Marine Fisheries Comm'n*, 609 F.3d 524 (2d Cir. 2010).

The reservation embodied in Section 15.1(s) of the Compact that Plaintiffs reference likewise accentuates the distinction between the newly created federal interstate compact agency and a federal agency. The Compact binds all federal as well as state agencies to the Commission's Comprehensive Plan. *See* Compact §§ 11.1 and 11.2. In Section 15.1(s)(2) of the

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Compact, Congress provided the federal representative on the Commission with a sixty-day period in which to exempt federal agencies from their obligation to comply with the Commission's Comprehensive Plan. In addition, following a determination that the national interest so requires, the President may suspend, modify or delete any provisions of the Comprehensive Plan to the extent that it affects the power of federal agencies. *Id.* § 15.1(s)(1). Plainly, the power to exempt federal agencies from the Commission's control does not also mean that the federal government controls the Commission. Nowhere does the exemption or any other provision of the Compact confer that power on the federal government.[14] Contrary to Plaintiffs' contention, these provisions do not demonstrate federal control over the Commission. Rather, they show that the Commission is distinct from the federal government, which reserves its authority to act "where the national interest so requires." Compact § 15.1 (s)(1). The ability of the federal government to act independently of the Commission under limited circumstances does not establish federal authority to control the Commission.

In summary, the Commission is a federal-interstate compact agency jointly controlled by the signatory parties. The four Basin states hold a majority of the voting power. In contrast, a federal agency is an instrument controlled by the federal government and not the States. Nowhere does the Compact provide that by agreeing to jointly exercise their sovereign powers through the Commission, the signatory parties were forming a federal agency, with all of its attendant present and future procedural and substantive requirements. The DRBC is not funded

[14] In this respect, the Compact is similar to the Coastal Zone Management Act ("CZMA"), 16 U.S.C. §§ 1451-1465, which requires the activities of all federal agencies to be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of approved State management programs. *Id.* § 1456(c). The CZMA gives the President authority to exempt certain federal activities from state CZMA requirements, as more specifically set forth in the CZMA. *Id.* § 1456(c)(1)(B). That authority does not transform the states into federal agencies.

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or staffed to do so. The DRBC is not a federal agency for NEPA purposes, and NEPA does not govern the DRBC's regulatory processes.

E. Pursuant To The Functional Equivalence Doctrine, DRBC Is Not A Federal Agency

If Plaintiffs could demonstrate that DRBC were a federal agency for some purposes, which they have not done, DRBC would still not be a federal agency for NEPA purposes. As discussed in the DRBC Defendants' November 1 Brief, at 37-39, federal courts have held that NEPA does not apply to an agency with an environmental protection mission and whose processes include opportunities for extensive public comment. This judicially created doctrine of "functional equivalence" is applicable to the DRBC, whose mission is to protect and manage the Basin's water resources.

In their brief in support of their motion for summary judgment, the Environmental Group Plaintiffs do not dispute the vitality of the functional equivalence doctrine. Rather, the crux of their argument is that "[t]here is no record of any kind to demonstrate that DRBC took the requisite 'hard look' at environmental issues before it approved publication of the Draft Regulations." Envtl. Groups Br. 24.

Plaintiffs' argument fails to recognize that the extensive text of the proposed regulations themselves indicate that such a "hard look" occurred. At the beginning of the draft regulations, *see* § 7.1(a), copies of which are attached to the Bein Declaration as Exhibits I (December 9, 2010) and O (November 8, 2011), the purpose of the regulations is stated as follows:

> The purpose of this Article is to protect the water resources of the Delaware River Basin during the construction and operation of natural gas development projects. To effectuate this purpose, this Section establishes standards, requirements, conditions and restrictions to prevent, reduce or mitigate depletion and degradation of surface and groundwater resources and to promote sound practices of watershed management including control of runoff and erosion.

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In fact, DRBC took a very "hard look" at potential environmental impacts from natural gas activities, and engaged in a process similar to NEPA. At the very least, Plaintiffs are not entitled to summary judgment on this issue. As set forth in the Declaration of Robert Tudor, DRBC Deputy Executive Director, who led the interdisciplinary team that researched and developed the draft regulations, DRBC engaged in a multi-year process that included benchmarking, research and dialogue with regulators, scientists and engineers across the country, and evaluation of potential environmental impacts and various alternative actions and mitigation measures to avoid or minimize impacts. Tudor Decl. ¶ 4. Existing and proposed regulations of Pennsylvania and NYS, including the NYS draft SGEIS, were considered, *id.* ¶ 11, in addition to other approaches utilized across the country, *id.* ¶¶ 4, 8.

Importantly, stakeholder and public involvement was solicited and occurred throughout the process of developing the regulations, commencing with informal meetings before proposed regulations were developed. *Id.* ¶¶ 12-16, 22-25. This involvement, which included among other things meetings with members of Plaintiff Delaware Riverkeeper Network, *Id.* ¶ 13, continued through the closing of the formal notice and comment rulemaking process. *See generally id.* DRBC's public process has been transparent and inclusive.

The Tudor Declaration and the draft regulations demonstrate that, contrary to the Environmental Group Plaintiffs' contentions, the DRBC took a "hard look" at environmental issues, and, through traditional means (*e.g.*, siting setbacks from wetlands and streams), innovative means (*e.g.*, natural gas development plans on a leasehold-wide basis to minimize cumulative environmental impacts), and mitigation measures, established requirements to minimize environmental and water resource impacts. *See generally* Bein Decl. Exs. I and O. Even if, for some purposes, Plaintiffs had shown DRBC to be a federal agency, which they have

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not, the functional equivalence doctrine exempts DRBC from NEPA and precludes the grant of summary judgment to the Plaintiffs.

F. Whether The Draft Natural Gas Regulations, If Enacted, Would Significantly Affect The Quality Of The Human Environment Is Not Properly Before The Court At This Time And Raises Disputed Issues Of Material Fact

In briefing their motion for summary judgment, Plaintiffs have assumed that, if the DRBC is a federal agency (which it is not), then the DRBC must prepare an EIS prior to promulgating natural gas regulations. *See* Envtl. Groups Br. 1 ("Defendants failed to comply with . . . [NEPA] to issue a draft [EIS] to accompany the Draft Regulations, a major federal action that will significantly affect the quality of the human environment."); NYS Br. 1 ("Because all defendant agencies, including DRBC, are federal agencies subject to NEPA, NEPA requires them to prepare an EIS to address those impacts."). NEPA requires a federal agency to prepare an EIS only if it takes a major federal action that would "significantly affect[] the quality of the human environment," 42 U.S.C. § 4332. *See, e.g.*, *Sierra Club v. Hassell*, 636 F.2d 1095, 1097 (5th Cir. 1981) ("An impact statement is not required for a non-major action or a major action which does not have a significant impact on the environment."); *Town of Groton v. Laird*, 353 F. Supp. 344, 348 (D. Conn. 1972) ("But an environmental impact statement is not required every time a federal agency does anything. Before an environmental impact statement is required, two threshold factors must exist: the proposed action must be 'major,' and its effect on the human environment must be 'significant.'").

In the present case, the DRBC Defendants acknowledge that natural gas activities, if left *unregulated*, may significantly affect the environment. The Executive Director previously determined that natural gas activities may have a substantial effect on the water quality of the Commission's Special Protection Waters. *See* Bein Decl. Ex. D, Executive Director

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Supplemental Determination (July 23, 2010). This determination was based on the natural gas activities likely to occur if left *unregulated.* But the very purpose of DRBC's proposed regulations – and applicable existing and proposed state regulations – is to prevent significant adverse effects from occurring. *See* Tudor Decl. ¶ 27. As explained in detail below, the relevant question for NEPA purposes is whether natural gas activities will cause a significant adverse effect *as regulated* by the states and by the Commission.[15]

For the reasons discussed below, a finding on summary judgment that issuance of final natural gas regulations by the DRBC would significantly affect the quality of the human environment would (1) usurp the opportunity of the DRBC to determine in the first instance whether or not that is so, and circumvent the "arbitrary and capricious" deferential standard of review ordinarily applicable to review of administrative agency actions, and (2) inappropriately resolve disputed issues of fact on a motion for summary judgment.

1. The Question Of Whether The DRBC's Natural Gas Regulations Would Significantly Affect The Quality Of The Human Environment Is Not Properly Before The Court.

The question of whether the DRBC's promulgation of final natural gas regulations would significantly affect the quality of the human environment is not cognizable at this stage. Only if Plaintiffs' claims are presently justiciable, if Plaintiffs have a right of action, and if the DRBC is a federal agency subject to NEPA, should the Court examine the actions of DRBC to determine whether it violated NEPA. But even then, it would be premature for the Court to determine whether an EIS is required. The question of whether the proposed DRBC regulations will

[15] The signatory parties may adopt Commission regulations to set minimum regulatory standards, fill in gaps in state regulations, or serve other purposes. Any regulations by EPA would also be considered.

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significantly affect the quality of the human environment and thereby trigger the EIS requirement should be decided by the DRBC – and not the Court – in the first instance.[16]

The Second Circuit has "consistently held that whether a particular agency action will have a 'significant' effect on the environment is a substantive question left to the informed discretion of the agency proposing the action." *Nat'l Audubon Society v. Hoffman*, 132 F.3d 7, 14 (2d Cir. 1997). Thus, the agency makes the determination in the first instance; if that determination is challenged, then the court reviews the determination on the basis of the agency record. *See, e.g.*, *Hanly v. Mitchell*, 460 F.2d 640, 645 (2d Cir. 1972) ("As the agency responsible for the acquisition of the site, the design and construction of the buildings, and their ultimate operation, GSA was the appropriate body to make the original determination as to environmental impact."). In this case, then, the DRBC would be charged, in the first instance, with making that determination.

If the question of "significant effects" comes before a court on appeal from an agency's determination, the court's role is merely to review the process engaged in by the agency, *not* to determine for itself "whether the proposed action may have a significant impact on the environment." *Hoffman*, 132 F.3d at 18. As the Second Circuit has explained: "The question [of whether the proposed action may have a significant impact on the environment] is substantive, and consequently not one within the purview of the district court. Rather, it is one the [agency] must decide." *Id.* And, if the record before the court is incomplete, the proper remedy is remand to the agency: "The [agency's] failure to weigh the relevant factors related to

[16] As NYS noted in its opposition to DRBC Defendants' motion to dismiss its Amended Complaint: "[T]he Court indicated at the December 13 conference that the present motions would address [the issue of liability] and not remedies at this time." NYS Br. 49. The DRBC Defendants agree. If, contrary to DRBC's arguments, the Court determines that DRBC must comply with NEPA, whether or not the DRBC should be ordered to perform an EIS should not be decided now.

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its project's environmental impact is a flaw that precludes a definitive determination as to whether the project may have a significant impact." *Id.* at 18. Thus, where the administrative record on the question is as-of-yet undeveloped, "the appropriate remedy is to remand the case to the agency to correct the deficiencies in the record and in its analysis." *Id.*

In this case, the DRBC has not issued a finding regarding "significant effects" in the NEPA context, having concluded (and continuing to understand) that it is not a federal agency within the scope of NEPA. As a result, the administrative record here is wholly undeveloped on the relevant question. Thus, if the Court holds that NEPA applies to the DRBC, the Court should not itself determine whether an EIS is required, but rather remand the question of whether an EIS must be prepared.

2. Even If The Question Of Whether The DRBC's Natural Gas Regulations Would Significantly Affect The Quality Of The Human Environment For NEPA Purposes Were Appropriately Before The Court, Which It Is Not, The Facts Are Disputed And So The Issue Cannot Be Resolved On Summary Judgment.

Despite Plaintiffs' portrayal to the contrary (which is inaccurate, as described above),[17] the question of whether the DRBC's promulgation of final natural gas regulations would significantly affect the quality of the human environment is not undisputed. There are several good reasons why the DRBC would not be required to perform an EIS, even if DRBC were held to be a federal agency.[18]

[17] *See, e.g.*, NYS Br. 1 ("Defendants acknowledge that natural gas development in the DRB may result in significant adverse environmental impacts to the Basin's waters."). The DRBC agrees only if such activities are unregulated, which they are not.

[18] As a threshold matter, it is not at all apparent that Plaintiffs intend their declarations be used to show that DRBC's natural gas regulations would significantly affect the environment for NEPA purposes (as they appear to have been submitted primarily – if not solely – to support Plaintiffs' standing arguments). Assuming that Plaintiffs' declarations, and particularly NYS's expert declarations, are submitted for purposes of this element of their NEPA claim, DRBC Defendants incorporate their *Daubert* arguments, *see supra* Part II.A.2, here. To the extent that

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First, the draft natural gas regulations incorporate mitigation requirements, *see generally* Bein Decl. Exs. I and O, which may be sufficient to eliminate significant effect on the quality of the human environment resulting from the promulgation of final regulations and the commencement of drilling. Many courts have "permitted the effect of mitigation measures to be considered in determining whether preparation of an EIS is necessary." *See Cabinet Mountains Wilderness/Scotchman's Peak Grizzly Bears v. Peterson*, 685 F.2d 678, 681-82 (D.C. Cir. 1982).[19] As the *Cabinet Mountains* court explained:

> Logic also supports this result. NEPA's EIS requirement is governed by the rule of reason, and an EIS must be prepared only when significant environmental impacts will occur as a result of the proposed action. If, however, the proposal is modified prior to implementation by adding specific mitigation measures which completely compensate for any possible adverse environmental impacts stemming from the original proposal, the statutory threshold of significant environmental effects is not crossed and an EIS is not required. To require an EIS in such circumstances would trivialize NEPA and would "diminish its utility in providing useful environmental analysis for major federal actions that truly affect the environment."

685 F.2d at 681 (internal citations omitted).

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the expert declarations are not excluded, but are considered by the Court to show substantial effect for purposes of NEPA, the facts contained within them (as well as their conclusions) are disputed, as set forth in the DRBC Defendants' response to NYS's and the Environmental Group Plaintiffs' Local Rule 56.1 Statements of Material Facts and *supra* Part II.A.2-3.

[19] *See also Spiller v. White*, 352 F.3d 235, 241 (5th Cir. 2003); *C.A.R.E. Now, Inc. v. FAA*, 844 F.2d 1569 (11th Cir. 1988); *Greenpeace Action v. Franklin*, 14 F.3d 1324 (9th Cir. 1992); *Roanoke River Basin Ass'n v. Hudson*, 940 F.2d 58 (4th Cir. 1991); *Audubon Soc'y of Cent. Arkansas v. Dailey*, 977 F.2d 428 (8th Cir. 1992); *Preservation Coalition, Inc. v. Pierce*, 667 F.2d 851, 860 (9th Cir. 1982); *City & County of San Francisco v. United States*, 615 F.2d 498, 501 (9th Cir. 1980); *Sierra Club v. Alexander*, 484 F. Supp. 455, 468 (N.D.N.Y.), *aff'd mem.*, 633 F.2d 206 (2d Cir. 1980).

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Plaintiffs and their experts have not addressed the impact of the mitigation provisions in the draft regulations.[20] Because of that oversight, there is at least a genuine issue of material fact as to whether the mitigation provisions included in the draft regulations would be sufficient to overcome any "significant" effects to the environment that would be caused by the DRBC's issuance of final regulations. It would be impossible, without analyzing the draft regulations in great detail, to conclude that there is not at least a dispute as to whether the mitigation provisions would minimize or ameliorate effects of natural gas development such that no "significant" effect on the quality of the environment would result from natural gas development in the Basin.

Second, NYS's expert declarations do not meet the *Daubert* standard and are disputed for the reasons stated in the declarations proffered by DRBC and discussed in Part II.A.2 and 3, above. For example, as explained in detail in the declarations of Scott Perry and Eugene Pine, Plaintiffs have not properly taken into account the impact of state regulations on natural gas drilling. In addition, Pennsylvania's statutes and regulations would apply to the drilling in Pennsylvania highlighted by NYS as potentially injuring its interests.[21] *See, e.g.*, Act of Feb. 14, 2012, 2012 Pa. Legis. Serv. Act 2012-13 (H.B. 1950) (amending Pennsylvania's Oil and Gas Act); 58 Pa. Cons. Stat. §§ 2301-3504 (codifying Pennsylvania's amended Oil and Gas Act); 25 Pa. Code ch. 78 (regulating oil and gas wells). These and other Pennsylvania statutes and

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[20] NYSDEC, in its revised dSGEIS, devoted a full chapter to mitigation measures "that, if implemented, would eliminate or mitigate potentially significant adverse impacts from high-volume hydraulic fracturing operations." NYSDEC, *Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulator Program*, Executive Summary 19 ("NYSDEC dSGEIS") (Rev. Draft Sept. 7, 2011), http://www.dec.ny.gov/energy/75370.html; *see also id.* ch. 7.

[21] *See, e.g.*, NYS Br. 14 ("New York has also shown a risk of increased State expenditures on Medicaid because gas development in the Pennsylvania portion of the DRB would . . . increase ozone levels in New York."). Drilling is currently prohibited in New York State, as explained at length in the DRBC Defendants' January 12 Brief.

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regulations cited by the PADEP declarants and which are already in place, create a baseline from which any change in regulation (such as the issuance of final regulations by the DRBC) must be studied. *Cf. Am. Rivers v. F.E.R.C.*, 201 F.3d 1186, 1195 n.15 (9th Cir. 1999) ("[W]e have stated that '[w]ithout establishing . . . baseline conditions . . . there is simply no way to determine what effect [an action] will have on the environment and, consequently, no way to comply with NEPA.'" (quoting *Half Moon Bay Fishermans' Mktg. Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir.1988))).[22] By failing to take Pennsylvania's regulations into account, and because of other deficiencies discussed in DRBC's declarations and in Part II.A.2 and 3, above, NYS's expert declarations are unreliable and are rebutted by DRBC's declarations. Moreover, as set forth in the Rule 56(d) Declaration of Kenneth J. Warren, discovery is needed for the PADEP declarants to fully evaluate NYS's declarations.[23]

In summary, a finding on summary judgment that issuance of final natural gas regulations by the DRBC would significantly affect the quality of the human environment would be inappropriate because the DRBC has not yet had an opportunity to make a determination

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[22] *American Rivers* discusses "baseline" environmental conditions in the context of the reissuance of a hydropower license to two hydroelectric power facilities located along a twenty-five mile stretch of the McKenzie River. The court concluded that, in analyzing the environmental impacts of the agency action, it would be implausible to recreate "a hypothetical pre-project or no-project environment." *Id.* at 1197. The same logic applies in this case with respect to baseline regulation.

[23] Additional discovery might include probing NYS's prior statements. For example, NYS, through the NYSDEC, has admitted that mitigation measures have a role to play, as discussed above. NYSDEC concluded in its dSGEIS as follows: "With additional required emission controls recommended in the revised SGEIS for the operations associated with drilling activities, coupled with potential deployment of further emission controls arising from upcoming O_3 SIP implementation actions, the Department is confident that the effect of cumulative impacts from the development of gas resources in the multi-county area underlain by the Marcellus Shale would be adequately mitigated." NYSDEC dSGEIS, at 6-179 (Sept. 7, 2011); *see also id.* at 6-156.

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regarding significant effects within the meaning of NEPA, disputed issues of fact exist on the question of significant effects, and further discovery is required.

III. CONCLUSION

For the reasons set forth above, in the DRBC Defendants' November 1 and January 12 Briefs, and in the Federal Defendants' briefs (to the extent applicable to the DRBC Defendants), Plaintiffs' Complaints should be dismissed in their entirety as to the DRBC Defendants. Likewise, Plaintiffs' motions for summary judgment should be denied as to the DRBC Defendants in their entirety.[24]

A proposed order is attached.

Respectfully submitted,

Dated: April 5, 2012

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[24] If the Court considers the February 13, 2012 *amicus* briefs submitted by the Council of the City of New York and the Chesapeake Bay Foundation, Inc., the arguments made by DRBC Defendants in this brief and in their November 1 and January 12 Briefs, to the extent relevant, should be considered in opposition to the points raised by the *amici*, as well.

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CERTIFICATE OF SERVICE

I, Kenneth J. Warren, Esquire, hereby certify that on April 5, 2012, I caused a true and correct copy of the foregoing Defendants Delaware River Basin Commission And Carol R. Collier's (Sued In Her Official Capacity) Memorandum Of Law In Opposition To Plaintiffs' Motions For Summary Judgment And Reply Memorandum Of Law In Support Of Their Motions To Dismiss to be served via first-class mail and electronic transmission on all counsel of record.

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RESOLUTION NO. 67-2

A RESOLUTION to amend the Comprehensive Plan with respect to water quality standards for the Delaware River Estuary and Bay.

WHEREAS, the Commission undertook a basin-wide water pollution abatement and control program as authorized by its resolution of May 6, 1966 (No. 66-7), and as a first step in the formulation of that program the Commission conducted a major conference on water pollution problems of the basin, in Philadelphia on July 27, 1966; and

WHEREAS, the Commission has received and considered the preliminary report of the Delaware River Estuary Comprehensive Study conducted and prepared by the Federal Water Pollution Control Administration of the United States Department of the Interior, and the various findings and conclusions thereof; and

WHEREAS, a public hearing was duly held by the Commission on the 26th day of January, 1967, at Trenton, New Jersey, upon proposed water quality standards, as authorized or required by the Federal Water Pollution Control Act, as amended, and Articles 5 and 13 of the Delaware River Basin Compact, following the publication of notice pursuant to law; and

WHEREAS, the Commission has duly considered the results of its staff investigations, the facts and arguments presented at the public hearings, and all of the data and communications received by the Commission, and has consulted with interested parties in accordance with the Compact, and in consideration thereof the Commission has made certain determinations with respect to water quality standards for the Delaware River Estuary and Bay, and the tributaries thereof; and

WHEREAS, upon such investigations, public hearings and otherwise the Commission finds and determines that the effectuation of national policy as set forth in the Water Pollution Control Act (Public Law 84-660) as last amended by the Clean Water Restoration Act of 1966 (P.L. 89-753), and of the purposes and provisions of the Delaware River Basin

1967

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Compact and the Comprehensive Plan adopted pursuant thereto, requires that the Commission assume jurisdiction to control future pollution and abate existing pollution in the waters of the Delaware River Basin, by amendment of the Comprehensive Plan and by the adoption and promulgation of rules, regulations and standards pursuant to Article 5 of the Delaware River Basin Compact, now therefore

BE IT RESOLVED by the Delaware River Basin Commission:

1. The Comprehensive Plan is hereby amended by renumbering the existing Section X to Section XII and by the addition thereto of a new section, to be designated Section X Water Quality Standards, to read as follows:

Section X

Water Quality Standards

(The text of the standards is attached)

2. This resolution shall take effect immediately. All resolutions and parts of resolutions, and all parts of the Comprehensive Plan, heretofore adopted which are inconsistent with any provision of this resolution are, to the extent of such inconsistency, hereby repealed. This resolution will not apply to existing effluents pending the adoption by the Commission of rules and regulations to implement the Comprehensive Plan as amended, pursuant to Article 5 of the Compact.

_____
Chairman

_____
Secretary

ADOPTED:

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QUALITY STANDARDS FOR THE INTERSTATE WATERS OF THE DELAWARE RIVER BASIN

ARTICLE I

ESTUARY GENERALLY

Water uses

Uses paramount. Water uses shall be paramount in determining stream quality objectives which, in turn, shall be the basis for determining effluent quality requirements.

Uses to be protected. The quality of waters shall be maintained in a safe and satisfactory condition for the following uses: (a) agricultural, industrial, and public water supplies after reasonable treatment, except where natural salinity precludes such uses; (b) wildlife, fish and other aquatic life; (c) recreation; (d) navigation; (e) controlled and regulated waste assimilation in reasonable compatibility with other uses; and (f) such other uses as may be provided by the Comprehensive Plan.

Stream quality objectives

Limits. The waters shall not contain substances attributable to municipal, industrial, or other discharges in concentrations or amounts sufficient to preclude the specified water uses to be protected. Within this requirement, the waters shall be substantially free from unsightly or malodorous nuisances due to floating solids, sludge deposits, debris, oil, scum, substances, in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life, or that produce color, taste, or odor.

Effluent quality requirements

Disinfection. Wastes (exclusive of stormwater bypass) containing human excreta shall be effectively disinfected before being discharged into surface bodies of water.

Public safety. Effluents shall not create a menace to public health or safety at the point of discharge.

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Limits. Discharges shall not contain more than negligible amounts of debris, oil, scum or other floating materials, suspended matter which will settle to form sludge, toxic substances or substances that produce color, taste ond odors.

Other considerations

Combined sewers. Any new facility or project combining sanitary or industrial waste with stormwater drainage, which would have a substantial effect on the quality of waters of the basin, shall not be permitted, whether or not any such project or facility discharges into an existing combined system.

Access and reports. The Commission, or its duly authorized representatives, shall have access, at reasonable hours, to observe and inspect waste treatment facilities and to collect samples for analyses. Upon written request, operation reports shall be submitted to the Commission.

Zones. The Delaware River and Bay may be divided into zones which will facilitate the management of surface and underground water quality. The required percentage reduction of biochemical oxygen demand of all wastes will be uniform within zones.

Definitions

Biochemical oxygen demand. Biochemical oxygen demand as determined under standard laboratory procedures for 5-days at 20° C.

Carbonaceous oxygen demand. That part of the ultimate oxygen demand associated with biochemical oxidation of carbonaceous, as distinct from nitrogenous, material.

Effective disinfection. The destruction of pathogenic organisms in such manner and under such controls as shall be prescribed by Commission regulations.

River mile. The distance, in statute miles, of a location or item measured from "mile zero" essentially along the centerline of the navigation channel. Mile zero is located at the

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intersection of a line between the Cape May Light and the tip of Cape Henlopen.

Application

This Article shall apply to the Delaware River Estuary and Bay, including the tidal portions of the tributaries thereof.

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ARTICLE II

ZONE 2

Description

Zone 2 is that part of the Delaware River extending from the head of tidewater at Trenton, New Jersey, R.M. (River Mile) 133.4 (Trenton-Morrisville Toll Bridge) to R.M. 108.4 below the mouth of Pennypack Creek, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 2 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) agricultural, industrial, and public water supplies after reasonable treatment; (b) wildlife, maintenance and propagation of resident fish and other aquatic life, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 5.0 mg/l (milligrams per liter) except during the periods from April 1 to June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l; chlorides, maximum 15-day mean 50 mg/l; pH; between 6.5 and 8.5; total alkalinity, between 20 and 100 mg/l; hardness, maximum monthly mean 95 mg/l; temperature, shall not exceed 5° F above the average daily temperature gradient displayed during the 1961 - 1966 period, or a maximum of 86° F, whichever is less; phenols, maximum 0.005 mg/l; threshold odor number not to exceed 24 @ 60° C; syndets (synthetic detergents) measured as M.B.A.S. (methylene blue active substances), maximum monthly mean 0.5 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l (picocuries per liter), beta emitters, maximum 1,000 pc/l.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article 1. The biochemical oxygen demand shall be reduced at all times by at least 85 percent. The carbonaceous oxygen demand from all outfalls in the Zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

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ZONE 3

Description

Zone 3 is that part of the Delaware River extending from R. M. 108.4 to R. M. 95.0, below the mouth of Big Timber Creek, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 3 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) agricultural, industrial, and public water supplies after reasonable treatment; (b) wildlife, maintenance of resident fish and other aquatic life, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 3.5 mg/l, except during the periods from April 1 to June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l; chlorides, maximum 200 mg/l; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; hardness, maximum monthly mean 150 mg/l; temperature, shall not exceed 5° F above the average daily temperature gradient displayed during the 1961 - 1966 period, or a maximum of 86° F, whichever is less; phenols, maximum 0.005 mg/l; threshold odor number not to exceed 24 @ 60° C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units; maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article 1. The biochemical oxygen demand shall be reduced at all times by at least 85 percent. The carbonaceous oxygen demand from all outfalls in the Zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

ZONE 4

Description

Zone 4 is that part of the Delaware River extending from R. M. 95.0 to R. M. 78.8, the Pennsylvania-Delaware boundary line, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 4 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) industrial water supply after reasonable treatment; (b) wildlife, maintenance of resident fish and other aquatic life, passage of anadromous fish; (c) recreation; and (d) navigation.

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Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 3.5 mg/l, except during the periods from April 1 to June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l; chlorides, maximum 250 mg/l at R. M. 92.47; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; temperature, shall not exceed 5° F above the average daily temperature gradient displayed during the 1961 - 1966 period, or a maximum of 86° F, whichever is less; phenols, maximum 0.02 mg/l; threshold odor number not to exceed 24 @ 60° C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article 1. The biochemical oxygen demand shall be reduced at all times by at least 85 percent. The carbonaceous oxygen demand from all outfalls in the Zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

ZONE 5

Description

Zone 5 is that part of the Delaware River extending from R. M. 78.8 to R. M. 48.2, Liston Point, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 5 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) industrial water supply after reasonable treatment; (b) wildlife, maintenance of resident fish and other aquatic life, propagation of resident fish from R. M. 70.0 to R. M. 48.2, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 3.5 mg/l at R. M. 78.8, 4.5 mg/l at R. M. 70.0 and 6.0 mg/l at R. M. 59.5, except during periods from April 1 to June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l in the entire zone; pH, betwen 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; temperature shall not exceed 5° F above the average daily temperature gradient displayed during the 1961 - 1966 period, or a maximum of 86° F, whichever is less; phenols, maximum 0.02 mg/l; threshold odor number not to exceed 24 @ 60° C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l.

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Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article 1. The biochemical oxygen demand shall be reduced at all times by at least 85 percent. The carbonaceous oxygen demand from all outfalls in the Zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

ZONE 6

Description

Zone 6 is that part of Delaware Bay extending from R. M. 48.2 to R. M. 0.00, the Atlantic Ocean, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 6 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) industrial water supply after reasonable treatment; (b) wildlife, maintenance and propagation of resident fish, shellfish, and other aquatic life, and passage of anadromous fish; (c) recreation and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 6.0 mg/l; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; temperature, shall not exceed 5° F above the average daily temperature gradient displayed during the 1961 - 1966 period, or a maximum of 86° F, whichever is less; phenols, maximum 0.02 mg/l; threshold odor number not to exceed 24 @ 60° C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l; coliform, MPN (most probable number) not to exceed U. S. Public Health Service's shellfish standards in designated shellfish areas.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article 1. The biochemical oxygen demand shall be reduced at all times by at least 85 percent.

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NO. 67-7

A RESOLUTION to amend the Comprehensive Plan with respect to water quality standards for the Delaware River Basin in general and for its interstate non-tidal streams.

WHEREAS, the Commission undertook a basinwide water pollution abatement and control program as authorized by its Resolution of May 6, 1966 (No. 66-7), and as a first step in the formulation of that program the Commission conducted a major conference on water pollution problems of the basin in Philadelphia on July 27, 1966; and

WHEREAS, the Commission by Resolution No. 67-2 adopted water quality standards for the Delaware River Estuary and Bay; and

WHEREAS, a public hearing was duly held by the Commission on the 30th day of March, 1967, at East Stroudsburg, Pennsylvania, upon proposed water quality standards for the basin as a whole and for the interstate non-tidal streams of the basin, as authorized or required by the Federal Water Pollution Control Act, as amended, and Articles 5 and 13 of the Delaware River Basin Compact, following the publication of notice pursuant to law; and

WHEREAS, the Commission has duly considered the results of its staff investigations, the facts and arguments presented at the public hearings, and all of the data and communications received by the Commission, and has consulted with interested parties in accordance with the Compact, and in consideration thereof the Commission has made certain determinations with respect to water quality standards for the Delaware River Basin generally, and for the interstate non-tidal streams; now therefore

BE IT RESOLVED by the Delaware River Basin Commission:

1. Section X of the Comprehensive Plan, as added by Resolution No. 67-2, is hereby amended by deleting Article I thereof (entitled Estuary Generally) and inserting a new Article I, entitled "Basinwide," to read as follows:

/The text of Article I is attached hereto/

2. Section X of the Comprehensive Plan is further amended by adding thereto a new Article II, entitled "Interstate Streams--Non-tidal," to read as follows:

/The text of Article II, to follow Article I, is attached hereto/

3. Article II of Section X of the Comprehensive Plan, as added by Resolution No. 67-2, is re-numbered Article III, to read as follows:

/Article III, following Article II, is attached hereto/

4. Section XII of the Comprehensive Plan, as re-numbered by Resolution No. 67-2, is hereby repealed.

Item #4- 4/26/67

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5. This resolution shall take effect immediately. All resolutions and parts of resolutions, and all parts of the Comprehensive Plan (including the Reciprocal Agreement for the Correction and Control of Pollution of the Waters of the Interstate Delaware River, of Addendum No. 1) heretofore adopted which are inconsistent with any provisions of this Resolution are, to the extent of such inconsistency, hereby repealed. This Resolution will not apply to existing effluents pending the adoption by the Commission of the rules and regulations to implement the Comprehensive Plan as amended, pursuant to Article 5 of the Compact.

_____
Chairman

_____
Secretary

ADOPTED: April 26, 1967

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SECTION X

WATER QUALITY STANDARDS FOR THE DELAWARE RIVER BASIN

ARTICLE I

BASINWIDE

Water uses

Uses paramount. Water uses shall be paramount in determining stream quality objectives which, in turn, shall be the basis for determining effluent quality requirements.

Uses to be protected. The quality of Basin waters shall be maintained in a safe and satisfactory condition for the following uses: (a) agricultural, industrial, and public water supplies after reasonable treatment, except where natural salinity precludes such uses; (b) wildlife, fish and other aquatic life; (c) recreation; (d) navigation; (e) controlled and regulated waste assimilation to the extent that such use is compatible with other uses; and (f) such other uses as may be provided by the Comprehensive Plan.

Stream quality objectives

Limits. The waters of the Basin shall not contain substances attributable to municipal, industrial, or other discharges in concentrations or amounts sufficient to preclude the specified water uses to be protected. Within this requirement, the waters shall be substantially free from unsightly or malodorous nuisances due to floating solids, sludge deposits, debris, oil, scum, substances in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life, or that produce color, taste, odor of the water, or taint fish or shellfish flesh. In no case shall concentrations of substances exceed those values given for rejection of water supplies in the United States Public Health Service Drinking Water Standards.

Effluent quality requirements

Minimum treatment. All wastes shall receive a minimum of secondary treatment, regardless of the stated stream quality objective.

Disinfection. Wastes (exclusive of stormwater bypass) containing human excreta or disease producing organisms shall be effectively disinfected before being discharged into surface bodies of water.

Public safety. Effluents shall not create a menace to public health or safety at the point of discharge.

Limits. Discharges shall not contain more than negligible amounts of debris, oil, scum or other floating materials, suspended matter which will settle to form sludge, toxic substances, or substances or organisms that produce color, taste, odor of the water, or taint fish or shellfish flesh.

Allocation of capacity. Where necessary to meet the stream quality objectives, the waste assimilative capacity of the receiving waters shall be allocated in accordance with the doctrine of equitable apportionment.

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Other considerations

Combined sewers. Any new facility or project combining sanitary or industrial waste with stormwater drainage which would have a substantial effect on the quality of waters of the Basin shall not be permitted, whether or not any such project or facility discharges into an existing combined system.

Access and reports. The Commission, or its duly authorized representatives, shall have access, at reasonable hours, to observe and inspect waste treatment facilities and to collect samples for analyses. Upon written request, waste treatment facility operation reports shall be submitted to the Commission.

Zones. The Delaware River and Bay and their tributaries may be divided into zones which will facilitate the management of surface and underground water quality.

Streamflow. Numerical stream quality objectives are based on a minimum consecutive 7-day flow with a 10-year recurrence interval.

Definitions

Biochemical oxygen demand. Biochemical oxygen demand as determined under standard laboratory procedures for 5 days at 20°C.

Carbonaceous oxygen demand. That part of the ultimate oxygen demand associated with biochemical oxidation of carbonaceous, as distinct from nitrogenous, material.

Effective disinfection. The destruction of pathogenic organisms in such manner and under such controls as shall be prescribed by Commission regulations.

Secondary treatment. The removal of practically all suspended solids and the reduction of the biochemical oxygen demand at all times by at least 85 percent, and may include the in-plant control of industrial wastes as prescribed by the Commission.

River mile. The distance, in statute miles, of a location or item measured from "mile zero."

> Delaware Bay and River. Mile zero is located at the intersection of the centerline of the navigation channel and a line between the Cape May Light and the tip of Cape Henlopen. Distances from mile zero are measured essentially along the centerline of the navigation channel up to the Trenton-Morrisville Toll Bridge (R.M. 133.4) and above that point along the State boundary line as shown on published quadrangle maps of the United States Geological Survey.
>
> Tributaries. Mile zero is located at the intersection of the centerline of the tributary and a line joining the opposite banks at its mouth. Distances from mile zero are measured along the centerline of the tributary.

Application

This Article shall apply to all surface waters of the Delaware River Basin.

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ARTICLE II

INTERSTATE STREAMS--NONTIDAL

This Article shall apply to the interstate nontidal streams of the Delaware River Basin.

Description

The interstate nontidal streams of the Delaware River Basin are those rivers, lakes, and other waters that flow across or form a part of state boundaries. The interstate waters are further classified as follows:

Zone 1A is that part of the Delaware River extending from the confluence of the East and West Branches of the Delaware River at Hancock, New York, R.M. (River Mile) 330.7, to the U. S. Route 106 bridge at Narrowsburg, New York, R.M. 289.9.

Zone 1B is that part of the Delaware River extending from the U. S. Route 106 bridge at Narrowsburg, New York, R.M. 289.9, to the U. S. Routes 6 and 209 bridge at Port Jervis, New York, R.M. 254.75.

Zone 1C is that part of the Delaware River extending from the U. S. Routes 6 and 209 bridge at Port Jervis, New York, R.M. 254.75, to Tocks Island Dam, R.M. 217.0 (proposed axis of dam).

Zone 1D is that part of the Delaware River extending from Tocks Island Dam, R.M. 217.0 (proposed axis of dam), to R.M. 185.0, above Easton, Pennsylvania.

Zone 1E is that part of the Delaware River extending from R.M. 185.0, above Easton, Pennsylvania, to the head of tidewater at Trenton, New Jersey, R.M. 133.4 (Trenton-Morrisville Toll Bridge).

Zone E is East Branch Delaware River extending from its source in the town of Roxbury, Delaware County, New York, to its mouth at Hancock, New York, at R.M. 330.7 on the Delaware River.

Zone W1 is West Branch Delaware River extending from its source in the town of Jefferson, Schoharie County, New York, to its mouth at Hancock, New York, at R.M. 330.71 on the Delaware River.

Zone W2 is Sand Pond Creek extending from R.M. 1.8 at the confluence of Sherman Creek and Starboard Creek in Pennsylvania to its mouth in New York at R.M. 10.1 on the West Branch Delaware River; Cat Hollow Brook extending from its source in New York to its mouth in Pennsylvania at R.M. 1.05 on Sand Pond Creek; Sherman Creek in Pennsylvania extending from its source to its mouth at R.M. 1.8 on Sand Pond Creek; an unnamed tributary of Sherman Creek extending from its source in New York to its mouth in Pennsylvania at R.M. 1.6 on Sherman Creek; and Starboard Creek extending from its source in Lake Oquaga in New York to its mouth in Pennsylvania at R.M. 1.81 on Sand Pond Creek.

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Zone N1 is that part of the Neversink River extending from R.M. 0.5 at its confluence with Clove Brook to its mouth on the Delaware River at R.M. 253.64.

Zone N2 is Clove Brook extending from its source in Steeny Kill Lake in New Jersey to its mouth in New York at R.M. 0.5 on the Neversink River; an unnamed tributary of Clove Brook extending from its source in New York to its mouth in New Jersey at R.M. 1.0 on Clove Brook; and an unnamed tributary to the above unnamed tributary of Clove Brook extending from its source in New York to its mouth in New Jersey at R.M. 0.7 on the unnamed tributary of Clove Brook.

Zone C1 is that part of the Christina River extending from its source in Pennsylvania to the head of tidewater at R.M. 16.3 at the outlet of Smalley's Pond in Delaware.

Zone C2 is West Branch Christina River extending from its source in Maryland to its mouth on the Christina River in Delaware at R.M. 25.7; Persimmon Run extending from its source in Maryland to its mouth on the West Branch Christina River in Delaware at R.M. 0.8; and East Branch Christina River extending from its source in Pennsylvania to its mouth on the Christina River in Delaware at R.M. 30.2.

Zone C3 is White Clay Creek extending from its source in Pennsylvania to R.M. 14.7 at the Pennsylvania-Delaware State line.

Zone C4 is that part of White Clay Creek extending from R.M. 14.7 at the Pennsylvania-Delaware State line to its mouth on the Christina River in Delaware at R.M. 10.0.

Zone C5 is that part of Red Clay Creek extending from the confluence of the East and West Branches of Red Clay Creek in Pennsylvania at R.M. 13.4 to R.M. 12.6, at the Pennsylvania-Delaware State line; and West Branch Red Clay Creek extending from its source to its mouth on Red Clay Creek at R.M. 13.4.

Zone C6 is that part of Red Clay Creek extending from R.M. 12.6 at the Pennsylvania-Delaware State line to its mouth on White Clay Creek in Delaware at R.M. 2.6.

Zone C7 is that part of Brandywine Creek extending from the confluence of the East and West Branches of Brandywine Creek in Pennsylvania at R.M. 20.0 to the head of tidewater at R.M. 2.0 at the Market Street Bridge in Wilmington, Delaware; and West Branch Brandywine Creek extending from its source to its mouth on Brandywine Creek at R.M. 20.0

Zone C8 is Naaman Creek extending from its source in Pennsylvania to the head of tidewater in Delaware.

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Water uses

Uses to be protected. The quality of interstate nontidal waters shall be maintained in a safe and satisfactory condition for the uses specified in Column 2 of Table 1. The following designations apply to that column:

A. Agricultural, industrial, and public water supplies after reasonable treatment.
B. Wildlife, maintenance and propagation of resident game fish and other aquatic life.
C. Maintenance and propagation of trout.
D. Spawning and nursery habitat for anandromous fish.
E. Passage of anadromous fish.
F. Recreation.

Stream quality objectives

The stream quality objectives of the interstate nontidal waters shall be those specified in Column 3 of Table 1. The following designations apply to that column:

A. Dissolved oxygen.
   1. Not less than 5.0 mg/l at any time.
   2. Not less than 4.0 mg/l at any time.

B. Temperature.
   1. Not to exceed 5°F rise above natural temperature until stream temperature reaches 70°F; natural temperature will prevail above 70°F.
   2. Not to exceed 5°F rise above natural temperature until stream temperature reaches 87°F, except in heat dissipation areas which may be designated by the Commission; natural temperature will prevail above 87°F, except in designated heat dissipation areas.

C. pH
   1. Between 6.0 and 8.5.
   2. Between 6.5 and 8.5.

D. Phenols - not to exceed 0.005 mg/l.

E. Threshold odor number - not to exceed 24 at 60°C.

F. Synthetic detergents (M.B.A.S.) - not to exceed 0.5 mg/l.

G. Fluorides - not to exceed 1.0 mg/l.

H. Alkalinity - not less than 20 mg/l.

I. Radiooctivity --
   alpha emitters - not to exceed 3 pc/l (picocuries per liter);
   beta emitters - not to exceed 1,000 pc/l.

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J. Turbidity - not to exceed the natural background by 10 units or a maximum of 25 units, whichever is less, except following precipitation; increases not to be attributable to industrial waste discharges.

Effluent quality requirements

The effluent quality requirements of the interstate nontidal waters shall be those specified in Column 4 of Table 1. The following designations shall apply to that column:

A. All discharges shall meet the effluent quality requirements of Article 1. The carbonaceous oxygen demand from an outfall (exclusive of stormwater bypass) shall not exceed that assigned by the Commission to maintain stream quality objectives.

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TABLE 1

Water Quality Standards for Interstate, Nantidal Streams in Terms of Minimum Water Uses, Stream Quality Objectives and Effluent Quality Requirements

Zone		Water uses	Stream quality objectives	Effluent quality requirements
(1)		(2)	(3)	(4)
1A.	Delaware River, Hancock to Narrowsburg	ABCDF	A1,B1,C1,D,E,F,I	A
1B.	Delaware River, Narrowsburg to Port Jervis	ABDEF	A2,B2,C1,D,E,F,I	A
1C.	Delaware River, Port Jervis to Tocks Island	ABDEF	A2,B2,C1,D,E,F,I	A
1D.	Delaware River, Tocks Island to Easton	ABDEF	A2,B2,C1,D,E,F,I	A
1E.	Delaware River, Easton to Trenton	ABDEF	A2,B2,C1,D,E,F,H,I	A
E.	East Branch Delaware River	ABCF	A1,B1,C1,D,E,F,I	A
W1.	West Branch Delaware River	ABCF	A1,B1,C1,D,E,F,I	A
W2.	Sand Pond Creek, Cat Hollow Brook, Sherman Creek, Starboard Creek	ABCF	A1,B1,C1,D,E,F,I	A
N1.	Neversink River, R.M. 0.0 to 0.5	ABF	A2,B2,C2,D,E,F,I	A
N2.	Clove Brook and its interstate tributaries	ABCF	A1,B1,C2,D,E,F,I	A
C1.	Christina River above Smalley's Pond	ABF	A2,B2,C1,D,E,F,I,J	A
C2.	East and West Branches Christina River, Persimmon Run	ABF	A2,B2,C1,D,E,F,I,J	A
C3.	White Clay Creek in Pennsylvania	ABCF	A1,B1,C1,D,E,F,I,J	A
C4.	White Clay Creek in Delaware	ABF	A2,B2,C1,D,E,F,I,J	A
C5.	Red Clay Creek in Pennsylvania and West Branch Red Clay Creek	ABCF	A1,B1,C1,D,E,F,I,J	A
C6.	Red Clay Creek in Delaware	ABF	A2,B2,C1,D,E,F,I,J	A
C7.	Brandywine Creek and West Branch Brandywine Creek	ABDEF	A2,B2,C2,D,E,F,G,I,J	A
C8.	Naaman Creek	ABF	A2,B2,C1,D,E,F,I	A

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ARTICLE III

INTERSTATE STREAMS--TIDAL

This Article shall apply to the Delaware River Estuary and Bay, including the tidal portions of the tributaries thereof.

Zone 2

Description

Zone 2 is that part of the Delaware River extending from the head of tidewater at Trenton, New Jersey, R.M. (River Mile) 133.4 (Trenton-Morrisville Toll Bridge) to R.M. 108.4 below the mouth of Pennypack Creek, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 2 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) agricultural, industrial, and public water supplies after reasonable treatment; (b) wildlife, maintenance and propagation of resident fish and other aquatic life, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 5.0 mg/l (milligrams per liter) except during the periods from April 1 to June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l; chlorides, maximum 15-day mean 50 mg/l; pH, between 6.5 and 8.5; total alkalinity, between 20 and 100 mg/l; hardness, maximum monthly mean 95 mg/l; temperature, shall not exceed 5°F above the average daily temperature gradient displayed during the 1961-1966 period, or a maximum of 86°F, whichever is less; phenols, maximum 0.005 mg/l; threshold odor number, not to exceed 24 @ 60°C; syndets (synthetic detergents) measured as M.B.A.S. (methylene blue active substances), maximum monthly mean 0.5 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l (picocuries per liter), beta emitters, maximum 1,000 pc/l.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article 1. The carbonaceous oxygen demand from all outfalls in the zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

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Zone 3

Description

Zone 3 is that part of the Delaware River extending from R.M. 108.4 to R.M. 95.0 below the mouth of Big Timber Creek, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 3 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) agricultural, industrial, and public water supplies after reasonable treatment; (b) wildlife, maintenance of resident fish and other aquatic life, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 3.5 mg/l, except during the periods from April 1 to June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l; chlorides, maximum 200 mg/l; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; hardness, maximum monthly mean 150 mg/l; temperature, shall not exceed 5°F above the average daily temperature gradient displayed during the 1961-1966 period, or a maximum of 86°F, whichever is less; phenols, maximum 0.005 mg/l; threshold odor number, not to exceed 24 @ 60°C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article I. The carbonaceous oxygen demand from all outfalls in the zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

Zone 4

Description

Zone 4 is that part of the Delaware River extending from R.M. 95.0 to R.M. 78.8, the Pennsylvania-Delaware boundary line, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 4 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) industrial water supply after reasonable

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treatment; (b) wildlife, maintenance of resident fish and other aquatic life, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall nat be less than 3.5 mg/l, except during the periods from April 1 to June 15 and September 16 to December 31 when the dissalved oxygen shall not average less than 6.5 mg/l; chlorides, maximum 250 mg/l at R.M. 92.47; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; temperature, shall not exceed 5°F above the average daily temperature gradient displayed during the 1961-1966 period, or a maximum of 86°F, whichever is less; phenols, maximum 0.02 mg/l; threshold odor number,not ta exceed 24 @ 60°C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article I. The carbonaceous oxygen demand from all outfalls in the zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

Zone 5

Description

Zone 5 is that part of the Delaware River extending from R.M. 78.8 to R.M. 48.2, Liston Point, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 5 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) industrial water supply after reasonable treatment; (b) wildlife, maintenance of resident fish and other aquatic life, propagation of resident fish from R.M. 70.0 to R.M. 48.2, passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 3.5 mg/l at R.M. 78.8, 4.5 mg/l at R.M. 70.0, and 6.0 mg/l at R.M. 59.5, except during periods from April 1 ta June 15 and September 16 to December 31 when the dissolved oxygen shall not average less than 6.5 mg/l in the entire zone; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; temperature, shall not exceed 5°F above the average daily temperature gradient displayed during the 1961-1966 period, or a maximum of 86°F, whichever is less; phenols, maximum 0.02 mg/l; threshold odor number,not to exceed 24 @ 60°C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l.

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Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article I. The carbonaceous oxygen demand from all outfalls in the zone (exclusive of stormwater bypass) shall not exceed that assigned by Commission regulations.

Zone 6

Description

Zone 6 is that part of Delaware Bay extending from R.M. 48.2 to R.M. 0.0, the Atlantic Ocean, including the tidal portions of the tributaries thereof.

Water uses

Uses to be protected. The quality of Zone 6 waters shall be maintained in a safe and satisfactory condition for the following uses: (a) industrial water supply after reasonoble treatment; (b) wildlife, maintenance and propagation of resident fish, shellfish, and other aquatic life, and passage of anadromous fish; (c) recreation; and (d) navigation.

Stream quality objectives

Dissolved oxygen, daily average concentration shall not be less than 6.0 mg/l; pH, between 6.5 and 8.5; total alkalinity, between 20 and 120 mg/l; temperature, shall not exceed 5°F above the average daily temperoture gradient displayed during the 1961-1966 period, or a maximum of 86°F, whichever is less; phenols, maximum 0.02 mg/l; threshold odor number, not to exceed 24 @ 60°C; syndets (M.B.A.S.), maximum monthly mean 1.0 mg/l; turbidity, maximum monthly mean 40 units, maximum 150 units; radioactivity, alpha emitters, maximum 3 pc/l, beta emitters, maximum 1,000 pc/l; coliform, MPN (most probable number) not to exceed U. S. Public Health Service's shellfish standards in designated shellfish areas.

Effluent quality requirements

All discharges shall meet the effluent quality requirements of Article I. The carbonaceous oxygen demand from an outfall (exclusive of stormwater bypass) shall not exceed that assigned by the Commission to maintain stream quality objectives.

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NO. 68-2

A RESOLUTION to adopt water quality regulations to implement Section X of the Comprehensive Plan.

WHEREAS, the Commission on April 26, 1967, adopted Section X of the Comprehensive Plan, entitled Water Quality Standards for the Delaware River Basin; and

WHEREAS, it is the purpose of the Commission to implement those standards by the adoption of regulations pursuant to Article 5 and Section 14.2 of the Compact; and

WHEREAS, proposed regulations were duly published and were the subject of a public hearing held in the City of Philadelphia, January 25, 1968, and the Commission has consulted with water pollution control and abatement agencies of the signatory parties and with affected public and private users and dischargers, and the draft regulations have been rivised by Commission staff with due regard to the consultation and testimony provided at such public hearing and otherwise; now therefore

BE IT RESOLVED by the Delaware River Basin Commission:

1. Pursuant to Article 5 and Section 14.2 of the Delaware River Basin Compact, water quality regulations, the text which is annexed hereto and made a part hereof, are hereby adopted.

2. The Commission staff shall make available copies of the regulations in sufficient quantity for public distribution as required, at such price as the Executive Director may find necessary to defray the printing and publication costs thereof, except that the Executive Director may provide for distribution of a reasonable number of copies without charge.

/s/ Stewart L. Udall
Chairman

/s/ W. Brinton Whitall
Secretary

ADOPTED: March 7, 1968

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U.S. ARMY ENGINEER DISTRICT PHILADELPHIA
U.S. ARMY ENGINEER DIV. • NORTH ATLANTIC

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DELAWARE RIVER BASIN REPORT

DEC. 1960

VOL. XI

APPENDIX V. BENEFITS AND COST ALLOCATIONS

APPENDIX W. RECREATION NEEDS AND APPRAISALS

APPENDIX X. STUDY OF THE GOVERNMENTAL ORGANIZATION FOR THE WATER RESOURCES OF THE DELAWARE RIVER BASIN

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REPORT OF THE

COMPREHENSIVE SURVEY

OF THE

WATER RESOURCES

OF THE

DELAWARE RIVER BASIN

APPENDIX X

STUDY OF THE GOVERNMENTAL ORGANIZATION

FOR THE WATER RESOURCES

OF THE DELAWARE RIVER BASIN

BASED ON REPORT PREPARED BY
SYRACUSE UNIVERSITY RESEARCH GROUP
AS SUBMITTED TO
WATER RESEARCH FOUNDATION FOR THE DELAWARE RIVER BASIN
UNDER DATE OF 1 AUGUST 1959

U. S. ARMY ENGINEER DISTRICT, PHILADELPHIA
CORPS OF ENGINEERS
PHILADELPHIA, PA.
OCTOBER 1959

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DELAWARE RIVER BASIN ADVISORY COMMITTEE

930 • SUBURBAN STATION BUILDING

PHILADELPHIA 3, PENNA.

RITTENHOUSE 6-8286-7

December 29, 1959.

Colonel Truman H. Setliffe
District Engineer
Corps of Engineers
P.O. Box 8629
Philadelphia 1, Pa.

Dear Colonel Setliffe:

In accordance with the decision reached at the October 9, 1959 meeting of the Coordinating Committee, and earlier agreements with your office, I am transmitting a copy of "A Brief Report On the Study of Governmental Organization for the Water Resources of the Delaware River Basin", for publication as Appendix X of your survey report on the Delaware.

This "Brief Report" was prepared by the Water Research Foundation for the Delaware River Basin. It reviews most of the findings and recommendations of the study of water resources administration carried out over the past two years by the Maxwell Graduate School of Syracuse University. The Syracuse study, as you know, was sponsored by the Water Research Foundation and financed by a grant from The Ford Foundation.

The complete report of the Syracuse study, entitled "The Problems of Water Resources Administration, With Special Reference to the Delaware River Basin", has been made available to your office in mimeograph. It will be published in book form in the spring of 1960 by the Syracuse University Press.

On September 30, 1959 the recommendations of the Syracuse study were presented to the Governors of Delaware, New Jersey, New York and Pennsylvania, and the Mayors of New York City and Philadelphia. It was agreed by these chief executives that there is a need for a unified water resources agency to be charged with important responsibilities in regard to the management and development of certain of the waters of the Delaware River Basin. The Governors and Mayors subsequently directed the Delaware River Basin Advisory Committee to prepare draft legislation for the creation of such a basin agency by interstate-federal compact. This work is now going forward and it is expected that proposed compact legislation will be ready for public consideration in the course of the year 1960.

Sincerely,

JPR:lel

John P. Robin, Chairman
Delaware River Basin Advisory Committee.

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Foreword

The staff of the Water Research Foundation has prepared for public distribution this brief report of the study of governmental administration for the water resources of the Delaware River Basin, made at the Maxwell Graduate School of Public Administration of Syracuse University under the direction of Dr. Roscoe C. Martin. Working with him were Professors Guthrie S. Birkhead, Jesse V. Burkhead and Frank J. Munger.

The complete study, of approximately 500 pages, will be published under the direction of the Syracuse University group, which has sole responsibility for its research, findings and recommendations under a contract with the Water Research Foundation, made possible by a $131,000 grant from the Ford Foundation.

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Introduction

The Delaware River is only 326 miles from its headwaters in the Catskill Mountains to the Atlantic Ocean, virtually nothing compared with the lengths of the Mississippi or the Colorado Rivers. But the Delaware River Basin service area contains 2,000,000 people from Kent County, Delaware, to Suffolk County, on Long Island, and Fairfield County, Connecticut. The U. S. Census Bureau estimates that this population will grow to 30,000,000 by 1980.

In order to plan intelligently, data on water resources and water uses must be gathered continuously. Water planning, like city planning, is a day to-day job. Structures to conserve and use the water must be designed, built, operated and maintained. The public must be kept informed. The "water job" does not do itself. It must be kept after so that floods like that in 1955 following Hurricane Diane will not again kill a hundred persons and do millions of dollars of damage in the Delaware Basin. Equally serious are droughts, of which there were recent examples in the summers of 1949 and 1957.

Concern with the problem of governmental organization for the administration of Delaware Basin water is not new. Two efforts were made during the 1920's to negotiate a tri-state compact creating a commission with broad powers. The Corps of Engineers, in a 1934 survey report on the Delaware, noted the economies that could result from unified control in the planning, design, and construction of water resource projects, and indicated that an interstate agency established for these purposes would be advisable. The water supply plan including a governmental organization proposed by the Interstate Commission on the Delaware River Basin (Incodel), came closest to an over-all plan for the Basin, but fell through in 1953 because one of the four states in the Basin did not join in the agreement. It is proper to assume, however, that Incodel's work has been a forerunner of any over-all Delaware River Basin development.

In the absence of an accepted, comprehensive plan, the water resources of the Basin continued the subject of serious

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interstate conflict which in 1931 had led to a Supreme Court decision granting 440 million gallons a day to New York City. In 1954, the Supreme Court decreed that New York City would be permitted to withdraw up to 800 million gallons daily and New Jersey permitted to take 100 million gallons daily out of the Delaware River Basin. The Court appointed a River Master to supervise these diversions and other requirements under its continuing jurisdiction.

In 1955 the Governors of New York, Pennsylvania, New Jersey and Delaware and the Mayors of New York City and Philadelphia established the Delaware River Basin Advisory Committee to review the water resources problems of the Basin and adjacent areas. The committee is comprised of one appointee of each of these four Governors and two Mayors.

Shortly after this action Hurricane Diane roared in, spreading damage through much of the Delaware Basin. The loss of life and property persuaded Congress to request a restudy of the Delaware Basin by the U. S. Army Corps of Engineers. An extensive three-year $2,000,000 physical survey was undertaken by the Corps with the aid of numerous other Federal and State agencies.

The concern of the Corps of Engineers and the Federal and State agencies associated with it is to evolve a physical plan of water development. It is not their function to investigate what governmental organization for water resources administration may be necessary to carry out the planned development and plan ahead as needs change. Yet this problem is a paramount one. There is a total of 25 Federal agencies that have a major concern with water resources. In the Delaware Basin survey, 19 different Federal agencies have been involved. Proposals for the reorganization of the Federal agencies involved in water have come from two Hoover Commissions and at least four other studies. Yet virtually nothing has been done to bring order out of the chaos at the Federal level. In addition there are at present 14 interstate agencies and 43 State departments, boards and commissions having some concern with water resources of the Delaware. On the local level there are more than 250 public and private water companies. At the present time government deals with Delaware Basin water prob-

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lems through a multiplicity of agencies with a splintering of responsibilities.

Faced with this situation, the Delaware River Basin Advisory Committee helped a number of citizens to establish the Water Research Foundation of the Delaware River Basin, a non-profit private corporation independent of government. As part of its program, it instituted a study of governmental organization needed for water resources planning, development, and operation in the Basin. Financed by a $131,000 grant from the Ford Foundation, the study was made by a research group from the Maxwell Graduate School under a contract entered into by the Water Research Foundation and the Syracuse University Research Institute.

This is the origin and background of the Syracuse study. What follows is a brief report on the basic recommendations of that study and the reasoning behind them.

Functions of Water Resources Administration

Developing and controlling the water resources of the Delaware Basin involve many different but related activities. The sum total of these activities makes up the job of water resources administration. The Syracuse recommendations concerning the structure of an administrative organization for the Delaware are closely tailored to the pattern of functions that will have to be performed. This pattern is outlined below. How the proposed new basin agency is to discharge these functions and the powers it must have to do so are explained in the last section of this report.

1. Data Collection—A solid foundation of facts about all aspects of water and its use by man is essential. Data must be gathered, correlated, and interpreted continuously. Where gaps exist, research must be undertaken.

2. Planning—Comprehensive plans covering all phases of water development and control must be prepared and kept current. The plan for surface water control of the Delaware, soon to be completed by the Federal Government, will be a point of departure. It must be supplemented, and kept up to date, and open to continuous revision as conditions change.

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3. Building Water Use and Control Structures—To help meet demands for water supply, recreation, reduction of flood damages, water quality improvement, hydroelectric power, fish and wildlife improvement and other water services, numerous water control structures must be designed, built, operated and maintained. Dams, pipelines, levees, wells, power plants, treatment plants, fish hatcheries, pumping stations and recreation facilities illustrate the wide variety of structures that will be needed. For maximum efficiency each structure must fit into the system as a whole, and the operation of existing structures must eventually be integrated with the whole system.

4. Application of Non-Structural Water Use and Control Measures—In conjunction with the major structures, a wide variety of essentially non-structural measures must be planned and administered. The functions involved here include:

a. land acquisition for reservoirs, recreation, wildlife and other purposes;
b. soil conservation, forestation, and other land treatment measures;
c. distribution of municipal, industrial and irrigation water supplies, and of hdyroelectric power;
d. establishment and enforcement of water quality standards; quality monitoring; regulation of effluent discharges;
e. establishment of flood warning systems, flood plain zoning, and other flood damage avoidance;
f. control of withdrawals and diversions from surface and ground water sources;
g. ground water recharge and development;
h. channel dredging and straightening.

5. Co-ordination—Programs of Federal, State, local, and private agencies must be made to operate in harmony if the full value of these efforts is to be realized. The preparation of an annual financial summary of all water programs, and an annual water use and supply budget will assist this co-ordination.

6. Representation and Information—The interests of the Basin with respect to water resources administration will need to be represented before government agencies, private groups or persons, and generally in the public.

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American Experience in River Basin Organization

On the Federal level the responsibilities for various water resources functions are dispersed widely among many agencies. This has been a target of investigation, analysis, and recommendation for many years. Despite these many studies and commissions, few recommendations have been applied and little reorganization accomplished. Given this disinclination for reorganization on the Federal level, there are three possibilities for the Delaware River Basin using existing types of mechanisms for *Federal* water resources administration.

The first would be to use an existing Federal agency, the Corps of Engineers, since it has the broadest scope of action as far as eastern river basins are concerned. This possibility is rejected on the basis of the organizational structure of the Corps, the functional orientation of the Corps, and past history of its administrative responsibility.

The second would be to utilize an inter-agency committee, similar to those in the Missouri and Columbia Basins. The record is clear with respect to this possibility. With regard to the planning, development, and administration of water resources, the inter-agency mechanism leaves much to be desired. The most publicized product of such an organization, the Pick-Sloan plan for the Missouri Basin, an objective analysis appears to be nothing more than a division of construction responsibilities, rather than an integrated plan for basin water resources development. Widespread disagreement and disillusionment with the inter-agency device is evidenced by the many and varied attempts to establish something different. It should also be noted that such committees have not achieved integrated operation of a total water resources program.

The third possibility on the Federal level would be to establish a separate regional agency reporting directly to the President, similar to the Tennessee Valley Authority. As a regional water resources agency and as the only existing example of this possibility, TVA merits objective consideration. TVA has emphasized a regional focus and consequently the people in the area consider it a local agency.

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It chose to work through the existing governmental mechanisms, rather than becoming a super-state. In so doing, it stimulated local and State agencies, many of which were dormant or non-existent at the time of its origin. By focusing on regional problems even though a Federal agency, and becoming knowledgeable about local conditions, it attained a competence on functional problems in the region, such as forestry, greater than the Federal agencies in the same functional programs.

Despite this record, the general acclaim it has received for its outstanding technical job—especially outside the country, and the co-operation and support it has engendered from the local and State governments in the region, TVA has not been successful in building a political base sufficient to ensure its general, continuous support at the national level. This result suggests caution with respect to wholly Federal river basin organizations.

Turning now to State efforts in the water resources field, the record shows their efforts to have been poor. No State department has prepared a comprehensive, multiple-purpose plan for a river basin, with the possible exception of the California Department of Water Resources in its current efforts. State programs in water resources have been limited generally to a single function and often to a segment of that function, as for example, passing on the quality of public water supplies or the review of plans developed by Federal agencies.

Perhaps the most notable example to date of a State agency in the water resources field is the Lower Colorado River Authority of Texas. This agency administers a multiple-purpose program including hydropower, flood control, water supply, irrigation, recreation, and conservation. The extent of its program varies from function to function, with its deepest involvement being in power, where it generates both hydro and steam energy, transmits, markets, and distributes. In recreation on the other hand, the LCRA merely makes arrangements for other agencies to develop and operate recreation facilities. Other effective intrastate agencies, though much more limited as to functions, are the Grand River Dam Authority and the Muskingum Watershed

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Conservancy District. The former functions only with regard to power, the latter flood control and recreation.

All three of these intrastate agencies evolved under special conditions and their capital investments were financed largely with Federal money. The combination of depression days and consequent need for spending outlets, flood damage, and strategic representation in Congress brought about the LCRA. The same first two factors spawned the Muskingum District. These factors suggest that none of these agencies provides a good example of what a multiple-purpose State water resources agency might be.

In the Delaware Basin states, there are certain significant active programs in water resources, such as those of the New York Power Authority, the Pennsylvania Department of Forests and Waters, and the New Jersey Department of Conservation and Economic Development. In no one of these states, however, are the function of water resources administration, as described herein, performed by a single water agency.

The reasons for limited State action are apparent. First, there is in general a paucity of leadership. Second, there is a lack of adequate departmental organization. Third, there are inadequate financial resources. Fourth, the states are limited in geographical jurisdiction. For State departments in the east this last is an unconquerable hurdle, since all the major rivers in the east drain more than one state.

Attempting to surmount the limitation of State boundaries in interstate river basins has logically led to interstate action, primarily through interstate compact agencies. But the record here is clear also. The interstate compact has not been productive of either broad water programs or of administrative structures. There is no case of a broad water program administered by an interstate agency.

The primary examples of interstate compact activity in water resources are in the field of water pollution in the east and in water allocation in the west, the latter being an even more limited function than the former. The Interstate Sanitation Commission (New York, New Jersey and Connecticut) and the Ohio River Valley Sanitation Commission

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are excellent examples of single-purpose interstate water agencies. In the Missouri basin where a broad, interstate compact water resources agency has been proposed and discussed at length, the proposal has been dropped because of lack of interest on the part of the states.

Legal Bases for Water Resources Organization

Four legal bases for regional organization exist: (1) executive orders or agreements; (2) parallel State statutes; (3) Federal statute; and (4) interstate compact. Experience with the first two indicates their inadequacy and ineffectiveness in regard to the range of functions an agency for water resources administration must perform.

The third basis, the Federal statute, meets the criterion of adequate powers more than any other legal basis. It also makes available, at least theoretically, all the financial resources of the Federal Government. Its advantages are: (1) sufficient geographic jurisdiction; (2) permanence; (3) adaptation to change; (4) adequate powers; (5) fiscal adequacy; and (6) sufficient prestige and possibilities for fitting into the framework of Federalism.

The interstate compact likewise provides a legal basis that meets the test of adequate geographic reach. Legally all powers available to the states individually are available to them collectively through the compact. Generally in interstate compact negotiations relating to water resources, there is Federal representation. On some of the agencies established by such compacts, Federal representation is accorded voting rights. The record of many compact negotiations reveals a strong interest in trying to make the compact an instrument for experimentation with new forms of governmental organization.

There is no guide for the extent of Federal participation in interstate compact agencies. There is no decision by the Supreme Court in this regard. Certainly there is and should be much leeway in discussing the possibilities, always remembering the existing paramount position of the national government. Despite the non-existence of any full-fledged precedent for multiple purpose planning and development by a compact agency with or without Federal

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participation, the interstate compact remains the best vehicle for State participation in the administration of interstate water resources.

One note is necessary on the role of the courts in interstate water resources. The Supreme Court is not a planning and administrative agency. The issue at point is not, "which States shall get how much water," but rather, "how can the water resources best be used"? The judicial process has been used to answer the former, but is not amenable to answer the second question. Rational answers to it are far more likely to stem from the administrative process, given an adequate administrative agency.

Neither legal foundation nor form determines the success or failure of a basin water resources organization. The level of government taking action appears to be a good deal more important. In almost all significant basin developments the Federal Government has been active in providing a legal base, establishing an agency, and contributing all or a large part of the funds. The reasons for this are not far to seek. The Federal Government has the jurisdictional and legal competence for the job, the ability to take a broad view, and the resources adequate to the task.

This is not to say that there are not difficulties facing a Federal regional agency. One possible difficulty would be in gaining co-operation of local and State agencies. That this is not necessarily a problem is evidenced by TVA's success in this regard. A second difficulty would stem from unco-operative and resisting Federal agencies and their client groups. A third is that the prevailing congressional structure does not accord representation to a regional agency, that is, an agency that has no recognized geographical base. Governors, city councilmen, congressmen all owe loyalty to areas other than river basins. National support for a regional undertaking is slow to form and quick to dissolve, while State and local support, even if it could be fashioned, is not alone sufficient as a political base for a regional agency. Such a base must be constructed in the Congress, and State and local officials are not up to that responsibility. The failure of TVA to develop continuous general support on the national level illustrates this problem

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Financing Water Resources Administration

Fundamental to establishing an agency for water resources administration for the Delaware River Basin is adequate financing. Without such financing an integrated and efficient administration will founder.

Not only will funds be required for the major structures such as reservoirs, pipelines, and power plants, but also for staff and facilities to carry out the many operating programs described in the discussion of functions. These include such programs as water quality monitoring and enforcement, recreation planning, flood damage reduction activities, operating the system of structures, public information, and research of various types. In addition, relatively large sums will be required in order to acquire lands for future reservoir sites, in order to prevent economic development thereon which would make future use of such sites for reservoirs economically infeasible. Likewise, lands around reservoirs must be acquired if the maximum recreational values are to be obtained from recreation development. In the early years of the existence of a Delaware Basin water resources agency, the funds required for the agency's staff alone, excluding any capital funds, might be on the order of $500,000 to $1,000,000 annually.

In considering sources of funds, it is assumed that the objective of a government agency is to provide services to the people with maximum economic and social efficiency. To achieve such a goal, four basic "planks" are suggested for a financial program. First, the sources of funds should be diversified. No one group in the population should have to shoulder an excessive share of the financial burden. Further, the costs allocated to any particular group should bear some relation to the benefits received. In computing benefits to be derived from water resources development, a definite expression of willingness to pay will serve as a check on such computations. Second, the control of funds for water resources administration should be centralized insofar as possible, in the hands of a single agency. Dispersion of control of funds tends to breed inefficiency, undesirable allocation of resources, and something less than the

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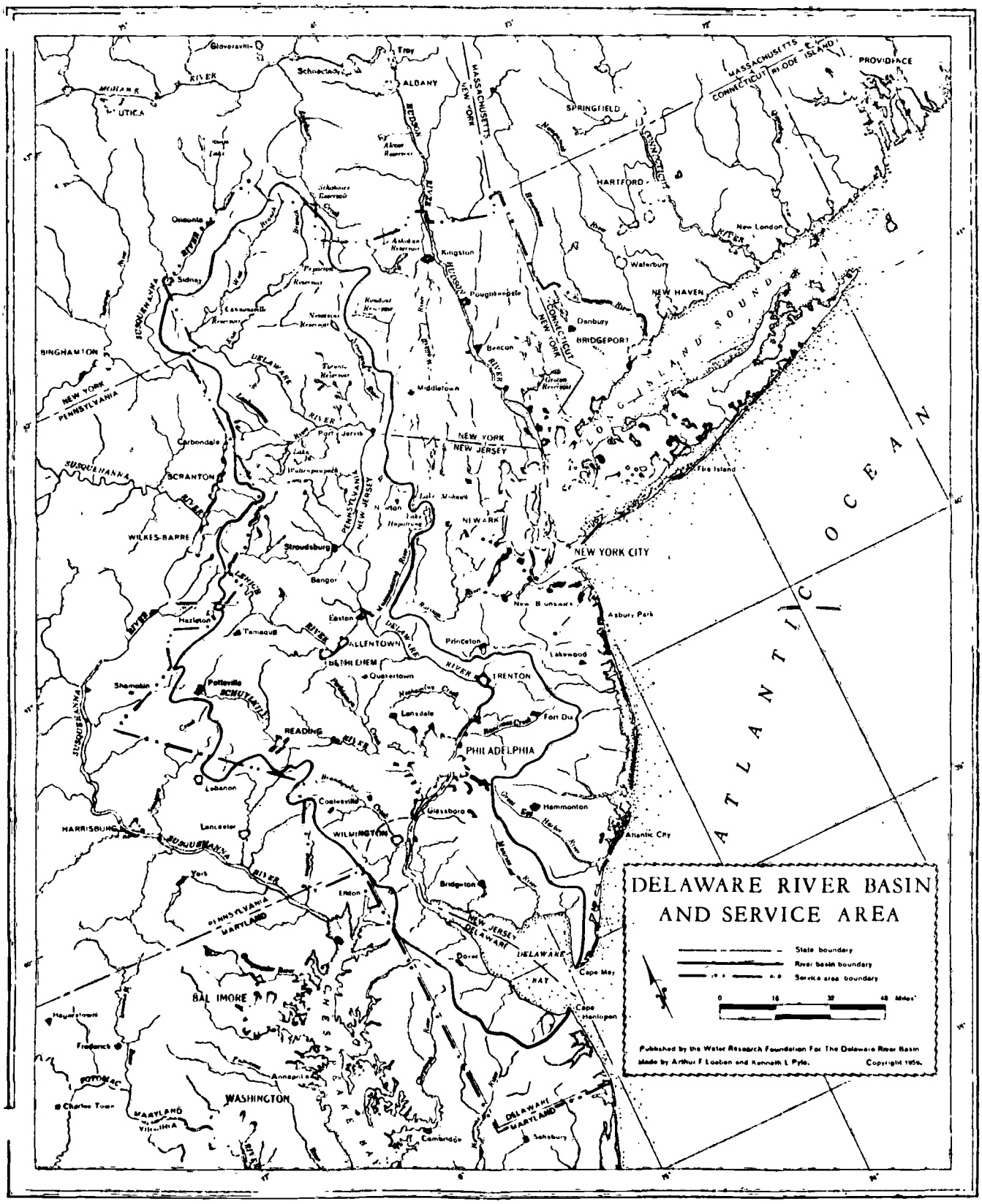

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most desirable development. Third, it is appropriate for the Federal Government to provide funds that are subject to a measure of State or regional control. Precedence for this exists in various grant-in-aid programs, highway programs, social welfare programs, etc. Fourth, there should be a high degree of flexibility in the application of revenues to water resources programs in the Basin. The rapidly changing character of the highly urban industrial area in and adjacent to the Delaware Basin results in a continuously changing complex of water demands. Fixing irrevocably the uses to which certain funds can be put will preclude the best administration.

Before enumerating specific sources of funds, one aspect of economic analysis, namely reimbursement, requires clarification. There are two ultimate sources of funds for planning, developing, and operating a governmental water resources system—the general public and the direct user. In the first case, a governmental unit—Federal, State, local—provides the funds without anticipation of any repayment. Such programs are known as non reimbursable. The rationale in this case is that the benefits are widespread, general, and that it is in the public interest to expend funds for such water programs. In the latter case, regardless of the source of the original funds for investment—the government, or private enterprise through the market—the funds are to be repaid by the beneficiaries or direct users. Such programs are termed reimbursable.

Potential sources of funds for water resources administration in the Delaware River Basin are listed and discussed in the following paragraphs.

1. Appropriations from the Federal Government for water programs for which the Federal Government traditionally has assumed major responsibility, i. e., flood control, navigation, pollution abatement, upstream watershed protection and various water data collection programs. Such appropriations could be made on a lump sum or an annual basis to either a Federal or interstate agency. Precedents for grants from the Federal Government for disbursement by other than Federal agencies do exist. Further, legis-

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lation is currently being considered in Congress for broadening this procedure.

2. Potential appropriations from the Federal Government for water programs wherein the national responsibility appears to be expanding, i. e., water supply, recreation, and low flow augmentation. Recent legislation now enables Federal agencies to include provision for water supply storage for future use in Federal developments wherever assurance is made that the cost of such storage will eventually be repaid. The procedures to carry out this new legislation have not been defined as yet. With respect to recreation, Federal practice in the past has been to provide funds for minimum facilities in connection with most Federal reservoir developments. However, there is a trend towards increasing non-reimbursable Federal contributions for recreation developments. Again, this "emerging responsibility" is in a state of flux. Legislation has been introduced to include low flow augmentation as a primary function in water resources development for which costs may be incurred. To the extent such costs provide benefits which are widespread, general, and accrue to non-identifiable beneficiaries, the legislation provides that such costs may be borne by the Federal Government. No action has been taken on this legislation as yet.

3. Appropriations from the various State Governments in the Basin. Such appropriations could be annual or lump sum and in whatever magnitudes decided upon or agreed to by the states. Existing water programs of the states indicate that the states are willing to expend funds in this field. Further, the approval of the Incodel plan by three of the four Basin states indicated willingness to undertake some financial responsibility.

4. Sale of end products of water resources development

   (a) Sale of municipal and industrial water

   Perhaps the most important long-range economic objective to be served by water resources development in the Delaware Basin is that of providing municipal and industrial water. However

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at the present time, and for the next one or two decades, there appears to be no significant market for municipal and industrial water. Until the demand for such water develops, no major revenues can be expected from this source.

(b) In the early years of water resources development and integrated administration in the Delaware Basin, the major source of revenue from the sale of an end product appears to be hydroelectric power. The demand for power in the Delaware Basin power marketing area has been estimated to double by 1980. As a consequence, large expansion of power facilities will be necessary. In the main, such expansions will come through construction of large thermal generating units. Such units achieve their optimum efficiency when operated continuously. As a consequence, there is a need for some flexible source of power which can handle rapid variations in a power load demand. Hydropower meets this requirement. Although there appears to be only a small amount of conventional hydropower which is economically feasible at the present time, there appears to be a significant pumped-storage potential in the Basin. Such potential would find its maximum utilization as peaking power. If pumped-storage hydropower can be produced at costs less than the value of such power to the users, a potential source exists for net revenues to a Basin agency, if the agency can sell the power for the maximum going rate. Such a rate would, of necessity, be established by bargaining with the users which, in the Delaware Basin power marketing area, would be the interconnected grid, or individual private utilities.

If the power facilities were installed by a Federal agency, the power output would have to be marketed in accord with present Federal Government policies. These policies include the preference clause and the requirement that rates be set at the cost of producing the power. As far as the preference clause provisions are concerned, these could be met by various wheeling and firming agreements with the private utilities, such as those negotiated by the Southeastern

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Power Administration. The second policy, i. e., selling power at cost, would of course have to be modified if any net revenue were to be available to the Basin agency. A primarily interstate agency, would not have to adhere to Federal Government policies with respect to the marketing of power. With the demand for hydropower likely to be the largest in the next 20-25 years, an interstate agency could adopt such marketing policies as would optimize its net power revenues.

(c) Traditionally charges for the use of recreation facilities have been minimal and far from sufficient to cover even the operation, maintenance, and replacement costs of recreation facilities themselves. However, a basin agency could and should experiment with different pricing policies for recreation, in order to ascertain what revenues might be available from this source. Such policies should be flexible and varied to meet different conditions and different needs. Three revenue goals with regard to recreation can be defined:

(1) Obtain revenues sufficient to cover all operating maintenance, and replacement costs of recreation facilities; (2) obtain revenues sufficient to cover the above plus the capital costs of recreation facilities; and (3) obtain revenues sufficient to cover the above plus some equitable portion of the costs of jointly used facilities in multiple purpose water developments, i. e., dams, reservoirs, access roads, and the like. In time it may be possible to attain the first and second goal but it appears highly unlikely that the third goal will ever be achieved.

5. Withdrawal Charges. The possibility of obtaining revenues by levying charges on water withdrawals in the Basin should be considered carefully by a water resources administration agency. There are two legal bases for making such charges. The first relies on the concept of private benefit. The rationalization here is that an improvement in water supply yields widespread indirect and secondary benefits over and above the benefits to the direct users. Such a technique is

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carried out through a formation of some sort of special district such as a water reclamation district, a flood control district, an irrigation district, a sewer district, and the like, and the assessment of all property in the district, regardless of the extent of water use on each property. Such an approach conceivably could be applied in the Delaware Basin. However, assessment on the basis of property bears no necessary or direct relation to the benefits from the use of water. The second basis rests on the concept of social damage. In this case, the rationalization is that all water is for public use and benefit, and that any damage to such waters, brought about by an individual user—industrial, municipal, or whatever—should be penalized. The method would be to make a charge for all water withdrawals. Charges would be based on magnitude of withdrawals, time pattern of withdrawals, and/or quality of effluent. One direct benefit of such an approach would be that the charges imposed would discourage wasteful water use.

Structure for a Delaware River Basin Administration

Existing government in the Delaware basin is not adapted to the administration of an integrated, basin-wide water resources program. State and local political jurisdictions are concerned only with pieces of the basin and cannot act for the whole. The Federal Government's responsibility, though adequate in scope, is restricted to a few specified water resource functions. In effect then, there is no machinery of government to meet growing water problems in a comprehensive fashion. The need is for a central agency to give unified administration to the basin water resources.

It is suggested that such an administration should be created in two steps. The first would be a Federal law to create a new Delaware River Agency for Water (DRAW), which would be a transitional agency having State representation along with the Federal Government. The second step should begin when the four basin states and the Federal Government have established by interstate compact a new Delaware River Commission (DRC). There are three reasons for this phasing.

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First, the speed of Federal legislation appears to be faster than the time required for negotiating and ratifying a compact. For 19 successful compacts around the nation dealing with various aspects of water resources administration, the average time was eight years, nine months. The compact to establish an agency with the powers outlined here is considerably more complex than any of the these compacts. However, the interstate compact recommended by Incodel, passed seven of the eight legislative houses in the four basin states, and failed in 1953 only in the Pennsylvania senate. There is, therefore, a record of appreciation by the legislatures of water resources needs. In addition, the Delaware River Basin Advisory Committee has developed and maintained a working relationship among the chief executives of the basin states, and the cities of New York and Philadelphia. While Federal legislation offers the possibility of getting the new agency established fairly promptly, the process of negotiating a compact can go forward on a prepared basis without delay.

Second, it seems apparent that the main financial source for Delaware development in the early years of the new basin agency will be the Federal Government. It seems logical that Congress will be more willing to vote money for a Federal agency than for a non-Federal one.

Third, it would be impossible as well as undesirable to avoid broad Federal action in water resources, for which there are many precedents. On the other hand, the states traditionally retain some of the basic water resource functions, such as quality control and control over diversions and withdrawals, whose immediate importance will grow in the years ahead.

Establishing DRAW

The composition of DRAW is a matter for public discussion and debate. It should have Federal representation appointed by the President and State representation nominated by the respective Governors and appointed by the President.

It might be felt that the great metropolitan areas centering in New York and Philadelphia should be represented

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on the agency, but there are two overriding difficulties. Constitutionally the states have sovereignty over the cities, and only the states, not the cities, have the legal right to enter agreements with the Federal Government. Secondly, the metropolitan areas are not political units. The New York metropolitan region includes suburban counties in New York, northeast New Jersey and a fringe of Connecticut. The Philadelphia metropolitan region includes not only suburban counties of Pennsylvania, but the Camden area of New Jersey and the Wilmington area of Delaware. It is patently impossible that each of these metropolitan complexes could have a single, formal representative on the agency board.

It is most important that the commission be of a manageable size. One suggestion for its composition would be an agency with one Federal representative and four State representatives. It should cause little dispute that the President should name the Federal member as chairman of DRAW. The membership of DRAW and DRC will be responsive if they are subject to removal by their individual appointing and nominating authorities.

Members of DRAW or DRC might receive annual salaries, or a per diem payment, or no compensation. Both the Federal and more often the State's interest have been served excellently by citizens giving their services on public boards without expectation of compensation. Such appointments can command the services of citizens who would be unable or unwilling to accept full-time paid positions.

Both DRAW and DRC are conceived as policy bodies which would organize and operate along the unitary lines so successful in private enterprise and in many public agencies. The agency should appoint a general manager with full administrative powers to employ a staff based on merit alone with salaries high enough to attract talented personnel. Of course an annual audit of accounts would be mandatory.

Establishing DRC

The President and the Governors of Delaware, Pennsylvania, New Jersey, and New York, should immediately

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appoint a study commission to draft and submit for approval an interstate-Federal compact to create the Delaware River Commission (DRC). Such a temporary commission might need a small staff and budget to complete its studies.

This plan should meet a warm response in the four basin states. If any states are capable of taking the lead in creating new and improved administration of water resources, it should be the states of the Delaware Basin, which rate high among all the states in co-ordinated resources administration. The Council of State Governments has encouraged the states to move in the direction of such an interstate compact. There are ample precedents for Federal representation on such an interstate Commission.

It is fundamental that DRC should completely replace DRAW, with a transfer of all staff, finances, facilities and powers to DRC. The transfer will be simpler if the composition of DRC is the same as DRAW. There seem to be no constitutional or administrative reasons why such a transfer from a basically Federal to a basically interstate agency cannot be made, although this aspect will doubtless receive public examination and consideration in the Congress and State Legislatures.

An Intergovernmental Advisory Committee

Consultation and co-operation with the multitude of water interests in the Delaware River Basin requires the appointment of an Intergovernmental Advisory Committee (IAC) which would have representatives of the public and of national, State and local water resources agencies, water-using industries, water-interest groups, labor and agriculture.

The IAC should be a quasi-public body rendering important advisory and auxiliary services to the basin agency. Nearly all the present water-related programs in the basin are making positive contributions to better water use. Any development program for the basin water resources should continue not only uninterrupted but improve the existing programs in agriculture, forestry, fish and wildlife, small watersheds and soil conservation, local flood control structures, water supply systems, sewage disposal plants, and recreation developments.

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Powers of a Delaware River Basin Administration

A responsible, central agency such as DRAW or DRC can give unified administration to a basin water program only if it has necessary powers.

Research and Data Collection

It is not the objective of DRAW or DRC to supplant activities of Federal, State and local agencies. But data on water resources from various agencies with programs in the basin need to be continuously compiled and correlated to provide an over-all picture that will always be current. There is no central point where this is done at the present time. In addition, there are gaps in the necessary knowledge of such matters as ground-water movement in the basin, industrial water technology, and the relation between water demand and price. DRAW or DRC should have the power to obtain special studies, advise and consult existing agencies, and gather scientific information for the development of the Delaware River Basin.

Planning

DRAW or DRC should have the power to provide the over-all plan and incorporate existing and future plans of other public as well as private agencies into its plan to best serve the beneficial purposes of all related development of water and land resources in the basin; to review and evaluate existing and future projects and programs both during design and after completion.

Each year there should be prepared a water-use budget and a financial budget, consistent with the comprehensive plan and clearly showing the relationship between current activities and proposals for the future. These budgets should be drawn in close co-operation with other public and private agencies and principal water users. The financial budget should be divided into current and capital sections.

Designing, Building, Operating

DRAW or DRC should have over-all control and supervisory authority over all structures affecting water re-

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sources in the basin regardless of the operating agency in any particular case.

The plans, and policies of DRAW or DRC should be controlling in case any operation of an existing project or plan for a proposed project is deemed to have a substantial adverse affect. All possible means of negotiating conflicts should be employed, but, failing in this, the agency should be able to seek enforcement of its rulings in the courts.

It is not necessary that ownership of existing structures be obtained in the immediate future, but as the demands for water increase, negotiations can be undertaken and supervising arrangements made to implement the power of the basin agency to integrate all of the water control structures in the basin. Incident to this power DRAW or DRC should be authorized to acquire property by purchase and eminent domain, particularly to reserve land at reservoir sites for recreation, fish and wildlife, and watershed management purposes until funds are available for dams and related facilities. It should negotiate agreements with State and local bodies for administration of these functions.

Quality Control

DRAW or DRC should have power to collect data on water quality and maintain a water quality monitoring system; stimulate research where necessary disseminate information on water quality; establish reasonable physical, chemical and bacteriological standards for various uses of water and with respect to waste effluents; classify the basin water according to changing uses; and enforce standards with regard to quality control. These powers should be exercised in full co-operation with the U. S. Public Health Service, State and local governments, and private industry.

Representation and Information

DRAW or DRC should have the power to represent the over-all regional interest in water resources development, to report regularly to public officials and the public generally, to promote water conservation measures, and to create public understanding of water problems.

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Co-ordination

DRAW or DRC should have power to promote and aid the co-ordination of activities of Federal, State, local and private agencies concerned with water and other related resources; advise, consult and make payments to any and all such agencies in the development and management of the water and related resources of the Delaware Basin.

Withdrawal and Diversion Control

DRAW or DRC should be given powers to approve, license or otherwise control withdrawals or diversion. In the exercise of such a strong power it will probably be necessary to appoint a Water Apportionment Appeals Board, from which further appeals could be provided to the Basin agency and thence to the courts. The basic statute might specify existing riparian and prescriptive rights or judicially allocated diversions, although it is likely a Basin agency would respect these rights without such a guarantee.

Maximum efficiency in the operation of a system of structures and in water resources administration can never be achieved without administrative control of withdrawals and diversions. If the situation makes it impossible for the basin agency to exercise this power immediately, the best alternative would be to incorporate the power in the organic law establishing the agency but reserve its exercise until a later date. This would be preferable to depending on passage of a separate law for this power at some future time.

Appropriations

DRAW or DRC should expect and receive financial support from the National and all the State Governments, in the forms of both capital and operating funds for navigation, water supply, flood control, data-gathering, recreation, activities, plans and surveys.

Reimbursement

DRAW or DRC should have the power to measure, assess and collect from such beneficiaries of water development as are subject to reimbursement. The Federal Government is moving toward expanded responsibilities in water supply, recreation and low-flow augmentation. Payments for such

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of these benefits as are reimbursable should be made to and through a basin agency.

Sale of Water

DRAW or DRC should have the power to study and possibly undertake negotiation with water distribution agencies, public and private, to obtain revenue from the sale of water for municipal, industrial, commercial and agricultural use.

Hydroelectric Power

DRAW or DRC should be given the power to establish wholesale power rates for both conventional and pumped-storage power at levels above minimum assignable costs. There are a number of arrangements across the country for the development and sale of power to the advantage of the public and the power customers.

Charges for Recreational Use

DRAW or DRC should have the power to investigate and establish the price policy with respect to recreation facilities and programs carried on by the basin agency or other public or private agencies. While traditionally charges for recreation use have been minimal, the agency could and should experiment with different pricing policies to ascertain what revenues might be available from recreation.

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NAPEN-R

15 November 1961

SUBJECT: Delaware River Basin Report

TO: Division Engineers, except Division Engineer, MD
District Engineers, except District Engineers of Eastern Ocean; Far East and Okinawa Districts and Districts in MD

1. The District Engineer, Philadelphia, recently completed a report on the comprehensive study of the water resources of the Delaware River Basin. In view of present emphasis on comprehensive basin planning, the Division Engineer, North Atlantic, proposed to the Office of Chief of Engineers that each Division Engineer and District Engineer office having Civil Works responsibilities be furnished a copy of that report as source material.

2. The Office, Chief of Engineers, concurred that such distribution was desirable, and requested that the distribution be made by the District Engineer in order to avoid rehandling. Accordingly, one complete copy of the District-Division report on the Delaware River Basin is furnished each addressee except those who were previously furnished copies in compliance with specific individual requests. The exceptions, to whom this letter is being furnished for information, are:

a. Division Engineers:

Ohio River
Lower Mississippi Valley
New England

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SUBJECT: Delaware River Basin Report

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T. H. SETLIFFE
Colonel, CE
District Engineer

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U. S. ARMY ENGINEER DIVISION, NORTH ATLANTIC
CORPS OF ENGINEERS
90 CHURCH STREET
NEW YORK 7, NEW YORK

27 December 1960

IN REPLY REFER TO
NADEN-R

SUBJECT: Delaware River Basin Report

TO: Chief of Engineers
Department of the Army
Washington, D. C.

1. I concur in the conclusions and recommendations of the District Engineer contained in his report on the Delaware River Basin dated December 1960.

2. The report presents a plan for coordinated long range development of the water resources of the Delaware River Basin. The plan has been developed through the joint efforts of all Federal and non-Federal governmental agencies concerned. Every effort has been made to insure that the plan represents the optimum with respect to conservation and development of the basin water resources and economy of cost. It is pertinent to emphasize, however, that the intricate and interrelated structure of the plan may be nullified by continuing encroachment and incompatible development of the project areas unless a vigorous program for preservation of the sites is undertaken at an early date. A proposal for such action is included among the District Engineer's recommendations.

T. H. LIPSCOMB
Brigadier General, USA
Division Engineer

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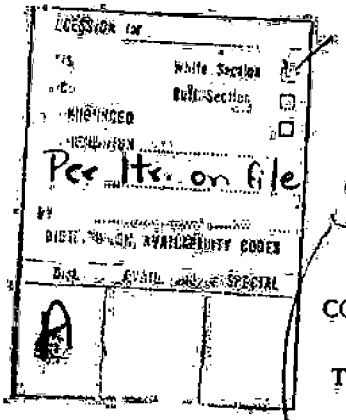

REPORT ON THE COMPREHENSIVE SURVEY OF THE WATER RESOURCES OF THE DELAWARE RIVER BASIN.

Volume I. Main Report.

PREPARED BY
U. S. ARMY ENGINEER DISTRICT, PHILADELPHIA
VALLEY REPORT GROUP
RUSSELL MORGAN, CHIEF

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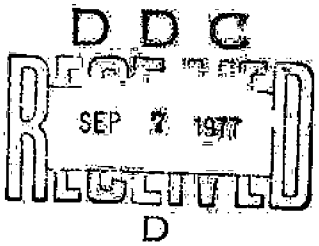

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DELAWARE RIVER BASIN REPORT

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	APPENDIX B	ECONOMIC BASE SURVEY
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COMPREHENSIVE REPORT ON THE DEVELOPMENT OF THE WATER RESOURCES OF THE DELAWARE RIVER BASIN

SYLLABUS

Recent disastrous flooding and authorizations by the U. S. Supreme Court for diversions out of the basin of 900 million gallons of water per day for water supply purposes focused attention on the need for control of the high and low flows in the Delaware River Basin. In water use studies based on present and projected populations and economic activities in the basin and adjacent areas, it was found that the primary needs that could be satisfied by water resources development were flood control, water supplies, recreation and hydropower. Present and projected needs for navigation, preservation of water qualities, preservation of fish and wildlife resources, sediment control, and drainage, create no direct requirements for added or expanded development of the water resources of the basin.

All practical measures to satisfy the needs of the basin were considered including land management measures, local protection works, reservoirs of all sizes, a saltwater barrier in the Delaware River estuary, and supplemental programs capable of satisfying significant portions of the needs. The economies and capabilities inherent in major impounding structures for multiple use required that the basic plan be defined in terms of major control projects with small reservoirs and other measures and programs added as supplements to mitigate the needs and to extend the effectiveness of the plan.

A total of 193 major reservoir potentials in the basin was considered. A series of evaluations defined a basic plan of 19 major control projects. The basic plan and the multiple-purpose elements of the plan were designed, on the basis of maximized net benefits, to provide, in a balanced and timely manner, for control of flood flows, control of low flows for water supply purposes, enhanced recreation opportunities and hydropower generation. A total of 386 small reservoir projects was also considered, and a series of discrete screenings identified 39 projects with sufficient economic attractiveness for flood control purposes to warrant their inclusion in the plan of development. All of these small control projects can be accomplished under existing authorizations and continuing programs. The physical features of needed land management programs also can be accomplished under existing authorizations and continuing programs. Since the effects of such measures on downstream flows are modest, the actual extent and nature of the physical features were not defined in this investigation.

a R May 1961

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The District Engineer recommends that a plan consisting of 19 major control projects and 39 small control projects, at an estimated total construction cost of 591 million dollars, be adopted as a guide to the timed and balanced development of the water resources of the basin. He recommends that authority be granted for the construction of eight major control projects indicated to be needed in the next 30 years at an estimated total Federal first cost of $134,900,000 plus $89,100,000 which would be reimbursable by local interests for water supply storage, a total of $224,000,000, and annual operation, maintenance and replacement costs of $2,450,000 during the period of deferred use of future water supplies and $2,260,000 during the period after use of future water supplies is initiated; provided local interests bear annual operation, maintenance and replacement costs of $266,000 during the period of deferred use of future water supplies and $450,000 during the period after use of future water supplies is initiated. The District Engineer recommends, also, that a program be established and executed at an early date for the acquisition of project lands in order to preserve the project sites.

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ATTACHMENT A

Information called for by
Senate Resolution 148, 85th Congress
1st Session, follows the
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CHAPTER VII

PLAN FOR DEVELOPMENT OF WATER RESOURCES

136. DEFINITION OF THE PLAN. In formulating the plan to satisfy the needs of the basin for the products and services of water resource development, a variety of measures were considered. These measures fall into three distinct categories: (a) major control impoundments to regulate streamflow in the principal watercourses and to provide pools for recreation, fish and wildlife habitat and the production of hydroelectric power; (b) small control impoundments to regulate streamflow in local upstream reaches and to provide pools to satisfy local recreation needs; and (c) measures and programs for land and water use to eliminate or ameliorate needs by environmental changes. These three types of measures are not entirely independent since they act together in complimentary fashion to contribute to the overall effectiveness of the plan either by direct satisfaction of needs through measures to control extreme flows and/or by indirect satisfaction of needs by removal of contributory causes.

137. The first category of measures considered is represented in the plan by a proposed system of major dams and reservoirs, the second by a proposed system of small dams and reservoirs, and the third category by a variety of related programs. Included in the latter are land management, soil conservation, reforestation, control of use and occupance of the flood plain, conservation of water by reuse in industry, improvement of water quality by removal of pollution loads, and continuation and improvement of hydrologic data collection with particular reference to water use, groundwater quantities and characteristics, and water quality.

138. The broad principles followed in the formulation of the plan of development were: (a) that the needs for products and services of water resource development are real in the sense that they exist or will come into existence at indicated dates during the next 50 years; (b) that the plan provide for congruent satisfaction of expanding needs in a balanced manner with the least investment in water resources and funds; and (c) that the scale of development of each project be such as to provide the maximum excess of benefits over costs. The first of these principles provided the planning criteria for selection of an array of projects having capabilities for meeting the needs in a timely manner. The second principle imposed the planning requirement of selecting the most economical projects from a variety of alternatives and times for their development. The third principle required the definition of project sizes and internal allocations to various project purposes in such manner as to define, where practicable, the optimum

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level of development as indicated by the greatest justifiable excess of benefits over costs. The selection and sizing of the projects and programs included in the three categories of measures referred to above constituted the formal planning studies made in connection with this investigation and reported in detail in the appendices.

139. MAJOR CONTROL PROJECTS. Projects to satisfy major segments of widespread needs for supplies of raw water, flood control in the principal watercourse areas, recreation, hydropower and other products of water resources development were selected from successive determinations by discrete screenings applied to 193 potential major dam sites in all parts of the basin. Further evaluations were applied to seven of these to assure maximized net returns from the major control projects. Nineteen major control projects were selected as elements of the plan of development. These projects are scheduled for varying degrees of initial development. The first group of eleven projects, listed in geographic order from upstream to downstream in table VII-1, would be developed for multiple-purposes at indicated times prior to year 2010. The second group of eight projects, also listed in the same geographic order in table VII-1, would be initially developed prior to year 2010 for the sole purpose of recreation with multiple-purpose development deferred to the time of need some time after year 2010. The major control projects in the plan are described individually in paragraphs 165 to 185 below and their locations are indicated on plate 9 bound at the end of the text.

140. *General characteristics of the major control projects.* The basic functions of the proposed major impoundments are characteristically associated with storage allocations that are used either for short-term impoundments, as for the control of excess flood flows, or for long-term impoundments, as in the case of seasonal and annual carryovers for water supply, recreation and power generation. Of the 19 major control projects, eight will have short-term storage allocations for the control of flood flows, eleven will have long term storage allocations for augmenting supplies of raw water, two will have long term storage allocations and facilities for the generation of hydroelectric power, and all of the 19 projects will have facilities to exploit the recreation potentials of the general project areas. The recreation lands and facilities to be provided at the eleven major projects proposed for multiple-purpose development prior to year 2010 have been placed in two general categories; (a) those that would be directly related to development of water resources at the site, and (b) those that would be indirectly associated with the water resource development. The directly related facilities include beaches, boat ramps, picnic areas, overnight camp grounds, roads, parking areas and other improvements for recreation in the vicinity of the proposed water area. The indirectly related facilities include group camping grounds, overlooks, recreational administration areas and other recreation facilities in the peripheral areas at a distance from the water.

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TABLE VII-1

WATER CONTROL PROJECTS IN PLAN OF DEVELOPMENT

Project	Stream	Drainage Area: Gross (Square Miles)	Drainage Area: Net (Square Miles)	Storage and Pool Elevations: Long-Term: Effective Capacity (Acre Ft.)	Long-Term: Effective Elevation Top of Pool (Ft. above m.s.l.)	Long-Term: Active Capacity (Acre Ft.)	Long-Term: Active Elevation Top of Pool (Ft. above m.s.l.)	Short-Term: Flood Control Capacity (Acre Ft.)	Short-Term: Flood Control Elevation Top of Pool (Ft. above m.s.l.)	Total: Evaporation Capacity (Acre Ft.)	Total: Evaporation Pool Elevation (Ft. above m.s.l.)	Indirect Completion Date
MAJOR CONTROL PROJECTS												
Hawk Mountain	E. Br. Delaware R., N.Y.	812	440 1/	40,000	1,006	233,000	1,082	-	-	294,000	1,082	2001
Prompton 2/	Lackawaxen R., Pa.	60	60	3,500	1,125	26,000	1,189	20,300	1,209	51,700	1,205	1974
Tocks Island	Delaware R., N.J., Pa.	3,827	2,612 3/	41,000	355	410,000	470	275,000	426	455,000	476	1975
Bear Creek 2/	Lehigh R., Pa.	286	286	2,400	1,300	70,000	1,425	10,000	1,401	100,000	1,401	1989
Beltzville	Tobyhanna Cr., Pa.	97	25 4/	1,200	535	49,000	615	2,000	601	66,200	641	1969
Aquashicola	Aquashicola Cr., Pa.	66	66	1,000	535	24,000	483	20,000	503	75,000	503	1981
Hoxie	Jordan Cr., Pa.	31	31	800	610	24,200	479	18,000	492	39,000	492	1978
Walden Pond	Walton Cr., Pa.	161	161	2,000	727	34,000	88	36,000	3 4	174,000	359	1982
Blue Marsh	Tulpehocken Cr., Pa.	174.5	174.5	1,400	392	14,000	279	43,000	303	59,000	303	1969
Newark	White Clay Cr., Del.	87	87	1,000	98	30,000	156	-	-	33,000	156	1975
Christiana	Christina R., Del.	61	61	1,000	23	35,000	169	-	-	36,000	68	1980

1/ Below Pepacton Reservoir
2/ Modification & existing authorized flood control project
3/ Below Cantongville, Pepacton, Hawk Mountain, Neversink and Prompton Reservoirs
4/ Below Wild Creek Reservoir

MAJOR CONTROL PROJECTS TO BE DEVELOPED IN TWO STAGES
(STORAGE AND POOL ELEVATIONS FOR 2ND STAGE MULTIPLE-PURPOSE POOL)

2 stage	Paulins Kill, N.J.	122	122	1,000	403	51,000	465	-	-	59,000	465	6/
Stage	Pequest R., N.J.	100	100	1,000	459	38,000	507	-	-	41,000	507	6/
Hackettstown	Hackettstown, N.J.	20	20	1,000	610	22,000	685	-	-	23,000	685	6/
New Hopeful	Musconetcong R., N.J.	123	53 5/	2,000	375	42,000	426	22	3	44,000	426	6/
Tob. Run	Tobyhanna Cr., Pa.	75	75	1,500	335	30,000	388	-	-	31,500	388	6/
Stroud	Neshaminy Cr., Pa.	150	150	2,000	114	60,000	176	-	-	62,000	176	6/
Frog Island Creek	French Cr., Pa.	47	47	1,300	301	25,700	289	-	-	27,000	289	6/
Quinsburg	Skippack Cr., Pa.	54	54	1,500	125	23,500	166	-	-	25,000	166	6/

5/ Net area applicable upon construction of proposed Hackettstown Reservoir
6/ 2-Fly development and operations indicated with multi-purpose development after 2010.

SMALL CONTROL PROJECTS

Perkasie (R-1)	Cranberry Cr., Pa.	6.8	6.8	57	768			2,818	822	2,870	822	7/
Reformatory (R-2)	Saltsburger Cr., Pa.	9.7	9.7	77	688			3,279	942	3,350	942	7/
Thorpe (Nesh)	Mine, Chunk, Cr., Pa.	16.8	16.8	180	952			3,520	976	3,700	976	7/
Mu-1	West Brook, N.Y.	21.3	21.3	140				4,587	-	727	-	7/
Mu-2	East Brook, N.Y.	3.4	3.4	35				832	-	86	-	7/
L-2	N.Br. Callicoon Cr., N.Y.	13.8	13.8	84				2,944	-	3,040	-	7/
P-1	Dwarfs Hole Cr., Pa.	4.8	4.8	40				1,022	-	1,062	-	7/
R-2	Rattlesnake Cr., Pa.	2.6	2.6	26				536	-	550	-	7/
Mu-3	Trib. Bark Hill Cr., Pa.	1.5	1.5	20				320	-	340	-	7/
P-3	Trib. Paradise Cr., Pa.	1.0	1.0	14				213	-	227	-	7/
R-7	Trib. Rattlesnake Cr., Pa.	1.6	1.6	20				320	-	340	-	7/
R-10	Forest Hill Run, Pa.	3.3	3.3	31				203	-	734	-	7/
P-11	Tank Cr., Pa.	2.2	2.2	23				469	-	492	-	7/
Mu-1	Lapylit Br., Pa.	5.1	5.1	53				1,129	-	1,172	-	7/
Mu-5	Poplar Run, Pa.	2.4	2.4	24				511	-	535	-	7/
Mu-6	Pipe Mountain Run, Pa.	2.7	2.7	29				575	-	602	-	7/
Mu-7	Trib. Bridkend Cr., Pa.	1.2	1.2	16				256	-	272	-	7/
Mu-10	Trib. Brodhead Cr., Pa.	2.5	2.5	28				532	-	560	-	7/
R-12	Scot Run, Pa.	1.7	1.7	19				362	-	382	-	7/
Po-13	Tr. to Scot Runs, Pa.	1.4	1.4	17				298	-	315	-	7/
Mu-14	P. and Cr., Pa.	5.6	5.6	45				1,193	-	1,238	-	7/
Po-15	Swamp Run, Pa.	2.5	2.5	25				532	-	557	-	7/
Po-16	Trib. Pocono Cr., Pa.	1.2	1.2	16				256	-	272	-	7/
Po-17	Trib. Pocono Cr., Pa.	1.2	1.2	15				256	-	271	-	7/
Po-18	Rowlands Run, Pa.	3.5	3.5	39				746	-	776	-	7/
Po-19	Rocky Run, Pa.	2.6	2.6	26				911	-	937	-	7/
Po-20	Bulgers Run, Pa.	1.7	1.7	19				362	-	381	-	7/
P-21	Cranberry Cr., Pa.	2.1	2.1	22				447	-	469	-	7/
Po-22	Wigwam Cr., Pa.	1.7	1.7	18				367	-	385	-	7/
R-	E.Br. Mahoneay Cr., Pa.	2.0	2.0	24				422	-	446	-	7/
R-2	Little Marikle Cr., Pa.	2.4	2.4	39				512	-	551	-	7/
Mu-3	Shohola Cr., Pa.	26.8	26.8	248				5,291	-	5,960	-	7/
R-4	Trib. Tenney Cr., Pa.	1.9	1.9	22				404	-	426	-	7/
R-10	Little Mahanoy Cr., Pa.	12.0	12.0	210				2,560	-	2,770	-	7/
R-11	Park Cr., Pa.	10.9	10.9	195				2,325	-	2,520	-	7/
Mu-1	Major Stony Cr., Pa.	2.1	2.1	26				648	-	300	-	7/
R-2	Trib. South Cr., Pa.	2.4	2.4	31				548	-	579	-	7/
R-4	Trib. Shady Run, Pa.	1.9	1.9	22				405	-	427	-	7/
R-15	Trib. Shady Run, Pa.	1.0	1.0	17				213	-	230	-	7/

7/ See drawing number for proposed outlet conditions and the desires of local interests.

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These indirectly related facilities are not necessarily dependent on the water resource development but are essential to a fuller realization of the project's recreation potential. To provide sound planning bases, the recreation lands and facilities were designed as an integrated unit for development of directly and indirectly related recreation potentials for the major control projects. The overall recreation lands and facilities, thus defined for the various projects, were segregated, by field appraisals, office studies and professional judgment, into balanced developments for the directly related and indirectly related categories. The directly related recreation developments were used as bases for allocating project costs to recreation as a project purpose as described in the following chapter. From consideration of the general manner in which the indirectly related recreation lands and facilities would be associated with the overall project development, these indirectly related features were considered to be desirable recreation reserves for individual local development as local recreation needs and programming indicate to be desirable and warranted. Accordingly, the development of the latter features was not considered as a project purpose in cost allocations.

141. As indicated in table VII-1, eight projects in the first group will have a total of 535,300 acre-feet of short-term storage and all eleven projects in this group will have a total of 1,137,000 acre-feet of long-term storage. Of the latter, 153,900 acre-feet are provided as inactive storage to assure acceptable minimum pool surfaces for recreation, to compensate for the anticipated accumulation of sediment in the various projects during their useful life and, in the case of the Hawk Mountain and Tocks Island Projects, to assure desirable minimum operating levels for power generation. The overall effects of the first eleven major control impoundments on the stream flows in the basin and the extent and nature of the services to be gained from the plan of development are discussed in the following chapter of this report. The second group of eight major control projects when fully developed will have only long-term storage amounting to a total of 308,500 acre-feet, of which 16,300 acre-feet will be inactive. The specific functions of each major control element of the plan are discussed as features of the individual project description in subsequent paragraphs.

142. SMALL CONTROL PROJECTS. Projects for the control of the uneven stream flows at local problem reaches in the intermediate upstream areas were selected from successive evaluations of 386 potential small dam sites in the basin. The sites investigated in this category included all practical small dam and reservoir potentials to control drainage areas of one to twenty square miles in extent. Details of the study of small control projects are presented in appendix R. Thirty-nine small control projects, as listed in table VII-1, were found to have sufficient economic merit to warrant their inclusion in the plan of development. These

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projects are proposed for early development for local flood control; and for recreation, water supply and other purposes to the extent warranted by local needs as indicated by local interests at the time preconstruction studies are undertaken. Thirty-six of these proposed small control projects might be accomplished under existing programs and continuing authorizations contained in Public Laws 566 and 685; provided the detailed studies, required under these authorities, confirm the appraisals made herein. Three of the small control projects, namely, the Parkside, Swiftwater and Jim Thorpe Projects, exceed cost limitations imposed by Public Law 685, but they are eligible for accomplishment under Public Law 566, subject to approval by the Senate Agriculture and Forestry Committee and the House Agriculture Committee. The latter three projects are described individually in paragraphs 186 to 189 below. Pertinent data on the remaining 36 projects are given in table VII-1. The location of each small control project is shown on plate 9 bound at the end of the text.

143. General characteristics of the small control projects. The small control projects are proposed primarily for flood control. As indicated in table VII-1, these 39 projects as now proposed will have a total of 40,400 acre-feet of short-term storage and 2,020 acre-feet of inactive long-term storage for the accumulation of sediment. However, water supply storage may be included as a purpose in these projects if local interests so desire at the time detailed studies are undertaken. Inclusion of such storage in a project to be accomplished under Public Law 685 would be in accordance with the provisions of the Water Supply Act of 1958. Should the inclusion of water supply storage cause the project estimate to exceed the federal funds expenditure limitation imposed by Public Law 685, local interests would be required to make a lump sum payment of the amount in excess of the limit before initiation of construction. Where water supply storage is included as a purpose in projects developed under Public Law 566, it would be necessary for the local interests to obligate themselves for the payments of the total cost of the water supply features of the structure. There are no provisions under Public Law 566 for the local interests to defer payment for water supply development, and therefore the total amount would have to be arranged for prior to initiation of construction. The overall effectiveness of the 39 small control projects in reducing flood damages and the extent of recreation opportunities to be provided at the Parkside, Swiftwater and Jim Thorpe Projects are discussed in the following chapter.

144. OTHER PROGRAMS FOR LAND AND WATER USE. The optimum development of the water resources of the basin depends not only on impoundments but also upon the application and extension of a variety of land and water use programs. Such programs tend to satisfy local needs and reduce widespread regional needs for products and services of water resources. In most instances these programs have been proposed by those public and private agencies

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contributing to the various fields of water resource development considered in this investigation and usually can be pursued as local applications of active continuing programs. Their role in the development of the water resources is in the satisfaction of those needs that are left unsatisfied by control projects because of physical, economic or geographic constraints. These programs often depend on expensive and sustained action by local interests and it would be presumptive to hazard assessments of their costs, extent of applicableness or effectiveness. Nevertheless the programs discussed in the paragraphs below are considered worthwhile features of the comprehensive plan for the development of the water resources of the Delaware River Basin.

145. Other programs for reduction of flood losses. Portions of the needs for relief from flooding and overland runoff reside in the uppermost headwater areas and the intermediate upstream areas of the basin. These needs, because of economic and geographic limitations, often remain unsatisfied by major control structures on the principle watercourses. No plan for the control and utilization of all surface water resources of the basin would be properly determined without due consideration of the needs in these areas. The importance of this segment of the water control is attested by the magnitude of agricultural flood damages which ranged from five to twelve thousand dollars per square mile on small watersheds in the 1955 flood. As indicated above, small control structures offer potentials for the satisfaction of these needs and have been studied as a feature of this investigation. In addition to the 39 small reservoirs selected as elements of the plan of development, watershed associations are actively planning small control measures for a number of intermediate upstream areas. Approved plans are in various stages of activation in five tributary watersheds as indicated in paragraph 101 above.

146. The land management programs of the Department of Agriculture are generally the most effective means of alleviating damages from overland flows in the uppermost headwater areas of the basin. In assessing these needs that Department in appendix K, established the extent of land areas currently in use in eight standard land capability classes and indicated the nature of conservation needs for each class. For example, there are about 1,750,000 acres of Class III lands in the basin suited primarily to cultivation. These lands are moderately sloping or wet lands; and the indicated conservation needs are strip cropping, terraces and drainage. The extent and indicated management measures for the various classes of land capabilities in the basin are shown in table VII-2. Although land management programs are active in the basin, much remains to be done to assess the effectiveness of indicated measures, to establish an integrated basinwide program and to implement such a program to accomplish optimum control of

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TABLE VII-2

CURRENT DISTRIBUTION OF LAND USE BY CAPABILITY CLASSES

Land Class	Use Suitability	Characteristics	Conservation Needs	% in Basin	Areas in Use (1,000 acres) Cropland	Pasture	Woodland	Idle	Urban	Total
I	Cultivation	Level, well drained	No special problems	3.2	151.1	19.9	60.1	13.9	12.6	257.6
II	Cultivation	Gently sloping, good drainage	Strip crops, simple management	21.5	1,095.4	162.3	354.5	124.1	25.4	1,761.7
III	Cultivation	Moderately sloping or wet land	Strip crops, terraces drainage	21.4	841.6	156.4	609.6	126.5	15.7	1,749.8
IV	Hay or grass	Moderately steep, eroded or wet	Erosion protection, drainage	8.7	221.2	30.7	515.6	31.6	8.8	707.7
V	Pasture, forest, wildlife	Nearly level, often wet or stony	Maintenance of cover		-	-	Very little within basin	-	-	
VI	Pasture, forest, wildlife	Steep slopes, eroded, stony or wet	Cover, forest and habitat management	14.2	102.7	49.8	974.4	27.9	5.0	1,159.8
VII	Timber, recreation, wildlife	Steep slopes, eroded, stony or wet	Forest and habitat management	19.2	55.7	27.6	1,448.5	33.9	2.6	1 568.4
VIII	Recreation, wildlife	Steep slopes, very rocky, waste, marshes	-	2.0	2.4	0.8	126.4	33.3	3.4	166.3
Unclassed *				9.8	-	-	-	119.7	678.7	798.4
TOTAL				100.0	2,470.2	447.5	3,988.9	510.9	752.2	8 169.7
%				100.0	30.2	5.5	48.8	6.3	9.2	100.0

* Cities, roads, water and other.
Data from Table 12, Appendix K, rounded to nearest 0.1, 1,000 acres

the overland flows in the basin.

147. Reforestation is cited by the Department of Agriculture as a land management measure. With programs to control cuttings and forest fires, encourage natural growth and replace low value species by high quality future stands, benefits would be realized in the control of flood runoff and the enhancement of timber resources. About one-half of the land area of the basin is occupied by forests of which one-fourth contains stands of marketable timber.

148. Controlled use of the flood plains of the basin provides excellent potentials for the alleviation of flood damages. Included in programs of this type are such measures as prevention of channel encroachment, zoning to regulate development and reconstruction in the flood plains, adjustments in the occupance of lands and structures subject to flooding, and evacuation of the flood plain either on a permanent basis to provide for parks and other developments not susceptible to serious damage by flooding, or on a temporary basis by flood warning arrangements. Programs to control the use of the flood plains would be entirely feasible in some areas and, as indicated in appendix Q, data for use in planning the programs are available. The effective application of any or all of the possible measures to control the use of the flood plains will require that local interests initiate and administrate such programs. Zoning and similar devices for controlling flood plain developments come under the general category of policing powers, delegated by the Constitution to the States and, in turn, usually delegated to counties, townships and municipal governments. In the Delaware River Basin this power is delegated by the States of New York, New Jersey and Delaware, and the Commonwealth of Pennsylvania to their various subdivisions. New York, New Jersey and Pennsylvania have specific statutes that allow municipalities to incorporate flood plain zoning provisions in municipal zoning ordinances. In Delaware the Attorney General's office could find no authority competent to act in the public interest in flood plain zoning. Pennsylvania and New Jersey have enacted and are enforcing laws that contain channel encroachment provisions.

149. Programs to control the use of flood plains appear particularly applicable at local communities where local protection works were found to be economically infeasible at this time. Local flood damage centers that were studied for possible flood protection measures are listed in table VII-3. In most of these cases relatively costly local protection works were found to be economically infeasible and unless the community is located in damage reaches downstream from proposed control projects or is

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TABLE VII-3

LOCAL FLOOD DAMAGE CENTERS

Locality	Stream	Area Flooded: Flood	Acres	Remarks
Margaretville, N. Y.	E.Br. Delaware R.	Nov. 1950	100	a,
Rockland, N.Y.	Beaver Kill	Nov. 1950	40	a,b
Roscoe, N.Y.	Willowemoc Cr.	Nov. 1950	65	a,b
Livingston Manor, N.Y.	L. Beaver Kill & Willowemoc Cr.	Nov. 1950	40	a,b
South Sterling, Pa.	Wallenpaupack Cr.	Aug. 1955	10	a,c
Newfoundland, Pa.	Wallenpaupack Cr.	Aug. 1955	50	a
Greentown, Pa.	Wallenpaupack Cr.	Aug. 1955	10	b
Tusten Township, N.Y.	Ten Mile River	-	-	a
Milanville, Pa.	Calkins Cr.	-	-	a,c
Liberty, N.Y.	Mongaup R.	-	-	a,b,
Port Jervis, N.Y.	Delaware R. & Neversink R.	Aug. 1955	50	b
Claryville, N. Y.	Neversink R.	-	-	a
Wurtsboro, N.Y.	Wilsey Brook	-	-	a,c
Sullivan County, N.Y.	Sheldrake Stream	-	-	a
Westbrookville, N.Y.	Basher Kill	-	-	a
Haven, N.Y.	Basher Kill	-	-	a
Godeffroy, N.Y.	Neversink R.	-	-	a,b
Port Jervis, N.Y.	Hollow Brook	-	-	a
Milford, Pa.	Saw Kill Cr.	-	-	a,b
Branchville, N.J.	Culver Cr.	-	-	a
Newton, N. J.	Paulins Kill	Aug. 1955	20	b
Blairstown, N.J.	Paulins Kill	Aug. 1955	70	a
Belvidere, N.J.	Delaware R. & Pequest R.	Aug. 1955	50	a
Easton, Pa.	Delaware R. & Lehigh R.	Aug. 1955	265	b
Phillipsburg, N.J.	Delaware R.	Aug. 1955	180	b
Canadensis, Pa.	Brodhead Cr.	Aug. 1955	40	b
Tannersville, Pa.	Pocono Cr.	Aug. 1955	20	b
Lehighton, Pa.	Lehigh R.	Aug. 1955	35	b
Bowmanstown, Pa.	Lehigh R.	Aug. 1955	15	a
Palmerton, Pa.	Lehigh R.	Aug. 1955	10	a
Slatington, Pa.	Lehigh R.	Aug. 1955	3	b
Walnutport, Pa.	Lehigh R.	Aug. 1955	5	b
Treichler, Pa.	Lehigh R.	Aug. 1955	5	b
Catasauqua, Pa.	Lehigh R.	Aug. 1955	25	b
Freemansburg, Pa.	Lehigh R.	Aug. 1955	60	a
Bath, Pa.	Monocacy Cr.	Aug. 1955	15	b
Riegelsville, Pa.	Delaware R.	Aug. 1955	100	b
New Hope, Pa.	Delaware R.	Aug. 1955	80	b
Yardley, Pa.	Delaware R.	Aug. 1955	150	b
Trenton, N.J.	Delaware R.	Aug. 1955	250	b
Hamilton Township, N.J.	Assunpink Cr.	-	-	e
Burlington, N.J.	Delaware R.	Aug. 1955	580	b
Bensalem Township, Pa.	Neshaminy Cr.	-	-	a
Chalfont, Pa.	Neshaminy Cr.	Aug. 1955	55	b
Newportville, Pa.	Neshaminy Cr.	Aug. 1955	60	b
Lumberton, N.J.	Rancocas R.	-	-	a,e
Tamaqua, Pa.	L. Schuylkill R. & Wabash Cr.	Aug. 1955	95	b
Kutztown, Pa.	Sacony Cr.	Aug. 1955	175	b
Shoemakersville, Pa.	Schuylkill R.	-	-	a,b
Reading, Pa.	Schuylkill R.	Aug. 1955	130	b
Birdsboro, Pa.	Schuylkill R.	Aug. 1955	10	a
Pottstown, Pa.	Schuylkill R.	Aug. 1955	250	b
Sellersville, Pa.	Perkiomen Cr.	-	-	a,b
Norristown, Pa.	Stony Cr.	Aug. 1955	85	a,b
Norristown, Pa.	Schuylkill R.	Aug. 1955	40	b
Norristown, Pa.	Saw Mill Run	Aug. 1955	70	b
Whitemarsh, Pa.	Wissahickon Cr.	-	-	b,d
Westville, N.J.	Big Timber Cr.	-	-	a,e
Upper Darby, Pa.	Naylor's Run	-	-	a
Darby, Pa.	Darby Creek	-	-	a
Upland, Pa.	Chester Creek	-	-	a
Pomeroy, Pa. (Chester Co.)	Buck Run	-	-	a
Eddystone, Pa.	Crum Creek	-	-	e
Downingtown, Pa.	E. Br. Brandywine Cr.	Aug. 1955	80	c,d
Coatesville, Pa.	W. Br. Brandywine Cr.	Aug. 1955	90	c,d
Wilmington, Del.	Little Mill Cr.	July 1952	200	f

All areas studied after 1955 flood.

a. Studies based on questionaries and field reconnaissance indicated insufficient flood damages to warrant detailed consideration of costly improvements.

b. Local flood damage problems evaluated in comprehensive survey and taken into account in defining plan of development.

c. Flood protection works provided or proposed by the State.

d. Flood protection works provided or proposed under PL 566 or PL 685.

e. Flood problems arise from local channel encroachments, local encroachment on tidal areas or inadequate local storm drainage.

f. Being studied for possible accomplishment under PL 685 (as of Sept. 1960).

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protected by measures provided by State or local interests, the local flood problems will remain substantially unchanged under the proposed plan of development. Each of these localities may profit by the application of local programs to control the occupance and use of the flood plain in its local area. In accordance with Section 206 of the Flood Control Act of 1960, the Corps of Engineers, may upon request of a state or responsible local government agency, provide data and information which will assist in planning adequately for flood plain use in their communities.

150. Other programs to satisfy water needs. The major control projects were designed to satisfy, to year 2010, the estimated demands for supplies of water for all purposes within subareas of the water service area. However, practical and economic considerations will result in those metropolitan centers, communities, industries and other riparian users conveniently located with respect to the reservoirs and augmented streamflows being the principal beneficiaries of the water supply features of the plan of development. The small control projects discussed earlier in this chapter should be considered, at the time detailed studies are made, as possible partial solutions to local water supply problems in some areas. Rural users and small communities will continue to rely mainly on ground-water sources at least until such time as the quality of surface waters or the distribution of centrally treated supplies of surface waters makes their use convenient and economical for the rural users. Under these conditions and with a view to assuring an equitable supply of water to all users in the future, it is imperative that specific programs for the controlled use and conservation of the basin's water resources and preservation of their quality be vigorously administered by local interests in the basin.

151. In 1955 ground-water resources were used to satisfy 440 mgd or about 15 percent of the water needs (exclusive of cooling water for thermal-electric generation) in the basin. In its inventory of the ground-water resources of the basin, as reported in appendix N, the U. S. Geological Survey found that ground-water suitable for most uses may be developed, at least in small quantities, almost anywhere in the basin. In the Coastal Plain large quantities of fresh water can generally be developed except near the ocean and Delaware Bay, and except as influenced by the inland extension of salt water in certain aquifers. The unused ground-water resources in the Coastal Plain were estimated at about 800 mgd that are susceptible of economic use. The potential ground-water supply in the Appalachian Highlands was estimated at 3,900 to 4,900 mgd. The U. S. Geological Survey in appraising this supply indicated that only a small fraction of this potential supply can be developed feasibly. In many places wells developed

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in permeable deposits near streams may induce recharge at rates far greater than the natural recharge rates and development of large supplies in such cases would be at the expense of stream-flow, at least until the withdrawals are returned eventually to the stream. In the estimates of gross and net water requirements reported in appendix P, about 1,400 mgd, or eleven percent, of the requirements at year 2010 for seven water problem areas in the basin and coastal region, was assumed to come from ground-water supplies. This represents virtually all ground-water resources presently considered available for economic use in the seven water problem areas. The extent of this projected ground-water usage focuses attention on the need, at an early date, for basinwide programs for continuous accumulation of complete data on current ground-water usage; for rigid control of the magnitude and geographic distribution of ground-water withdrawals; and for augmenting these resources, where the geologic formations permit, by artificial ground-water recharge, subsurface storage of surface water excesses, and similar measures. The U. S. Geologic Survey has been engaged actively, in cooperation with the States, in the collection of ground-water data, but expansion of these activities will be required in the future as water uses increase in the basin. The other programs needed in connection with ground-water are presently considered to be in the area of State responsibility, and their extent and effectiveness rest with that level of government.

152. The problem of deficient natural supplies of surface and ground-waters in the southern basin areas adjacent to Delaware Bay and in the Coastal Plain may some day be solved by the desalting and purification of sea water or brackish water. Present minimum costs of such processes are many times the cost of providing fresh water by impoundments in the Delaware River Basin ($0.03 per 1,000 gal.). Conventional distillation processes today can desalt sea water at a cost of $2.00 - $3.00 per 1,000 gallons. Recent improvements in desalting techniques are expected to reduce this cost to $1.00 per 1,000 gallons. Membrane processes have been demonstrated capable of producing fresh water from brackish water (4,000 ppm dissolved solids) at costs ranging from $0.30 to $0.80 per 1,000 gallons. Such plants have been designed and installed with capacities up to 2.5 million gallons per day. The office of Saline Water Conversion, of the U. S. Department of the Interior, has reported world-wide inventories of progress in this field in its series of Research and Development Progress reports.

153. Programs to preserve water qualities. As discussed in paragraph 126 above, the waters of the Delaware River below Trenton receive tremendous waste loads. In the reach of the river from Trenton to Wilmington, the U. S. Public Health Service lists in appendix C sixteen municipal waste disposal facilities that served in 1958 a total population of 2,874,000, or more than 40 percent of the total population of the basin. These facilities discharged to

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the river in 1958 an average daily flow of 365 mgd carrying an estimated pollution load equivalent to a population of 2,250,000. Because of pollution control measures, the pollution loads in this reach have been steadily decreasing since 1940 in spite of an increasing population during that period. However, the pollution load discharged to the river in 1958 provides opportunity for much improvement in the field of pollution load removal. The present level of the overall removal of the pollution load to the estuary, the Public Health Service reported in appendix C, is about 32 percent including discharges of raw and treated municipal sewage. In projecting the pollution loads as discussed in paragraph 126 above it was anticipated that the increased interception of waste and increased efficiency of treatment will increase the level of pollution load removal to 50 percent at year 1980 and 70 percent at year 2010. To achieve such levels of removal increasing emphasis will need to be placed on sewage treatment and sewage treatment research. It is apparent that acceptable water qualities in the basin will depend on a continued and vigorous program to increase waste removal efficiencies to assure a 70 percent removal of future raw pollution loads.

154. Water conservation programs. The general water use habits of the people of the basin and water service area have evolved from a long history of bounteous supplies of high quality water available to the individual or corporate users for the taking. The exercise of strict water conservation practices possibly would serve to prolong the current era of reasonably adequate water quantities and delay the time of constructing extensive and costly developments to augment raw water supplies. Many water conservation practices have been proven feasible in water deficient areas. Probably the most effective for use in this area would be internal recycling of water used by industry and increased repetitive use of water as it flows from the headwater levels of the basin to the sea. In both of these possibilities the problems of water pollution may act to set constraints on the practical limits of their application. However, it is apparent that the practice of conservation measures in the use of water has much to offer in an area such as the Delaware River Basin where projected population and industrial activity foretell dwindling surpluses of raw water. Programs by local interests to encourage the acceptance and practice of all possible water conservation measures should be features of any plan to develop the water resources of the basin.

155. Other programs to provide recreation opportunities. Appendix I contains an inventory of all non-urban public park and recreation developments in the Delaware River Basin. These include 96 state and county parks, 15 state forests, 99 hunting and fishing areas, 9 state and county historical sites, 3 forest-park reservations, 3 national wildlife refuges, one Federal reservation and one Federal historic site. This reflects the present

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capacity of recreation developments in the basin including recreation developments similar to those proposed in connection with water storage and control projects.

156. Within the Pennsylvania portion of the Delaware River Basin there are 13 state parks with a total of 37,231 acres; 1 state forest of 71,387 acres on which are located four separate recreation areas; 29 state game areas with a total of 110,660 acres; 8 public fishing areas totalling 1,159 acres; and 4 historical sites with a total of 260 acres. The parks are fairly well distributed with regard to population centers, whereas the state forest and fish and game areas are located, for the most part, in the middle and upper part of the basin. In addition, there are 213,579 acres of cooperative farm-game program lands open for public hunting.

157. Existing park and recreation developments within the New Jersey portion of the basin include 15 state parks ranging in size from 12 acres to 10,935 acres, with a total of 17,882 acres; 8 state forests totalling 56,177 acres; 2 forest-park reservations of 96,000 and 6,200 acres; and a total of 87,027 acres of public shooting and fishing areas. New Jersey also administers 18 historic sites throughout the state.

158. Existing park and recreation developments within the entire state of Delaware include 3 state parks with a total of 1,079 acres; 6 state forests totalling 4,709 acres; 29 wildlife and fishing areas with a total of 14,858 acres, of which 5,000 acres are lands of the Chesapeake and Delaware Canal, and 2,650 acres of state beach lands extending 14.6 miles along the shore; and one historic site. These recreation areas are administered by five different agencies of the state government.

159. Within the New York portion of the basin there are no state parks; there are, however, 234,610 acres in the Catskill Forest Preserve, one game management area and 57 miles of stream easement wholly or partially within the confines of the basin area which are used to some extent for nonurban outdoor recreation.

160. Appendix I contains proposals relating to the expansion and further facility development of 15 state parks in New Jersey, 10 state parks in Pennsylvania, state forest camps in New York, and three state parks in Delaware. This proposal provides for a portion of the recreation needs of the basin not met by the recreation development proposed in connection with water control projects. Appendix I also contains proposals relating to the planning and development of additional park and recreation areas in the basin states, namely one state park in New Jersey, three in Pennsylvania and four in Delaware and three historical sites in the latter state. It is also proposed that certain lands in Pennsylvania, New Jersey and Delaware be acquired as recreation reserves to be developed at some future period when the need

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arises. The proposed new recreation and historical areas and the proposed recreation land reserves within the basin boundaries are listed in table VII-4 together with available data on acreage and estimated annual visitation. The recreation land reserves are proposed for development after year 1980. The proposed new areas and reserves related primarily to fresh water resources of the basin are marked by single asterisks. The reserves listed in table VII-4 are in addition to the recreation reserves based on indirectly related recreation potentials at major control projects described in paragraph 140 above.

161. Programs to enhance fish and wildlife resources. General guide-lines by which the more important fish and wildlife resources of the Delaware River Basin can be protected and improved are presented in appendix J. The more important elements of these guidelines concern the fresh water fisheries, marine fisheries, anadromous and catadromous fishes, and wildlife.

162. With regard to fresh water fisheries, appendix J points out that the elements necessary for the protection and/or improvement of the fresh water resource would include acquisition of public fishing rights, the development of access facilities, stream habitat improvement, reclamation and a stocking of selected trout streams throughout the basin. Also necessary is the development of additional access and the improvement of fishing waters presently open to public use, including some of the reservoirs and major streams of the basin. The construction and management of small water impoundments specifically for fishing, and of large impoundments capable of producing good fishing, is included in the general guidelines. Other features are the use of all fishable waters in parks for maximum feasible public use; installation of stream improvement devices on certain sections of streams altered by small dams; elimination of acid, culm and silt from upstream basin waters; and the reduction of water contamination from domestic, municipal and industrial wastes. Also considered among the important elements of necessary steps to the protection and improvement of the fishery resources are the inclusion of access, sanitation, parking and boat launching developments for public fishing at all dam and reservoir projects included in the plan of development, and the provision of water releases below each project to meet volume and temperature requirements necessary to protect and enhance, if possible, the fishery values downstream. Other elements include acquisition of public fishing rights, and the development of access and public facilities along streams in the basin to mitigate the loss of stream fisheries expected as a result of the construction of dam and reservoir projects included in the plan of development. As mitigating measures for loss of stream fishery values in connection with the Tocks Island Dam and Reservoir, appendix J also proposes the construction of project outlet works that will permit releases from various levels of the reservoir, with provisions for coordination between project operators and appropriate fish conservation agencies

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TABLE VII-4

PROPOSED NEW RECREATION AREAS AND RECREATION LAND RESERVES
WITHIN DELAWARE RIVER BASIN

State	Area	Acreage	Estimated Average Annual Visitation
	PROPOSED NEW RECREATION AND HISTORICAL AREAS		
Delaware	* Lums Pond	1,350	350,000
	* Killen-Coursey-McCauley Ponds	3,600	300,000
	Delaware Dunes	1,000	100,000
	Churchman's Marsh	1,500	15,000
	** Cooch's Bridge	15	1/
	** Buena Vista	15	1/
	** McDonough House	2	1/
Pennsylvania	* Baron Hills	3,500	1,000,000
	* Green Lane	2,000	1,500,000
	PROPOSED RECREATION LAND RESERVES		
Delaware	Cape Henlopen	2,000	1/
	Woodland Beach	1/	1/
	* Becks Pond & Sunset Lake	50 2/	1/
	* Voshell Pond	31	1/
	* Red Mill Pond	150 3/	1/
	Augustine Beach	1/	1/
	* Smalley's Pond	60 3/	1/
New Jersey	Raritan Arsenal	1/	1/
	W. Cape May Beach	1/	1/
	Cox Hall Creek	1/	1/
Pennsylvania	Shohola Falls	12,000	1/
	* Warner Lakes	3,200	1/
	* Reservoir WA-5A	175 3/	1/
	Jacobsburg Tract	500	1/

1/ Data not available.
2/ Water surface area for Becks Pond only
3/ Water Surface area only.
* Related primarily to fresh water resources.
** Historical areas.

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throughout the project life. Special studies are proposed during planning and construction, and thereafter if necessary, to determine appropriate fish passage measures to offset the barrier effects on migration of fishes.

163. Important elements proposed for the protection and improvement of the marine fishery resource include the initiation of a coordinated Federal-non-Federal comprehensive survey of the commercial and recreational uses of these fishery resources; an estuarine research program, including a study of fin fishes and shell fishes; the development of public boat launching areas; and public fishing access areas along the Delaware Bay shore.

164. Protection and improvement of wildlife resources of the Delaware Basin, as proposed in appendix J, include legislation and education activities, and administrative action and habitat management for the deer populations. Similar proposals are made with regard to wild turkey, farm game resources, and upland game resources. The acquisition and development of public hunting areas, the expansion and development of small marshes and ponds, the preservation of wetlands to conserve and enhance waterfowl and fur animal resources are also proposed. The improvement and preservation of marshland habitat in the Coastal Plains section of the basin is of special consideration. Mentioned as units deserving consideration in this respect are. 1,300 acres of the Crosswicks Creek-Trenton Marshes; 250 acres of fresh tidal marsh and water along Pennsauken Creek; 700 acres of marsh along Rancocas Creek; 180 acres of mudflat and shoal at Fish House Cove; 250 acres of marsh at Hermesprota Creek; 1,500 acres of marsh, swamp and shoal in the Monds Island-Rapaupo Creek-Chester Island area; 960 acres of fresh tidal marsh on Raccoon Creek; 1,200 acres on Oldman's Creek; and 850 acres along the Christina River, including 400 acres at Churchman's Marsh. To improve public waterfowl hunting opportunities there are also included the development of access facilities; the development of feasible measures for the disposal of spoil from navigation works which will spare the better habitat and offset destruction through use of spoil to improve, replace and/or create water fowl habitat; the continuation and expansion of efforts to adapt insect control and waterfowl development methods that are mutually acceptable and beneficial; and the coordination of the development of waterfowl habitat with road building activities. Important elements that would mitigate losses of existing wildlife habitat and/or public hunting areas as a result of the construction of dams and reservoirs, include the acquisition of land and improvement of habitat thereon for single-purpose game management and public hunting use throughout the basin, together with the replacement of certain facilities serving game administration needs. The Fish and Wildlife Service in assessing

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the overall effects of the proposed plan of water resource development on the fish and wildlife resources of the basin could foresee the need for preconstruction studies to examine in detail these effects. The Service estimated the cost of these studies at $65,000.

165. DESCRIPTIONS OF MAJOR CONTROL PROJECTS PROPOSED FOR MULTIPLE-PURPOSE DEVELOPMENT PRIOR TO YEAR 2010. The eleven major control projects proposed for complete development prior to year 2010 are described in the following paragraphs. The projects included in this category and the order of the individual project descriptions are as follows:

Hawk Mountain	Trexler
Prompton (Modification)	Maiden Creek
Tocks Island	Blue Marsh
Bear Creek (Modification)	Newark
Beltzville	Christiana
Aquashicola	

166. Hawk Mountain Project.

a. Description. The Hawk Mountain Project is proposed for multiple-purpose development to provide supplies of water, for production of hydroelectric power, and for recreation purposes. Hawk Mountain dam site is located on the East Branch of Delaware River about 2-1/2 miles east and upstream from Hancock, N.Y. (See plate 10.) The contributing drainage area is 440 square miles exclusive of 372 square miles which contributes to Pepacton Reservoir, created by Downsville Dam and constructed as a part of New York City's water supply system. The proposed earth and rock fill dam will rise 177 feet above the river bed with a top length of 1,900 feet. A side channel spillway with a 550-foot length of crest at elevation 1,082 will be cut into the left abutment to convey water through a chute and stilling basin to the river channel below the dam. The concrete conduits will be constructed on rock along the left bank of the river with gates and a control tower at the upstream end. After serving as diversion conduits during construction, a steel penstock will be installed in each conduit from the center of the dam to the powerplant. The powerplant, located about 450 feet below the axis of the dam on the left bank, will contain two turbines each with a rating, at best head, of 15,000 horsepower and each direct-connected to a 10,500 kilowatt generator. The step-up substation would be located adjacent to the powerhouse on a raised section of the toe of the main embankment. Storage allocations for the Hawk Mountain Project are 60,000 acre-feet of inactive long-term storage, primarily for hydropower, to elevation 1,008, and 233,000 acre feet of active long-term storage for supplies of water, power and recreation to elevation 1,082. The reservoir, at elevation 1,082, would extend upstream about 22 miles to a point about one-mile downstream from the town of Downsville, N. Y. Relocation of about

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21-1/2 miles of State Highway Routes 17 and 30, and the communities of Fishs Eddy and East Branch will be necessary. A total of 7,800 acres would be required for the complete development. Of this area 5,800 acres would be for the construction of the project, and 2,000 acres would be for directly related recreation The total estimated cost of the Hawk Mountain Project is $42,000,000 which includes specific costs for power and recreation of $5,080,000 and $1.420,000 respectively. The estimated specific recreation costs include $778,000 for recreation facilities and $637,000 for recreation lands, both of which are in the category of directly related recreation. Financing of the separable costs for hydropower for this project at the private financing rate applied in deriving alternate thermal power costs, resulted in the hydropower feature being unfavorable. In view of the long range completion schedule and the sound water supply value, however, the hydropower feature is retained in the Hawk Mountain Project as an added though marginal feature. As for all non-Federal interest projects the hydropower feature would be given detailed study by local interests when planning for construction.

b. Functions:

(1) Supplies of water. Use of 233,000 acre-feet of active long-term storage at the Hawk Mountain Project will result in a net yield of 580 cubic feet per second at the site. The effective augmention to the yield of the Tocks Island reservoir would be 465 cubic feet per second This augmention of flow would contribute to the satisfaction of the water needs of the Trenton-Philadelphia area for the projected 50-year period under consideration.

(2) Power. The hydroelectric powerplant at the Hawk Mountain Project would have an installed capacity of 21,000 kilowatts, a dependable capacity of 11,000 kilowatts and would produce an average of 93.8 million kilowatt-hours of energy annually.

(3) Recreation. The Hawk Mountain Project would provide recreation capacity to accommodate about 187,000 visitors annually. Facilities will be provided for one-day outings as required. The necessary roads, trails, sanitary facilities and water supplies will be provided. Hunting will be permitted in appropriate season and under reasonable regulation to assure public safety. Operation of the project will consider the streamflow requirements of stream fisheries and the management of the impounded water for lake fisheries as a coordinated element for full realization of the recreation potential of the project.

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167. Prompton Project.

a. Description. The Prompton Project, now under construction as a single-purpose flood control project (with incidental recreation use) and scheduled for completion in 1960, would be modified for multiple-purpose use to provide supplies of water and recreation benefits as well as the presently designed flood control function. The Prompton dam is located in the valley of Lackawaxen River about 1/2 mile upstream from the confluence of Waymart Branch with the river, and about 4 miles west of Honesdale, Pennsylvania (See plate 11). The dam presently under construction, which controls 60 square miles of drainage area, will be 1,300 feet long and 140 feet high. The spillway, which is cut into the hill around the right (west) end of the dam, is 50 feet wide. A conduit has been built along the right bank to carry limited amounts of flow. This conduit has an uncontrolled inlet at elevation 1,125 in the reservoir pool and a stilling basin at the downstream end.

b. Storage allocations for the modified Prompton Project, based on the most economical modification of the existing dam and reservoir, would be 3,400 acre-feet of inactive long-term storage to elevation 1,125; 28,000 acre-feet of active long-term storage for supplies of water and recreation use to elevation 1,180; and 20,300 acre-feet of short-term storage for flood control to elevation 1,205. Comparative data on the present and proposed modified project at this site are as follows:

	Present Project	Proposed Modified Project
Capacities, in acre-feet		
Flood Control	20,300	20,300
Water Supply	0	28,000
Inactive	3,400	3,400
Elevation Top of Pool, in feet, m.s.l.		
Flood Control	1,168.1	1,205 1/
Water Supply	-	1,180
Inactive	1,125	1,125

1/ Spillway crest elevation

The long-term storage requirement and operation for multiple-purposes dictate the following additions or modifications to the structures presently under construction:

(1) A control tower with gates and a service bridge to control releases from the reservoir.

(2) A blanket of impervious material on the valley wall and floor upstream from the dam.

(3) Widening of the spillway to 250 feet.

(4) Clearing of reservoir land and relocating roads subject to inundation.

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c. The reservoir to be created by long-term storage up to elevation 1,180 will extend about 4 miles upstream. The reservoir for short-term storage would rise to about the same level as that for the structure now under construction and hence would require procurement of flowage easement on only 30 acres of land in addition to that already under easement. The modified Prompton development will include a total area of 2,055 acres. In addition to the 730 acres required for construction of the project, 925 acres would be required for directly related recreation and 400 acres for indirectly related recreation. The total estimated cost of the modified multiple-purpose project, excluding $387,000 for indirectly related recreation, is $8,050,000, which is made up of $3,700,000 estimated as the cost of the flood control project now under construction and $4,350,000 estimated as the cost for the modifications previously discussed. Of this amount, $427,000 are included as the estimated specific costs of directly related recreation. The directly and indirectly related recreation costs are composed of the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$144,000	$ 62,000
Facilities	283,000	325,000
	427,000	387,000

The cost of land now being acquired by the Commonwealth for recreation purposes is included in these estimates of recreation costs.

d. Functions.

(1) Supplies of water. Use of 28,000 acre-feet of active long-term storage at the Prompton Project would result in a net yield of 57 cubic feet per second. This augmentation of flow will contribute to the satisfaction of the water needs of the Trenton-Philadelphia area for the projected 50-year period under consideration.

(2) Reduction of flood damage. Flood heights on the Lackawaxen River will be substantially reduced by the Prompton Project and the Edgar Jadwin dam and reservoir on Dyberry Creek, above Honesdale, Pennsylvania. The towns of Honesdale, located at the confluence of Dyberry Creek with the Lackawaxen River, and Hawley, located between the junctions Middle Creek and Wallenpaupack Creek with the Lackawaxen River, will obtain substantial relief from frequent and considerable flood damage. Several villages and seven townships located in the lower reaches of Lackawaxen River have residential, commercial, utility, highway and other developments on the flood plain, and experienced 1-1/2 million dollars in flood damage in 1955. Conversion of the Prompton Dam and Reservoir to a multiple-purpose development would preserve the flood control function of this project as originally authorized and flood reduction benefits will be unaffected by the proposed modification. Control

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of flood waters by the Prompton and Edgar Jadwin Projects will reduce the river stages at Hawley, Pa. by about four feet for a flood of the magnitude experienced in 1955. Additional limited reduction of flood damage will accrue on the main stem of the Delaware River from the Prompton and Edgar Jadwin Projects.

(3) Recreation. The Prompton Dam and Reservoir Project would provide a total recreation capacity to accommodate a total of 156,300 visitors annually. Of these, 81,900 visitors annually are credited to the directly related recreation developments. Due to the lack of suitable terrain, recreation potential at this project is limited. However, lands suitable for day-use recreation are included in the plan of improvement. Necessary roads, trails, sanitary and administrative facilities will be provided. Hunting will be permitted in appropriate season and under reasonable regulation to assure public safety. Operation of the project will consider the downstream flow requirements for stream fisheries and the management of the impoundment for lake fisheries as a coordinated element for full realization of the recreational potential of the project.

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168. Tocks Island Project.

a. Description. The Tocks Island Project is proposed for multiple-purpose development to provide supplies of water, flood control, production of hydroelectric power, and for recreation purposes. The Tocks Island dam site is located on Delaware River about 5 miles upstream from Delaware Water Gap and about 7 miles northeast of Stroudsburg, Pennsylvania. (See plate 12.) The site is at the upstream end of Tocks Island which is about 2-1/2 miles upstream from Shawnee-on-Delaware, Pennsylvania. The contributing drainage area is 2,912 square miles, exclusive of 915 square miles which contribute to the Neversink, Pepacton and Cannonsville Projects of the City of New York. The dam will contain about 3-1/2 million cubic yards of earth and rock, be 3,200 feet long, and rise 160 feet above the river bed to elevation 456. (See plate 13.) It will have a central impervious earth core extending into the foundation to a maximum depth of 30 feet below the base of the dam. Two 22-foot diameter conduits placed on rock along the left river bank will serve both as diversion conduits during construction and later as penstocks for production of power. At the downstream end of the conduits will be a powerplant with two turbine-driven generators of 23,000-kilowatt capacity each. All low level water releases will pass through the turbines or through a bypass channel from each penstock built into the powerhouse substructure. The step-up substation will be located adjacent to the powerhouse on a raised section of the toe of the main embankment. In addition to the conventional powerplant described above, a pumped-storage powerplant with provision for four reversible power turbine units of 91,500-kilowatt capacity each will be located upstream from the spillway and about 1,200 feet upstream from the centerline of the dam. The spillway cut into the left (New Jersey) abutment will have a concrete crest at elevation 395 surmounted by ten radial gates each 40 feet long and 35 feet high. The concrete lined spillway chute cut into rock will discharge water into a stilling basin downstream from the powerplant and from there into the river channel. An item has been included in the cost estimates for facilities for passing fish over the dam in the event preconstruction studies show the need for specific facilities for that purpose. Storage allocations for the Tocks Island Project, as determined from detailed planning studies, indicate 80,000 acre-feet of inactive long-term storage to elevation 356; 410,000 acre-feet of active long-term storage for supplies of water, power, recreation and other uses to elevation 410; and 275,000 acre-feet of short-term storage for flood control to elevation 428. The reservoir formed by this dam, up to elevation 428, will extend approximately 9 miles up Flat Brook and 37 miles up the Delaware River to Port Jervis, New York. It will necessitate the relocation of 27 miles of Federal Highway 209 as well as county roads, local roads, the community of Bushkill, Pennsylvania, parts of Dingmans Ferry, Pennsylvania, and a few buildings at Milford, Pennsylvania. The

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town of Matamoras, Pennsylvania, at the upper end of the reservoir would be protected by a dike about 12,000 feet long and appurtenant outlet pipes, drains and pumping plants. The bridge on U.S. Route 6 to Tri-State, New York would be replaced. No railroad relocations will be required and there are no commercially valuable mineral deposits in the reservoir area. A total of 62,370 acres of land will be acquired for the complete development. In addition to the 14,800 acres required for construction of the project, 9,500 acres would be required for directly related recreation and 38,070 acres for indirectly related recreation. The total estimated cost of the Tocks Island Project, excluding $31,600,000 for indirectly related recreation, is $146,000,000 which includes specific costs for power and recreation of $66,200,000 and $18,300,000 respectively. The estimated specific costs for power include $12,300,000 for conventional power at the dam and $53,800,000 for pumped-storage type power facilities to be included in the overall development. The estimated specific costs for directly and indirectly related recreation include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$ 8,080,000	$13,400,000
Facilities	10,200,000	18,200,000
	18,280,000	31,600,000

b. Functions.

(1) Supplies of water. Use of 410,000 acre-feet of active long-term storage at Tocks Island Project would provide a net yield of 980 cubic feet per second. This augmentation of flow would contribute to the satisfaction of the water requirements of the Trenton-Philadelphia area as indicated for the 50-year period under consideration.

(2) Reduction of flood damage. The 1955 flood damages in the reach from Tocks Island to Burlington, New Jersey, exceeded 85 percent of the total damages for the main stem of the Delaware River, and occurred principally at the damage centers of Easton, Riegelsville, New Hope, and Yardley, Pennsylvania; and Belvidere, Phillipsburg, Trenton and Burlington, New Jersey. The flood control storage provided at Tocks Island and other projects in the water control plan, would reduce, by system operation, the stage of the 1955 flood at Trenton by about 6 feet, based on the modified stage reflecting the regulation capacities of the Bear Creek, Edgar Jadwin and Prompton Projects. For the 1942 flood, the system flood control storage, including that at the Tocks Island Project, would result in a stage reduction of about 3.7 feet.

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(3) Power. Operation of the Tocks Island Project for multiple-purpose use would support a conventional hydropower installation of 46,000 kilowatts, a dependable capacity of 20,000 kilowatts, and the average annual production of 281.5 million kilowatt-hours. In addition to the conventional power plant, advantageous physical conditions at the site permit the construction of a pumped storage power scheme with an installed capacity of about 366,000 kilowatts, a dependable capacity of 342,000 kilowatts and the average annual production of 732.0 million kilowatt hours.

(4) Recreation. The Tocks Island reservoir area would provide recreation capacity to accommodate 6,750,000 visitors annually of which 2,470,000 are credited to the directly related recreation use. The lands to be acquired for recreation would provide for public ownership of the shore area and would provide space for development of 10 major recreation areas. The outstanding scenic and recreation resources of the project would thus be preserved in public ownership. Various facilities would be provided for one-day outings as well as camping. Operation of the project would consider the fishing requirements of the impoundments; the flow requirements for the stream fisheries downstream from the dam; and, should facilities be provided for moving anadromous fish above the dam, consideration would be given to augmenting flows in the month of October for the purpose of moving young fish populations through the polluted zone of the river in the vicinity of Marcus Hook. Special studies would be pursued during later planning stages in order to determine this specific requirement. Hunting would be permitted during appropriate season and in accordance with reasonable regulation to assure public safety.

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169. Bear Creek Project.

a. Description. The Bear Creek Project now under construction and scheduled for completion in 1961 is a single-purpose flood control project (with incidental recreation use) which would be modified for multiple-purpose development to provide supplies of water and recreational use as well as the presently authorized flood control. The earth and rock fill dam is located on Lehigh River 75 miles above its confluence with Delaware River and about 5 miles north of White Haven, Pennsylvania. (See plate 14). At this location the dam controls 288 square miles of drainage area. Comparative data on the present and proposed modified project at this site are as follows:

	Present Project	Proposed Modified Project
Capacities, in acre-feet		
Flood Control	108,000	108,000
Water Supply	0	70,000
Inactive	2,000	2,000
Elevation Top of Pool, in feet m.s.l.		
Flood Control	1,450 1/	1,481 1/
Water Supply	-	1,425
Inactive	1,300	1,300

1/ Spillway crest elevation

The proposed modifications to the dam now under construction to make it serviceable for long-term storage in addition to the present flood control storage will involve:

(1) Moving and raising the spillway crest 31 feet to elevation 1,481.

(2) Raising the dam to elevation 1,503.

(3) Adding 70 feet of concrete conduit to the downstream end of the outlet tunnel.

(4) Constructing new dikes and raising existing dikes north of the dam

The modified dam will rise 263 feet above the stream bed and have a length of 3,500 feet. The spillway would be cut through rock to the north of the dam, and farther north a dike 4,600 feet long will fill a swale in the reservoir rim. Operation of three gates controls the flow through the outlet tunnel. The reservoir for long-term storage would have a maximum depth of 185 feet and would extend 7.0 miles up the Lehigh River and 4.0 miles up Bear Creek from the dam. This reservoir would necessitate the purchase of land to be inundated on which flood easements have already been taken and would require the acquisition of additional flood easements at

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higher elevations. No economically valuable mineral deposits would be flooded and only one road along Bear Creek would require relocation in addition to those required for the presently authorized flood control project. A total of 3,950 acres of land would be acquired for the complete development. In addition to the 1,950 acres that would be required for construction of the project, 1,300 acres would be required for directly related recreation and 700 acres for indirectly related recreation. The total estimated cost of the modifications to the Bear Creek Project, excluding $875,000 for indirectly related recreation, is $8,990,000 which includes specific recreation costs of $595,000. The estimated specific costs of directly and indirectly related recreation include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$190,000	$102,000
Facilities	405,000	773,000
Total	595,000	875,000

The total cost of the project modified as proposed herein would be $20,100,000 which includes an estimated cost of $11,100,000 for the present project. Costs for indirectly related recreation are excluded from this estimated total cost.

b. Functions:

(1) Supplies of water. Use of 70,000 acre-feet of active long-term storage at the Bear Creek Project would provide a net yield of 196 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water requirements of the Allentown-Bethlehem area and the Trenton-Philadelphia area as indicated for the 50-year period under consideration.

(2) Reduction of flood damages. The 108,000 acre-feet of presently authorized short-term storage would be included as the initial stage in the multiple-purpose development. This storage will be effective in alleviating flooding in the upper reach of the Lehigh River where damage is confined, primarily, to the towns of Jim Thorpe, Lehighton, Weissport, Parryville, Palmerton, and Bowmanstown, Pennsylvania. Below Lehigh Gap both the river and flood plain widen. Railroad alignments located in the flood plain together with 44 railroad and highway bridges spanning the Lehigh River are subject to recurring flood damage. The inundation of the Lehigh Navigation Canal, in the reach from Jim Thorpe to Easton, Pennsylvania, is accompanied by extensive flood damage. Damage centers in the reach from Lehigh Gap to Easton, Pennsylvania, include industrial and residential areas located in the vicinity of the towns of Northampton, Hokendauqua, Catasauqua, Allentown, Bethlehem, Freemansburg and Easton, Pennsylvania. Considerable flood stage reduction will be provided in these damage areas by operation of the short-term storage at the Bear Creek Project. The flood control storage has been preserved as previously authorized,

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and flood reduction benefits will be unaffected by the proposed modification.

(3) Recreation. The Bear Creek Reservoir will provide recreation capacity for 250,000 visitors annually of which 101,200 are credited to the directly related recreation uses. The lands acquired for recreation will provide for public ownership of the desirable shore area and provide space for development of three recreation sites. Necessary facilities for one-day outings as well as camping would be provided. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impoundment for lake fisheries as a coordinated element for the full realization of the recreation potential of the project. Hunting would be permitted during appropriate season and in accordance with reasonable regulation to assure public safety.

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170. Beltzville Project.

a. Description. The Beltzville Project is proposed for multiple-purpose development to provide supplies of water, flood control and recreation. The Beltzville dam site is located in the Pohopoco Valley about 0.3 mile upstream from the confluence of Sawmill Run and Pohopoco Creek and approximately 4 miles east of Lehighton, Pennsylvania. (See plate 15). The net contributing drainage area above this site is 75 square miles, excluding 22 square miles that contribute to the Wild Creek Reservoir, which supplies water to the City of Bethlehem, Pennsylvania. The earth and rock fill dam will extend for a length of 4,500 feet and rise 160 feet above the creek bed. Diversion flows and low level reservoir releases will pass through a conduit constructed on rock along the right side of the valley. A spillway will be constructed around the north end of the dam with the channel in bedrock. Flow from the spillway will discharge into Sawmill Run and thence back into Pohopoco Creek. Storage allocations for the Beltzville Project, as indicated by detailed planning studies, are 1,200 acre-feet of inactive long-term storage to elevation 525; 40,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 615; and 27,000 acre-feet of short-term storage for flood control to elevation 641. The reservoir up to spillway crest elevation 641 will extend approximately 7 miles upstream. Relocation or improvement of about 4.7 miles of county road will be required. No railroads or communities are in the reservoir area and there are no workable mineral deposits. However, sections of two oil pipelines will require relocation, and power lines and water lines will require reinforcing where they cross the reservoir. During the planning studies for this project the Palmer Water Company submitted a report setting forth its needs for a continuous and permanent supply of water from Pohopoco Creek downstream from the dam site. The Company supplies municipal and industrial water in the vicinity of Palmerton, Pennsylvania and in accordance with Act 365 of the Commonwealth of Pennsylvania the Company has filed with the Commonwealth a statement showing its water withdrawals to be about 13 mgd with future needs estimated at 20 mgd. Arrangements will be made during construction and thereafter to release water as required to fully satisfy downstream water rights. A total of 2,413 acres of land will be acquired for the complete development. In addition to the 1,030 acres required for construction of the project, 723 acres would be required for directly related recreation and 660 acres for indirectly related recreation. The total estimated project cost, excluding $1,190,000 for indirectly related recreation, is $13,800,000 which includes $1,290,000 of specific costs for directly related recreation. The directly and indirectly related recreation costs include the following:

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Item	Estimated Specific Recreation Costs Directly Related	Indirectly Related
Land	$411,000	$ 34,000
Facilities	876,000	1,153,000
Total	1,287,000	1,187,000

b. Functions.

(1) Supplies of water. Use of 40,000 acre-feet of active long-term storage at the Beltzville Project would provide a net yield of 80 cubic feet per second. This flow augmentation would contribute to the satisfaction of the needs of the Palmerton, Bethlehem and Trenton-Philadelphia areas during the 50-year period under consideration.

(2) Reduction of flood damage. The flood control storage at the Beltzville Project will contribute to flood stage reductions at the principal damage centers on Lehigh River below the confluence of that river with Pohopoco Creek. These damage centers are located at Bowmanstown, Walnutport, Northampton, Hokendauqua, Catasauqua, Allentown, Bethlehem, Freemansburg and Easton, Pennsylvania. Combined operation of the three new major flood control projects in the Lehigh River Basin included in the water control plan will result in a stage reduction of two feet at Bethlehem, Pennsylvania, for a flood similar to that experienced in 1955. This reduction is in addition to the effects of the Bear Creek Project.

(3) Recreation. The Beltzville reservoir will provide a recreation capacity for 500,000 visitors annually, of which 110,000 are credited to directly related recreation uses. The lands acquired specifically for recreation development will provide for public ownership of the shore area and space for development of five recreation sites. Facilities would be provided for one-day outings as well as camping. Hunting would be permitted in appropriate season and under reasonable regulation to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of lake fisheries as a coordinated element for full realization of the recreation potential of the project.

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171. Aquashicola Project.

a. Description The Aquashicola Project is proposed for multiple-purpose development to provide supplies of water, flood control and recreation. The Aquashicola dam site is located on Aquashicola Creek about 4-1/2 miles upstream from its confluence with the Lehigh River and about 3 miles east of Palmerton, Pennsylvania. (See plate 16). The site is about one mile downstream from the confluence of Buckwha Creek with Aquashicola Creek. The drainage area above this site is 66 square miles. The compacted earth fill dam would stretch approximately 2,000 feet across the valley with a concrete section and spillway 160 feet long founded on rock at the south end. The dam would rise 110 feet above a cutoff with maximum depth at 30 feet to control passage of water through the foundation. The top of dam would be 20 feet above the spillway crest. Outlet sluices through the spillway would provide for water releases. Diversion during construction would be made through low blocks in the spillway section. Storage allocations for the Aquashicola Project as indicated by detailed planning studies, are 1,000 acre-feet of inactive long-term storage to elevation 435; 24,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 483; and 20,000 acre-feet of short-term storage for flood control to elevation 503. The reservoir at spillway crest elevation 503 would be 90 feet deep at the dam and extend five miles up Aquashicola Creek from the dam and six miles up Buckwha Creek. Relocation of an oil pipeline, a waterline, roads, 7.3 miles of the Chestnut Ridge Railroad, quarry equipment, rural residences and the community of Little Gap, Pennsylvania, would be required. The only commercial mineral deposit near the reservoir area is a sandstone quarry southeast of Little Gap, Pennsylvania. The reservoir does not inundate this quarry but some relocation of crushing and processing equipment would be required. Sand from this quarry is shipped by rail cars at the approximate rate of five cars per day. This constitutes the principal traffic on the Chestnut Ridge Railroad in the vicinity of the reservoir. A total of 2,150 acres of land will be acquired for the complete development. In addition to the 900 acres required for construction of the project, 770 acres would be required for directly related recreation and 480 acres for indirectly related recreation. The total estimated project cost, excluding $488,000 for indirectly related recreation, is $19,000,000, which includes $878,000 of specific costs for directly related recreation. The directly and indirectly related recreation costs include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$549,000	$103,000
Facilities	329,000	385,000
Total	878,000	488,000

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b. Functions.

(1) Supplies of water. Use of 24,000 acre-feet of active long-term storage at the Aquashicola Project would provide a net yield of 63 cubic feet per second. This flow augumentation would contribute to the satisfaction of the needs of the Allentown-Bethlehem area and the Trenton-Philadelphia area during the 50-year period under consideration.

(2) Reduction of flood damage. The short-term storage provided at the Aquashicola Project will contribute to flood stage reductions at Palmerton, just downstream from the dam, and at principal damage centers on Lehigh River below the Lehigh Gap. These damage centers include Walnutport, Northampton, Hokendauqua, Catasauqua, Allentown, Bethlehem, Freemansburg, and Easton, Pennsylvania. Combined operation of the three new major flood control projects in the Lehigh River Basin included in the water control plan will result in a stage reduction of two feet at Bethlehem, Pennsylvania for a flood similar to that experienced in 1955. This reduction is in addition to the effects of the Bear Creek Project.

(3) Recreation. The Aquashicola reservoir will provide a recreation capacity to accommodate 156,300 visitors annually, of which 100,500 are credited to directly related recre ation uses. The lands to be acquired specifically for recreation development provide for public ownership of the principal part of the shoreline and space for the development of four recreation sites. Facilities would be provided for one-day outings and camping. Hunting would be permitted in appropriate season under reasonable regulation to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impounded water for lake fisheries as a coordinated element for the full realization of the recreation potential of the project.

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172. Trexler Project.

a. Description. The Trexler Project is proposed for multiple-purpose development to provide supplies of water, flood control and recreation. The Trexler dam site is located on Jordan Creek in the Trexler Pennsylvania State Game Preserve about 1/2 mile downstream from the mouth of Mill Creek and about 8 miles northwest of Allentown, Pa. (See plate 17.) The drainage area above this site is 51 square miles. The proposed dam would be a concrete gravity type structure 800 feet long, and rise 120 feet above the creek bed. Flood waters would pass over a spillway section of the dam 200 feet long with a crest about 104 feet above the creek. Conduits through the dam with regulating gates will permit low level releases. Diversion during construction would be made over concrete monoliths left low, temporarily, for that purpose. Storage allocations for the Trexler Project, as indicated by detailed planning studies, are 800 acre-feet of inactive long-term storage to elevation 416; 24,200 acre-feet of active long-term storage for supplies of water and recreation to elevation 479; and 14,000 acre-feet of short-term storage for flood control to elevation 492. The reservoir at elevation 492 would extend about 8 miles up Jordan Creek with bays or prongs extending about 3 miles up Lyon Creek and 2 miles up Mill Creek. Fills and bridges will be required to carry U. S. Route 309 across the reservoir. Relocation of other roads and the communities of Lyon Valley and Weidasville will also be necessary. A total of 3,587 acres of land will be acquired for the complete development. In addition to the 960 acres required for construction of the project, 1,776 acres would be required for directly related recreation and 851 acres for indirectly related recreation. The total estimated project cost, excluding $1,140,000 for indirectly related recreation, is $10,100,000, which includes $1,500,000 of specific costs for directly related recreation. The directly and indirectly related recreation costs include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$1,010,000	$141,000
Facilities	436,000	1,000,000
Total	1,496,000	1,141,000

b. Functions

(1) Supplies of water. Use of 24,200 acre-feet of active long-term storage at the Trexler Project would provide a net yield of 55 cubic feet per second. This flow augmentation would contribute to the satisfaction of the needs of the Bethlehem area and the Trenton-Philadelphia area during the 50-year period under consideration.

(2) Reduction of Flood Damage. The short-term storage at the Trexler Project will contribute to flood stage reductions at the principal damage centers of Allentown, Bethlehem

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and Easton, Pennsylvania. Combined operations of the three new major flood control projects included in the Lehigh River Basin in the water control plan will result in a stage reduction of two feet at Bethlehem, Pennsylvania, for a flood similar to that experienced in 1955. This reduction is in addition to the effects of the Bear Creek Project.

(3) Recreation. The Trexler reservoir will provide a recreation capacity to accommodate a total of 312,500 visitors annually of which 177,200 are credited to directly related recreation uses. The lands to be acquired specifically for recreation development would provide for public ownership of the shore area and space for the development of six recreation sites. Facilities would be provided for one-day outings as well as camping. Necessary roads, trails, sanitary and administrative facilities, and potable water also would be provided. Hunting will be permitted in appropriate season and under reasonable regulations to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impounded water for lake fisheries as a coordinated element for the full realization of the recreational potential of the project.

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173. Maiden Creek Project.

a. Description. The Maiden Creek Project is proposed for multiple-purpose development to provide supplies of water, flood control and recreation. The Maiden Creek dam site is located on Maiden Creek about 1/3 mile upstream from the mouth of Moselem Creek and about 12 miles north of Reading, Pa. (See plate 18.) The drainage area above this site is 161 square miles. The dam, 2,600 feet long and rising 110 feet above the bed of Maiden Creek, would be of earth and rock fill construction. A conduit founded on rock along the left side of the valley would be designed to carry diversions during construction and low level reservoir releases. The spillway, 750 feet wide, would be cut through a rock ridge about 400 feet east of the dam. Storage allocations for the Maiden Creek Project, as indicated by detailed planning studies, are 2,000 acre-feet of inactive long-term storage to elevation 323; 74,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 381; and 38,000 acre-feet of short-term storage for flood control to elevation 394 The reservoir would extend about 10 miles up Maiden Creek. Relocation of a railroad line, numerous roads, and the communities of Lenhartsville, Virginville and a part of Moselem would be required There are no commercially developed mineral resources in the reservoir area. A total of 8,450 acres of land will be acquired for the complete development. In addition to the 2,850 acres required for the construction of the project, 2,255 acres would be required for directly related recreation and 3,345 for indirectly related recreation. The total estimated project cost, excluding $3,250,000 for indirectly related recreation, is $27,600,000, which includes $2,440,000 of specific costs for directly related recreation. The directly and indirectly related recreation costs include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$1,280,000	$1,420,000
Facilities	1,160,000	1,830,000
Total	2,440,000	3,250,000

b. Functions.

(1) Supplies of water. Use of 74,000 acre-feet of active long-term storage at Maiden Creek Project would provide a net yield of 134 cubic feet per second. This flow augmentation would contribute to the satisfaction of the needs of the Pottstown-Reading area as well as to the Philadelphia area during the 50 year period under consideration.

(2) Reduction of flood damage. The flood control storage at Maiden Creek Project will contribute to flood stage reductions at the principal damage centers on the Schuylkill River from Reading, Pennsylvania to Philadelphia, Pennsylvania. These damage centers are Reading, Birdsboro, Pottstown, Norristown,

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Conshohocken, Manayunk and Philadelphia, Pennsylvania. The floodway at these centers is occupied mostly by commercial and industrial interests which suffered about 70% of the total flood damages in these areas in August 1955. Combined operation of storage allocated to flood control at the Maiden Creek and Blue Marsh Projects in the Schuylkill River Basin would result in a flood stage reduction of about 4-1/2 feet at Reading, Pennsylvania, and of about three feet at Pottstown, Pennsylvania for a flood similar to that experienced in 1955.

(3) Recreation. The Maiden Creek reservoir would provide a recreation capacity to accommodate a total of 625,000 visitors annually of which 267,400 are credited to the directly related recreation uses. The lands to be acquired specifically for recreation development would provide for public ownership of the shore area and space for development of five recreation sites. Facilities will be provided for one-day outings and camping. Necessary access, and sanitary and administrative facilities also will be provided. Hunting will be permitted in appropriate season and under reasonable regulation to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impounded water for lake fisheries as a coordinated element for the full realization of the recreation potential of the project.

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174. Blue Marsh Project.

a. Description. The Blue Marsh Project is proposed for multiple-purpose development to provide supplies of water, flood control and recreation. The Blue Marsh dam site is located on the Tulpehocken Creek, 1-1/2 miles upstream from the mouth of Plum Creek and about 6 miles northwest of Reading, Pa. (See plate 19) The drainage area above this site is 175 square miles. The dam would consist of a rock and earth fill embankment 1,100 feet long and 90 feet high. A conduit on rock along the right abutment would provide for low level reservoir releases and diversion during construction. The spillway would be located about 1,000 feet south of the dam where a 900-foot wide flat crested channel cut into the shale would conduct excess water from the reservoir to Tulpehocken Creek. Final storage allocations for the Blue Marsh Project, as indicated by detailed planning studies, are 1,500 acre-feet of inactive long-term storage to elevation 249; 14,500 acre-feet of active long-term storage for supplies of water and recreation to elevation 279; and 33,000 acre-feet of short-term storage for flood control to elevation 303. The reservoir would extend upstream from the dam about 10 miles on Tulpehocken and Northkill Creeks. The reservoir would require relocation of pipelines, roads, the community of Blue Marsh and a few buildings in the Bernville area. One commercially valuable mineral deposit is located in the reservoir, a shale pit about 1 mile north of Blue Marsh. A total of about 5,296 acres of land will be acquired for the complete development. In addition to the 1,520 acres required for construction of the project, 1,093 acres will be required for directly related recreation and 2,683 acres for indirectly related recreation. The total estimated project cost, excluding $3,280,000 for indirectly related recreation, is $12,500,000, which includes $1,500,000 of specific costs for directly related recreation. The directly and indirectly related recreation costs include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$ 664,000	$2,040,000
Facilities	832,000	1,240,000
Total	1,496,000	3,280,000

b. Functions.

(1) Supplies of water. Use of 14,500 acre-feet of active long-term storage at the Blue Marsh Project will provide a net yield of 65 cubic feet per second. This flow augmentation will contribute to the satisfaction of the needs of the Pottstown-Reading area as well as to the Philadelphia area during the 50-year period under consideration.

(2) Reduction of flood damage. The flood control storage at the Blue Marsh Project will contribute to flood stage reductions at the principal damage centers on the Schuylkill River from

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Reading, Pennsylvania to Philadelphia, Pennsylvania. These damage centers are Reading, Birdsboro, Pottstown, Norristown, Conshohocken, Manayunk and Philadelphia, Pennsylvania. Combined operation of storage allocated to flood control at the Blue Marsh and Maiden Creek Projects in the Schuylkill River Basin would result in a flood stage reduction of about 4-1/2 feet at Reading, Pennsylvania, and of about three feet at Pottstown, Pennsylvania for a flood similar to that experienced in 1955.

(3) Recreation. The Blue Marsh reservoir would provide a recreation capacity to accommodate a total of 437,500 visitors annually, of which 137,000 are credited to the directly related recreation uses. The lands to be acquired specifically for recreation development would provide public ownership of the shoreline and space for the development of six recreation sites. Facilities will be provided for one-day outings as well as camping. Necessary access, sanitary and administrative facilities also will be provided. Hunting would be permitted in appropriate seasons and under reasonable regulations to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impounded water for lake fisheries as a coordinated element for the full realization of the recreational potential of the project.

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175. Newark Project.

a. Description. The Newark Project is proposed for multiple-purpose development to provide supplies of water and recreation. The dam site is located on White Clay Creek about 1-1/2 miles north of Newark, Delaware. (See plate 20.) The drainage area above this site is 67 square miles. A concrete gravity type dam 1,200 feet long, including a spillway section 400 feet long, is proposed for this site. The non-overflow section of the dam would be 97 feet above the creek bed and the spillway crest 81 feet above that datum. Gated sluices through the dam 7 feet above the creek bed and bypass pipes would be provided for low level reservoir releases. Stream diversion during construction would be over concrete monoliths left low, temporarily, for that purpose. Storage allocations for the Newark Project are 1,000 acre-feet of inactive long-term storage to elevation 98 and 30,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 156. The reservoir would extend about six miles up White Clay Creek into Pennsylvania. Relocation of 2.7 miles of county road including a bridge across the reservoir, a stream gaging station, a pumping plant and a sewer line would be required. No railroads, communities, or commercially developed mineral deposits are located in the reservoir area. A total of 6,490 acres of land would be acquired for the complete development. In addition to the 1,090 acres required for the construction of the project, 4,000 acres would be required for directly related recreation and 1,400 acres for indirectly related recreation. The total estimated project cost, excluding $3,550,000 for indirectly related recreation, is $15,300,000, which includes specific costs for directly related recreation of $5,140,000. The directly and indirectly related recreation costs include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$3,250,000	$1,400,000
Facilities	1,890,000	2,150,000
Total	5,140,000	3,550,000

b. Functions.

(1) Supplies of Water. Use of 30,000 acre-feet of active long-term storage at Newark Project would provide a net yield of 43 cubic feet per second. This flow augmention would contribute to partial satisfaction of the needs of the Wilmington area during the 50-year period under consideration.

(2) Recreation. The Newark Project including the recreation element defined as the Mason-Dixon Interstate Park Area would provide recreation capacity for 937,500 visitors annually, of which 554,000 are credited to directly related recreation. The lands to be acquired specifically for recreation development would provide public ownership of the shore area and space for the development of

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six major recreation sites. Facilities also would be provided for one-day outings and camping. Required roads, trails, sanitary and administrative facilities and potable water are included in the plan. Hunting would be permitted in appropriate season and under reasonable regulation to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impounded water for lake fisheries as a coordinated element for full realization of the recreation potential of the project.

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176. Christiana Project.

a. Description. The Christiana Project is a multiple-purpose development to provide supplies of water and recreation. The dam site is located on Christina River about 1-1/2 miles southwest of Christiana, Delaware, and 10 miles southwest of Wilmington, Delaware. (See plate 21.) The drainage area above the site is 41 square miles. The spillway would be a concrete lined chute through the hill which constitutes the left abutment of the dam. This spillway would have a broad crest at elevation 49, about 46 feet above the river bed. Diversion flows would be carried through a concrete conduit constructed on natural ground at the base of the left abutment. Subsequent to use of this conduit for diversion, two concrete pipes would be installed in the conduit to carry low level reservoir release. Storage allocations for the Christiana Project are 1,000 acre-feet of inactive long-term storage to elevation 23, and 36,000 acre feet of active long-term storage for supplies of water and recreation to elevation 49. The reservoir will extend about 6.7 miles up the river, about 3.8 miles up Muddy Run and inundate existing Silver Lake. No main roads cross the reservoir but the State of Delaware is planning a new highway across the reservoir at a grade that would necessitate its relocation as a feature of the development of this project. This possible cost was not included in the estimates of project costs. The raising of two bridges on U. S. Route 40, raising of one mile of the Pennsylvania Railroad single track line from Porter to Newark, Delaware, and construction of two new bridges on State Route 896 would be required. There are no communities in the reservoir area and only one commercially valuable mineral deposit is located in the reservoir area, which is a gravel pit about 1/2 mile upstream from the dam site. A total of about 8,080 acres of lands would be required for the complete development. In addition to the 3,050 acres required for construction of the project, 3,057 acres would be required for directly related recreation and 1,973 acres for indirectly related recreation. The total estimated project cost, excluding $5,420,000 for indirectly related recreation, is $18,000,000 which includes $7,560,000 of specific costs for directly related recreation. The directly and indirectly related recreation costs include the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$4,770,000	$1,820,000
Facilities	2,790,000	3,600,000
Total	7,560,000	5,420,000

b. Functions.

(1) Supplies of water. Use of 36,000 acre-feet of active long-term storage at Christiana Project would provide a net yield of 34 cubic feet per second. This flow augmentation would contribute to partial satisfaction of the needs of the Wilmington area during the 50-year period under consideration.

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(2) Recreation. The Christiana Project would provide a recreation capacity to accommodate about 1,875,000 visitors annually of which 1,093,000 are credited to directly related recreation. The lands to be acquired specifically for recreation development would provide for public ownership of the shore area and provide for the development of three major recreation sites. Facilities are to be provided for one-day outings and camping. Required roads, trails, sanitary and administrative facilities, and drinking water would be provided. Hunting would be permitted in appropriate season under reasonable regulation to assure public safety. Operation of the project would consider the downstream flow requirements for stream fisheries and the management of the impounded waters for lake fisheries as a coordinated element for full realization of the recreation potential of the project.

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177. DESCRIPTIONS OF MAJOR CONTROL PROJECTS PROPOSED FOR TWO-STAGE DEVELOPMENT. Eight major control projects are proposed for development in two stages with the initial stage for recreation in the immediate future and the second stage for water supply and other purposes as needed after year 2010. The projects included in this category and the order of the individual project descriptions are as follows:

Paulina	Tohickon
Pequest	Newtown
Hackettstown	French Creek
New Hampton	Evansburg

178. Paulina Project.

a. Description. The Paulina Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial stage of development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired, for the initial stage of development, as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Paulins Kill about 11.25 miles above the mouth and 1.5 miles east of Blairstown, New Jersey. (See plate 22.) The drainage area upstream from the dam site is 122 square miles. Suggested storage allocations for ultimate development are 4,000 acre-feet of inactive long-term storage to elevation 403 and 51,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 465. The reservoir at elevation 465 would extend 14 miles upstream and provide a reservoir area of 1,650 acres. Total lands, including the eventual reservoir area, desirable for the initial stage of development comprise 5,717 acres at an estimated cost of about 8.8 million dollars. The estimated cost of the initial stage of development is 12.2 million dollars, including 5.3 million dollars to acquire the reservoir area to assure its preservation for future use and 6.9 million dollars of specific recreation costs. Included in the latter are 3.5 million dollars for recreation lands and 3.4 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 23.1 million dollars of which 10.9 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 51,000 acre-feet of active long-term storage in the Paulina Project would provide a net yield of 90 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010.

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(2) Recreation. The Paulina Project would provide a recreation capacity to accommodate 600,000 visitors annually during the initial stage of development and 1,000,000 visitors annually when fully developed. The topography surrounding this site is steeply rolling and irregular as the result of glacial action. The overall character of the site makes it readily adaptable for nonurban recreation uses

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179. Pequest Project.

a. Description. The Pequest Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial stage of development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Pequest River about 7 miles above the mouth and 2.5 miles northeast of Oxford, New Jersey. (See plate 23.) The drainage area above the dam site is 100 square miles. Suggested storage allocations for ultimate development are 3,000 acre-feet of inactive long-term storage to elevation 455 and 38,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 507. The reservoir at elevation 507 would extend about 4.5 miles upstream and provide a reservoir area of 1,260 acres. Total lands, including the eventual reservoir area, desirable for the initial stage of development comprise 4,520 acres at an estimated cost of about 3.2 million dollars. The estimated cost of the initial stage of development is 5.0 million dollars, including an estimated 2.0 million dollars to acquire the reservoir area to assure its preservation for future use and 3.0 million dollars of specific recreation costs. Included in the latter are 1.2 million dollars for recreation lands and 1.8 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 16.3 million dollars, of which 11.3 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 38,000 acre-feet of active long-term storage in the Pequest Project would provide a net yield of 75 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010

(2) Recreation. The Pequest Project would provide a recreation capacity to accommodate 312,000 visitors annually during the initial stage of development and 520,000 visitors annually when fully developed. The general setting of this proposed reservoir site is excellent for nonurban recreation purposes. The southeast shores are well situated for intensive day-use purposes.

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180. Hackettstown Project.

a. Description. The Hackettstown Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Musconetcong River about three miles upstream from Hackettstown, New Jersey. (See plate 24.) The drainage area upstream from the dam site is 70 square miles. Suggested storage allocations for ultimate development are 1,000 acre-feet of inactive long-term storage to elevation 630 and 22,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 665. The reservoir at elevation 665 would extend about five miles upstream and provide a reservoir area of 1,200 acres. Total lands, including the eventual reservoir area, desirable for the initial stage of development would comprise 10,362 acres at an estimated cost of 8.6 million dollars. The estimated cost of the initial stage of development is 17.1 million dollars, including an estimated 3.5 million dollars to acquire the reservoir area to assure its preservation for future use and 13.6 million dollars of specific recreation costs. Included in the latter are 5.1 million dollars for recreation lands and 8.5 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 20.0 million dollars of which 10.9 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 22,000 acre-feet of active long-term storage in the Hackettstown Project would provide a net yield of 53 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010.

(2) Recreation. The Hackettstown Project would provide a recreation capacity to accommodate 1,500,000 visitors annually during the initial stage of development and 2,500,000 visitors annually when fully developed. The total recreation resources available would provide outstanding nonurban recreation opportunities. The character of the area is such that facilities for every conceivable type of nonurban recreation could be included in the development plan.

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181. New Hampton Project

a. Description. The New Hampton Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The development to satisfy existing initial recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Musconetcong River 2.5 miles south of Washington, New Jersey. (See plate 25.) The gross drainage area upstream from the dam site is 123 square miles, including 70 square miles contributing to the proposed Hackettstown project. Suggested storage allocations for ultimate development are 2,000 acre-feet of inactive long-term storage to elevation 375 and 42,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 426. The reservoir at elevation 426 would extend upstream from the dam about seven miles and provide a reservoir area of 1,850 acres. Total lands, including the eventual reservoir area, desirable for the initial stage of development would comprise 5,518 acres at an estimated cost of about 11.2 million dollars. The estimated cost of the initial stage of development is 16.3 million dollars including an estimated 7.3 million dollars to acquire the reservoir area to assure its preservation for future use and 9.0 million dollars of specific recreation costs. Included in the latter are 3.9 million dollars for recreation lands and 5.1 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 29.6 million dollars, of which 13.3 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 42,000 acre-feet of active long-term storage in the New Hampton Project would provide a net yield of 82 cubic feet per second. (Net yield would be increased to 95 cubic feet per second with the proposed Hackettstown and New Hampton Projects operating in series.) This flow augmentation would contribute to the satisfaction of the water needs after the year 2010.

(2) Recreation. The New Hampton Project would provide a recreation capacity to accommodate 900,000 visitors annually during the initial stage of development and 1,500,000 visitors annually when fully developed. The northwest shore of the reservoir is ideally situated for the placement of day-use facilities to accommodate large visitor loads. The southeast shore rises steeply and is well forested, thus providing an interesting backdrop for day-use areas on the opposite shore.

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132. Tohickon Project

a. Description. The Tohickon Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Tohickon Creek about one mile southwest of Ottsville, Pennsylvania. (See plate 26.) The drainage area above the dam site is 75 square miles. Suggested storage allocations for ultimate development are 1,500 acre-feet of inactive long-term storage to elevation 335 and 30,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 388. The reservoir at elevation 388 would extend about 6-1/2 miles upstream and provide a reservoir area of 1,250 acres. Total lands, including the eventual reservoir area, indicated as desirable for the initial stage of development at this project would include 7,475 acres at an estimated cost of 7.9 million dollars. The estimated cost of the initial stage of development is 12.2 million dollars including an estimated one million dollars to acquire the reservoir area to assure its preservation for future use and 11.2 million dollars for specific recreation costs. Included in the latter are 6.9 million dollars for recreation lands and 4.3 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 21.8 million dollars, of which 9.6 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 30,000 acre-feet of active long-term storage at Tohickon Project would provide a net yield of 49 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010.

(2) Recreation. The Tohickon Project would provide a recreation capacity to accommodate about 750,000 annual visitors during the initial stage of development and 1,250,000 visitors annually when fully developed. The recreation area would be primarily developed for day-use activities.

c. Preservation of site. Late in September, 1960, the Commonwealth of Pennsylvania announced its plan to purchase land in the area of the proposed Tohickon Project for a state park. The Commonwealth's intent is to develop the area initially for recreation, and thus preserve the site for future additional development for water supply. The General Assembly of the Commonwealth has made funds in the amount of $1,000,000 available for the land acquisition program for this project.

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183. Newtown Project

a. Description. The Newtown Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Neshaminy Creek about 19 miles upstream from its confluence with Delaware River and three miles west of Newtown, Pennsylvania. (See plate 27.) The drainage area upstream from the dam site is 150 square miles. Suggested storage allocations for ultimate development are 2,000 acre-feet of inactive long-term storage to elevation 114 and 60,000 acre-feet of active long-term storage for supplies of water and recreation to elevation 176. The reservoir at elevation 176 would extend about nine miles upstream from the dam and provide a reservoir area of 2,120 acres. Total lands, including the eventual reservoir area, desirable for the initial stage of development would comprise 7,200 acres at an estimated cost of about 21.4 million dollars. The estimated cost of the initial stage of development is 27.8 million dollars including an estimated 9.3 million dollars to acquire the reservoir area to assure its preservation for future use and 18.5 million dollars of specific recreation costs. Included in the latter are 12.1 million dollars for recreation lands and 6.4 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 46.4 million dollars, of which 18.6 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 60,000 acre-feet of active long-term storage in the Newtown Project would provide a net yield of 100 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010. This reservoir project is ideally located geographically for purposes of equalizing daily and weekly peaks in the municipal water demands for the Philadelphia metropolitan area and this potential further supports the need for future development of the Newtown Project for water supply purposes.

(2) Recreation. The Newtown Project would provide a recreation capacity to accommodate 1,125,000 visitors annually during the initial stage of development and 1,875,000 visitors annually when fully developed. Of considerable importance at this site is the wide expanse of open land readily adaptable for intensive nonurban recreation purposes. The terrain is ideally suited for the development of facilities to accommodate large visitor

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loads. "The site would be developed primarily for intensive day-outing purposes with facilities for swimming, boating, fishing, picnicking, field sports and related activities.

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184. French Creek Project

a. Description. The French Creek Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after year 2010 when full development of the site is indicated. The project site is located about 9.5 miles above the mouth of French Creek and 8 miles west of Phoenixville, Pennsylvania. (See plate 28.) The drainage area upstream from the dam site is 47 square miles. Suggested storage allocations for ultimate development are 1,300 acre-feet of inactive long-term storage to elevation 240 and 25,700 acre-feet of active long-term storage for supplies of water and recreation to elevation 289. The reservoir at elevation 289 would extend 8 miles upstream from the dam and provide a reservoir area of 1,250 acres. Total lands, including the eventual reservoir area desirable for the initial stage of development would include 4,270 acres at an estimated cost of 6.9 million dollars. The estimated cost of the initial stage of development is 12.1 million dollars including an estimated 3 million dollars to acquire the reservoir area to assure its preservation for future use and 9.1 million dollars of specific recreation costs. Included in the latter are 3.9 million dollars for recreation lands and 5.2 million dollars for recreation facilities. The estimated cost of the two-stage development is 18.7 million dollars, of which 6.6 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 25,700 acre-feet of active long-term storage in the French Creek Project would provide a net yield of 33 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010.

(2) Recreation. The French Creek Project would provide a recreation capacity to accommodate 900,000 visitors annually during the initial stage of development and 1,500,000 visitors annually when fully developed. Approximately 5,000,000 people reside within 50 miles of the site. The general setting, the shoreline topography, size of the proposed impoundment, accessibility by existing primary roads, and its proximity to large urban population combine to make this one of the most choice nonurban recreation sites in the lower Delaware River Basin. The recreation area would be primarily developed for day-use activities.

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5. Evansburg Project

a. Description. The Evansburg Project, fully developed in two stages, would be a multiple-purpose project to provide supplies of water and recreation. The initial development to satisfy existing recreation needs is economically feasible and is proposed for the immediate future. It is also proposed that, contingent upon the wishes of local interests, land be acquired for the initial stage of development as it becomes available. Such an arrangement will assure preservation of the potential reservoir which is considered essential to water resources development in the basin after the year 2010 when full development of the site is indicated. The project site is located on Skippack Creek about a mile above its confluence with Perkiomen Creek and about two miles southeast of Collegeville, Pennsylvania. (See plate 29.) The drainage area above the dam site is 54 square miles. Suggested storage allocations for ultimate development are 1,500 acre-feet of inactive long-term storage to elevation 125 and 23,500 acre-feet of active long-term storage for supplies of water and recreation to elevation 166. The reservoir at elevation 166 would extend about eight miles upstream from the dam and provide a reservoir area of 1,120 acres. The total lands, including the eventual reservoir area, indicated as desirable for the initial stage of development at this project include 4,654 acres at an estimated cost of about 11.0 million dollars. The estimated cost of the initial stage of development is 16.3 million dollars which includes an estimated 4.3 million dollars to acquire the reservoir area to assure its preservation for future use and 12.0 million dollars of specific recreation costs. Included in the latter are 6.7 million dollars for recreation lands and 5.3 million dollars for recreation facilities. The estimated cost of the complete two-stage development is 23.8 million dollars, of which 7.5 million dollars is the estimated cost of the dam and appurtenant works, relocations and reservoir clearing.

b. Functions.

(1) Supplies of water. When fully developed, use of 23,500 acre-feet of active long-term storage in the Evansburg Project would provide a net yield of 36 cubic feet per second. This flow augmentation would contribute to the satisfaction of the water needs after the year 2010.

(2) Recreation. Evansburg Project would provide a recreation capacity to accommodate 936,000 visitors annually during the initial stage of development and 1,560,000 visitors annually when fully developed. The topography of the land surrounding the reservoir varies from steep near the dam site, to rolling with an exceptional amount of usable area. This area would be particularly adaptable for such activities as swimming, boating, fishing, picnicking, hiking, field sports, nature study, and group camping.

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186. DESCRIPTION OF SMALL CONTROL PROJECTS. Thirty-nine small control projects are proposed as elements of the overall plan for the control and utilization of the water resources of the basin. Thirty-six can be accomplished under continuing authorizations and must be studied and reported on in detail when undertaken as features of current programs authorized either by Public Law 566 or Public Law 685. To avoid unnecessary duplication of effort, these thirty-six small control projects are not covered in survey scope detail in this report. The remaining three small control projects exceed cost limitations imposed by Public Law 685, but they are eligible for accomplishment under Public Law 566 subject to approval by the Senate Agriculture and Forestry Committee and the House Agriculture Committee. The three small control projects in this category and the order of individual project descriptions are Parkside, Swiftwater and Jim Thorpe.

187. Parkside Project.

a. Description. The Parkside Project is a single-purpose flood control project with provision for incidental recreation use of the sediment pool. The Parkside dam site is located on Cranberry Creek, one mile southeast of Parkside, Pennsylvania, and 0.5 mile upstream from the confluence of this creek with Paradise Creek. (See plate 30.) The drainage area above the dam site is 6.8 square miles. Cranberry Creek occupies a narrow wooded valley, with the Delaware, Lackawanna and Western Railroad running parallel to it high on the east side. The proposed rolled earth fill dam would have a 23-foot top width at elevation 835, 80 feet above the stream bed. Low level water releases, controlled by a slide gate, would pass through an outlet pipe having a riser up to elevation 768. The concrete-lined spillway around the left end of the dam would be 70 feet wide with an "overflow" type crest at elevation 822. The concrete lined spillway chute would be approximately 650 feet long from the crest to the point where it empties into the creek. Storage allocations for the Parkside Project are 52 acre-feet of inactive storage to elevation 768 and 2,218 acre-feet of flood control storage to elevation 822. The reservoir at the elevation of the outlet riser would form a pool of seven acres surface area. At the spillway crest elevation the reservoir would extend about one mile upstream and inundate 107 acres. No relocations are required for the development of this site. The estimated cost of this project, excluding $11,000 of specific recreation costs, is $1,020,000, including $21,000 for land easements and rights-of-way.

b. Functions.

(1) Reduction of Flood Damage. Combined operation of the flood control storage at Parkside Project and at 24 other proposed upstream auxiliary projects in the Brodhead Creek Basin will contribute to flood stage reductions in the Stroudsburg and

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East Stroudsburg, Pennsylvania area. The Parkside Project specifically will contribute to reductions of stage in the major damage reach from Parkside to Stites Bridge, Pennsylvania.

(2) Recreation. The Parkside Project would provide recreation capacity to accommodate a total of 1,900 visitors annually. Land, in addition to that acquired for construction of the project, would be required to provide access to the recreation facilities. Facilities would be provided for one-day outings including facilities for picnicking, swimming, boating and fishing. The possibility of modifying the flood control project to provide for recreation development as a project purpose at the Parkside Project was investigated. For this type of project the height of the dam would be raised and additional land acquired to provide a recreation area and pool of desirable size. The estimated cost of this modification and the operation and maintenance costs for the added recreation would be charged to local interests. The studies suggest that economic feasibility of such modification is sufficiently attractive to warrant further consideration, at the time of preconstruction studies, of local recreation needs and of the desires and willingness of local interests to participate therein. A similar study was made and the same conclusions determined for the Jim Thorpe and Swiftwater Projects, which are described in subsequent paragraphs. Details of the studies made for these three small control projects are contained in appendix R.

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188. Swiftwater Project.

a. Description. The Swiftwater Project is a single-purpose flood control project with provision for incidental recreational use of the sediment pool. The Swiftwater dam site is located on Swiftwater Creek 2.5 miles east of Swiftwater, Pennsylvania, and 0.8 mile upstream from the confluence with Paradise Creek. (See plate 31.) The drainage area above the dam site is 9.7 square miles. The valley at the dam site is flat-bottomed and about 400 feet wide with idle fields and brush in the flood plain. The hills on either side are partly wooded, rising over 300 feet above the valley floor. A paved secondary highway runs parallel to the valley along the north side about 25 feet above the creek. The proposed rolled earth fill dam will have a 25-foot top width at elevation 958, 88 feet above the stream bed. Low level water releases, to be controlled by a slide gate, would pass through an outlet pipe with a riser up to elevation 888. An unlined spillway chute 70 feet wide cut through rock around the right end of the dam will be approximately 850 feet long from the crest at elevation 942 to the point at which it discharges into a small existing reservoir downstream from the dam site. Storage allocations for the Swiftwater Project are 71 acre-feet of inactive storage to elevation 888, and 3,279 acre-feet of flood control storage to elevation 942. The surface area of the reservoir at elevation 888 will be nine acres. At the spillway crest elevation the reservoir will extend about one mile upstream and inundate 107 acres. Relocation of about 2,000 feet of road parallel to the reservoir site will be required. The estimated cost of this project, excluding $4,000 of specific recreation costs, is $1,080,000, including $47,000 for land easements, rights-of-way and road relocations.

b. Functions.

(1) Reduction of flood damage. Combined operation of the flood control storage at Swiftwater Project and at 24 other proposed upstream auxiliary projects in the Brodhead Creek Basin will contribute to flood stage reductions in the Stroudsburg and East Stroudsburg area. The Swiftwater Project specifically will contribute to stage reductions in the major damage reach downstream from the site from East Swiftwater to Parkside, Pennsylvania, and the Henryville, Pennsylvania area.

(2) Recreation. The Swiftwater Project would provide recreation capacity to accommodate a total of 1,300 visitors annually. Land, in addition to that acquired for construction of the project, would be required to provide access to the recreation facilities. Facilities would be provided for one-day outings including facilities for picnicking, swimming, boating, fishing and camping.

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189. Jim Thorpe Project.

a. Description. The Jim Thorpe Project is a single-purpose flood control project with provision for incidental recreational use of the sediment pool. The Jim Thorpe dam site is located on Mauch Chunk Creek 2.9 miles upstream from its confluence with Lehigh River at Jim Thorpe, Pennsylvania. (See plate 32.) The drainage area above the dam site is 6.8 square miles. The creek lies in a narrow wooded valley between Pisgah Mountain on the north and Mauch Chunk Ridge on the south. A paved secondary highway runs along the north side of the valley about 100 feet above the stream at the dam site. The rolled earth fill dam will have a top width of 18 feet at elevation 988, 53 feet above the stream bed. Low level water releases, controlled by a slide gate, would pass through an outlet pipe with a riser up to elevation 952. A concrete-lined spillway around the left end of the dam would be 50 feet wide with the crest at elevation 976, and would be approximately 650 feet long from crest to the end of the lining. From that point, an earth channel about 500 feet long would carry flood flows back to the creek bed. Storage allocations for the Jim Thorpe Project are 80 acre-feet of inactive storage to elevation 952 and 1,520 acre-feet of flood control storage to elevation 976. The surface area of the reservoir at elevation 952 will be 14 acres. At the spillway crest elevation, the reservoir would extend about 1.5 miles upstream and inundate 130 acres. No relocations are required for development of this project. The estimated cost of the project, excluding $14,000 of specific recreation costs, is $469,000, including $24,000 for lands, easements and rights-of-way.

b. Functions.

(1) Reductions of Flood Damage. Operation of the flood control storage at Jim Thorpe Project contributes to flood stage reductions in the major damage reach located at the town of Jim Thorpe, Pennsylvania.

(2) Recreation. The Jim Thorpe Project would provide recreation capacity to accommodate a total of 3,800 visitors annually. Land, in addition to that acquired for construction of the project, would be required to provide access to the recreation facilities. Facilities would be provided for one-day outings including facilities for picnicking, swimming, boating, fishing and camping.

c. Evidence of local interest. The local people have demonstrated interest in this project, for multi-purpose use, by requesting planning assistance from the Soil Conservation Service.

189a. A summary cost table listing the first costs of the water control projects in the plan of development is shown in Table VII-5.

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TABLE VII W-5
FIRST COSTS OF WATER CONTROL PROJECTS IN PLAN OF DEVELOPMENT
(In thousands of dollars)
(All amounts rounded; totals may not agree with sums of individual items due to rounding)

Project	Costs prior to year 2010							Cost of Construction for supplies of water subsequent to year 2010 2/	Total Cost
	Construction for indicated purposes		Additional cost for				Total cost prior to year 2010		
	Cost	Purposes 1/	Indirectly related recreation	Pumped-storage hydroelectric development	Initial recreation development, two-stage project	Construction site preservation two-stage project			
MAJOR CONTROL PROJECTS									
Hawk Mountain	42,000	WS,R,P	-	-	-	-	42,000	-	42,000
Prompton (Modification)	4,970 2/	WS,R	387	-	-	-	5,350	-	5,350
Tocks Island	90,800	FC,WS,R,P	31,600	55,000	-	-	177,800	-	177,800
Beer Creek (Modification)	13,400 3/	WS,R	875	-	-	-	14,300	-	14,300
Beltzville	11,800	FC,WS,R	1,190 4/	-	-	-	13,000	-	13,000
Aquashicola	19,000	FC,WS,R	488	-	-	-	19,500	-	19,500
Trexler	10,100	FC,WS,R	1,140	-	-	-	11,200	-	11,200
Maiden Creek	27,600	FC,WS,R	3,250	-	-	-	30,800	-	30,800
Blue Marsh	12,500	FC,WS,R	3,290	-	-	-	15,800	-	15,800
Newark	15,300	WS,R	3,550	-	-	-	18,800	-	18,800
Christiana	18,000	WS,R	5,420 5/	-	-	-	23,500	-	23,500
Sub-totals	267,000	-	51,200	55,000	-	-	374,000	-	374,000
MAJOR CONTROL PROJECTS TO BE DEVELOPED IN TWO STAGES									
Paulins					6,940	5 250	12,200	10,900	23,100
Paquest					2,990	2,000	4,990	11,300	16,300
Hackettstown					13,600	3.500	17,100	10,900	28,000
New Hampton					9 070	7.250	16,300	13,300	29,600
Tohickon					11,200	1,000	12,200	9,600	21,800
Newtown					18,500	9.250	27,800	18,600	46,400
French Creek					9,050	3,000	12,100	6,600	18,700
Evansburg					12,000	4,250	16,300	7,500	23,800
Sub-totals					83,400	35,500	119,000	88,700	208,000
SMALL CONTROL PROJECTS									
Parkside	1,030 6/	FC,R	-	-	-	-	1,030	-	1,030
Swiftwater	1,080 7/	FC,R	-	-	-	-	1,080	-	1,080
Jim Thorpe	483 8/	FC,R	-	-	-	-	483	-	483
36 small control projects listed in Table VII-1	7,060	FC	-	-	-	-	7,060	-	7,060
Sub-totals	9,650	-	-	-	-	-	9,650	-	9,650
TOTAL ALL WATER CONTROL PROJECTS									
Major control projects	267,000	-	51,200	55,000	-	-	374,000	-	374,000
Major control projects to be developed in two stages	-	-	-	-	83,400	35,500	119,000	88,700	208,000
Small control projects	9,650	-	-	-	-	-	9,650	-	9,650
Total	277,000	-	51,200	55,000	83,400	35,500	502,000	88,700	591,000

Footnotes

1/ WS = Supplies of water; R = Directly related recreation; P = Conventional hydroelectric power; FC = Flood control.
2/ Includes $620,000 for rehabilitation and $4,350,000 for modification of existing project. Excludes $3,700,000 cost of existing project.
3/ Includes $4,460,000 for rehabilitation and $8,990,000 for modification of existing project. Excludes $11,100,000 cost of existing project.
4/ Includes $11,000 optional cost for recreation facilities.
5/ Includes $4,000 optional cost for recreation facilities.
6/ Includes $14,000 optional cost for recreation facilities.
7/ These costs are included to indicate the possible magnitude of the future construction program.

CHAPTER IX

IMPLEMENTATION AND USE OF PLAN

219. INTRODUCTION. The development of the program of improvements will require an orderly sequence in the construction of water control projects and the timely prosecution of the related programs. The implementation of this plan will require the active participation of Federal and non-Federal interests in the sharing of financial responsibilities and obligations, in initiating the required related resource programs, in continually reassessing and evaluating the needs and measures for water resource development, and in the coordination needed for operation of the elements of the plan.

220 SCHEDULE FOR PROJECT DEVELOPMENT. The selection of the time sequence and order of development for the major water control elements of this plan was primarily based on the projected time pattern of water resource product demands and the geographic distribution of these demands throughout the basin. It has been shown that major markets presently exist for the additional production of such goods and services as the reduction of flood damages, recreation, fish and wildlife, electric energy, and for supplies of water. These markets, as projected to the year 2010, will expand at a rate corresponding to the accelerated overall growth rate projected for the economic activity in the Delaware River Wat r Service Area. The schedule and sequence presented below for the eleven major control projects was established on a basis consistent with the present and projected future expansion of product markets. This sequence has been designed to minimize the effects of delayed production of products for which markets may presently exist. The sequence was esigned, also, to avoid the production of water resource derivatives, such as supplies of water, for which substantial markets would not become fully effective for some years in the future.

Order of Project Development	Year Required
Beltzville	1965
Blue Marsh	1969
Trexler	1972
Prompton 1/	1974
Newark	1975
Tocks Island	1975
Christiana	1980
Aquashicola	1981
Maiden Creek	1982
Bear Creek 1/	1989
Hawk Mountain	2001

1/ Modification of existing project

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ATTACHMENT A

TO

REPORT ON THE COMPREHENSIVE

SURVEY OF THE WATER RESOURCES

OF THE DELAWARE RIVER BASIN

INFORMATION CALLED FOR BY
SENATE RESOLUTION 148
85th CONGRESS, 1st SESSION
ADOPTED 28 JANUARY 1958

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ATTACHMENT A

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ATTACHMENT A

ADDITIONAL INFORMATION ON RECOMMENDED PROJECTS CALLED FOR IN SENATE RESOLUTION 148, 85TH CONGRESS, FIRST SESSION, ADOPTED 28 JANUARY 1958.

1. GENERAL INFORMATION RELATIVE TO PROJECTS RECOMMENDED IN THE PLAN OF DEVELOPMENT. The 19 major control projects in the recommended plan of development were selected from successive determinations by discrete screenings applied to 193 potential major dam sites inventoried in the basin. Further evaluations applied to these projects assured their maximized net returns. These projects are scheduled for varying degrees of development. The first group of eleven projects would be developed for multiple-purposes prior to the year 2010. The second group of eight projects would be initially developed prior to the year 2010 for meeting present single-purpose needs with development for multiple-purpose deferred to after the year 2010. The 39 small control projects in the recommended plan were selected by discrete screenings from 386 potential small dam sites inventoried in the basin. All selected 39 projects were found to be presently justified for development primarily for flood control with potential development for supplies of water and recreation as dictated by local needs. Thirty-six of these small projects would be constructed under continuing authorizations contained in Public Laws 566 and 685. Three of the small control projects exceed cost limitations imposed by Public Law 685 but are eligible for accomplishment under Public Law 566 subject to approval by the Senate Agriculture and Forestry Committee and the House Agriculture Committee.

2. Under the planning procedures followed in this survey for the formation of the plan of development, it has been demonstrated that the 58 selected water resource projects will satisfy both local and basin-wide current and future needs for the control of the water resources of the Delaware River Basin in the most efficient and economical manner. Those potential projects rejected in the process of program formation, through successive screening determinations, are not actual physical alternatives to any of the recommended projects in the plan of development. The application of the alternative evaluation standards, called for in Senate Resolution 148, to the rejected projects would provide no basis for findings substantially different from those contained in the report.

3. PROJECTS RECOMMENDED FOR AUTHORIZATION. Eight major control projects are recommended for authorization. These are Beltzville, Blue Marsh, Trexler, Prompton (modification), Tocks Island, Aquashicola, Maiden Creek and Bear Creek (modification). Additional information, called for in Senate Resolution 148, with respect to the eight projects recommended for authorization is presented in the following paragraphs.

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4. BELTZVILLE PROJECT:

a. Description. The Beltzville Project site is located on Pohopoco Creek about 0.3 miles upstream from its confluence with Sawmill Run and 4 miles east of Lehighton, Pennsylvania. The proposed project would be a multiple-purpose development to provide supplies of water, flood control and recreation. Reservoir capacity to spillway crest level would be 68,200 acre-feet; 1,200 acre-feet inactive, 40,000 acre-feet for supplies of water and recreation, and 27,000 acre-feet for flood control. It would be formed by an earth and rock fill dam 4,500 feet long rising 160 feet above the creek bed, and have a spillway around the north end of the dam and gate-controlled outlet works discharging through a conduit on rock along the right abutment. The project would contribute to: (1) the satisfaction of the future water supply needs of downstream areas especially Palmerton, Bethlehem, and the Trenton-Philadelphia area; (2) the reduction in flood damages of especial importance in the highly industrialized Allentown, Bethlehem and Easton areas and in other smaller communities; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Beltzville Project would be required by the year 1965.

b. Economic life. The economic life of the Beltzville Project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction is $13,800,000, excluding $1,190,000 for indirectly related recreation; the cost of operation and maintenance is $102,000 annually; and the cost of replacement is $5,600 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The benefit-cost ratio of the Beltzville Project for a 50-year economic life is 1.7 and for a 100-year economic life it is 2.0. Capital costs, operation and maintenance costs, replacement costs, and benefits for 50 years and 100 years are as follows:

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	Amortization Period	
	50 Years	100 Years
CONSTRUCTION EXPENDITURES	$13,800,000	$13,800,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction)	558,000	454,000
Operation and Maintenance	102,000	102.000
Major Replacements	6.000	8.000
Economic Cost of Land	16.000	15,000
Total Annual Charges	682,000	578,000
ANNUAL BENEFITS		
Reduction of flood damages	286,000	293,000
Recreation, directly related	174,000	174,000
Supplies of water	669,000	675,000
Total Annual Benefits	1,130,000	1,140,000
BENEFIT-COST RATIO	1.7	2.0

Notes: Costs and benefits for indirectly related recreation are excluded.
All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and discounting of future benefits.

e. Intangible project effects. Intangible effects of the Beltzville Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Beltzville Project to control 71% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at Beltzville Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Beltzville Project essentially would be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report the acres of land and miles of stream that would be required to replace these resources in kind. No monetary equivalent for means of recovering such damages is presented.

f. Physical feasibility and cost of providing for future needs. The Beltzville Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, and supplies of water over the economic life of the project. No provision has been made for later or phased construction at the Beltzville Project to satisfy known additional

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future requirements in the area served by the project since it was found uneconomic to do so. System analyses for the four recommended major water control projects in the Lehigh River Basin; namely Beltzville, Trexler, Aquashicola, and Bear Creek, indicated that the satisfaction of additional and future requirements would be more economically achieved through the orderly development of the Trexler, Aquashicola and Bear Creek Projects, as recommended herein, than through the extension of the scale of development or phased construction of the Beltzville Project.

g. Allocation of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method, (2) the priority of use method, and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-1. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal Agencies, affected states and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960 at various points throughout the Delaware River Basin and service area; Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report, local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $6,280,000 for construction expenditures and $74,000 annually for operation, maintenance and replacement costs during the period of deferred use of future water supplies and $59,000 annually after use of the future water supplies is initiated.

i. Repayment schedules for reimbursable costs. The reimbursable cost for the Beltzville Project includes a construction

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TABLE AA-1

ALLOCATIONS OF COST FOR BELTZVILLE PROJECT 1/

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period - 50 Years				Amortization Period - 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$ 286,000	$ 174,000	$ 669,000	$1,130,000	$ 294,000	$ 174,000	$ 675,000	$ 1,140,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	206,000	94,000	328,000	628,000	168,000	83,000	264,000	516,000
b. Annual O & M and Replacement Costs	30,000	29,000	48,000	108,000	30,000	32,000	48,000	110,000
c. Specific Use Construction Expenditures	-	1,290,000	-	1,290,000	-	1,290,000	-	1,290,000
d. Joint-Use Facility Constr. Expenditures	4,720,000	268,000	7,540,000	12,500,000	4,760,000	264,000	7,500,000	12,500,000
e. Total Constr. Expenditures (First Cost)	4,720,000	1,550,000	7,540,000	13,800,000	4,760,000	1,550,000	7,500,000	13,800,000
PRIORITY OF USE METHOD 2/								
1. BENEFITS	286,000	174,000	669,000	1,130,000	294,000	174,000	675,000	1,140,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	286,000	114,000	228,000	628,000	258,000	105,000	153,000	516,000
b. Annual O & M and Replacement Costs	42,000	32,000	33,000	108,000	47,000	36,000	28,000	110,000
c. Specific Use Construction Expenditures	-	1,290,000	-	1,290,000	-	1,290,000	-	1,290,000
d. Joint-Use Facility Constr. Expenditures	6,560,000	743,000	5,220,000	12,500,000	7,300,000	889,000	4,330,000	12,500,000
e. Total Constr. Expenditures (First Cost)	6,560,000	2,030,000	5,220,000	13,800,000	7,300,000	2,180,000	4,330,000	13,800,000
INCREMENTAL COST METHOD 3/								
1. BENEFITS	286,000	174,000	669,000	1,130,000	294,000	174,000	675,000	1,140,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	159,000	82,000	387,000	628,000	129,000	73,000	314,000	516,000
b. Annual O & M and Replacement Costs	23,000	28,000	57,000	108,000	23,000	30,000	57,000	110,000
c. Specific Use Construction Expenditures	-	1,290,000	-	1,290,000	-	1,290,000	-	1,290,000
d. Joint-Use Facility Constr. Expenditures	3,670,000	-	8,860,000	12,500,000	3,670,000	-	8,860,000	12,500,000
e. Total Constr. Expenditures (First Cost)	3,670,000	1,290,000	8,860,000	13,800,000	3,670,000	1,290,000	8,860,000	13,800,000

1/ Fish and Wildlife benefits and costs discussed in Appendix J. No monetary equivalent given

2/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water.

3/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2½% used in determination of annual costs and in discounting of future benefits.

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expenditure of $7,540,000 for supplies of water. Alternative repayment schedules acceptable to the Federal government for the recovery of this cost are shown below:

Function	Construction Expenditures	Lump Sum	Annual Payment 1/	Deferred Lump Sum	Deferred Annual Payment 1/
Supplies of Water	($7,540,000 rounded)				
Current Supply	$3,393,000	$3,393,000	$128,000	N. A.	N. A.
Deferred Supply	4,144,000	4,144,000	156,000	$4,144,000 2/	$156,000

1/ Assumes Federal financing of such costs at 2-5/8%, and amortization period 50 years.
2/ Initiation of use of deferred supply within ten-year interest free period.
N.A. = not applicable.

In addition, non-Federal interests would be required to contribute $34,000 for the annual cost of operation, maintenance, and replacement during the period of deferred use of future water supplies and $48,000 annually after use of the future water supplies is initiated.

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Beltzville Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the revenues resulting from Federal acquisition of lands in the Beltzville Project area, it is expected that such reductions will be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Beltzville Project.

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5. BLUE MARSH PROJECT

a. Description. The Blue Marsh Project site is located on Tulpehocken Creek about 1-1/2 miles upstream from its confluence with Plum Creek and about 9 miles northwest of Reading, Pennsylvania. The proposed project would be a multiple-purpose development to provide supplies of water, flood control and recreation. Reservoir capacity to spillway crest level would be 49,000 acre-feet; 1,500 acre-feet inactive, 14,500 acre-feet for supplies of water and recreation, and 33,000 acre-feet for flood control. It would be formed by an earth and rock fill dam 1,100 feet long and rising 90 feet above the creek bed, and have a spillway about 1,000 feet south of the dam and gate-controlled outlet works discharging through a conduit on rock along the right abutment. The project would contribute to: (1) the satisfaction of the future water supply needs of downstream areas especially the Reading-Pottstown and Philadelphia areas; (2) the reduction in flood damages of especial importance to such damage centers as Reading, Pottstown, Norristown, and Philadelphia; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Blue Marsh Project would be required by the year 1969.

b. Economic life. The economic life of the Blue Marsh Project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction is $12,500,000, excluding $3,290,000 for indirectly related recreation; the cost of operation and maintenance is $106,000 annually; and the cost of major replacement is $5,000 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The benefit-cost ratio of the Blue Marsh Project for 50-year economic life is 1.6 and for 100-year economic life it is 2.0. Capital costs, operation and maintenance costs, replacement costs, and benefits for 50 years and 100 years are as follows:

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	Amortization Period	
	50 Years	100 Years
CONSTRUCTION EXPENDITURES	$12,500,000	$12,500,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction)	483,000	386,000
Operation and Maintenance	106,000	106,000
Major Replacements	5,000	7,000
Economic Cost of Land	48,000	45,000
Total Annual Charges	642,000	544,000
ANNUAL BENEFITS		
Reduction of Flood Damages	301,000	316,000
Recreation, directly related	217,000	217,000
Supplies of water	530,000	539,000
Total Annual Benefits	1,050,000	1,070,000
BENEFIT-COST RATIO	1.6	2.0

Notes: Costs and benefits for indirectly related recreation are excluded.
All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and discounting of future benefits.

e. Intangible project effects. "Intangible effects of the Blue Marsh Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate short-term storage capacity at the Blue Marsh Project to control 62% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at the Blue Marsh Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Blue Marsh Project essentially would be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report the acres of land and miles of stream that would be required to replace these resources in kind for a similar project, designated as Bernville, considered in the vicinity. No monetary equivalent for means of recovering such damages is presented.

f. Physical feasibility and cost of providing for future needs. The Blue Marsh Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, and supplies of water over the economic life of the project. No provision has been made for later or phased con-

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struction at the Blue Marsh Project to satisfy known additional future requirements in the area served by the project since it was found uneconomic to do so. Analysis of the water control requirements in the Schuylkill River Basin indicated that the satisfaction of additional or future requirements would be more economically achieved through the later development of the Maiden Creek Project, as recommended herein, than through the extension of the scale of development or phased construction of the Blue Marsh Project.

g. Allocations of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method; (2) the priority of use method; and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-2. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states and municipalities during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960 at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report, local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $7,100,000 for construction expenditures and $85,000 annually for operation, maintenance and replacement costs during the period of deferred use of future water supplies, and $72,000 annually after use of the future water supplies is initiated.

i. Repayment schedules for reimbursable costs. The reimbursable cost for the Blue Marsh Project would include a con-

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TABLE AA-2

ALLOCATIONS OF COST FOR BLUE MARSH PROJECT 1/

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period - 50 Years				Amortization Period - 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$ 302,000	$ 217,000	$ 531,000	$ 1,050,000	$ 317,000	$ 217,000	$ 540,000	$ 1,070,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	240,000	120,000	252,000	611,000	213,000	104,000	190,000	508,000
b. Annual O&M and Replacement Costs	36,000	36,000	38,000	111,000	40,000	38,000	36,000	113,000
c. Specific Use Construction Expenditures	-	1,500,000	-	1,500,000	-	1,500,000	-	1,500,000
d. Joint-Use Facility Constr. Expenditures	5,140,000	457,000	5,410,000	11,000,000	5,580,000	429,000	5,000,000	11,000,000
e. Total Constr. Expenditures (First Cost)	5,140,000	1,950,000	5,410,000	12,500,000	5,580,000	1,930,000	5,000,000	12,500,000
PRIORITY OF USE METHOD 2/								
1. BENEFITS	302,000	217,000	531,000	1,050,000	317,000	217,000	540,000	1,070,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	302,000	142,000	167,000	611,000	317,000	130,000	61,000	508,000
b. Annual O&M and Replacement Costs	46,000	39,000	25,000	111,000	59,000	43,000	11,000	113,000
c. Specific Use Construction Expenditures	-	1,500,000	-	1,500,000	-	1,500,000	-	1,500,000
d. Joint-Use Facility Constr. Expenditures	6,480,000	939,000	3,590,000	11,000,000	8,310,000	1,120,000	1,590,000	11,000,000
e. Total Constr. Expenditures (First Cost)	6,480,000	2,430,000	3,590,000	12,500,000	8,310,000	2,610,000	1,590,000	12,500,000
INCREMENTAL COST METHOD 3/								
1. BENEFITS	302,000	217,000	531,000	1,050,000	317,000	217,000	540,000	1,070,000
2. ALLOCATION OF COST:								
a. Annual Economic Costs	180,000	99,000	332,000	611,000	148,000	88,000	272,000	508,000
b. Annual O&M and Replacement Costs	27,000	33,000	51,000	111,000	27,000	35,000	51,000	113,000
c. Specific Use Construction Expenditures	-	1,500,000	-	1,500,000	-	1,500,000	-	1,500,000
d. Joint-Use Facility Constr. Expenditures	3,870,000	-	7,140,000	11,000,000	3,870,000	-	7,140,000	11,000,000
e. Total Constr. Expenditures (First Cost)	3,870,000	1,500,000	7,140,000	12,500,000	3,870,000	1,500,000	7,140,000	12,500,000

1/ Fish and Wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.

2/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water.

3/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2½% used in determination of annual costs and in discounting of future benefits.

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struction cost of $5,410,000 for supplies of water. Alternative repayment schedules acceptable to the Federal government for recovery of this cost are shown below:

Function	Construction Expenditures	Lump Sum	Annual Payment [1/]	Deferred Lump Sum	Deferred Annual Payment [1/]
Supplies of Water:	($5,410,000 rounded)				
Current Supply	1,657,000	$1,657,000	$62,000	N. A.	N. A.
Deferred Supply	3,751,800	3,752,000	139,000	$3,752,000 [2/]	$139,000

1/ Assumes Federal financing of such costs at 2-5/8%, and amortization period 50 years.

2/ Initiation of use of deferred supply within ten-year interest free period.

N. A. - not applicable.

In addition, non-Federal interests would be required to contribute $26,000 annually for the cost of operation, maintenance and replacement during the period of deferred use of future water supplies and $38,000 annually after use of the future water supplies is initiated.

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Blue Marsh Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the tax revenues resulting from Federal acquisition of lands in the Blue Marsh Project area, it is expected that such reductions will be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Blue Marsh Project.

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6. TREXLER PROJECT

a. Description. The Trexler Project site is located on Jordan Creek about 1/2 mile downstream from its confluence with Mill Creek and 8 miles northwest of Allentown, Pennsylvania. The proposed project would be a multiple-purpose development to provide supplies of water, flood control and recreation. Reservoir capacity to spillway crest level would be 39,000 acre-feet; 800 acre-feet inactive, 24,200 acre-feet for supplies of water and recreation, and 14,000 acre-feet for flood control. It would be formed by a concrete gravity type dam 800 feet long and rising 120 feet above the creek bed, and have a spillway in the stream channel and gate-controlled outlet works discharging through sluices in the spillway section. The project would contribute to: (1) the satisfaction of the future water supply needs of downstream areas especially the Allentown-Bethlehem and Trenton-Philadelphia areas; (2) the reduction in flood damages of especial importance in the highly industrialized Allentown, Bethlehem and Easton areas; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Trexler Project would be required by the year 1972.

b. Economic life. The economic life of the Trexler Project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction is $10,100,000, excluding $1,140,000 for indirectly related recreation; the cost of operation and maintenance is $101,000 annually; and the cost of major replacement is $3,000 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The benefit-cost ratio of the Trexler Project for 50-year economic life is 1.6 and for 100-year economic life it is 1.8. Capital costs, operation and maintenance costs, replacement costs, and benefits for 50 years and 100 years are as follows:

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	Amortization Period	
	50 Years	100 Years
CONSTRUCTION EXPENDITURES	$10,100,000	$10,100,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction)	404,000	330,000
Operation and Maintenance	101,000	101,000
Major Replacements	3,000	4,000
Economic Cost of Land	44,000	40,000
Total Annual Charges	552,000	475,000
ANNUAL BENEFITS		
Reduction of Flood Damages	114,000	116,000
Recreation, directly related	281,000	281,000
Supplies of Water	463,000	466,000
Total Annual Benefits	858,000	864,000
BENEFIT-COST RATIO	1.6	1.8

Notes: Costs and benefits for indirectly related recreation are excluded
All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and in discounting of future benefits.

e. Intangible project effects. Intangible project effects of the Trexler Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Trexler Project to control 71% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at the Trexler Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Trexler Project would essentially be a consequence of the damages expected to wildlife resources in the project area. There is presented in appendix J to this report the acres of land that would be required to replace these resources in kind. No monetary equivalent for means of recovering such damages is presented.

f. Physical feasibility and cost of providing for future needs. The Trexler Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, and supplies of water over the economic life of the project. No provision has been made for later or phased construction at the Trexler Project to satisfy known additional future requirements in the area served by the

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project since it was found uneconomic to do so. System analyses for the four recommended major water control projects in the Lehigh River Basin, namely, Beltzville, Trexler, Aquashicola and Bear Creek, indicated that the satisfaction of additional and future requirements would be more economically achieved through the orderly development of the Beltzville, Aquashicola and Bear Creek Projects, as recommended herein, than through the extension of the scale of development or phased construction of the Trexler project.

g. Allocation of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method; (2) the priority of use method; and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-3. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four month intervals from April 1957 to March 1960, at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report, local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $4,300,000 for construction expenditures and $69,000 annually for operation, maintenance and replacement costs during the period of deferred use of future water supplies, and $57,000 annually after use of future water supplies is initiated.

i. Repayment schedules for reimbursable costs. The reimbursable cost for the Trexler Project would include a construction ex-

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TABLE AA-3

ALLOCATIONS OF COST FOR TREXLER PROJECT 1/

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period - 50 Years				Amortization Period - 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$ 114,000	$ 281,000	$ 464,000	$ 859,000	$ 117,000	$ 281,000	$ 467,000	$ 865,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	97,000	151,000	263,000	512,000	87,000	151,000	210,000	427,000
b. Annual O&M and Replacement Costs	18,000	40,000	47,000	104,000	19,000	41,000	46,000	106,000
c. Specific Use Construction Expenditures	-	1,500,000	-	1,500,000	-	1,500,000	-	1,500,000
d. Joint-Use Facility Constr. Expenditures	2,150,000	653,000	5,770,000	8,570,000	2,330,000	628,000	5,610,000	8,570,000
e. Total Constr. Expenditures (First Cost)	2,150,000	2,150,000	5,770,000	10,100,000	2,330,000	2,130,000	5,610,000	10,000,000
PRIORITY OF USE METHOD 2/								
1. BENEFITS	114,000	281,000	464,000	859,000	117,000	281,000	467,000	865,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	114,000	185,000	213,000	512,000	117,000	169,000	142,000	427,000
b. Annual O&M and Replacement Costs	20,000	46,000	38,000	104,000	26,000	49,000	31,000	106,000
c. Specific Use Construction Expenditures	-	1,500,000	-	1,500,000	-	1,500,000	-	1,500,000
d. Joint-Use Facility Constr. Expenditures	2,490,000	1,410,000	4,670,000	8,570,000	3,120,000	1,650,000	3,790,000	8,570,000
e. Total Constr. Expenditures (First Cost)	2,490,000	2,910,000	4,670,000	10,100,000	3,120,000	3,150,000	3,790,000	10,100,000
INCREMENTAL COST METHOD 3/								
1. BENEFITS	114,000	281,000	464,000	859,000	117,000	281,000	467,000	865,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	83,000	120,000	309,000	512,000	68,000	107,000	253,000	427,000
b. Annual O&M and Replacement Costs	15,000	34,000	55,000	104,000	15,000	36,000	55,000	106,000
c. Specific Use Construction Expenditures	-	1,500,000	-	1,500,000	-	1,500,000	-	1,500,000
d. Joint-Use Facility Constr. Expenditures	1,830,000	-	6,740,000	8,570,000	1,830,000	-	6,740,000	8,570,000
e. Total Constr. Expenditures (First Cost)	1,830,000	1,500,000	6,740,000	10,100,000	1,830,000	1,500,000	6,740,000	10,100,000

1/ Fish and wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.

2/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water.

3/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2½% used in determination of annual costs and in discounting of future benefits.

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penditure of $5,770,000 for supplies of water. Alternative repayment schedules acceptable to the Federal government for the recovery of this cost are shown below:

Function	Construction Expenditures	Lump Sum	Annual Payment 1/	Deferred Lump Sum	Deferred Annual Payment 1/
Supplies of Water	($5,770,000 rounded)				
Current Supply	2,747,000	$2,747,000	$102,000	N. A.	N. A.
Deferred Supply	3,019,000	3,019,000	112,000	$3,019,000 2/	$112,000

1/ Assumes Federal financing of such costs at 2-5/8%; amortization period 50 years.
2/ Initiation of use of deferred supply within ten-year interest free period.
N. A. = not applicable.

In addition, non-Federal interests would be required to contribute $35,000 annually for the cost of operation, maintenance and replacement during the period of deferred use of future water supplies and $47,000 annually after use of the future water supplies is initiated

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Trexler Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the tax revenues resulting from Federal acquisition of lands in the Trexler Project area, it is expected that such reduction would be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Trexler Project.

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7. PROMPTON PROJECT.

a. Description. The Prompton Project is a modification of the single-purpose flood control project, now under construction, which is located on Lackawaxen River about 1/2 mile upstream from its confluence with Waymart Branch and about 4 miles west of Honesdale, Pennsylvania. The proposed project would be a multiple-purpose development to provide for supplies of water and recreation in addition to the present flood control purpose. Reservoir capacity to spillway crest level would be 51,700 acre-feet; 3,400 acre-feet inactive, 28,000 acre-feet for supplies of water and recreation, and 20,300 acre-feet for flood control. The proposed modification would require construction of a control tower with gates and service bridge, placing an impervious blanket on the valley walls and floor upstream from the dam, widening of the spillway, and clearing land and relocating roads in the reservoir. The dam presently under construction, which would not be modified, will be 1,300 feet long and rise 140 feet above the river bed. The existing spillway which is cut into the rock of the right abutment, will be modified and the present uncontrolled outlet works, discharging into a concrete conduit along the right bank, will be provided with gates and a control tower. The modified project would contribute to: (1) the future water supply needs of the Trenton-Philadelphia area; (2) the reduction in flood damages in the downstream areas of especial importance to Honesdale, Hawley, and the lower reaches of Lackawaxen River; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Prompton Project would be required by the year 1974.

b. Economic life. The economic life of the Prompton Project from the time modifications are completed and including features of the existing project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction, excluding $387,000 for indirectly related recreation, is $8,050,000 which is made up of $3,700,000 estimated as the cost of the flood control project now under construction and $4,350,000 estimated as the cost for the modifications for multiple-purpose development. The total new construction expenditures required, including $620,000 for rehabilitation of the existing project would be $4,970,000. The estimated annual operation and maintenance cost is $82,000, and the major replacement cost is estimated at $2,000 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The economic justification for the Prompton Project was based on the premise that the modification constituted a second stage of development and rehabilitation to provide feasible comprehensive development with a 50-year life expectancy. The benefit-cost ratio of

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the Prompton Project for a 50-year economic life is 1.4 and for a 100-year economic life it is 1.6. Capital costs, operation and maintenance costs, replacement costs, and benefits for 50 years and 100 years are as follows:

	Amortization Period	
	50 Years	100 Years
NEW CONSTRUCTION EXPENDITURES	$ 4,970,000	$ 4,970,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction)	239,000	197,000
Operation & Maintenance	82,000	82,000
Major Replacements	2,000	2,000
Economic Cost of Land	26,000	24,000
Total Annual Charges	348,000	305,000
ANNUAL BENEFITS		
Reduction of Flood Damages	49,000	49,000
Recreation	130,000	130,000
Supplies of Water	307,000	307,000
Total Annual Benefits	486,000	486,000
BENEFIT-COST RATIO	1.4	1.6

Notes: Costs and benefits for indirectly related recreation are excluded.
All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and discounting of future benefits.

e. Intangible project effects. Intangible project effects of the Prompton Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Prompton Project to control 69% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at the Prompton Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Prompton Project essentially would be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report a discussion of how such damages attributable to other projects in the plan of development might be mitigated. No monetary equivalent for means of recovering such damages is presented.

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f. Physical feasibility and cost of providing for future needs. The Prompton Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, and supplies of water over the economic life of the project. No provision has been made for further modification at the Prompton Project to satisfy known additional future requirements in the area served by this project since it was found uneconomic to do so. Given the magnitude of future water control requirements, it was determined that the satisfaction of such needs would be more economically achieved through the orderly development of the remaining major control projects scheduled for development after completion of modifications at Prompton, as recommended herein, than through additional modifications of the scale of development of the Prompton Project.

g. Allocation of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method, (2) the priority of use method, and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-4. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for modification of the existing project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960 at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $ 463,000 for new construction expenditures and $45,000

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TABLE AA-6

ALLOCATIONS OF COST FOR PROMPTON PROJECT 1/

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period - 50 Years				Amortization Period - 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$ 295,000	$ 130,000	$ 307,000	$ 732,000	$ 295,000	$ 130,000	$ 307,000	$ 732,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	122,000	51,000	228,000	400,000	55,000	44,000	194,000	333,000
b. Annual O&M and Replacement Costs	10,000	19,000	54,000	84,000	10,000	28,000	55,000	84,000
c. Specific Use Construction Expenditures	-	427,000	-	427,000	-	427,000	-	427,000
d. Joint-Use Facility Constr. Expenditures	2,860,000	254,000	5,500,000	7,620,000 2/	2,800,000	234,000	4,590,000	7,620,000 2/
e. Total Constr. Expenditures (First Cost)	2,860,000	681,000	5,500,000	8,050,000 2/	2,800,000	661,000	4,590,000	8,050,000 2/
PRIORITY OF USE METHOD 3/								
1. BENEFITS	295,000	130,000	307,000	732,000	295,000	130,000	307,000	732,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	168,000	85,000	147,000	400,000	136,000	78,000	119,000	333,000
b. Annual O&M and Replacement Costs	30,000	27,000	26,000	84,000	30,000	29,000	26,000	84,000
c. Specific Use Construction Expenditures	-	427,000	-	427,000	-	427,000	-	427,000
d. Joint-Use Facility Constr. Expenditures	3,520,000	1,020,000	3,080,000	7,620,000 2/	3,460,000	1,130,000	3,020,000	7,620,000 2/
e. Total Constr. Expenditures (First Cost)	3,520,000	1,450,000	3,080,000	8,050,000 2/	3,460,000	1,560,000	3,020,000	8,050,000 2/
INCREMENTAL COST METHOD 4/								
1. BENEFITS	295,000	130,000	307,000	732,000	295,000	130,000	307,000	732,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	102,000	36,000	261,000	400,000	82,000	34,000	218,000	333,000
b. Annual O&M and Replacement Costs	8,000	18,000	57,000	84,000	8,000	19,000	57,000	84,000
c. Specific Use Construction Expenditures	-	427,000	-	427,000	-	427,000	-	427,000
d. Joint-Use Facility Constr. Expenditures	2,520,000	-	5,100,000	7,620,000 2/	2,520,000	-	5,100,000	7,620,000 2/
e. Total Constr. Expenditures (First Cost)	2,520,000	427,000	5,100,000	8,050,000 2/	2,520,000	427,000	5,100,000	8,050,000 2/

1/ Fish and Wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.
2/ Includes existing flood control project cost of $3,700,000.
3/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water.
4/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2½% used in determination of annual costs and discounting of future benefits.

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annually for operation, maintenance and replacement costs during the period of deferred use of future water supplies and a total of $29,000 annually after use of the future water supplies is initiated.

k. Repayment schedules for reimbursable costs. The reimbursable cost for the Prompton Project would include a construction cost of $4,500,000 for supplies of water. Alternate repayment schedules acceptable to the Federal government for the recovery of this cost are shown below:

Function	Construction Expenditure	Lump Sum	Annual Payment 1/	Deferred Lump Sum	Deferred Annual Payment 1/
Supplies of Water	$4,500,000 (rounded)				
Current Supply	2,089,000	$2,089,000	$78,000	N. A.	N. A.
Deferred Supply	2,414,000	2,414,000	90,000	$2,414,000 2/	$90,000

1/ Assumes Federal financing of such costs at 2-5/8%, amortization period 50 years.

2/ Initiation of use of deferred supply within ten-year interest free period.

N. A. - not applicable.

In addition, non-Federal interests would be required to contribute $38,000 annually for the cost of operation, maintenance and replacement during the period of deferred use of future water supplies and $54,000 annually after use of the future water supply is initiated.

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Prompton Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the revenues resulting from Federal acquisition of lands in the Prompton Project area, it is expected that such reductions would be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Prompton Project.

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8. TOCKS ISLAND PROJECT.

a. Description. The Tocks Island Project site is located on Delaware River about 5 miles upstream from Delaware Water Gap and about 7 miles northeast of Stroudsburg Pennsylvania. The proposed project would be a multiple-purpose development to provide supplies of water, flood control, production of hydroelectric power, and recreation. Reservoir capacity to level of top of spillway gates would be 765,000 acre-feet; 80,000 acre-feet inactive, 410,000 acre-feet for supplies of water, power and recreation, and 275,000 acre-feet for flood control. The dam would be of earth and rock fill 3,200 feet long and rising 160 feet above the river bed. A spillway would be cut in the rock of the left abutment, and it would be lined with concrete and provided with crest gates. A gate-controlled outlet works, discharging through concrete conduits on rock along the left bank, would regulate releases either through the turbines in the powerhouse at the downstream end of the conduits or through bypass channels in the powerhouse substructure. A pumped-storage powerhouse would be located underground, upstream from the dam, on the left side. The project would contribute to: (1) the future water supply needs of the Trenton-Philadelphia area; (2) the reduction in flood damages in the downstream areas of especial importance to the Delaware Water Gap-to-Trenton section; (3) the satisfaction of the future demand for electric energy in the area; and (4) the satisfaction of the desire for nonurban recreation facilities of the regional population. The Tock Island Project would be required in the year 1975.

b. Economic life. The economic life of the Tocks Island Project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction, annual cost of operation and maintenance, and annual cost of major replacements are as follows:

	1/	2/	3/
Construction expenditures	$146,000,000	$122,000,000	$177,000,000
Operation and maintenance	4,460,000	1,760,000	5,310,000
Major replacements	204,000	207,000	320,000

1/ Flood control, water supply, directly related recreation, and conventional and pumped-storage hydropower.
2/ Flood control, water supply, directly and indirectly related recreation and conventional hydropower.
3/ Flood control, water supply, directly and indirectly related recreation, and conventional and pumped-storage hydropower.

All amounts are rounded and are computed on the basis of 1959 price levels.

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d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The benefit-cost ratio of the Tocks Island Project for a 50-year economic life is 2.2 without the pumped-storage hydro-power feature. This ratio was computed with the total recreation benefits and costs (directly and indirectly related) included. The comparable figure for 100-year economic life is 2.6. Capital costs, operation and maintenance, replacement costs, and benefits for 50 years and 100 years are as follows:

	50 years	100 years
	1/	1/
CONSTRUCTION EXPENDITURES	$122,000,000	$122,000,000
ANNUAL CHARGES:		
Interest and Amortization (including interest during construction)	4,700,000	3,700,000
Operation and Maintenance	1,760,000	1,760,000
Replacements	207,000	318,000
Economic Cost of Land	697,000	641,000
Taxes	335,000	335,000
Total Annual Charges	7,700,000	6,750,000
ANNUAL BENEFITS:		
Reduction of Flood Damages	1,460,000	1,500,000
Recreation (directly & indirectly related)	10,000,000	10,000,000
Supplies of Water Power	3,780,000	4,090,000
	1,820,000	1,820,000
Total Annual Benefits	17,100,000	17,400,000
BENEFIT-COST RATIO	2.2	2.6

1/ Excluding pumped-storage hydropower.

Notes: All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and discounting of future benefits.

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e. Intangible project effects. Intangible project effects of the Tocks Island Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Tocks Island Project to control 54% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at Tocks Island Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Tocks Island Project essentially would be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report the acres of land and miles of stream that would be required to replace these resources in kind. No monetary equivalent for means of recovering such damages is presented. Some project facilities for fisheries have been included and are considered in the overall joint-use construction expenditures for this project.

f. Physical feasibility and cost of providing for future needs. The Tocks Island Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, supplies of water, and hydroelectric power over the economic life of the project. No provision has been made for later or phased construction at the Tocks Island Project to satisfy known additional future water control requirements since it would be uneconomic to do so. Site limitation at Tocks Island above elevation 428 involving costs for protecting the Port Jervis area precludes the extension of the scale of development at Tocks Island as recommended herein. Further consideration given to the role of the other major control projects, to be developed in a logical time sequence, indicated that the satisfaction of additional and future requirements could be more economically achieved through use and development of these projects than through further site development at Tocks Island.

g. Allocation of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method, (2) the priority of use method, and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-5. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states, and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water

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TABLE AA-3

ALLOCATIONS OF COST FOR TOCKS ISLAND PROJECT 1/

(All amounts rounded; totals may not agree with sum of individual items due to rounding)

	Amortization Period - 50 Years						Amortization Period - 100 Years					
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Power: Conventional	Power: Pumped Storage	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Power: Conventional	Power: Pumped Storage	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD												
1. BENEFITS	$ 1,460,000	$ 3,660,000	$ 3,810,000	$ 1,820,000	$ 11,000,000	$ 21,800,000	$ 1,500,000	$ 3,660,000	$ 4,120,000	$ 1,820,000	$ 11,000,000	$ 22,200,000
2. ALLOCATION OF COSTS:												
a. Annual Economic Costs	552,000	1,430,000	1,080,000	1,370,000	9,010,000	13,700,000	459,000	1,440,000	799,000	1,260,000	8,680,000	12,600,000
b. Annual O&M and Replacement Costs	52,000	577,000	84,000	254,000	3,690,000	4,660,000	53,000	602,000	80,000	291,000	3,850,000	4,870,000
c. Specific Use Construction Expenditures	-	18,200,000	-	12,300,000	53,800,000	84,400,000	-	18,200,000	-	12,300,000	53,800,000	84,400,000
d. Joint-Use Facility Constr. Expenditures	12,100,000	6,630,000	24,000,000	8,100,000	10,500,000	61,400,000	12,600,000	6,100,000	22,000,000	1,640,000	12,100,000	61,400,000
e. Total Constr. Expenditures (First Cost)	12,100,000	24,900,000	24,000,000	20,400,000	64,300,000	146,000,000	12,600,000	24,300,000	22,000,000	21,000,000	65,900,000	146,000,000
PRIORITY OF USE METHOD 2/												
1. BENEFITS	1,460,000	3,660,000	3,810,000	1,820,000	11,000,000	21,800,000	1,500,000	3,660,000	4,120,000	1,820,000	11,000,000	22,200,000
2. ALLOCATION OF COSTS:												
a. Annual Economic Costs	1,460,000	2,400,000	200,000	1,040,000	8,370,000	13,700,000	1,500,000	1,890,000	-	975,000	8,270,000	12,600,000
b. Annual O&M and Replacement Costs	104,000	433,000	14,000	243,000	3,870,000	4,660,000	134,000	644,000	-	279,000	3,820,000	4,870,000
c. Specific Use Construction Expenditures	-	18,200,000	-	12,300,000	53,800,000	84,400,000	-	18,200,000	-	12,300,000	53,800,000	84,400,000
d. Joint-Use Facility Constr. Expenditures	33,200,000	23,600,000	4,570,000	-	-	61,400,000	42,700,000	18,600,000	-	-	-	61,400,000
e. Total Constr. Expenditures (First Cost)	34,200,000	41,800,000	4,570,000	12,300,000	53,800,000	146,000,000	42,700,000	36,900,000	-	12,300,000	53,800,000	146,000,000
INCREMENTAL COST METHOD 3/												
1. BENEFITS	1,460,000	3,660,000	3,810,000	1,820,000	11,000,000	21,800,000	1,500,000	3,660,000	4,120,000	1,820,000	11,000,000	22,200,000
2. ALLOCATION OF COSTS:												
a. Annual Economic Costs	207,000	1,370,000	2,280,000	1,200,000	8,610,000	13,700,000	170,000	1,230,000	1,830,000	1,100,000	8,300,000	12,600,000
b. Annual O&M and Replacement Costs	30,000	558,000	164,000	243,000	3,670,000	4,660,000	30,000	585,000	164,000	279,000	3,820,000	4,870,000
c. Specific Use Construction Expenditures	-	18,200,000	-	12,300,000	53,800,000	84,400,000	-	18,200,000	-	12,300,000	53,800,000	84,400,000
d. Joint-Use Facility Constr. Expenditures	4,130,000	-	52,100,000	4,040,000	1,130,000	61,400,000	4,130,000	-	52,100,000	4,040,000	1,130,000	61,400,000
e. Total Constr. Expenditures (First Cost)	4,130,000	18,200,000	52,100,000	16,400,000	55,000,000	146,000,000	4,130,000	18,200,000	52,100,000	16,400,000	55,000,000	146,000,000

1/ Fish and Wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.

2/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water; (4) conventional power; (5) pumped-storage power.

3/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2⅞ used in determination of annual costs and discounting of future benefits.

resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960, at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report, local interest will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in the Tocks Island Project would be as follows:

	1/
CONSTRUCTION EXPENDITURES	$93,900,000
Annual Operation, Maintenance and Replacements 2/	1,870,000 (1,950,000)

1/ Excluding pumped-storage hydropower.
2/ Amounts in parentheses are O M & R during period of deferred use of water supplies.

i. Repayment schedules for reimbursable costs: Costs apportioned to non-Federal interests are as follows:

	1/
CONSTRUCTION EXPENDITURES	$28,500,000
Annual Operation, Maintenance and Replacements 2/	98,000 (20,000)

1/ Excluding pumped-storage hydropower.
2/ Amounts in parentheses are O M & R during period of deferred use of water supplies.

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Alternative repayment schedules acceptable to the Federal government for recovery of these costs are shown below:

Function	Construction Expenditure	Lump Sum	Annual Payment [1/]	Deferred Lump Sum	Deferred Annual Payment [1/]
Supplies of Water [2/]	($28,500,000 rounded)				
Current Supply	1,248,000	$1,248,000	$48,000	N.A.	N.A.
Deferred Supply	27,241,000	27,241,000	1,050,000	$27,241,000 [3/]	$1,050,000

1/ Assumes Federal financing of such costs at 2-5/8%, and amortization period of 50 years.
2/ Pumped-storage hydropower excluded.
3/ Initiation of use of deferred supply within ten-year interest free period.
N. A. = not applicable.

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Tocks Island Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the tax revenues resulting from Federal acquisition of lands in the Tocks Island Project area, it is expected that such reductions would be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Tocks Island Project. In the case of the conventional hydropower facilities, recommended for Federal development, Federal, state and local taxes estimated at $335,000 annually will be foregone. The effects of these taxes were taken into account in project formulation and in the computation of benefit-cost ratios shown in paragraph 8d.

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9. AQUASHICOLA PROJECT.

a. Description. The Aquashicola Project site is located on Aquashicola Creek about 4-1/2 miles upstream from its confluence with Lehigh River and about 3 miles east of Palmerton, Pennsylvania. The proposed project would be a multiple-purpose development to provide supplies of water, flood control and recreation. Reservoir capacity to spillway crest level would be 45,000 acre-feet; 1,000 acre-feet inactive, 24,000 acre-feet for supplies of water and recreation, and 20,000 acre-feet for flood control. It would be formed by an earth dam 2,000 feet long and rising 110 feet above the creek bed, and have a concrete spillway located in the south wing of the dam and gate-controlled outlet works discharging through sluices in the spillway section. The project would contribute to: (1) the satisfaction of the future water supply needs of downstream areas especially the Allentown-Bethlehem and the Trenton-Philadelphia areas; (2) the reduction in flood damages of especial importance to the highly industrialized Allentown, Bethlehem and Easton areas; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Aquashicola Project would be required by the year 1981.

b. Economic life. The economic life of the Aquashicola Project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction, excluding $488,000 for indirectly related recreation, is $19,000,000; the cost of operation and maintenance is $82,000 annually; and the cost of replacement is $2,000 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The benefit-cost ratio of the Aquashicola Project for a 50-year economic life is 1.1 and for a 100-year economic life it is 1.3. Capital costs, operation and maintenance costs, replacement costs, and benefits for 50 years and 100 years are as follows:

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	Amortization Period	
	50 Years	100 Years
CONSTRUCTION EXPENDITURES	$19,000,000	$19,000,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction)	769,000	625,000
Operation & Maintenance	82,000	82,000
Major Replacements	2,000	3,000
Economic Cost of Land	21,000	19,000
Total Annual Charges	874,000	730,000
ANNUAL BENEFITS		
Reduction of Flood Damages	293,000	299,000
Recreation, directly related	159,000	159,000
Supplies of Water	484,000	498,000
Total Annual Benefits	936,000	956,000
BENEFIT-COST RATIO	1.1	1.3

Notes: Costs and benefits for indirectly related recreation are excluded.
All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and discounting of future benefits.

e. Intangible project effects. Intangible project effects of the Aquashicola Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Aquashicola Project to control 77% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at the Aquashicola Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Aquashicola Project would essentially be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report the acres of land and miles of stream that would be required to replace these resources in kind. No monetary equivalent for means of recovering such damages is presented.

f. Physical feasibility and cost of providing for future needs. The Aquashicola Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, and supplies of water over the economic life of the project. No provision has been made for later or phased construction at the Aquashicola Project to satisfy known additional future requirements in the area served by the project since it was

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found uneconomic to do so. System analyses for the four recommended major control projects in the Lehigh River Basin, namely, Beltzville, Trexler, Aquashicola and Bear Creek, indicated that the satisfaction of additional and future requirements would be more economically achieved through the orderly development of the Beltzville, Trexler, and Bear Creek Projects, as recommended herein, than through the extension of the scale of development or phased construction of the Aquashicola Project.

g. Allocations of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method, (2) the priority of use method, and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-6. In the incremental cost method of allocation, supply of water was considered the basic function because the schedule date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960 at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $8,540,000 for construction expenditures and $51,000 annually for operation, maintenance and replacement during the period of deferred use of future water supplies and $40,000 annually after use of the future water supplies is initiated.

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TABLE AA-6

ALLOCATIONS OF COST FOR AQUASHICOLA PROJECT 1/

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period - 50 Years				Amortization Period - 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$ 293,000	$ 159,000	$ 485,000	$ 937,000	$ 300,000	$ 159,000	$ 499,000	$ 958,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	271,000	94,000	435,000	800,000	226,000	70,000	346,000	642,000
b. Annual O&M and Replacement Costs	28,000	13,000	44,000	85,000	29,000	12,000	44,000	86,000
c. Specific Use Construction Expenditures	-	878,000	-	878,000	-	878,000	-	878,000
d. Joint-Use Facility Constr. Expenditures	6,490,000	1,170,000	10,400,000	18,100,000	6,750,000	953,000	10,400,000	18,100,000
e. Total Constr. Expenditures (First Cost)	6,490,000	2,050,000	10,400,000	19,000,000	6,750,000	1,830,000	10,400,000	19,000,000
PRIORITY OF USE METHOD 2/								
1. BENEFITS	293,000	159,000	485,000	937,000	300,000	159,000	499,000	958,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	293,000	104,000	402,000	800,000	300,000	96,000	247,000	642,000
b. Annual O&M and Replacement Costs	38,000	14,000	41,000	85,000	38,000	16,000	32,000	86,000
c. Specific Use Construction Expenditures	-	878,000	-	878,000	-	878,000	-	878,000
d. Joint-Use Facility Constr. Expenditures	7,040,000	1,410,000	9,660,000	18,100,000	9,000,000	1,690,000	7,420,000	18,100,000
e. Total Constr. Expenditures (First Cost)	7,040,000	2,290,000	9,660,000	19,000,000	9,000,000	2,570,000	7,420,000	19,000,000
INCREMENTAL COST METHOD 3/								
1. BENEFITS	293,000	159,000	485,000	937,000	300,000	159,000	499,000	958,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	165,000	46,000	589,000	800,000	132,000	39,000	471,000	642,000
b. Annual O&M and Replacement Costs	17,000	8,000	60,000	85,000	17,000	8,000	60,000	86,000
c. Specific Use Construction Expenditures	-	878,000	-	878,000	-	878,000	-	878,000
d. Joint-Use Facility Constr. Expenditures	3,920,000	-	14,200,000	18,100,000	3,920,000	-	14,200,000	18,100,000
e. Total Constr. Expenditures (First Cost)	3,920,000	878,000	14,200,000	19,000,000	3,920,000	878,000	14,200,000	19,000,000

1/ Fish and Wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.

2/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water.

3/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2½% used in determination of annual costs and in discounting of future benefits.

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i. Repayment schedules for reimbursable costs. The reimbursable cost for the Aquashicola Project would include a construction cost of $10,400,000 for supplies of water. Alternative repayment schedules acceptable to the Federal government for recovery of this cost are shown below:

Function	Construction Expenditures	Lump Sum	Annual 1/ Payment	Deferred Lump Sum	Deferred 1/ Annual Payment
Supplies of Water	$10,400,000 (rounded)				
Current Supply	4,753,000	$4,753,000	$178,000	N.A.	N.A.
Deferred Supply	5,696,000	5,696,000	214,000	$5,696,000 2/	$214,000

1/ Assumes Federal financing of such costs at 2-5/8%, amortization period 50 years.
2/ Initiation of use of deferred supply within ten-year interest free period.
N. A. - not applicable.

In addition, non-Federal interests would be required to contribute $34,000 annually for the cost of operation, maintenance and replacement during the period of deferred use of future water supplies and $44,000 annually after use of the future water supply is initiated.

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Aquashicola Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the tax revenues resulting from Federal acquisition of lands in the Aquashicola Project area, it is expected that such reduction would be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Aquashicola Project.

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10. MAIDEN CREEK PROJECT

a. Description. The Maiden Creek Project site is located on Maiden Creek about 1/3 mile upstream from its confluence with Moselem Creek and about 12 miles north of Reading, Pennsylvania. The proposed project would be a multiple-purpose development to provide supplies of water, flood control and recreation. Reservoir capacity to spillway crest level would be 114,000 acre-feet; 2,000 acre-feet inactive, 74,000 acre-feet for supplies of water and recreation, and 38,000 acre-feet for flood control. It would be formed by an earth and rock fill dam 2,600 feet long and rising 110 feet above the creek bed, and have a spillway about 400 feet east of the dam and gate-controlled outlet works discharging through a conduit on rock along the left abutment. The project would contribute to: (1) the satisfaction of the future water supply needs of downstream areas especially the Reading-Pottstown and Philadelphia areas; (2) the reduction in flood damages of especial importance to such damage centers as Reading, Pottstown, Norristown, and Philadelphia; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Maiden Creek Project would be required by the year 1982.

b. Economic life. The economic life of the Maiden Creek Project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction, excluding $3,250,000 for indirectly related recreation, is $27,600,000; the estimated cost of operation and maintenance is $130,000 annually; and the estimated cost of major replacement is $7,000 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The benefit-cost ratio of the Maiden Creek Project for a 50-year economic life is 1.1 and for a 100-year economic life it is 1.3. Capital costs, operation and maintenance costs, replacement costs, and benefits for 50 years and 100 years are as follows:

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	Amortization Period	
	50 Years	100 Years
CONSTRUCTION EXPENDITURES	$27,600,000	$27,600,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction	1,170,000	965,000
Operation and Maintenance	130,000	130,000
Major Replacements	7,000	10,000
Economic Cost of Lands	76,000	69,000
Total Annual Charges	1,390,000	1,180,000
ANNUAL BENEFITS		
Reduction of Flood Damages	243,000	254,000
Recreation, directly related	424,000	424,000
Supplies of Water	826,000	903,000
Total Annual Benefits	1,490,000	1,580,000
BENEFIT-COST RATIO	1.1	1.3

Notes: Costs and benefits for indirectly related recreation are excluded.
All amounts rounded; totals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8%, used in determination of annual costs, where applicable, and discounting of future benefits.

e. Intangible project effects. Intangible project effects of the Maiden Creek Project include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Maiden Creek Project to control 55% of the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at the Maiden Creek Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Maiden Creek Project would essentially be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report the acres of land that would be required to replace wildlife resources in kind. No monetary equivalent for means of recovering such damages is presented.

f. Physical feasibility and cost of providing for future needs. The Maiden Creek Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood damages, recreation, and supplies of water over the economic life of the project. No provision has been made for later or phased construction at the Maiden Creek Project to satisfy known additional future requirements in the area served by the project since it was found uneconomic to do so. Analysis of the water control requirements in the Schuylkill River Basin indicated that the satisfaction of additional or future requirements would be more economically

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achieved through the orderly development of the Blue Marsh Project, as recommended herein, than through the extension of the scale of development or phased construction of the Maiden Creek Project.

g. Allocations of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method, (2) the priority of use method, and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-7. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960, at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $9,750,000 for construction expenditures, and $94,000 annually for operation, maintenance and replacement during the period of deferred use of future water supplies and $83,000 annually after use of the future water supplies is initiated.

i. Repayment schedules for reimbursable costs. The reimbursable cost for the Maiden Creek Project includes a construction cost of $17,800,000 for supplies of water. Alternative re-

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TABLE AA-7

ALLOCATIONS OF COST FOR MAIDEN CREEK PROJECT[1/]

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period = 50 Years				Amortization Period = 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$ 244,000	$ 424,000	$ 833,000	$ 1,500,000	$ 255,000	$ 424,000	$ 910,000	$ 1,590,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	233,000	256,000	733,000	1,220,000	200,000	205,000	587,000	992,000
b. Annual O & M and Replacement Costs	17,000	66,000	55,000	138,000	18,000	68,000	55,000	141,000
c. Specific Use Construction Expenditures	-	2,440,000	-	2,440,000	-	2,440,000	-	2,440,000
d. Joint-Use Facility Constr. Expenditures	5,610,000	1,700,000	17,800,000	25,200,000	6,060,000	1,160,000	17,900,000	25,200,000
e. Total Constr. Expenditures (First Cost)	5,610,000	4,140,000	17,800,000	27,600,000	6,060,000	3,600,000	17,900,000	27,600,000
PRIORITY OF USE METHOD [2/]								
1. BENEFITS	244,000	424,000	833,000	1,500,000	255,000	424,000	910,000	1,590,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	244,000	279,000	700,000	1,220,000	255,000	255,000	482,000	992,000
b. Annual O & M and Replacement Costs	18,000	68,000	52,000	138,000	24,000	72,000	45,000	141,000
c. Specific Use Construction Expenditures	-	2,440,000	-	2,440,000	-	2,440,000	-	2,440,000
d. Joint-Use Facility Constr. Expenditures	5,910,000	2,280,000	17,000,000	25,200,000	7,780,000	2,670,000	14,700,000	25,200,000
e. Total Constr. Expenditures (First Cost)	5,910,000	4,720,000	17,000,000	27,600,000	7,780,000	5,110,000	14,700,000	27,600,000
INCREMENTAL COST METHOD [3/]								
1. BENEFITS	244,000	424,000	833,000	1,500,000	255,000	424,000	910,000	1,590,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	198,000	187,000	836,000	1,220,000	158,000	167,000	666,000	992,000
b. Annual O & M and Replacement Costs	15,000	61,000	62,000	138,000	15,000	64,000	62,000	141,000
c. Specific Use Construction Expenditures	-	2,440,000	-	2,440,000	-	2,440,000	-	2,440,000
d. Joint-Use Facility Constr. Expenditures	4,770,000	-	20,400,000	25,200,000	4,770,000	-	20,400,000	25,200,000
e. Total Constr. Expenditures (First Cost)	4,770,000	2,440,000	20,400,000	27,600,000	4,770,000	2,440,000	20,400,000	27,600,000

1/ Fish and Wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.

2/ Priority for assigning remaining costs: (1) reduction of flood damages; (2) directly related recreation; (3) supplies of water.

3/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2⅛% used in determination of annual costs and in discounting of future benefits.

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payment schedules acceptable to the Federal government for recovery of this cost are shown below:

Function	Construction Expenditures	Lump Sum	Annual Payment 1/	Deferred Lump Sum	Deferred Annual Payment 1/
Supplies of Water	$17,800,000 (rounded)				
Current Supply	9,570,000	$9,570,000	$360,000	N. A.	N. A.
Deferred Supply	8,279,000	8,279,000	311,000	$8,948,000 2/	$336,000

1/ Assumes Federal financing of such costs at 2-5/8%, amortization period 50 years.

2/ Initiation of use of deferred supply estimated at 13 years after project completion. Accrual of 3 years interest added to deferred supply total cost.

N. A. - not applicable.

In addition, non-Federal interests would be required to contribute $44,000 annually for the cost of operation, maintenance and replacement during the period of deferred use of future water supplies and $55,000 annually after use of the future water supply is initiated.

j. Effect of project on state and local governments.

There are no major changes expected in the cost of state and local government services as a result of the Maiden Creek Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the tax revenues resulting from Federal acquisition of lands in the Maiden Creek Project area, it is expected that such reduction would be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Maiden Creek Project.

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11. BEAR CREEK PROJECT.

a. Description. The Bear Creek Project is a modification of the single-purpose flood control project with incidental recreation use now under construction, which is located on Lehigh River 75 miles above its confluence with Delaware River and about 5 miles north of White Haven, Pennsylvania. The proposed project would be a multiple-purpose development to provide for supplies of water and recreation in addition to the present flood control purpose. Reservoir capacity to spillway crest level would be 180,000 acre-feet; 2,000 acre-feet inactive, 70,000 acre-feet for supplies of water and recreation, and 108,000 acre-feet for flood control. The proposed modification would require alteration of the spillway, increasing the height of the dam, extending the outlet tunnel by the addition of a concrete conduit, and constructing new and raising the heights of existing dikes. The modified dam would rise 263 feet above the river bed and be 3,500 feet long. The modified project would contribute to: (1) the satisfaction of the future water supply needs of downstream areas especially the Allentown-Bethlehem and the Trenton-Philadelphia areas; (2) the reduction in flood damages in the downstream areas of especial importance to the highly industrialized Allentown, Bethlehem, and Easton areas; and (3) the satisfaction of the desire for nonurban recreation facilities of the surrounding population. The Bear Creek Project would be required by the year 1989.

b. Economic life. The economic life of the Bear Creek Project from the time modifications are completed and including features of the existing project as used in project analysis is 50 years.

c. Project costs. The estimated cost of construction, excluding $875,000 for indirectly related recreation, is $20,100,000, which is made up of $11,100,000 for the cost of the project now under construction and $8,990,000 for the cost of modifications for multiple-purpose development. The total new construction expenditure required, including $4,460,000 for rehabilitation of the existing project would be $13,400,000. The estimated annual operation and maintenance cost is $117,000 and the estimated major replacement cost is $3,000 annually. All costs are computed on the basis of 1959 price levels.

d. Benefit-cost ratios. Benefit-cost ratios were computed using total tangible benefits and total costs reflecting various interest rates applied to Federal and non-Federal interests for 50 years and 100 years. The economic justification for the Bear Creek Project was based on the premise that the modification constituted a second stage of development and rehabilitation to provide feasible comprehensive development with a 50-year life expectancy. The benefit-cost ratio of the Bear Creek Project for a 50-year economic life is 2.6 and for a 100-year economic life it is 3.3. Capital costs,

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operation and maintenance costs, replacement costs and benefits for 50 years and 100 years are as follows:

	Amortization Period	
	50 Years	100 Years
NEW CONSTRUCTION EXPENDITURES	$ 13,400,000	$ 13,400,000
ANNUAL CHARGES		
Interest and Amortization (including interest during construction)	577,000	467,000
Operation and Maintenance	117,000	117,000
Major Replacements	3,000	4,000
Economic Cost of Land	17,000	16,000
Total Annual Charges	714,000	603,000
ANNUAL BENEFITS		
Reduction of Flood Damages	427,000	427,000
Recreation, directly related	161,000	161,000
Supplies of Water	1,290,000	1,380,000
Total Annual Benefits	1,880,000	1,970,000
BENEFIT-COST RATIO	2.6	3.3

Notes: Costs and benefits for indirectly related recreation are excluded.
All amounts rounded; t tals may not agree with sums of individual items due to rounding.
Interest rate of 2-5/8% used in determination of annual costs, where applicable, and discounting of future benefits.

e. Intangible project effects. Intangible project effects of the Bear Creek Project would include: a contribution to the prevention of loss of life, which amounted to 99 lives lost throughout the Delaware River Basin in the August 1955 flood; assurance values from assigning adequate flood control storage capacity at the Bear Creek Project to completely control the standard project flood to non-damaging proportions so as to avoid a false sense of security from floods among the residents in the urban downstream reaches; and the value of the provision for sufficient site development at Bear Creek Project to insure the realization of optimum recreation benefits. Adverse effects resulting from the Bear Creek Project essentially would be a consequence of the damages expected to fish and wildlife resources in the project area. There is presented in appendix J to this report a discussion of how such damages attributable to other projects in the plan of development might be mitigated. No monetary equivalent for means of recovering such damages is presented.

f. Physical feasibility and cost of providing for future needs. The Bear Creek Project has been formulated to contribute to the satisfaction of current and future needs for reduction of flood

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damages, recreation, and supplies of water over the economic life of the project. No provision has been made for further modification at the Bear Creek Project to satisfy known additional future requirements in the area served by this project since it was found uneconomic to do so

g. Allocation of costs. Allocation of costs were computed by (1) the separable costs-remaining benefits method, (2) the priority of use method, and (3) the incremental cost method on two time periods for amortization, 50 years and 100 years. The cost allocation data are shown in table AA-8. In the incremental cost method of allocation, supply of water was considered the basic function because the scheduled date for development of the project is based on the anticipated need for supplies of water.

h. Extent of interest in project. In order to take into account the desires and views of Federal agencies, affected states and municipalities, during the survey and the preparation of the survey report, the District Engineer formally established the Delaware Basin Survey Coordinating Committee. This Committee was comprised of representatives of the States of Pennsylvania, New York, New Jersey, and Delaware; of the cities of Philadelphia and New York; and of the various Federal agencies concerned with water resources. Ten meetings of the Committee, which were open to the public, were held at about four-month intervals from April 1957 to March 1960 at various points throughout the Delaware River Basin and service area. Federal agencies, states and municipalities were informed at these various meetings as to the progress of the study and given the opportunity to review and comment on the features of the comprehensive plan. Also, a formal review procedure assured each member of the Coordinating Committee ample time to comment on the major features of the studies as they were reported on in the 24 appendices to the report. At the conclusion of the studies four public hearings were held in the basin to advise local interests of the findings of the study and afford them opportunities to express their views. It is believed that these interests are in general agreement with the plan presented. Under the review procedures prescribed for this survey report, local interests will have additional opportunity for comment on the features of the plan and cost sharing arrangements. Federal participation in this project has been estimated at $4,330,000 for new construction expenditures, and $85,000 annually for operation, maintenance, and replacement costs during the period of deferred use of future water supplies and a total of $55,000 annually after use of the future water supplies is initiated.

i. Repayment schedules for reimbursable costs. The reimbursable cost for the Bear Creek Project would include a construction cost of $9,110,000 for supplies of water. Alternate

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TABLE AA-8

ALLOCATIONS OF COST FOR BEAR CREEK PROJECT 1/

(All amounts rounded; totals may not agree with sums of individual items due to rounding)

	Amortization Period = 50 Years				Amortization Period = 100 Years			
	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total	Reduction of Flood Damages	Recreation (Directly Related)	Supplies of Water	Total
SEPARABLE COSTS - REMAINING BENEFITS METHOD								
1. BENEFITS	$1,060,000	$ 161,000	$ 1,300,000	$ 2,520,000	$ 1,060,000	$161,000	$ 1,390,000	$ 2,610,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	409,000	60,000	404,000	872,000	323,000	53,000	330,000	706,000
b. Annual O & M and Replacement Costs	31,000	25,000	64,000	120,000	31,000	26,000	65,000	121,000
c. Specific Use Construction Expenditures	-	595,000	-	595,000	-	595,000	-	595,000
d. Joint-Use Facility Constr. Expenditures	10,100,000	229,000	9,110,000	19,500,000 2/	10,100,000	210,000	9,170,000	19,500,000 2/
e. Total Const. Expenditures (First Cost)	10,100,000	824,000	9,110,000	20,100,000 2/	10,100,000	805,000	9,170,000	20,100,000 2/
PRIORITY OF USE METHOD 3/								
1. BENEFITS	1,060,000	161,000	1,300,000	2,520,000	1,060,000	161,000	1,390,000	2,610,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	454,000	305,000	313,000	872,000	361,000	96,000	248,000	706,000
b. Annual O&M and Replacement Costs	53,000	30,000	37,000	120,000	53,000	32,000	36,000	121,000
c. Specific Use Construction Expenditures	-	595,000	-	595,000	-	595,000	-	595,000
d. Joint-Use Facility Constr. Expenditures	10,700,000	1,340,000	7,400,000	19,500,000 2/	10,600,000	1,530,000	7,310,000	19,500,000 2/
e. Total Const. Expenditures (First Cost)	10,700,000	1,940,000	7,400,000	20,100,000 2/	10,600,000	2,120,000	7,310,000	20,100,000 2/
INCREMENTAL COST METHOD 4/								
1. BENEFITS	1,060,000	161,000	1,300,000	2,520,000	1,060,000	161,000	1,390,000	2,610,000
2. ALLOCATION OF COSTS:								
a. Annual Economic Costs	398,000	49,000	425,000	872,000	316,000	44,000	346,000	706,000
b. Annual O & M and Replacement Costs	30,000	23,000	67,000	120,000	30,000	24,000	67,000	121,000
c. Specific Use Construction Expenditures	-	595,000	-	595,000	-	595,000	-	595,000
d. Joint-Use Facility Constr. Expenditures	9,920,000	-	9,570,000	19,500,000 2/	9,920,000	-	9,570,000	19,500,000 2/
e. Total Const. Expenditures (First Cost)	9,920,000	595,000	9,570,000	20,100,000 2/	9,920,000	595,000	9,570,000	20,100,000 2/

1/ Fish and wildlife benefits and costs discussed in Appendix J. No monetary equivalent given.
2/ Includes existing flood control project cost of $11,100,000.
3/ Priority for assigning remaining costs: (1) reduction of flood damages, (2) directly related recreation, (3) supplies of water.
4/ Supplies of water considered the basic function to which all remaining costs are assigned.

NOTE: Interest rate of 2⅞% used in determination of annual costs and discounting of future benefits.

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repayment schedules acceptable to the Federal government for the recovery of this cost are shown below:

Function	Construction Expenditure	Lump Sum	Annual Payment 1/	Deferred Lump Sum	Deferred Annual Payment 1/
Supplies of Water	$9,110,000 (rounded)				
Current Supply	3,087,000	$3,087,000	$116,000	N. A.	N. A.
Deferred Supply	6,026,000	6,026,000	226,000	$6,026,000 2/	$226,000

1/ Assumes Federal financing of such costs at 2-5/8%, amortization period 50 years.
2/ Initiation of use of deferred supply within ten-year interest free period.
N. A. = not applicable.

In addition, non-Federal interests would be required to contribute $34,000 annually for the cost of operation, maintenance and replacement during the period of deferred use of future water supplies and $64,000 annually after use of the future water supplies is initiated.

j. Effect of project on state and local governments. There are no major changes expected in the cost of state and local government services as a result of the Bear Creek Project. Any increased costs of state and local services associated with the project have been taken into account in the estimate of annual operation and maintenance costs for the project. While there may be reductions in the revenues resulting from Federal acquisition of lands in the Bear Creek Project area, it is expected that such reductions would be more than compensated for through increased activity, directly and indirectly associated with the multiple-purpose development features of the Bear Creek Project.

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D E L E T I O N S

Paragraphs 12, 13 and 14 previously appearing on Pages AA-43 thru AA-48 have been deleted.

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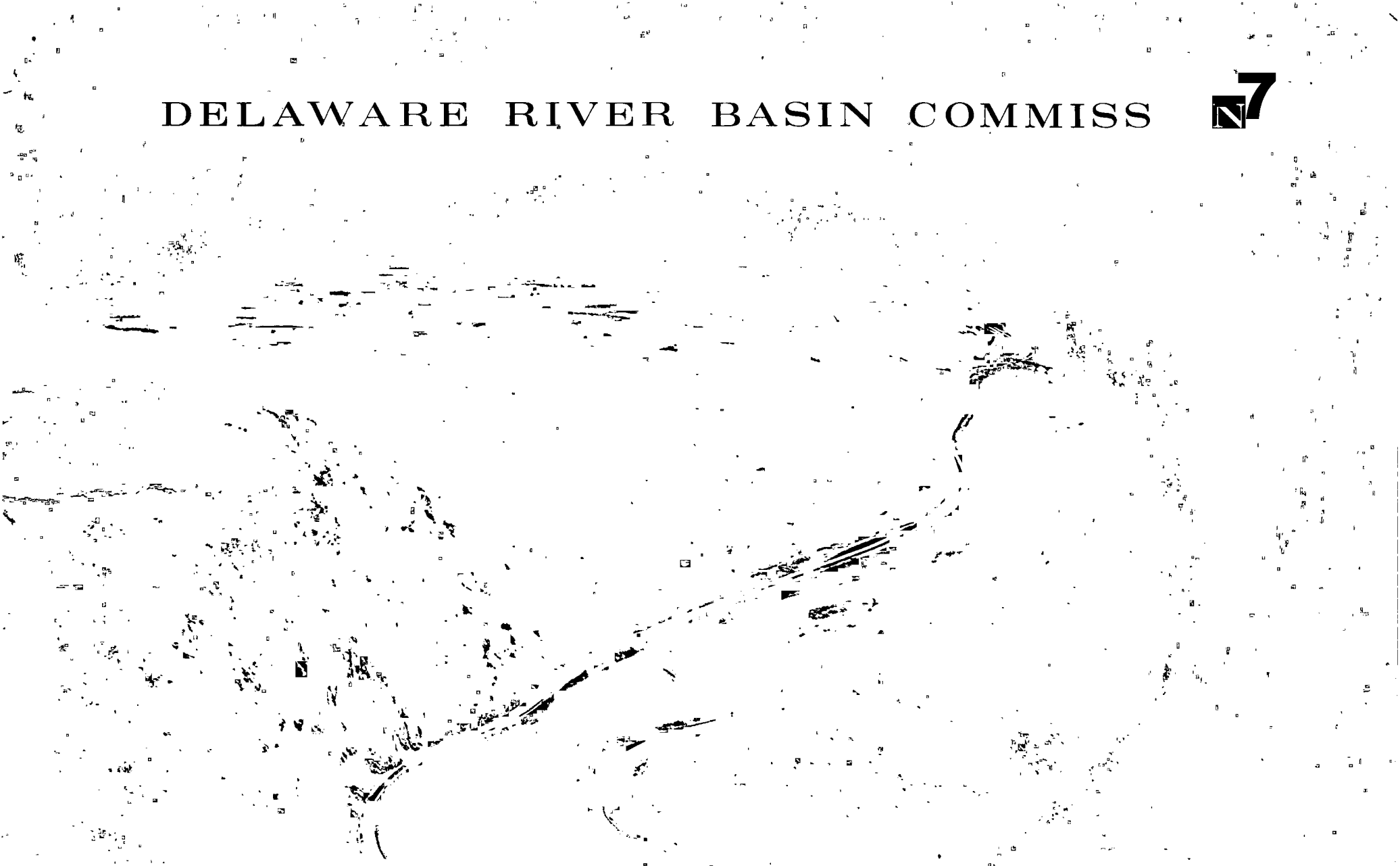
DELAWARE RIVER BASIN COMMISS



Annual Report 1963

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Scene on Upper Delaware

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Cover: Looking south from the Delaware Water Gap.

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Introduction

This First Annual Report of the Delaware River Basin Commission is presented to the people of the Basin and to the Congress of the United States and the Legislatures of the Commonwealth of Pennsylvania and the States of New York, Delaware and New Jersey. The United States Government and the States are the five signatory parties to the 1961 Delaware River Basin Compact, the authority under which the Commission was established.

The period actually covered by this report is from the first organization meeting of the Commission at Princeton, N.J., on December 13, 1961 through the fiscal year ending on June 30, 1963. The Commission's governing body, made up of the Governors of the signatory states and a Federal Commissioner appointed by the President of the United States, each with a voting Alternate Commissioner, was in existence throughout the period covered by this report. However, most of the 1961-1962 fiscal year had passed before the first staff employee of the Commission was engaged in the Spring of 1962.

The principal theme of this report is BUILDING A SOUND FOUNDATION for a long-range river system planning, development and management agency. In a phrase, this theme summarizes the dominant consideration of both the policy-guiding governing body and the professional staff of the Commission since its formation. Laying the foundation has involved a vast combination of administrative organizing, staffing, compiling knowledge about the Basin, early programming, and establishing cooperative relations with agencies of the signatory parties and with the great variety of persons and organizations outside the overnment structure that share the Commission's interests.

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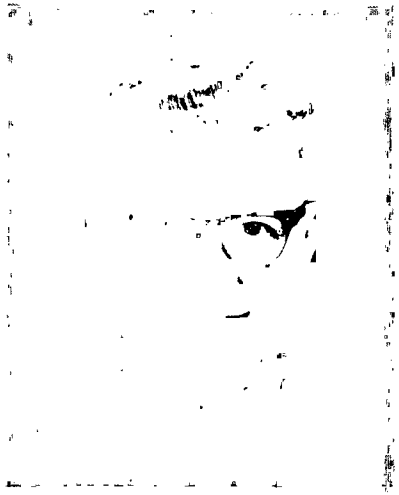
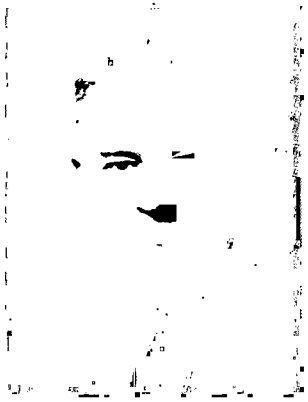
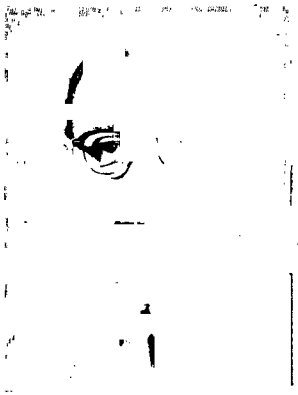


Richard J. Hughes†
Governor of New Jersey

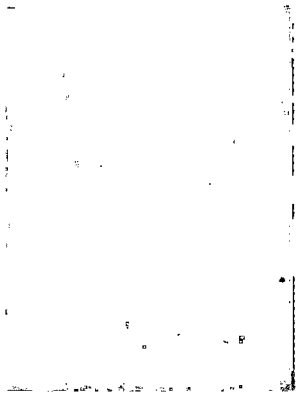
H. Mat Adams, *Alternate*





Vernon D. Northrop,
Alternate

Col. Elmer P. Yates,
Advisor



Chairman

Stewart L. Udall *
U.S. Secretary of Interior

William W. Scranton†
Governor of Pennsylvania

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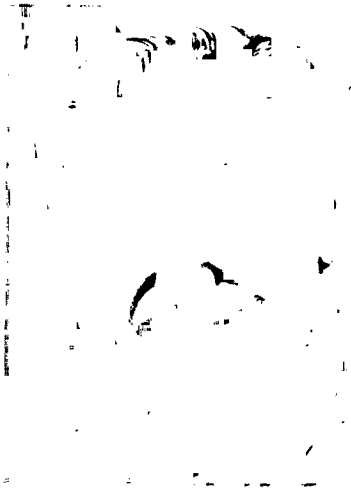
The Commission · 1963

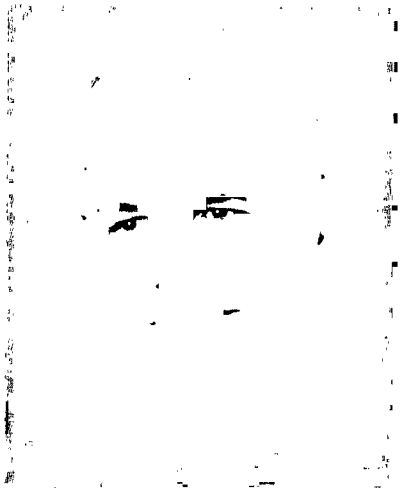


Nelson A. Rockefeller †
Governor of New York

Vice Chairman

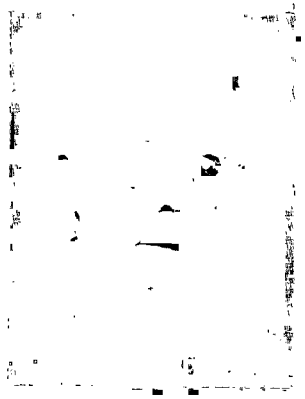
Harold G. Wilm, *Alternate*

Arthur C. Ford, *Advisor*



Elbert N. Carvel †
Governor of Delaware

Norman M. Lack, *Alternate*



Maurice K. Goddard, *Alternate*

William L. Rafsky, *Advisor*

* By appointment of The President
† Ex officio

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The Delaware Basin Compact

The success story to establish a strong regional action agency representing the interests of every one who relies upon or is concerned with the resources of the great Delaware River system began in July 1955

It was in that month, only weeks before the Valley's worst flood disaster struck on the weekend of August 19, that he Chief Executives of the Commonwealth of Pennsylvania and states of New York, Delaware and New Jersey and the Cities of Philadelphia and New York agreed to unite in a drive to seek Basinwide solutions to the water resource problems of the Delaware Valley. This agreement resulted in the establishment of the Delaware River Basin Advisory Committee, with one member each appointed by Mayors Robert F. Wagner Jr. of New York and Joseph S. Clark of Philadelphia, now the senior U.S. Senator from Pennsylvania, and Governors Robert B. Meyner of New Jersey, George M. Leader of Pennsylvania, J. Caleb Boggs of Delaware and W. Averell Harriman of New York.

The Advisory Committee's original membership comprised Thomas Morgan for New York State, John P. Robin for Pennsylvania, James Kerney Jr. for New Jersey, General Norman M. Lack for Delaware, Major Irving Huie for New York City and Gilbert F. White for Philadelphia.

The first chairman was Mr. Morgan, followed by Mr. Kerney and later by Mr. Robin, who headed the Committee for the longest period and during the 1960-1961 compact negotiations. Walter M. Phillips was the Committee's Executive Secretary throughout its six-and-one-half-year period of existence. Subsequent Advisory Committee members were Arthur C. Ford for New York City; Thorndike Saville and State Conservation Commissioners Sharon Mauhs and Harold G. Wilm for New York State; State Conservation Commissioners Joseph E. McLean, Salvatore A. Bontempo and H. Mat Adams for New Jersey, and Senator Clark and William L. Rafsky for Philadelphia. Senator Clark was named to the Committee by Richardson Dilworth, his successor as Mayor of Philadelphia.

Establishment of the Advisory Committee meant that for the first time the many governmental jurisdictions within the four-state, 12,750 square-mile Basin area had agreed upon a unified approach to the comprehensive development and control of the river system.

Absence of a regional effort left the downstream jurisdictions and New York City, which draws about a third of its water supply from the Delaware headwaters, with no place but the U.S. Supreme Court to settle their water rights disputes. It meant runoff of vast quantities of precious water into the Atlantic Ocean in wet periods instead of storage for the supply-short dry spells that invariably follow. It meant severe hardships from flooding, an annual occurrence in many areas, rather than an enlightened Valleywide flood damage reduction program. If left millions of citizens without the advantage of widespread water-based recreation that could be made available.

In the wake of the flood devastation in August 1955 that took 99 lives and inflicted more than $100 million in property damage came a public clamor reflected by the Congress' quick action in directing the Army Corps of Engineers, in cooperation with other Federal agencies, to fashion a comprehensive physical plan to develop and control the Delaware's resources.

It is a tribute to the foresight of the four Governors and two Mayors that their action in creating the Advisory Committee did not wait until disaster struck. Yet, without question, the fear of a recurrence of that tragedy played a major role in the progress of the Basin planning activities in the eight years that have followed.

While the Advisory Committee was busy concerning itself with the legislative and governmental aspects of the basin planning job ahead, the Corps of Engineers and 18 other Federal agencies were working on the study and report, at a cost of several million dollars, to solve the physical problems involved.

On July 10, 1958 the same Governors and Mayors convened at Washington Crossing, Pa., in the first of a series of "summit" meetings to hear a progress report on the activities of the Advisory Committee and the Corps' study.

By this time, another study, into the type of governmental organization that should be created as a permanent Basin agency, was well under way at the Maxwell Graduate School of Syracuse University. The Water Research Foundation of the Delaware River Basin, a non-government group which the Advisory Committee helped found, had contracted with Syracuse for the study after securing a $131,000 Ford Foundation grant to finance

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. . . why and how

it. Mr. Kerney had become Executive Vice President of the Water Research Foundation, and the Syracuse study team had been organized under the direction of Dr. Roscoe C. Martin, Professor of Political Science.

Meanwhile, the efforts to alert prominent citizens, organizations and the general public to the needs of the Valley received a boost with the formation in May 1959 of the Water Resources Association of the Delaware River Basin, a non-profit and non-partisan citizen group dedicated to the Basin's orderly development. This group was later to become increasingly active as the "best friend and severest critic" of the Commission.

The second "summit" meeting was held in Philadelphia on September 30, 1959, at which the Chief Executives, now including Governors Nelson A. Rockefeller of New York and David L. Lawrence of Pennsylvania, received the Syracuse report, "River Basin Administration and the Delaware," and accepted a recommendation for a joint federal-state Commission to be created by compact between the states and Federal Government. After deciding on this recommendation, the Governors and Mayors directed the Advisory Committee to draft the necessary legislation.

The recommendation for the establishment of a Commission attracted immediate widespread attention, mainly due to the unique arrangement under which the Basin states and the Federal Government were for the first time in the Nation's history to join hands as essentially equal operating partners in a river planning and development agency.

In December 1960 the Corps completed its report. This dramatic document, 11 volumes in length, advocated a 50-year development program of 58 water control projects at a cost of $591 million to reduce flood damage, to augment stream flows and increase water supplies, to provide 41,000 acres of additional recreation waters, and to produce millions of kilowatt hours annually in conventional hydroelectric power. The Corps assignment did not encompass such political and policy issues as what kind of government arrangement should be made to implement the plan and how its recommendations might be financed. These problems had been placed in the lap of the Advisory Committee.

Within three months after the Corps completed its findings, the Advisory Committee unveiled its compact draft at a third "summit" meeting, also in Philadelphia, on February 1, 1961. This meeting brought another new chief executive, Governor Elbert N. Carvel of Delaware, into the Basin's planning picture. The Compact draft was officially received and endorsed by the Governors and Mayors, and by nightfall had already been introduced in the legislature of one state, New York.

On November 2, 1961, former Govs. Meyner, Carvel and Lawrence joined President Kennedy at the White House for a formal Compact signing ceremony.

Each Commissioner is authorized by the Compact to name an advisor. Representatives of New York City and Philadelphia have been designated as Advisors to the Commissioners of their respective states in recognition of their deep interest in the Basin's resources and Commission's activities. The U.S. Commissioner designated a representative of the Corps of Engineers.

Before the summer months had passed, the Compact had won the approval of both houses of the legislative branches of all four states and the Congress and had been signed by the four Governors, each of whom had thrown full support behind the plan in his own state. It was record speed for a compact approval.

On September 27, 1961, President John F. Kennedy added his signature to the Congressional action. Thirty days later, on October 27, the Delaware Basin Compact was law. A White House Compact-signing ceremony, attended by representatives of all the five signatory parties, was held on November 2, 1961. *

Less than six weeks later, on December 13, 1961, the historic first meeting of the Delaware River Basin Commission, fittingly ceremonial, was held in Princeton. Its mission achieved, the Advisory Committee was dissolved, although two of its staff members were later to move into key Commission positions -- William Miller as General Counsel and W. Brinton Whitall as Secretary.

* *United States: Public Law 87-328, Approved September 27, 1961, 75 Statutes at Large 688.*
Delaware: 53 Delaware Laws, Chapter 71, Approved May 26, 1961.
New Jersey: Laws of 1961, Chapter 13, Approved May 1, 1961.
New York: Laws of 1961, Chapter 148, Approved March 17, 1961.
Pennsylvania: Acts of 1961, Act No. 268, Approved July 7, 1961.

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The Commission's Early Decisions

Former Gov. Lawrence

Former Gov. Meyner

Shortly before 11:00 o'clock on the morning of December 13, 1961 the original membership of the Delaware Basin Commission, seated in a large conference room off the lobby of Princeton's Nassau Inn, responded to its first roll call. The opening of this meeting between Governors Lawrence, Meyner and Rockefeller, Secretary of Interior Udall and a representative of Governor Carvel signaled a new era for conservation and water resource development in the heavily-populated and still fast-growing river valley. Governor Lawrence was elected as the Commission's first Chairman and Secretary Udall as Vice Chairman for the year 1962.

The event meant that for the first time the focus of all major water resource activities in the Basin by the Federal Government and the states would be located beneath the roof of a single authority. There was at last foreseeable a united and coordinated Valleywide assualt on the problems involving flood control, water supply, anti-pollution, water-related recreation, fish and game propagation and protection, development of hydroelectric power and promotion of forestry, watershed and soil conservation programs.

The Commissioners immediately assigned their Alternate Commissioners to find a permanent executive director and provided for the interim operation of the Commission by the temporary staff appointments of three leading figures of the Compact negotiation period -- John P. Robin as Acting Executive Director, Walter M. Phillips as Acting Secretary and William Miller as Acting General Counsel.

The first organization meeting was the only Commission session held while Governor Meyner was in office. Upon turning his post over to Governor Richard J. Hughes a month later, he cited in his farewell message the agency's creation as a "proud" achievement of his Administration.

The March 28, 1962 meeting of the Commission was also important. This session, Governor Hughes' first, resulted in the appointment of James F. Wright, then Chief Deputy Director of the California Water Resources Department, as Executive Director; the selection of Trenton, New Jersey's capital city, as the location of the Commission's permanent headquarters, and adoption of current expense budgets of $80,000 for fiscal 1962 and $33,000 for fiscal 1963.

Still another major result of the March meeting was the unanimous approval of the 20-point First Phase Comprehensive Plan, the preparation of which had been ordered by the Commissioners only three and one-half months earlier and which included the Tocks Island Reservoir on the main stem of the river just north of the Delaware Water Gap. The Tocks Island project is one of a dozen multi-purpose dam and reservoir proposals incorporated in the Commission's Comprehensive Plan as the result of recommendations by the Corps of Engineers' report of 1960. The remaining eight projects included in the Comprehensive Plan adopted at the March meeting are local watershed control efforts in Pennsylvania, New Jersey and Delaware in which local authorities have teamed with the U.S. Soil Conservation Service and, in most cases, the U.S. Forestry Service,

Lt. Gen. W. K. Wilson Jr., Chief of Army Engineers, confers with five Delaware Basin Commissioners before their 1963 reorganization meeting at Wilmington.

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. . . charting the course

under Public Law 566.

Four months hence, the Commission was to make its first addition to its Comprehensive Plan by adding to it a large number of pre-existing projects such as municipal water supply and waste disposal facilities, non-urban recreation areas, river stage and stream gauging stations and, on an interim basis, the water quality standards that had been produced in the early 1940s by the Interstate Commission on the Delaware River Basin (Incodel).

It was a month later that the Commission exercised for the first time its Compact power to pass upon projects initiated by non-Commission sources, public or private, to insure that they confrom to the Commission's Comprehensive Plan. This Commission power was first employed in approving the application of the City of Philadelphia to build a new addition to its Northeast Sewage Treatment Works. The Compact provision involved was Section 3.8, known as the "project review" clause.

At the August 29, 1962 meeting the Commission took its first action on a matter involving hydroelectric power in the Basin. In another exercise of its project review function under the Compact, it granted an application by a group of New Jersey utility companies to construct a pumped-storage project using water from Yards Creek, a short distance over the Kittatinny Ridge from the projected location of the Tocks Island dam.

At the same meeting, the Commission issued a historic decision involving the first out-of-basin water diversion authorized by an administrative agency, breaking the pattern of such rulings emanating from judicial or legislative halls. Transfer of diversion disputes to an agency where settlements could be shaped by the affected parties themselves had been a goal of the Compact's framers. The decision permitted a water company to divert up to a billion gallons yearly during high flow periods from Bear Creek in the Delaware Basin to supply a new industrial area in the Susquehanna Basin.

In keeping with the Compact's concern for fish and game values in the Basin, the Commission, at a meeting in the Poconos attended by Governors Lawrence and Carvel, went on record in September 1962 urging the U.S. Fish and Wildlife Service to analyze and evaluate data collected in a Tri-State fisheries study launched in the Basin in 1959.

At the same session, the Commission also prepared for the fiscal needs of 1963-64 by adopting a $530,000 budget.

The Commission's November 28, 1962 session was marked by an announcement that the States of Pennsylvania and Delaware, under Commission auspices, had come to an agreement that the Brandywine Valley project would be developed by Pennsylvania in such a manner as to protect the downstream interests of the State of Delaware. The Brandywine project is one of the eight local watershed development programs in the Commission's Comprehensive Plan.

The 1963 reorganization was held February 27 at Wilmington and was the first Commission session ever attended by all four Governors and Secretary Udall, who was elevated to the Chairmanship to succeed Governor Lawrence. Governor Rockefeller became Vice Chairman. It was Governor Scranton's first Commission meeting. Despite the turnover in Commission membership from two states during the first 13 months of the Commission's existence, continuity in the operation of the new agency's day-to-day affairs throughout the period covered by this first report was assured by the retention of all five original Alternates.

The new Chairman's address reviewed the growth and accomplishments of the Commission in relation to national needs and programs and stressed the important role that lay ahead for the Commission in helping to frame broad regional goals. The Executive Director reported on the progress in assembling his staff, and alerted the Commission to important policy considerations lying ahead in the fields of flood loss reduction, hydroelectric power, water quality improvement and the financing of water supply and recreation costs.

In April 1963 Colonel Truman H. Setliffe retired from the Corps of Engineers after nearly four years' service as Philadelphia District Engineer, during which he played an important role in the Basin planning efforts. He was succeeded both as District Engineer and as Advisor to the U.S. Commissioner by Colonel Elmer P. Yates, former Chief of the Atomic Division in the Army's Research and Development Office. Throughout the period covered by this report Arthur C. Ford was New York City's Advisor to the New York State Commissioner and William L. Rafsky of Philadelphia was Advisor to the Pennsylvania Commissioner.

Col. T. H. Setliffe

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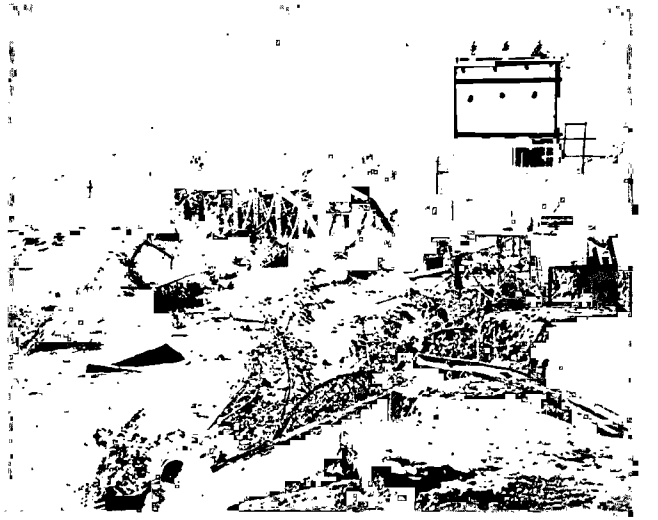
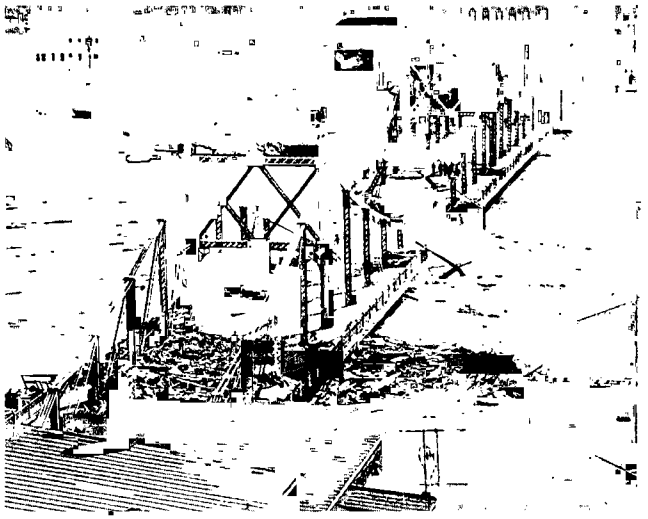
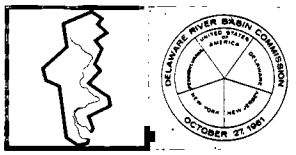




Provoked by a one-two hurricane punch, the flood torrents of August 1955 found bridges from Trenton north a favorite target. A span across Brodhead Creek at Stroudsburg was ripped from its moorings (top right), while the swollen Delaware tore the old Phillipsburg-Easton free bridge in half (center). The Washington Crossing span north of Trenton managed to survive the record flows (bottom), although a long shutdown for repairs was required.



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Highlights

Many of the significant events and decisions of the past 18 months that will affect future activities in the Delaware Basin occurred far beyond the doors of the Commission's headquarters at Trenton and outside the Commission meeting rooms. Some took place in the halls of Congress or in the legislatures of the other four signatory jurisdictions, while others occurred in government executive offices. Three decisions involved the President of the United States. Some important occurrences involved gatherings of private organizations.

Here is a chronology of events affecting the Valley during the past year-and-a-half:

April 15, 1962—The U. S. Public Health Service opens its offices in Philadelphia to begin a major water quality study of the Delaware River estuary in which the Commission is actively participating.

June 21, 1962—Representative Francis E. Walter of Pennsylvania, who died May 31, 1963, introduces the first bill in Congress calling for establishmest of a vast National Recreation Area at the Tocks Island Reservoir. A companion proposal is introduced on July 11 in the Senate by U. S. Senators Joseph S. Clark and Hugh Scott of Pennsylvania, Clifford P. Case and Harrison A. Williams Jr. of New Jersey and Jacob K. Javits of New York.

August 27, 1962—The Corps of Engineers submits its request to Congress for authorization of eight major Delaware Basin dam projects in the Commission's Comprehensive Plan carrying a total cost figure of $224 million and each with federal aid flood control features. These are projects one through eight in the Comprehensive Plan adopted by the Commission on March 28, 1962.

October 4, 1962—U. S. Senate and House Appropriations Committee conferees clear a Corps of Engineers' request for $100,000 in advance engineering and design funds for the Beltzville Reservoir in the Lehigh Valley, but, at the same time, failed to approve a similar request of $200,000 to begin work at Tocks Island.

October 23, 1962—President Kennedy signs into law the Congressional authorization of the eight Delaware Valley projects from the Commission's Comprehensive Plan.

October 25, 1962—An appropriation of $100,000 for initial work on the Beltzville Dam project is approved by President Kennedy.

. . . away from home

November 16, 1962—The Corps of Engineers at Philadelphia announces the signing of contracts for an aerial survey and core drilling, pressure testing and test boring to determine the nature of sub-surface materials at the Beltzville Reservoir site.

November 29, 1962—Channel 13, New York City's educational television outlet, produces show on the Tocks Island Reservoir plan, featuring appearances by U. S. Senator Williams of New Jersey and officials of the Corps of Engineers, National Park Service and the Commission. Maintaining its interest in the Delaware Valley, Channel 13 broadcasts a program on "What the Commission's Comprehensive Plan Means to New Jersey" on April 24, 1963.

January 1, 1963—Incodel closes the doors of its Philadelphia offices after more than a quarter-century of operation under Executive Secretary James H. Allen, during which its principal activities were in the field of water quality. The staff and assets of Incodel are absorbed by the new Delaware Basis Commission.

January 17, 1963—In his annual Budget Message to the Congress, President Kennedy asks for a $250,000 appropriation for design and engineering work on the now-authorized Tocks Island Dam and for $240,000 in additional funds for the Beltzville project. (As of the publication of this report, these proposals were still before the Congress).

January 21, 1963—Representative Walter reintroduces his Tocks Island Recreation legislation, and his action is followed quickly by similar moves on the part of Representative John P. Saylor of Pennsylvania and five basin Senators, Messrs. Scott, Clark, Javits, Case and Harrison Williams.

May 27-29, 1963—National Watershed Congress for 1963 is held in Philadelphia with emphasis on the Delaware Basin Compact and other affairs in the Valley.

June 25, 1963—The Natural Resources and Power Subcommittee of the U. S. House Government Operations Committee, under the Chairmanship of Representative Robert E. Jones of Alabama, schedules an on-site public hearing and inspection tour in the Delaware Basin as part of its nationwide investigation of water pollution problems.

June 30, 1963—As the fiscal year ended, the Kennedy Administration prepares to unveil its official endorsement of the National Recreation Area plan for the Tocks Island Reservoir.

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The Comprehensive Plan

The 100-year renewable duration of the Delaware Basin Compact is reflected in its requirement that the Commission maintain a Comprehensive Plan with sights trained on the needs in the distant future of the 22 million persons who live in the Basin and the area served by it. The Comprehensive Plan is thus the Commission's blueprint for orderly development of the Valley's water resources for all purposes and a means for averting crisis-provoked -- and usually inadequate -- solutions.

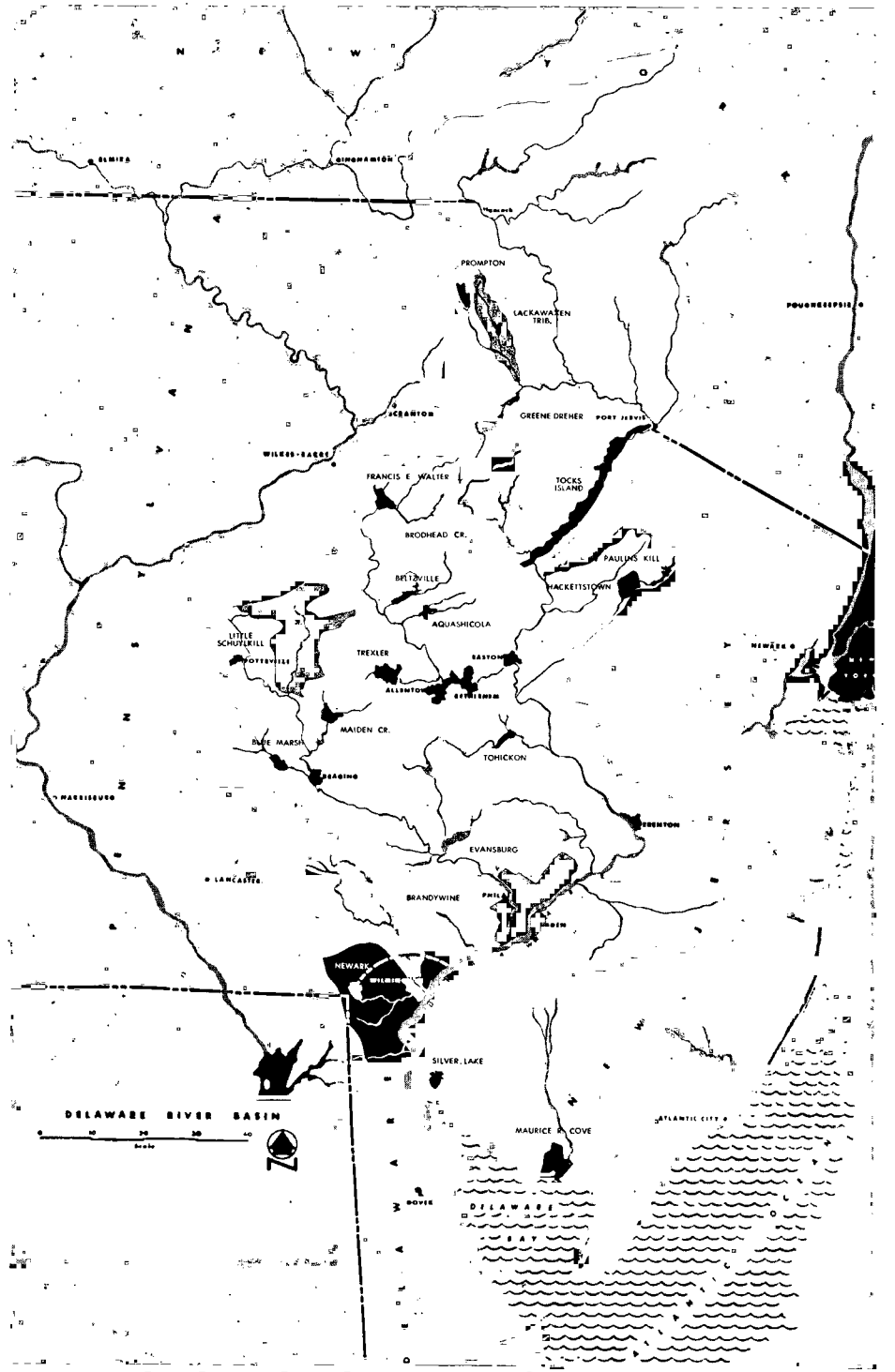
The Commission complied with this Compact mandate at one of its early meetings by adopting a First Phase Comprehensive Plan comprising 20 water control projects ranging in size from two quarter-million dollar flood control programs on South Jersey streams to the $122 million Tocks Island Dam.

Shortly afterward, the Plan was enlarged by the addition of Cannonsville, a New York City reservoir under construction; and existing water supply and waste disposal installations, recreation areas and river stage and stream gauging stations; and, pending formulation of the Commission's own pollution abatement policies, the water quality regional zone classications produced more than 20 years earlier by Incodel.

As Commission policies evolve in all areas of its authority -- also including recreation, fish and wildlife, water supply, flood loss reduction, hydroelectric power, low flow augmentation, and means of project financing -- it is anticipated that they will be added to the Plan.

Major dam and reservoir projects for multi-purpose river control.

Local watershed projects consisting of systems of small dams and reservoirs and land treatment measures.



Map shows the projects in Phase One of the Commission's Comprehensive Plan.

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The 12 major reservoir projects in the Plan, including Tocks Island, were recommended in the Corps of Engineers' 1960 Delaware Survey Report. Of these, the eight with Federal aid flood control features already have been authorized by Congress for probable construction by the Corps. An advance engineering and design appropriation was voted by Congress last year for Beltzville Reservoir in the Lehigh Valley, and 1964 funds have been requested by President Kennedy for both Tocks Island and Beltzville.

The eight projects authorized by Congress all include major recreation and water supply features as well as flood control, and are to be completed within 25 years. Actually, two of these big reservoirs have been built already by the Army Engineers and are now giving flood protection not provided in 1955. They are to be enlarged for water supply and recreation.

The projected cost of all the projects now in the Comprehensive Plan is $340 million, of which about $180 million, or 55 per cent, is to be produced by non-federal sources to pay for water supply, much recreation and some other features. Washington's share of the $340 million is to be about $160 million for flood control, recreation and conventional hydro-power.

These are the projects now foreseen by the Comprehensive Plan:

Beltzville — A $15 million project that in combination with Trexler and Aquashicola Reservoirs will provide flood protection in the Lehigh Valley equivalent to cutting two feet from the 1955 flood crest at Bethlehem, Pa. Beltzville alone will provide 40,000 acre feet of storage for water supply and meet the needs of 500,000 recreation seekers annually.

Blue Marsh — A $15.5 million Schuylkill watershed facility near Reading, Pa., that will contain 14,500 acre feet of storage for water supply and attract 437,500 visitors annually. Will help trim the equivalent of three feet from the 1955 flood peak at Pottstown.

Trexler — To be built eight miles from Allentown in a Pennsylvania game preserve, this Lehigh Valley reservoir will cost $11.2 million and will provide 24,200 acre feet of storage and accommodate 312.500 visitors a year for recreation.

Prompton — One of two existing flood control dams to be enlarged to hold 28,000 acre feet for storage and attract some 156,000 visitors each year. This reservoir is already protecting the Honesdale and Hawley, Pa., regions from frequent flooding. It is a $5.3 million project.

Tocks Island — Had this dam been built in 1955, the flood crest at Trenton would have been six feet lower, leaving only minor damage. The $122 million cost includes 410,000 acre feet of storage and a $60 million National Recreation Area to accommodate up to seven million pleasure seekers annually. The authorization includes a conventional hydroelectric facility. The terrain is also suitable for construction of a pumped-storage hydro-power installation. Legislation designating Tocks Island as a National Recreation Area is pending in Congress.

Aquashicola — Besides helping to provide protection to Lehigh Valley communities from high waters, this $19.5 million project will accommodate more than 155,000 yearly visitors and hold 24,000 acre feet of storage.

Maiden Creek — Reading, Pa., would have enjoyed 4½ feet of flood crest safety which it needed in 1955 had this $30.8 million Schuylkill Valley reservoir and Blue Marsh been in existence. It will accommodate 625,000 visitors a year and hold 74,000 acre feet of storage.

Francis E. Walter — Formerly Bear Creek, this dam near Wilkes-Barre, Pa., completed in 1961 for flood protection of upper Lehigh River communities, will be expanded for 70,000 acre feet of water storage and 250,000 visitors a year at a cost of $14.3 million.

Four other major reservoir jobs are contemplated for construction by 2010 in the Comprehensive Plan. These are for water supply and recreation facilities to be built on the Musconetcong River near Hackettstown, N.J., on White Clay Creek near Newark, Del., on Tohickon Creek near Newtown, Pa., and at Evansburg, Pa.

Also part of the Plan are eight small watershed programs, two of them well under way in the Brodhead Creek and Greene-Dreher regions of the Pocono Mountains, where 70 lives were claimed by the 1955 flood. One New Jersey small watershed program, at Silver Lake in Salem County, was completed in 1962. Two others, on the Paulins Kill in Warren County and at Maurice Cove in Salem County, are under way. Other watershed operations in the Plan -- and also in progress -- are on the Brandywine Creek, which flows into Delaware from Pennsylvania, and on the Little Schuylkill and Lackawaxen Rivers in Pennsylvania.

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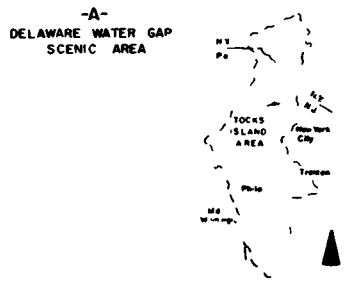
Tocks Island . . . showpiece

Projects that make up a river development system are so interrelated that one facility cannot properly be singled out as paramount in importance. Tocks Island Reservoir is thus one of many links in a chain of installations that will contribute to the orderly development and control of Delaware Valley water resources.

Yet of all the projects recommended by the Corps of Engineers in 1960 that have become part of the Commission's Comprehensive Plan, it is Tocks Island that has aroused the attention and imagination of the public to the greatest degree.

A combination of factors has made Tocks Island the showpiece of the Commission's program. It has a close association with the Delaware Water Gap, since the dam is to be erected only a few miles north of that landmark on the River's main stem. It is the largest and most costly project in the Plan, and the only one for which hydroelectric power generation is now proposed. Its 100-mile shoreline will be encircled by the first major National Recreation Area in the Eastern United States if a Congressional proposal is enacted to implement a National Park Service recommendation. It will be a large contributor to the over all flood protection foreseen for the Basin, as well as a major water supply source.

More than any facility in the Commission's long-range plan, Tocks Island symbolizes the unity that produced the Federal-Interstate Compact under which it is to be built. The 3200-foot-long dam will link Pennsylvania and New Jersey in terms of natural resource development just as they have been linked by a series of modern bridges for transportation. Thirty-seven miles to the northeast of the dam, the reservoir will penetrate miles into New York State, another Compact partner, where much of the drainage area for the lake is located. And despite the distance that will separate it from the dam, the State of Delaware, far to the south, will enjoy the benefits of the project.



Demonstrated effectively by Tocks Island is the Federal Government's unusual partnership role in the Compact. The combination of the proposed National Recreation Area and federal-supported flood control would mean a deeper financial involvement by Washington than in other Basin projects.

Also, the extent of the water supply purpose at Tocks Island illustrates the expressed willingness of non-federal sources to carry their share of the project burden, since federal funds are available for this benefit on a reimbursable basis only. The densely populated and still growing counties of northeastern New Jersey look to Tocks Island as a major source for solving their future water supply problems.

The water supply factor alone illustrates the magnitude of the Tocks Island facility. The storage potential in this reservoir is greater than that of all the other reservoirs combined in the Commission's Plan.

The estimated seven million persons a year attracted to the National Recreation Area at a rate of up to 100,000 visitors daily would add new dimensions to the already important resort industry of the Pocono Mountains in Pennsylvania and the Kittatinnys in New Jersey. One estimate is that each of the seven million visitors will pump about $6.50 into the area's economy.

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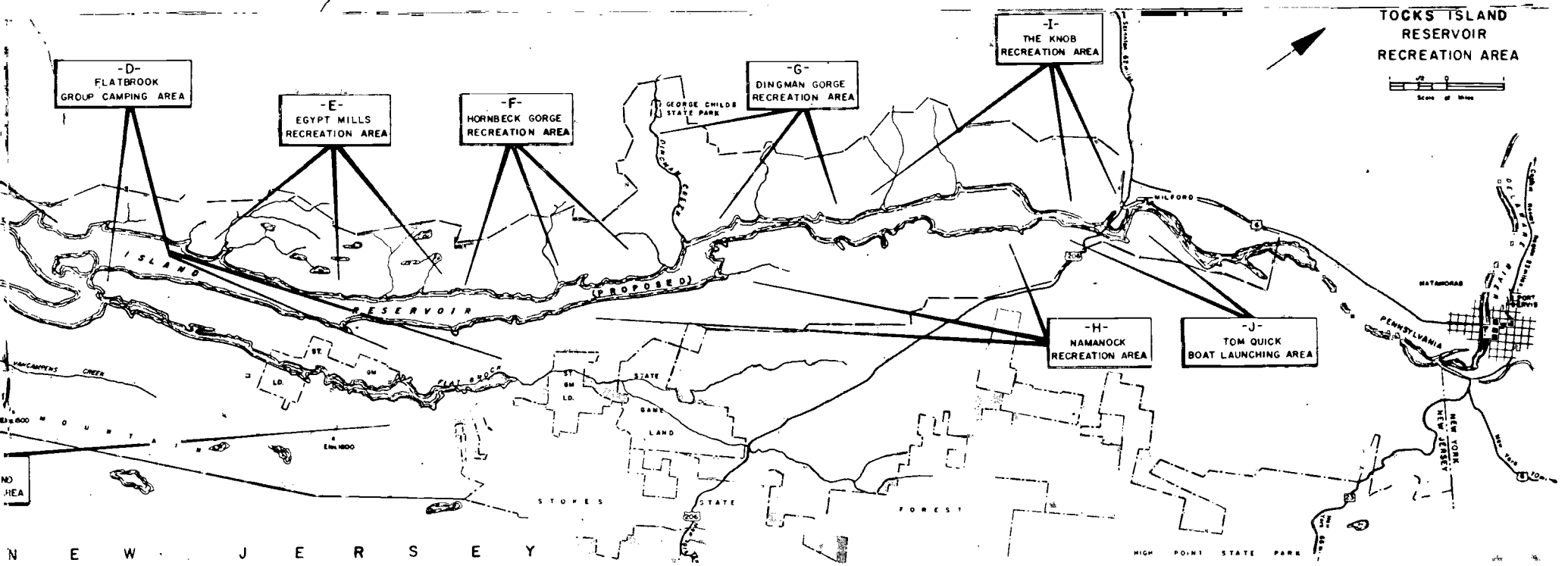

The reservoir site is within 100 miles -- or two hours' driving time -- from the homes of about 30 million people. The National Park Service says there is a shortage of outdoor recreation in the area and contends that the Tocks Island plan is ideal to help meet it.

Artist's rendering of the dam as authorized by Congress.

Even though completion of the facility may take a decade, effects of the project will be felt as soon as work commences.

Citizens and organizations of the area already are demonstrating an awareness of the changes the future will bring. The basinwide Water Resources Association is spearheading a drive to establish a Tocks Island Regional Council that would unite the five counties and 107 municipalities of the three-state region in a campaign to guide the area's orderly expansion for land use, transportation, traffic, and other prospective problems and to avert honky-tonk type development.

Congress and President Kennedy authorized construction of the Tocks Island project by the Corps of Engineers in the fall of 1962, and the President has asked the 1963 Congress for $250,000 for the Corps to begin engineering and design studies on the dam. If this appropriation is made, land acquisition will begin about 1967 and construction soon thereafter.

The projected cost of the Tocks Island project, including a conventional hydro-power installation to produce an average of 281.5 million kilowatt hours a year but excluding a possible pumped-storage hydroelectric facility with a potential annual output of 732 million kilowatt hours, is $122 million. Here is the cost breakdown: Flood control, $14.2 million; water supply, $28.5 million; conventional power, $21.5 million; and recreation, $58.2 million.

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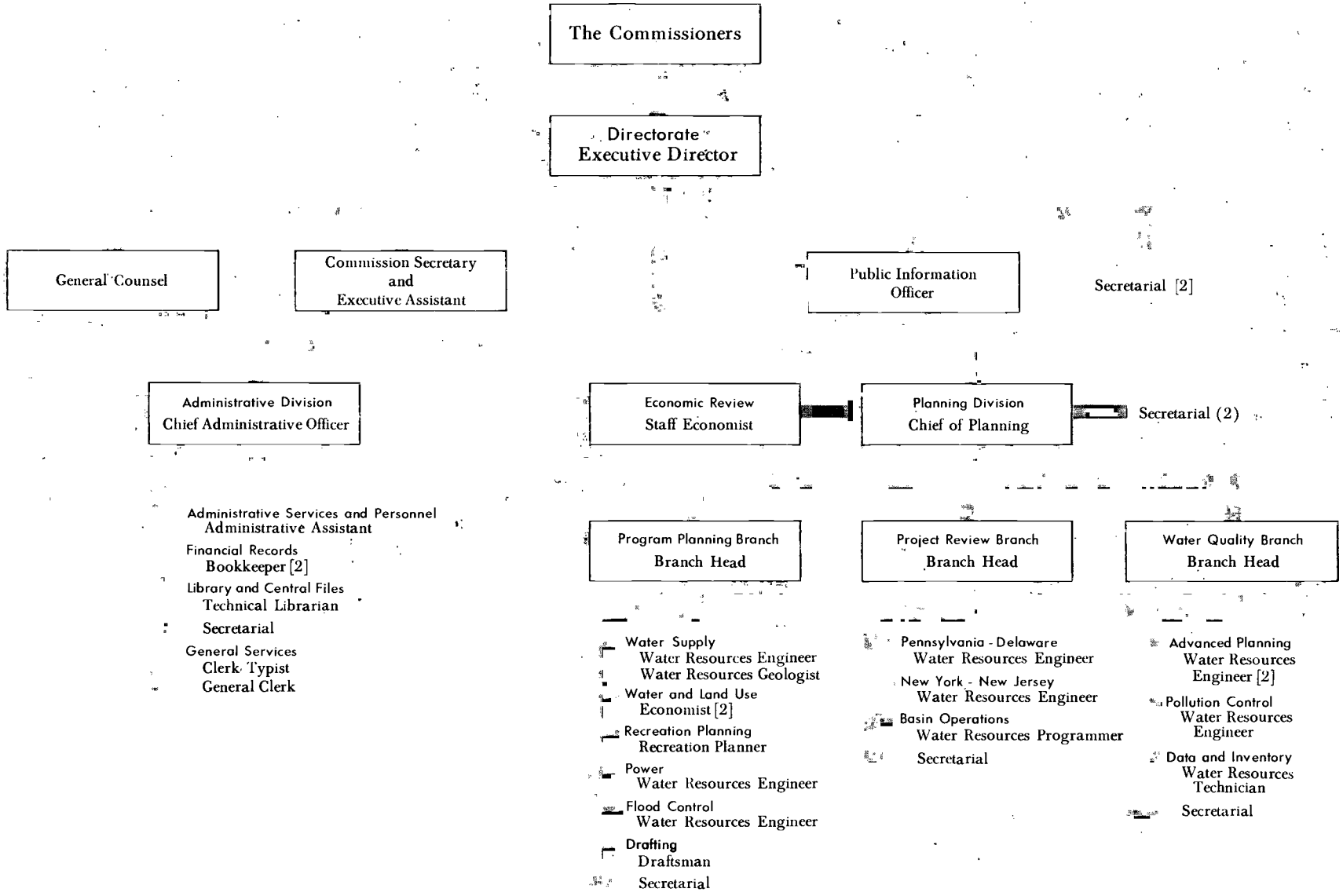
The Organization



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James F. Wright
Executive Director

William Miller
General Counsel

W. Brinton Whitall
Secretary

Arthur E. Peeck
Chief Administrative Officer

Herbert A. Howlett
Chief of Planning

J. W. Thursby
Staff Economist

C. H. J. Hull *Head,*
Program Planning Branch

Theodore Briganti *Head,*
Project Review Branch

Robert Buckingham *Head,*
Water Quality Branch

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Administration

The Executive Director heads an organization that by June 30, 1963 had grown to 36 persons. His own Directorate staff of six includes the General Counsel, the Commission Secretary and the Public Information Officer, who aid the Director in the close association he maintains with the Commission, as well as in his liaison activities with the signatory parties and the public.

Following his appointment as Executive Director at the March 1962 meeting of the Commission, James F. Wright actually commenced his duties on April 16, 1962. Ten weeks later, on July 1, 1962, the total number of Commission employees was six. However, the staff had grown to 22 by January 1, 1963 and to 34 as of the close of the 1963 fiscal year.

A majority of the three dozen members of the Commission staff are engineers and other specialists who will carry out the Commission's planning, coordinating and operating activities for flood control, surface and ground water supply, pollution abatement, water-based recreation, fish and wildlife enhancement, hydroelectric power development, and promotion of soil conservation, forestry and watershed activities.

These water resource experts are assigned to the Planning Division, the agency's technical arm, which is headed by Chief of Planning Herbert A. Howlett, who joined the Commission July 8, 1962. Mr. Howlett's first year with the Commission was divided largely between employing his Division's technical staff members, all but a handful of whom were appointed between January 1 and June 30, 1963, and getting his planning programs outlined and initiated.

The Planning Division is made up of three branches -- Program Planning, headed by Dr. C. H. J. Hull; Project Review, headed by Theodore Briganti; and Water Quality, headed by Robert A. Buckingham.

By the end of fiscal 1963, all but one of the budgeted planning positions had been filled or committed. However, the professional specialists required to staff two of the Division's nine planning programs did not become available until May 1, 1963, and the specialist needed for another program still had not been engaged at the end of the 1963 fiscal year. Yet there was marked progress in training the staff on hand and in compiling data on the Basin's water resources essential to the nine planning programs that will be in full operation during fiscal 1964.

With the Planning Division fully staffed, there will be greater emphasis in the coming year on the policy aspects of the Comprehensive Plan. This work will involve preparation of staff analyses for presentation to the Commission in order that policies can be adopted for the guidance of the staff and the public.

Completing the organization structure is the Administrative Division, under Chief Administrative Officer Arthur E. Peeck, who was appointed July 1, 1962.

During the 1963 fiscal year, procedure manuals were completed and policies established by this Division in major areas of administrative concern, including travel regulations, personnel policies, financial records and accounts, payroll, budget format, technical library, purchasing, and a personnel classification plan. Additional manuals were scheduled for development on systems and forms management, mailroom procedures, bookkeeping transactions, and central files. Completion of these will lead to a comprehensive administrative manual.

The Division force that manages the Commission's daily affairs in these and other business matters is made up of seven persons.

In its brief period of existence, the Commission has already had two homes. Until its activities were consolidated on September 19, 1962 at its present headquarters at 25 Scotch Road, Trenton, the agency formally functioned out of the old Delaware River Basin Advisory Committee offices in Philadelphia. However, it actually operated from both locations during a transition period of more than two months during the summer of 1962. There is some prospect that the Commission may have a third home in two years. It has lease its present headquarters until 1965, when it is anticipated it will be moved to a more centralized location in downtown Trenton.

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Planning Programs

Continuing Inventory of Water Supply

The Problem

A continually up-to-date Comprehensive Plan is reliant upon the collection, compilation, evaluation and periodic publication of reliable water crop date. While federal, state and other governmental and private sources collect much basin information, it is not continually compiled in form suitable to permit analyses upon which Commission decisions must depend.

Progress – Fiscal 1963

A 40-year base runoff period of 1922-1962 was selected and the U.S. Geological Survey was contracted to compute natural runoff at selected stations. Studies of location and characteristics of ground water reservoirs were begun. Data on water diversions to and from the Basin were compiled and analyzed.

Program – Fiscal 1964

Data collection on surface and ground waters will continue and the natural runoff computation will be completed. So that location can be pinpointed, a stream mileage system will be set up. Water withdrawals and returns will be spotted, tabulated and mapped. Comparison of base-period stream flows to current water needs will be started to determine areas of surplus.

Population Analysis and Demands for Land and Water

The Problem

Population concentrations, types of land use and water prices all influence water demands. Information on these factors is being collected by government at all levels and private sources, which also are forecasting population shifts and planning land use accordingly. Only the Delaware Basin Commission is empowered to plan for unified Basin development with a view toward compatible and efficient land and water uses.

Progress – 1963

Population statistics and projections by political subdivisions were recorded for both the Basin and its larger service area according to drainage regions. Reviews were made of local zoning laws and other conditions in local jurisdictions and the Commission's own land use studies were started.

Program – 1964

Analysis of data on types of water use and consumption as well as population and land use trends will enable the staff to revise and update forecasts of water demands and thus determine areas of potential water surplus and shortage.

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Programs . . .

Analysis of Recreation, Fish and Wildlife Demands

The Problem

Both the Compact and the needs of a complex modern society mandate that the Delaware's water resources be fully developed to accommodate recreation seekers. In addition to recreational water use, the protection and enhancement of sport and commercial fisheries may set basic standards for water quality and stream flows.

Progress – 1963

A map was prepared showing data collected on the location of public recreation, fishing and hunting lands and waters in and near the Basin. Also mapped were population densities to illustrate the distribution of visitors to recreation areas. Under Commission endorsement a four-state study of the Delaware shad fishery was launched, and a general fisheries inquiry was begun in cooperation with signatory agencies. Liaison was established with groups sharing the Commission's interest in the field. The Commission financially supported a Rutgers University shad research project.

Program – 1964

Private facilities will be added to the inventory of recreation locations to help step up the study of both facilities and demands. Research into pollution effects on the movement of resident and migratory fish populations in the estuary will be supported to determine the species composition and the reaction of resident fishes to seasonal variations in the chemical quality. Work will continue on the classification of recreation, fish and wildlife resources and facilities leading to the development of a management plan for the Basin.

Analysis of Power Potentials and Demands

The Problem

The Basin's water resources have a determinable potential for generating electric power. A balance must be found between this potential and demands for it, since marketing factors are essential to decisions on proposals to establish power installations, private or public.

Progress – 1963

Although this program was not staffed until May 1, 1963, development of Commission power policies was begun. Power needs for the Basin were estimated through 1968 and recent technological trends affecting power economics were reviewed.

Program – 1964

Studies of the hydroelectric power potential of the Basin, the market for such power and costs and benefits of power development will be continued. New developments in economics and technology of hydro-power will be reviewed.

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Investigation of Projects Proposed by Others

The Problem

There is a constant flow of plans by public agencies and private sources to undertake projects that could alter the natural flow of water, its quality and even the cost of water downstream. Some installations simply delay runoff through temporary use of water, while others may export water from the Basin. Examples of such projects are dams, waste disposal installations, water supply systems and water using industries. Section 3.8 of the Compact empowers the Commission to screen projects for compatibility with the Comprehensive Plan.

Progress – 1963

Two sewage treatment projects, six water supply operations, three multi-purpose watershed development programs, a pumped storage hydroelectric power plan and a high voltage line through a future reservoir site were cleared by the Commission under Section 3.8. In addition, efforts to establish regulations to facilitate review procedures among signatory agencies were under way.

Program – 1964

Review procedure regulations were slated for adoption, and liaison with public agencies and private sources working on water related matters will be stepped up. Under this continuing Commission function, projects will be reviewed as applications are submitted.

Water Quality

The Problem

The Commission seeks to attain the objectives of the water quality work started during the 25-year existence of Incodel and to broaden its programs in order to keep abreast of the growth of one of the nation's most heavily populated and industrialized areas. While water quality in the New York State portion of the Basin and some other headwater areas is excellent, there is acid mine drainage in the Schuylkill and Lehigh Rivers, which also have factory and city waste problems near their Delaware confluence. The Basin's main water quality problem area, the Delaware estuary, is marked by the large volumes of industrial and municipal waste it receives, as well as salt water intrusion and turbidity.

Progress – 1963

The Incodel regional zone classifications were incorporated in the Commission's Comprehensive Plan on July 1962 and Incodel's activities and personnel were absorbed in January 1963. The staff compiled Basin water quality data and inventoried waste treatment facilities throughout the Valley. A board of two consulting engineers and a water resources economist was engaged to help formulate a long-range water quality management program and a master policy to become part of the Comprehensive Plan. Commission representatives served on technical and advisory committees of the Public Health Service's Delaware estuary study.

Program – 1964

As the Commission continues to coordinate activities among pollution control agencies, present-day adequacy of the Incodel standards will be studied and compliance by industries and municipalities will be determined. A continuing inventory of locations, quantities and qualities of return flows will be maintained. Formulas for equitable allocation of costs for maintaining regional water quality will be researched.

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Programs . . .

Comprehensive Plan and Water Resources Program

The Problem

In recognition of the interrelation of interests and needs throughout the four Basin states, the Compact requires the Commission to maintain a Comprehensive Plan for the Valley's development on a continually updated basis. In addition, it calls for annual adoption of a Water Resources Program, based on the Plan, presenting the Basin's needs and the projects required to meet them.

Pro ress – 1963

Work commenced on formulating policies for the Comprehensive Plan on both hydroelectric power and recreation, fish and wildlife. Preparations were made for expanding and revising the Comprehensive Plan and a preliminary draft of the first Water Resources Program was submitted for Commission consideration.

Pro ram – 1964

Studies of alternative means of financing construction of projects and of methods for the Commission to recover reimbursable costs from beneficiaries of project features will be initiated. Procedures for determining benefits, cost allocations and priorities among Basin projects will be recommended. The revised Comprehensive Plan outline will be completed and policies for inclusion in it will be presented to the Commission.

Flood Loss Reduction

The Problem

Homes, businesses and industries continue to crop up on land that is vulnerable to occasional yet severe floods. There is a lack of awareness of the hazards, and construction of even modest flood control measures tends to instill a false sense of security among flood plain dwellers. In addition, it is often economically infeasible to build expensive facilities to protect even a highly developed area from floods that are extreme but infrequent. The Commission must exercise leadership in alerting the public to the hazards, in providing information on flood locations, frequency, duration and inundation and in establishing programs to reduce loss of life and property damage.

Progress – 1963

Studies were begun of published material in the field and of action and information programs of other agencies. Channel encroachment laws, local flood plain zoning provisions, building codes and subdivision regulations were reviewed in preparation for a Basinwide plan. This program was not staffed until May 1963.

Pro ram – 1964

Key flood plain hazard areas will be mapped. Guides for effective use of undeveloped flood plains will be drawn. Existing flood forecasting and warning systems will be reviewed and supplemental programs planned. Efforts will be initiated to integrate warning and forecasting systems with related enlightened programs affecting flood plain buildup, such as urban redevelopment, open spaces and tax incentives to low-hazard flood plain users. A cooperative atmosphere among all interested elements will be encouraged.

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Basin Operations

The Problem

A river system such as the Delaware offers innumerable prospective combinations for operation. For example, adjustments can be made to intercept forecasted flood waters by transferring supplies being held for downstream needs to an off-stream reservoir. Also, excess flows can be pumped to an off-stream reservoir to produce hydro-power in later high demand periods when river flows are inadequate. Through the use of computers, it is now possible to develop an efficient, integrated plan for operating all projects in a river system. Since such a plan should be developed early in a basin's development, the Delaware Basin Commission is in a good position to profit from this new approach.

Pro ress – 1963

Although the position assigned to this program was not filled during the year, research was initiated into the use of automated operations in other basins.

Pro ram – 1964

Methods of processing data on water resource withdrawals, return flows, population, land use, and other factors will be tested and applied to the Commission's program where economies are indicated.

River Conditions

Sustained drought conditions marked the 18-month span covered by this report. Surface stream flows generally were below normal, reaching critical proportions in the northern tier of the Basin, and reservoir water levels were very low.

The lowest May-to-October flow volume on record was tabulated in 1962 at Trenton despite upstream reservoir releases. Forty per cent of the river water that passed Trenton in July 1962 came from upstream supplies. Water lines at New York City's Pepacton and Neversink Reservoirs in the Catskill Mountains hit new lows. The dry spell continued into 1963, the first half of which marked Trenton's all-time low for precipitation.

While seasonal ground water declines during the warm months of 1962 were replenished by the end of the year, sharp drops and many new lows in wells were recorded at key locations in the Basin from February through mid-1963.

Considering the prolonged period of low flows and hotter-than-average summer months in 1962 and 1963, no signigicant changes in the quality of the water in the Basin's streams were observed aside from the upstream progress of the salt water from Delaware Bay.

Quality of the River's headwaters was excellent. Water passing Trenton had a good oxygen level and was suitable for most purposes. Industrial and domestic wastes from the highly populated and industrialized Philadelphia metropolitan area had a serious influence on the River's chemical quality.

The number of serious fish kills was high. There were four within 13 months due to low oxygen or high toxic counts in the water. The first and largest -- of hundreds of thousands of herring -- occurred between Bristol and North Philadelphia in early-June 1962. Others were late in August 1962 in the Easton Area, June 4 to 6, 1963 near the southern limits of Philadelphia and June 20, 1963 below the Burlington-Bristol Bridge.

After a virtual 20-year absense of shad from the Delaware, once celebrated as a shad stream, 1962 marked the return of the species with a fine run. This was followed by an even greater run in 1963, when one commercial fisherman at Lambertville reported the greatest single net catch since 1896.

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Auditor's Report

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Budget Distribution *Fiscal Year 1963 and 1964*

REVENUES

EXPENDITURES

By Organization

By Program

WATER SUPPLY

WATER DEMAND

RECREATION

POWER

PROJECT REVIEW

WATER QUALITY

COMPREHENSIVE PLAN

FLOOD LOSS

BASIN OPERATION

(1) $20,000 Received in 1963 from 1962 Federal Allocation.

Unexpended Balance 1963
Carried Forward to 1965

GRAND TOTAL

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A Tribute to . . .

Three men whose pooled leadership, imagination and energy proved to be indispensible to the success of the Compact negotiations and who have turned to other pursuits since its enactment are Walter M. Phillips, John P. Robin and James Kerney Jr.

As Chairman of the Delaware Basin Advisory Committee, then the symbol of the river development aspirations of the four states and Cities of Philadelphia and New York, Mr. Robin was both the campaign's forceful leader and its vital link to the Commonwealth of Pennsylvania.

Mr. Phillips was more than the Advisory Committee's tireless Executive Secretary. His contributions were especially effective in designing public information programs and in garnering essential citizen group support throughout the Basin as well as in his native Philadelphia, where he was already a leader in community affairs.

His prominence and his long background as a newspaper editor gave Mr. Kerney a combined role as key liaison man not only with his home State of New Jersey but the Nation's Capital while he was Executive Vice President of the Water Research Foundation.

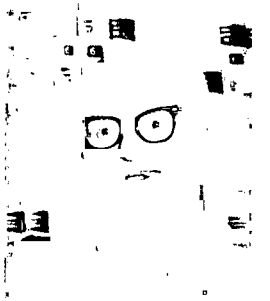
Walter M. Phillips

John P. Robin

James Kerney Jr.

Carrying the banner alone for years in behalf of concerned Basinwide planning was Incodel, which was absorbed last January 1 by the new Commission. Executive Secretary of Incodel for a quarter-century was James H. Allen, who, as the 1962-63 year drew to a close, planned soon to enter retirement.

In Memorium . . .



Rep. Francis E. Walter

David A. Robertson

Intimately associated with Delaware Basin planning were two persons -- one as an influential member of Congress and the other as an important engineer in the Commission's family of water resource specialists -- who died in 1963.

Representative Francis E. Walter had represented Pennsylvania's 15th District for more than 30 years in the House of Representatives, where his was the leading voice in Delaware conservation affairs. Only a few months before his death on May 31, in a talk at Weatherly, Pa., he expressed pride in the part he had played in the success of the Delaware Basin Compact. Bear Creek Dam, part of the Commission's Comprehensive Plan, recently was renamed for him.

David A. Robertson had been Head of the Commission's Water Quality Branch less than four months when his untimely death occurred on March 22 at the age of 37. He had brought to the staff an outstanding record as a sanitary engineer with the U.S. Public Health Service, Ohio River Valley Water Sanitation Commission, the States of Virginia and North Carolina and the City of Fredericksburg, Va.

James H. Allen

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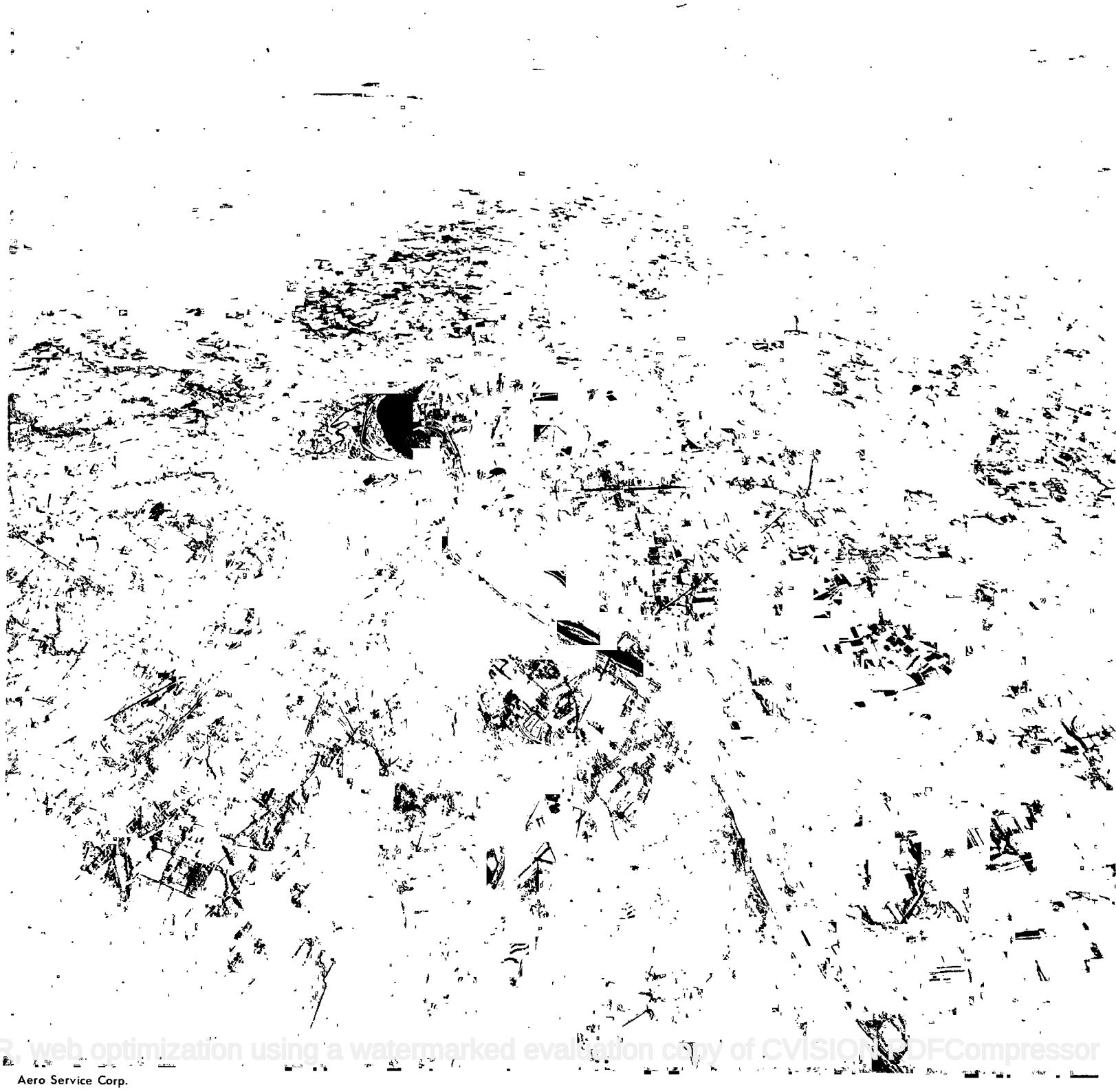

Looking south at DelawareValley through infra red camera six miles up from just north of Trenton, center left. Visible are Philadelphia area, upper right, Cape May Point, top center, and Jersey coast, upper left.

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-A-
DELAWARE WATER
SCENIC AREA

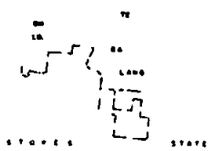
-B-
POXONO
RECREATION AREA

-C-
WALLPACK BEND
RECREATION AREA

-D-
FLATBROOK
GROUP CAMPING AREA

-E-
EGYPT MILLS
RECREATION AREA

-F-
HORNBECK GORGE
RECREATION AREA



-G-
DINGMAN GORGE
RECREATION AREA

-I-
THE KNOB
RECREATION AREA

-H-
EATION AREA

-J-
TOM QUICK
BOAT LAUNCHING AREA

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The Delaware River Basin Commission

Annual Report 1967

A-8

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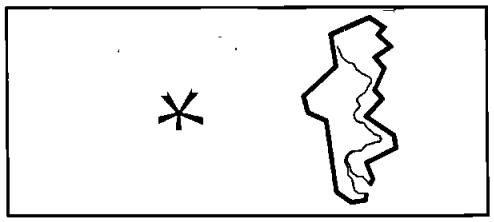

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Cover photography by George J. Fistrovich

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Introduction

Photos by James M. Staples

Unlike most other American rivers, the water affairs of the four-state area that is drained — and served — by the Delaware River and its many tributaries are the responsibility of a regional planning-operating instrument of government, the Delaware River Basin Commission.

Since it was organized in December 1961, the Commission has endeavored to bring into harmonious interdependence all the demands, competing as well as compatible, that a highly developed and crowded society can impose on a river. The Commission has worked toward this sometime difficult goal daily and in a mutually helpful atmosphere with the agencies of the five signatories of the Delaware Basin Compact that gave life to the Commission.

This is a report on the developments in this effort during the year ending June 30, 1967, a period marked by headlined situations as well as vital but less-heralded activities.

It was the year the Commission came to grips with a great public problem by enacting a pollution-control law that will bring the region a purer river, reversing the trend toward giving waste disposal the upper hand over other river uses.

Nature's unpredictability, sometimes the purveyor of hardship or worse, brought improved fortune to the 13,000-square-mile basin in 1967 by easing off on the drought conditions that had plagued it for six years.

The comprehensive responsibilities assigned to the Commission by the Compact equip it to respond to a drought's water shortages or the consequences of some other unpredictable turn in nature's conduct. This multipurpose nature of the Commission's duties, its regional jurisdiction, the high-level membership and a unique interstate-federal partnership also provide the mechanism for dealing with the other river resource problems.

In the hope that the Commission is effectively using this mechanism, this fifth annual report is presented respectfully to the basin's 7 million citizens and their representatives in the Legislatures of Pennsylvania, New York, New Jersey and Delaware and the United States Congress. ■

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The Commission • 1967

Chairman
Raymond P. Shafer*
Governor, Pennsylvania

Vice-Chairman
Stewart L. Udall†
U.S. Secretary of Interior

Nelson A. Rockefeller*
Governor, New York

Richard J. Hughes*
Governor, New Jersey

Charles L. Terry Jr.*
Governor, Delaware

*Ex-Officio
†By appointment of the President

Governors Rockefeller, Hughes, Terry and Shafer and Secretary Udall

Advisors

Samuel S. Baxter	*Pennsylvania*
Col. William W. Watkin	*United States*
James L. Marcus	*New York*

Alternate Members

Maurice K. Goddard	*Pennsylvania*
Vernon D. Northrop	*United States*
R. Stewart Kilborne	*New York*
H. Mat Adams	*New Jersey*
Harold L. Jacobs	*Delaware*

Mr. Northrop, Mr. Jacobs, Mr. Kilborne, Mr. Adams, Dr. Goddard

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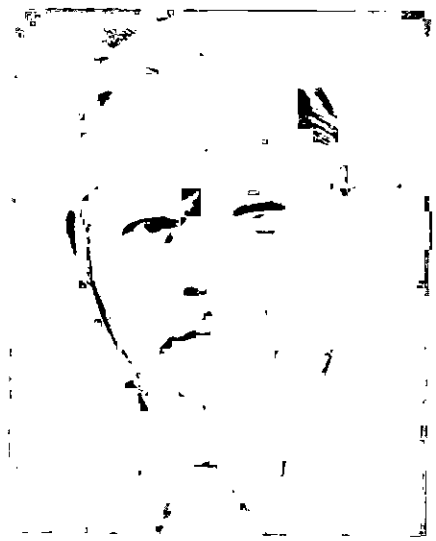
The Staff



Mr. Wright

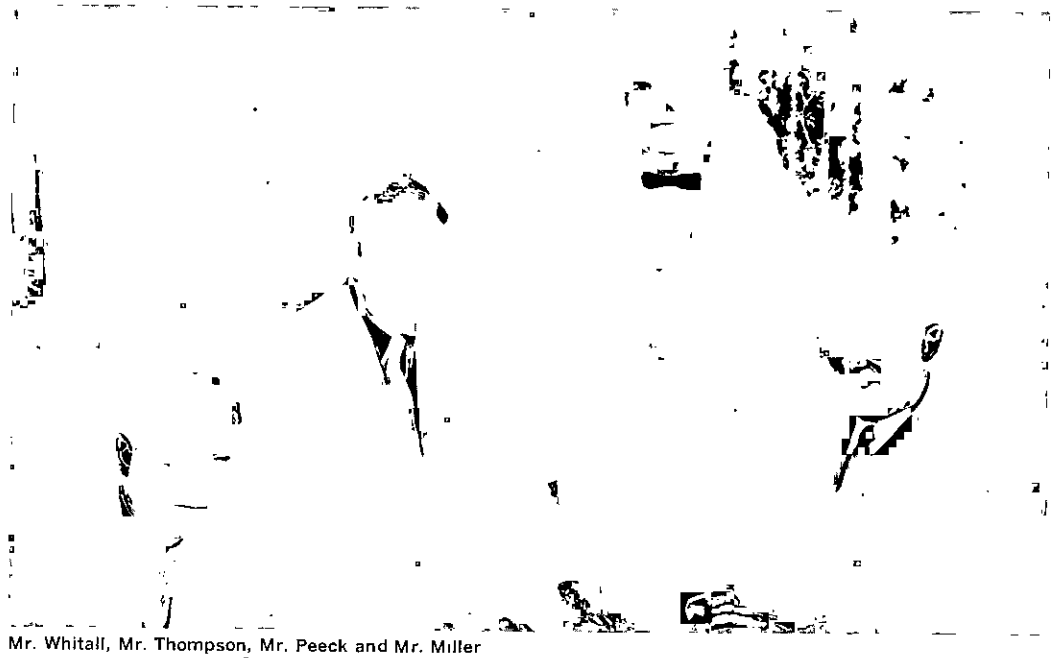
James F. Wright
Executive Director

William Miller
General Counsel

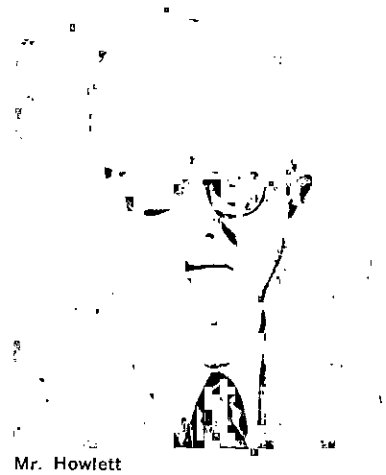
W. Brinton Whitall
Secretary

Dawes Thompson
Public Information Officer

Arthur E. Peeck
Chief Administrative Officer



Mr. Whitall, Mr. Thompson, Mr. Peeck and Mr. Miller



Mr. Howlett

Mr. Goodell, Mr. Porges, Dr. Hull, Mr. Briganti, Mr. Thursby and Dr. Hastings

Planning Division

Herbert A. Howlett
Chief Engineer

Ralph Porges, *Head*
Water Quality Branch

Theodore Briganti, *Head*
Project Review Branch

Robert L. Goodell, *Head*
Operations Branch

C. H. J. Hull, *Head*
Program Planning Branch

J. W. Thursby
Staff Economist

V. Stevens Hastings, *Assistant Head*
Program Planning Branch

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The Year Reviewed

Commission, 5 years old, enacts broad clean-streams code: Valley shakes off worst drought

The big water story of the year in the Delaware River Basin was the adoption of pollution control standards recognized widely for their comprehensive scope.

Of further consequence to the well-being of the four-state area dependent on the Delaware was the welcome termination of the basin's severest and most prolonged drought.

The 1967 anti-pollution action marked just the beginning of what is to become the Delaware Basin Commission's permanent water quality program. But time may show that the beginning step, in this instance, was the momentous one. Opportunely, current public demand for cleaner environment enabled — or obliged — the river community's regional water agency to set the goals high from the start.

The criteria are established. Now comes the implementation.

The standards selected, keyed to water uses, will require greater initial improvement of the lower river than the discarded lesser alternative plans. They will take longer — and more money — to achieve, but once attained will give the public a cleaner river. Residential and industrial development intensifies each year, constantly increasing the waste loads, but the new program is geared to attaining precise quality levels by whatever degree of waste treatment necessary.

Fortunately, the Delaware above Trenton is still a clean river, and it is to be kept that way.

•

After six years of drought, conditions began picking up during the 1966-67 winter in precipitation, streamflows and reservoir storage. By spring, it appeared that the drought had been broken, and by summer, the picture, customarily one of abundance in a valley usually bestowed with 45 inches of precipitation yearly, was happily getting back to normal. There was even a return of the usual spring flooding of smaller streams.

Most critical in 1965, the drought was straining the good water relations between regions competing for the then-dwindling supplies of Delaware water. But water peace prevailed as the Commission's five signatory participants used its emergency powers to protect both New York City and Philadelphia, with a twentieth of the nation's population, from the threat of water calamity.

A fortnight after the normal termination of the drought, fast-accumulating water in Cannonsville, newest of New York City's Delaware Basin reservoirs, reached 50 billion gallons, automatically making it a functioning part of the city's water system under a court ruling. This entitled the city to pipe more water for its own needs out of the basin, and at the same time obligated it to release more water and increase low flows to benefit areas downstream.

The period covered by this report, having marked the first five years of the Basin Commission's existence, provided an appropriate time for reflection on the performance of the first — and only — federal-interstate regional river management agency in the United States.

Both the 1967 pollution control action and the management of the river's deficient supplies during the 1960s encompassed operations transgressing state boundaries. Willingness of the neighboring states to cooperate on both critical issues was nourished by continuous association through the Basin Commission. Still, without the Commission, there would have been neither the apparatus nor jurisdiction for enacting the legally binding interstate drought and pollution decisions.

In earlier years, the Commission adopted, then enlarged upon, a Comprehensive Plan reflecting its responsibility to provide the water needs of 22 million persons living in the basin and its service area, and of the generations to come. The plan, for instance, prescribes an interstate network of more than a dozen large, multi-purpose reservoirs now at various stages of development and it contains the basin's anti-pollution standards and other policy requirements.

Sixth annual meeting of Delaware River Basin Commission was held in Senate Chamber of the scenic State Capitol in Dover, Del. Gov. Charles L. Terry Jr., the host chief executive, opened the session before being succeeded as chairman by Gov. Raymond P. Shafer of Pennsylvania.

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Review

The Commission's interstate operations and planning programs are varied. They involve such present and future activities as reducing flood damages by means other than reservoirs; a 10-year fisheries research plan reaching into all corners of the four-state basin; the collection and publication of river recreation maps and information; formulation of pricing policies on interstate marketing of water supply and other potential commodities; development of a good waste disposal and water supply system in and around the Delaware Water Gap National Recreation Area; and centralized manipulation of flows for flood control, water supply and flow augmentation, among others.

In another activity heavily oriented to regional protection, 172 water-connected projects planned by public agencies, businesses or others were screened this year for possible harmful effects on water resources. This brought the five-year total of projects reviewed to nearly 500. This year's list included 128 public, industrial and farm water supplies, 20 sewerage projects, 19 industrial waste operations, and two watershed development programs, one of them the vital multi-purpose reservoir system to develop the Neshaminy Creek in Bucks and Montgomery Counties (Pa.) for flood control, water supply, recreation and pollution control.

•

Both the adoption of the new anti-pollution standards and the action officially ending the water supply emergency took place at the Commission's sixth annual meeting, held March 2, 1967 in Delaware's historic and picturesque State Capitol at Dover.

This year's "summit" meeting marked the passing of the chairman's gavel to Gov. Raymond P. Shafer of Pennsylvania from Gov. Charles L. Terry Jr. of Delaware. Pennsylvania thus became the first signatory to hold the rotating chairmanship for the second time around, the late Gov. David L. Lawrence having been the original presiding officer when the agency was organized late in 1961.

The 1967 vice chairman is U. S. Interior Secretary Stewart L. Udall. He and Gov. Nelson A. Rockefeller of New York are the only original members still on the Commission.

Gen. Norman M. Lack retired as Delaware's Commissioner after serving for 5½ years. He is pictured welcoming his successor as Gov. Charles L. Terry Jr.'s alternate member, Harold L. Jacobs, a veteran industrial water quality engineer.

As 1966-67 drew to a close, Brig. Gen. Norman M. Lack, who is "Mr. Water" in his home state of Delaware, disclosed his plan to retire as Gov. Terry's Alternate Member, having served from the Commission's inception. Gov. Terry announced that his new Commissioner would be Harold L. Jacobs, who recently retired as the E. I duPont de Nemours Co.'s principal consultant on water pollution and waste. Three of the five original Commissioners, H. Mat Adams for New Jersey, Vernon D. Northrop for the United States and Secretary Maurice K. Goddard for Pennsylvania, were still serving.

•

The long-awaited project to restore the Lambertville-New Hope wing dams got under way toward the end of the year after the Commission, acting for Pennsylvania and New Jersey, awarded a $395,000 construction contract to the low-bidding contractor. The badly deteriorated, century-old dams back up a five-mile "pond" that makes the area one of the river's most popular recreation attractions.

•

A five-man team of West German water scientists and administrators made the Delaware Basin Commission the first stop of a coast-to-coast tour of American pollution control agencies and installations last May. The visit was part of the United States-German Cooperative Program in Natural Resources, which began in September 1966 with a similar tour in Germany by an American group which included James F. Wright, the Commission's executive director.

•

The Commission's current and capital expenditures for fiscal 1967 totaled $611,203 to support programs staffed by 39 persons, mostly resource professionals. This was $29,897 over the previous year. For the coming year, fiscal 1968, the Commission adopted a $1,056,000 budget with nearly all of the non-mandatory increases earmarked for a sizeable expansion of the pollution cleanup program. In fiscal 1967, the Commission also spent $110,112 from grants and other sources on projects not included in the regular operating budget. ■

Aerial photo shows Lambertville-New Hope wing dams in run-down condition before start of restoration work in mid-1967 under Delaware Basin Commission contract.

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Public impatience with impure rivers and streams, a subject of increasing national intensity through the 1960s, won unprecedented response this year on the Delaware, culminating in the adoption of comprehensive basinwide water quality standards developed with new scientific approaches.

The momentum came from many directions:

- Enactment of stringent federal and state anti-pollution laws and passage of financing referendums for waste disposal programs reflected the public's pressure.
- The findings came in from a five-year study by federal pollution control scientists into the severe pollution of the Delaware's tidal estuary, reaching 133 miles up the river to Trenton.
- The Delaware River Basin Commission's broad pollution control authority was being geared up to convert the results of the federal research program, named the Delaware Estuary Comprehensive Study, as well as other programs, into an extensive water quality improvement program.

The year's pollution control events started in July 1966 with a public unveiling of the findings of the federal estuary study, which for the first time employed a computerized river model for interpreting stream conditions and projecting future quality. The report revealed that the wastes being discharged into the estuary, much of it even after treatment, are eating up the river's oxygen at about a million pounds a day. These wastes are about two-thirds municipal and one-third industrial. The discharges, combined with sludge and other demands, so tax the river's assimilative capacity that there is virtual complete oxygen depletion in the water just downstream of Philadelphia for extended periods each spring and summer. This interferes with recreation and fish life and generally depresses the river aesthetically. High levels of coliform bacteria and heavy acid discharges also were detected.

The federal pollution team offered five alternative levels of cleanup ranging from merely preventing further quality impairment to a sophisticated program under which up to 95 percent of the pollution load might be removed in treatment.

At a basinwide water quality conference convened by the Commission, the findings and alternatives presented by the federal estuary group were analyzed and evaluated as the job of formulating the program got under way. The months that followed were devoted to preparation of a pair of alternative standards from which the Commission staff felt a new pollution law for the estuary should be selected. At a spirited public hearing held January 26, 1967, a high level of cleanup was endorsed by civic groups, pollution control officials and public health spokesmen, while the principal waste dischargers pleaded for a more moderate — and less costly — improvement in the river. The two alternatives offered were roughly equivalent to the second and third highest plans offered in the federal study.

At the Commission's annual meeting held March 2, 1967 in Delaware's State Capitol, a compromise version of the higher level program was adopted by a four-to-one vote. Gov. Charles L. Terry Jr. of Delaware, calling for a program that would attract "the full support and aid of industry," urged instead adoption of an approach that could be upgraded to the stricter and costlier level at a later date.

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Public impatience, 5-year research findings instrumental in new pollution-control law

DISSOLVED OXYGEN is a main water purity measure. Levels below 4 (parts per million) harm fish and aquatic life, with kills occurring more often as oxygen drops. Chart shows (bottom line) typical warm weather oxygen sag in Delaware estuary; (straight lines) the oxygen criteria specified in Commission's new standards; and (top line) projection of oxygen when the standards are achieved.

The adopted version, by setting a modified load requirement in part of the estuary, represented a significantly less costly plan. At the same time, it includes a series of requirements that it feels will produce a generally healthier and more attractive river, among them treatment of wastes to a degree that will leave enough oxygen in the river at all times to protect fish and aquatic life. It also requires disinfection of sewage to kill disease-carrying bacteria. The program to keep the stream quality high would be perpetual, with the first 20-year period of sharpest improvement costing public and private dischargers some $250 million for installation, upgrading, operation and maintenance of treatment facilities.

Within two months after its action on the estuary, the Commission offered for public hearing then adopted additional standards — for non-tidal waters in the four-state basin. In contrast to the need for quality improvement in the estuary, the goal in the non-tidal streams is to maintain the waters at their already generally good condition. Nonetheless, some non-tidal areas have pollution problems stemming from coal mine acid, high industrial-urban concentrations and fast-growing suburbs without regional sewerage facilities.

The Standards' Features

Here are the key features of the basin's new standards, effective immediately for new facilities and pending adoption of implementing rules and regulations for existing discharges:

1) Water uses are paramount in setting stream objectives which, in turn, determine effluent quality. Recognized uses include supplies for agriculture, industry and public consumption (after treatment, except where precluded by salinity); wildlife, fish and other aquatic life; recreation; navigation; and controlled waste disposal where compatible with other uses.

2) All wastes must receive minimum of secondary treatment (removal of practically all suspended solids and reduction of oxygen consuming pollutants by at least 85 percent). Except for stormwater bypass, discharges containing human wastes or disease-producing organisms must first be disinfected, thus protecting river recreation users and shellfish.

3) Where needed to meet stream quality goals, the waste assimilative capacity of the streams will be allocated under the equitable apportionment doctrine provided in the Basin Compact. It is likely therefore that, with the passage of time, waste treatment in excess of 85 percent may be required in the estuary.

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4) Stream standards vary within the basin, with higher oxygen requirements in the estuary when anadromous fish make their runs and in trout waters. Other requirements are set on water temperatures, alkalinity-acidity balance, phenols, odor, detergents, fluorides, radioactivity and turbidity (cloudiness).

Implementation

The months since adoption of the new standards, which are under review by the Federal Water Pollution Control Administration for conformity with the Federal Water Quality Act of 1965, have been devoted to staff preparation of rules and regulations and implementation procedures. These will be proposed for public hearing and adoption in 1967-68.

Besides offering precise definitions of the terms used in the adopted standards, the rules will expand and contain more detail on the general requirements. They will list the actual maximum waste assimilative capacity in terms of oxygen-demand poundage allowable in each of the four zones of the estuary from Trenton to the beginning of Delaware Bay some 20 miles downstream of Wilmington. The assimilative capacity of each zone later will be allocated among individual dischargers, including those along tributary tidal waters.

Procedures and policies for attaining and enforcing the adopted standards, including delineation of responsibilities between the Commission and state pollution control agencies, will be detailed. Step-by-step action in processing pollution abatement orders will be listed, as well as in handling of complaints and enforcement where there is noncompliance. In 1968, individual polluters can expect to be put on notice by the appropriate state agencies.

As the year came to a close, the Commission also was negotiating agreements with the estuary states of Delaware, New Jersey and Pennsylvania calling for surveillance of major dischargers to the estuary and tidal tributaries. The State of Delaware will also collect samples on weekly boat runs on the river. Each state will handle analysis of samples and other laboratory work.

Other Activities

Action was getting under way during the year on programs with local authorities toward regionalizing the collection and treatment of wastes along small tributaries throughout the basin where flows are inadequate to handle large numbers of isolated discharges. This is an effort that will receive concentrated attention from the Commission in the immediate years ahead, particularly adjacent to the estuary region as the abatement program there gets into full swing.

The water quality staff was preparing to seek demonstration grants as the Commission searches for more sophisticated and economical means of treating wastes to keep pace with pollution problems that magnify along with population and industrial expansion. For example, it could strive for an efficient solution to the potential problem of removing nutrients that overfertilize organic life, resulting in unpleasant water taste and other quality problems.

The Commission found several occasions to employ the alert system it had set up for quick notification of downstream water users in case of suddenly developing quality problems. Among the Commission's warnings was an alert issued to purveyors of water when the June 5, 1967 power blackout caused waste treatment shutdowns and consequent discharge of raw sewage.

Breaks in old pipelines that sent petroleum discharges into otherwise clean streams prompted initiation of a program of pinpointing for warning and safety purposes the stream-crossing locations of scores, perhaps hundreds, of old pipelines. This is an extension of the protection assured by Commission review requirements that newly-laid petroleum pipelines must be of strong construction with shutoff valves. ■

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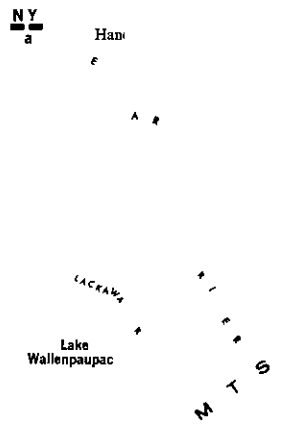
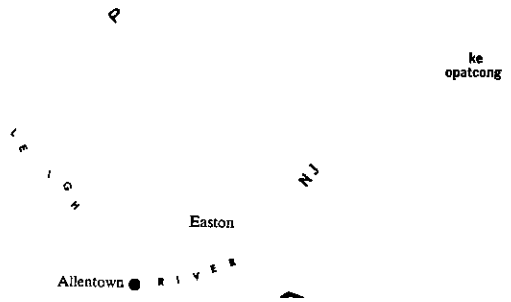
Tocks Island Environment

Study progresses on giving reservoir-park region a water supply-sewerage plan





Map shows tri-state, six-county region, surrounding the Tocks Island reservoir and Delaware Water Gap National Recreation Area, that is under study for the best long-range sewerage-water supply system to meet demands from future visitor and resort development influx. Study is in second year.

Water-wise, the environment of the six-county region surrounding the coming Tocks Island reservoir and Delaware Water Gap National Recreation Area is generally excellent, and a program aimed at keeping it that way has entered its second year.

Within a decade, the reservoir and companion park will be one of the nation's most heavily-patronized outdoor recreation attractions. More than 10 million day-visits are expected at the park annually, most of them in the summer months. And that is only part of what is to come, considering the vast permanent and summer home boom that will mushroom outside the 70,000-acre parkland.

The protection program is the Tocks Island Region Environmental Study, which the Delaware River Basin Commission is coordinating for a large group of participating state, local and federal agencies. It is a three-year effort that was launched by the Basin Commission in May 1966 to devise the best means for disposing of wastes and for providing an abundant water supply in and around the reservoir and park that will stretch about 40 miles along the Delaware River from the Water Gap to Port Jervis, N. Y. It is crucial also to the prevention of contamination of the Tocks Island reservoir itself.

The intent is to give the area a workable plan that can be implemented in plenty of time to avert a series of future crisis solutions in the six counties of Orange in New York, Sussex and Warren in New Jersey, and Northampton, Pike and Monroe in Pennsylvania. The prospective influx volume would overwhelm the limited water-supply and waste-disposal facilities there now.

It is the hope of the Environmental Study's sponsors that fast-growing public sensitivity to conservation needs and natural beauty preservation will produce local acceptance of some efficient long-range water and sewerage scheme for the region. A good water-sewerage system could help guide a well-planned development in the area as well as respond to its water resource needs. The study also encompasses disposal of solid wastes where they could affect water.

The first year of the study began with organization of four task groups — population and land use, water supply, liquid wastes, and solid wastes — which concentrated on an extensive data collection program prior to the analytical and planning work now under way toward preparation of a master plan. Also, a consulting engineering firm was retained to help in the data collection and planning work.

The master plan is to evaluate alternative suggestions for solving the region's water supply and waste disposal problems, of which sewage disposal is prospectively the knottiest.

The early phases of the study have indicated a number of sewerage alternatives to be considered, including:

A regional system with large interceptor sewers conveying waste waters to a central treatment facility below the Water Gap; a series of six subregional systems providing for collection, treatment and disposal of waste waters within each; a series of about 60 localized systems; or a combination of subregional and local systems. Whatever solution is adopted, however, will involve substantial construction cost — out of the same dollars which ultimately would be needed anyway to protect the quality of the water in the reservoir.

Since the rugged terrain would preclude gravity flows in many locations, a series of high-lift pumping stations would be required in the regional or subregional systems.

Some of the severest water quality situations facing the Commission elsewhere in the Delaware Basin can be met only by cleanup of existing pollution. By contrast, the Tocks Island Environmental Study, a $430,000 program that includes $260,000 in federal demonstration grant funds, happily is able to put the emphasis on prevention rather than cure.■

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Returning to Normal

Water supply emergency called off as 6-year drought eases; Spring rains flood some streams

After its driest six years on record, the Delaware River Basin's worst drought appeared to be at an end.

For the Basin Commission, which came into existence some months after the dry spell began, being without a drought was a new and welcome experience. It meant that much of the concentrated staff effort that had been diverted into managing the river's deficient resources finally could be turned more to development of constructive solutions to other water problems in the four-state area.

The new year opened in July 1966 with a discouraging three-month intensification of the drought. Autumn did bring some encouraging above-normal rains, and this might have been another false break — but it wasn't. Modest but continued improvements in precipitation, streamflows and well-levels persisted, and by mid-winter the upswing was sharp. After years of substandard levels, normal storage volumes had accumulated in New York City's reservoirs on the Delaware's Catskill Mountain headwaters. (This was partly due to economical water management in 1965 and 1966.)

By March 1967, the Commission felt it was safe to terminate the water supply emergency that had been in continuous effect for 20 months. President Johnson's Drought Disaster declaration for the Delaware and its service area, including New York City and North Jersey, also was ended.

Under the Commission's emergency powers, court-sanctioned allocations of Delaware River water to New York City had been cut by one-third, and privately-owned reservoirs were tapped to assure sending enough flow down the Delaware to keep the advancing ocean salt out of Philadelphia's water supply. These arrangements prevented a reopening of old court battles over Delaware River water between New York City and the downstream states.

By spring 1967, two of New York City's Delaware reservoirs were overflowing and another was near-full. The end of the water year (June 30) found streamflows and most groundwater tables at long-term normal levels. Precipitation was better than normal.

Flooding Helped Signal Drought End

Indeed, by springtime, nature was over-generous to some of the tributaries in the southern half of the basin. In one 24-hour period on March 6 and 7, many points in the Trenton-Philadelphia area were drenched by nearly as much rain as they normally get in the whole month, overflowing the banks of some small streams.

Assunpink Creek, which drains much of Mercer County in New Jersey and empties into the Delaware in downtown Trenton, was especially hard-hit. Factory workers were evacuated in the Trenton area and total damage to industries, residences, automobiles and public facilities was about a half-million dollars. The first stages of a long-range flood control-recreation-water supply system of reservoirs for the Assunpink watershed were getting under way, but they were not far enough along to hold back the torrents this time.

The March flooding, generally the heaviest around the basin since the beginning of the drought in 1961, occurred also along the Cooper River and Newton and Rancocas Creeks in New Jersey and on several streams in the Philadelphia area, including Wissahickon, Perkiomen, Darby, Neshaminy and Cobbs Creeks. These escaped serious damage, however.

Meanwhile, the efforts to hold to a minimum damage and casualties from local flooding by calling public attention to the boundaries of high-risk flood plains were continued. During the year, the Basin Commission and U. S. Geological Survey published another flood history map — for the 15-mile reach of the Delaware River's shores in Northampton County, Pa., and Warren County, N. J., in the Belvidere area. In addition, a new mapping project was begun for the Perkiomen Creek in Montgomery County, Pa.

Another key method of cutting down on the consequences of floods is through advance warning of coming high waters. In June 1967, the U. S. Weather Bureau unveiled the details for strengthening existing river forecasting services, including flood waters, in the Delaware Basin and in its neighboring river valley to the west, the Susquehanna. The stepped-up operation involved establishment of a computer-equipped river forecasting center at Harrisburg for both basins and a river district office at Trenton to collect data from upper-Delaware sources to be used in the forecasts. In addition to federal, state and Basin Commission cooperation, the expanded program involves non-government volunteers or part-time helpers located at nearly 200 "observation" locations. ■

March 1967 flood pictures show bus stranded in waters of Wissahickon Creek watershed on Pennsylvania Turnpike near Fort Washington Industrial Park, and inundation in Trenton from overflowing Assunpink in Trenton, with DeLaval Turbine, Inc., plant seen in distance. Water came within inches of flooding Pennsylvania Railroad main line, beyond water tower.

Evening Bulletin, Philadelphia
George Moldovan, Trentonian

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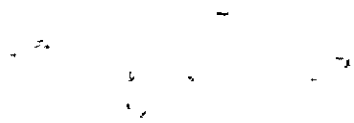
River Yield Reappraised



Cannonsville, New York City's newest reservoir, is shown full of Delaware River west branch water in Spring 1967. When storage recently hit 50 billion gallons — capacity is 95.7 billion — New York's taking rights to Delaware water and guaranteed-flow obligation to benefit downstream areas were altered.

In view of dry spell, are old water crop forecasts, reservoir plans realistic? Another NYC reservoir

Much of the existing plan for future development of the Delaware is based on the water history of the four-state basin prior to the unprecedented drought. Accordingly, the plan fails to take into account that nature delivered to the Delaware the equivalent of less than five years' precipitation in the six-year dry spell.

In the wake of the drought, thus, there is considerable concern by water experts over the ability of the Delaware River system to deliver water at the old rate and over the adequacy of existing and planned water supply facilities in the Basin Commission's Comprehensive Plan. This is particularly so with the yield capacity and operational procedures that have been assumed for New York City's reservoir system on the Delaware, which supplies that city with nearly half of its water by way of diversion tunnels through the Catskill Mountains.

At its first meeting following the termination of the Drought Emergency, therefore, the Commission set into motion in March 1967 a study to determine if the basin's water supply sources and storage facilities — existing and planned — are realistic in view of a hydrologic history that now includes the drought.

The study, in which the Army Engineers and other federal agencies are cooperating along with the four basin states and Cities of Philadelphia and New York, paves the way for possible revision of policies and planned projects. Conclusion of the study in 1968 is anticipated.

Another New York City Reservoir

Last year, the Commission reported that New York City had completed construction of Cannonsville, its third large reservoir in the upper Delaware Basin. Located on the West Branch of the Delaware about 25 miles east of Binghamton, this 95.7-billion-gallon facility is the second largest lake in the Delaware's four-state drainage area.

On March 30, 1967, water storage in Cannonsville hit the 50-billion-gallon level, automatically triggering an important change in the allocation of Delaware water between New York City and the downstream states of New Jersey, Pennsylvania and Delaware under a U. S. Supreme Court decree.

In ruling on the disputed claims to upper basin water, the court said that New York City was entitled to divert from the Delaware valley an average of 490 million gallons a day and that, in compensation, it must release enough storage from its reservoirs to guarantee a flow of not less than 1525 cubic feet a second where the river passes between Milford, Pa., and Montague, N. J., a short distance downstream of the Tri-State Rock.

Under the decree, the permissible daily allowance to New York jumped to 800 million gallons daily and the minimum downstream flow obligation increased to 1750 feet a second when storage in Cannonsville hit 50 billion gallons, about half-full. This provides added available storage to meet the city's expanding needs and, at the same time, assures that flows in the river no longer would be so low during the annual warm spells when precipitation drops off sharply. With no reservoirs in the upper basin, the uncontrolled flow often would drop below the required minimums.

Spring rainfalls were so abundant that within a few weeks of becoming half-full, the newest of New York City's large mountain reservoirs was overflowing.

The other Delaware River reservoirs of New York City are Pepacton, on the East Branch, and Neversink, named for the Delaware tributary river on which it is located. ■

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Fish Research

10-year program approved on shell, migrating and resident species; Tocks Island phase under way

One of the great lures to man of a fine river system is its fisheries.

Such a river is the Delaware, with a rich endowment of shellfish in the ocean-influenced bay, of shad and other popular fin species that run between the ocean and various upstream reaches of the river, and of trout and many other fresh water fishes that spend their life cycle in the main stem and in tributaries reaching upstream to the Pocono and Catskill Mountains.

Ironically, society's attraction to rivers is so intense that it inevitably disrupts the very resources it pursues.

Discharges of sewage, acid and other wastes from our cities and industries cause problems of stream quality, especially oxygen depletion. Hot water dumped by industry into a river alters natural water temperature. Dams and other impoundments cut down on natural mobility of fish, and so on.

A comprehensive river management program is one that achieves a reasonable balance of all beneficial resource uses. Among other things, the Delaware Basin supplies domestic water to two great cities and hundreds of smaller communities, it feeds the region's thousands of industrial and commercial enterprises, it is the recreation haven for millions of people, and still it carries off massive volumes of the basin area's wastes every day. One of the responsibilities of the Delaware Basin Commission is to insure that fishery resources get their share of protection in a river with so many competing uses, and a number of studies and programs to that end have been initiated.

Basinwide Fisheries Program

In 1964, the Commission established a Fisheries and Wildlife Technical Assistance Committee representing the fisheries agencies of the four basin states and federal government. This advisory group went to work with the staff on recommending a long-range fisheries protection and enhancement program that the Commission approved in January 1967 as the fisheries research plan for the interstate river and bay. This comprehensive plan calls for a series of efforts over the next decade that could cost about $1 million. The executive director was authorized to proceed on getting the early phases of the program under way in cooperation with the signatory agencies, and implementation of some has now begun.

Generally, the plan covers these subjects: The effects of the Tocks Island reservoir project on fish life; problems of American shad and other anadromous species making their annual runs up and downstream; problems of resident Delaware River finfish, and the declining shellfish industry of the lower river.

The first phase of the Tocks Island fisheries work is a three-year inquiry, now under way, relating to a proposed pumped-storage hydroelectric installation that would be integrated into the dam project. The generating system would work by water being pumped from the Tocks Island reservoir up to smaller high-level ponds, then being released back downhill to produce energy at peak-demand periods. The Commission is studying how fish would be affected by the resulting fluctuations in the water level in the Tocks lake.

Annual harvests from spring shad runs in the Delaware were nearly 20 million pounds before heavy pollution loads started going into the lower river early in the 20th Century, but they have dwindled to less than a hundredth of that figure in the past two decades. Large shad kills have become common. The fisheries plan includes a six-year study aimed at improving the plight of shad and other migratory fish, including striped bass, alewives, blueback herring, white perch and sturgeon.

The lower Delaware's sagging oyster industry could yield more than $14 million a year, but only a small fraction of that potential crop has been raked in over the last decade. A five-year shellfish research effort will deal with the oyster problem and also encompasses blue crabs, clams and mussels.

With present research inadequate to assure balanced management of the basin's finfish, the Commission will study this resource in both the estuary and upper river. This is a 10-year program that will include walleyes, small and largemouth bass, sunfish, and brook, rainbow and brown trout.

Not all the activity during the year that will benefit aquatic life was conducted exclusively in the name of fisheries work. Probably the greatest boon ever registered for fish on the Delaware came with adoption of new water quality standards for the basin's interstate streams. The standards for the estuary will assure adequate oxygen to accommodate runs of migrating fish, while new non-tidal standards are designed in large measure for the protection of trout and other species in upper river areas.

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Basin Commission research to determine pumped-storage hydro-power effect on fish is being conducted in these four ponds near the Tocks Island damsite.

Tocks Island Fluctuation Study

Pumped-storage is a young technique for generating peaking electricity, and little is known about its effects on resident fish in reservoirs. The level in the reservoir could fluctuate several feet daily as water is exchanged between the lower and upper ponds.

Largely because spawning activity of many fresh water fishes occurs in shallow water near the banks, concern has been voiced over possible disruption of this natural reproductive process.

A pioneering research project that will shed light on the relation between pumped-storage and fisheries thus has been launched by the Commission.

With funds supplied by the utility company applicants, the Commission has constructed near the Tocks Island damsite four two-acre ponds in which the aquatic environment in the Tocks Island reservoir is being simulated. Staff biologists are checking whether the spawning, hatching, development, growth and behavior of selected native fish species are undergoing any significant changes due to rising and falling pond levels, or to resulting temperature changes. They are also checking the effects of pumped-storage on plant life for possible reactions on the fish, and whether the surges of water rushing to and from the upper ponds would alter fish behavior.

Each pond is stocked with about 100 fish of varied species and daily water levels are being fluctuated automatically. At pre-established intervals, fish are caught by nets or electric gear and checked for growth, weight, length and other features. Meanwhile, daily and weekly records are kept on a dozen-odd physical qualities of the water, on plant life, and on general fish conduct.

With the results of the study, the Commission will be equipped to evaluate the utilities' application for biological consequences. Hopefully, the research also will add generally — and valuably — to existing knowledge on reservoir fisheries and their management. Meanwhile, studies dealing with other phases of the pumped-storage proposal also are in progress.

Lehigh Investigation

In recent decades the Lehigh River has appeared increasingly less able to support the abundant fish and plant life that once existed in this large tributary, which drains about a tenth of the Delaware Basin in the Pocono Mountain region. While conjecture has produced a number of theories, the Commission felt a technical study into the relation between the river's water quality and its present and potential fish life would better equip it to manage the Lehigh's resources.

A three-year biological-water quality investigation was recently concluded, scientifically establishing a close correlation between pollution and poor fish environment. The study, a joint Basin Commission-Pennsylvania Fish Commission effort, showed that coal mine acids degrade a 45-mile stretch of the 105-mile river from below White Haven in the headwaters to Northampton, five miles upstream of Allentown. However, below that five-mile recovery area, the quality again dips, this time from oxygen depletion due to heavy industrial waste and sewage, for 17 miles between Allentown and the confluence with the Delaware at Easton. Despite the low quality of the Lehigh from White Haven to Allentown in terms of depressed biological life, the oxygen counts were uniformly healthy. Only minimal adverse effects to the Delaware were found immediately below Easton. The study revealed excessive plant life from Easton to Trenton, a generally high-quality 45-mile reach of the river, but did not link this Delaware condition to the Lehigh.

•

A separate three-year research project on temperature and fish is under way at Rutgers University. This program, financed in part by the Commission, seeks to determine the tolerance of five species — American shad, striped bass, alewife herring, blueback herring and white perch — to heat and cold and how different measures of oxygen, salts and pollutants in the water affect their tolerance levels. The tests are being made in laboratory tanks simulating actual conditions in the river, where heated discharges often hit fish already under stress from pollutants and other poor conditions.

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Reservoir Gains

Progress listed on most projects;
Tocks Island slowdown posed
by war budget

The Commission has a Comprehensive Plan for the long-range development of the four-state river basin that includes, along with pollution control standards and other features of a non-structural nature, a network of large multi-purpose reservoir projects.

Here is the current status, as of the summer of 1967, of reservoir projects in the plan that are moving ahead:

Tocks Island

Best known and largest of the basin's reservoir jobs, Tocks Island moved ahead generally, but because of military demands on the federal budget dam construction may be put off until 1969-70 and project completion for seven years thereafter. Land is being purchased for the reservoir and surrounding Delaware Water Gap National Recreation Area. The Army Engineers' general design is under review, plans for relocating Rt. 209 on the Pennsylvania side of the Delaware are taking shape, design of levees and other works for protecting Port Jervis and Matamoras from reservoir waters is progressing, and initial National Park Service facilities are to be ready next summer.

Artist's rendering of Beltzville dam, now under construction on Pohopoco Creek, a Lehigh River tributary.

Beltzville, Blue Marsh

Another Corps of Engineers dam project, Beltzville, is now under construction on a Lehigh River tributary. In October 1966, the Delaware Basin Commission contracted with the Corps to buy Beltzville's water supply storage, equivalent to the needs of a city of 100,000 population. The Commission will wholesale the water supply in federal reservoirs. Blue Marsh, a Schuylkill River valley reservoir, is nearing preconstruction design completion by the Corps.

Prompton Trexler

Design funds also have been provided the Corps for Prompton, a reservoir to be enlarged in the Lackawaxen River valley in northeast Pennsylvania, and for Trexler reservoir, a dam to be built on a Lehigh River tributary. Construction schedules will depend on the need for water supply.

Tohickon, Evansburg

The Commonwealth of Pennsylvania has designed a recreation and future water supply dam on Tohickon Creek, east of Quakertown in Bucks County, as part of its Nockamixon State Park. Construction may begin by 1969. The Commonwealth's Forests and Waters Department and the Delaware Basin Commission have recommended to the State Planning Board that plans proceed for developing Evansburg reservoir in Montgomery County. Tohickon and Evansburg are to become important links in a chain of recreation facilities around the Philadelphia and suburban metropolitan area.

Hackettstown

New Jersey has now acquired a substantial part of the lands needed for development of Hackettstown reservoir on Musconetcong River and for the surrounding recreational facilities. To be located inside the new Allamuchy Mountain State Park, initial development of this property will be for recreation, with the reservoir planned for construction in the mid-1970s.

The Basin Commission's Water Resources Program, an annual document citing resource needs in the valley, lists projects desirable for development in the ensuing six years. In addition to Beltzville, Tocks Island, Blue Marsh and Tohickon, the latest edition urged that steps be taken toward development of Newark reservoir, which would lbe built on White Clay Creek straddling the Delaware-Pennsylvania boundary and of Marsh Creek reservoir, the largest unit of the Brandywine Creek watershed development program, in Chester County, Pa.■

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James M. Staples

Researchers at the Woods Hole Oceanographic Institution are using a remotely operated vehicle to study the effects of oil spills on the ocean floor.

Financial Summary

Budgetary

1967 REVENUES	
Budgeted	Received
Delaware 22,800	22,800
New Jersey 143,000*	143,000*
New York 142,000	142,000
Pennsylvania 143,000*	143,000*
U. S. 115,000	115,000
Public Health Service Grant 45,223	45,223
Miscellaneous 200	4,219
Working Reserve 0	0
TOTAL 611,223	615,242
4,019**	
615,242	

*Includes $1000 appropriation for Capital Budget

**Unencumbered balance transferred to working reserve—Total $4,039

The records of the Commission are independently audited each year as required by the Compact.

	1967 EXPENDITURES	
	Appropriations	Expended
By Organization		
Directorate	118,387	119,492
Administrative Division	74,027	76,246
Planning Division	416,809	413,465
TOTAL	609,223	609,203
By Program		
WATER SUPPLY	30,000	45,378
WATER DEMAND	45,000	35,664
RECREATION	31,000	46,010
POWER	28,000	27,467
PROJECT REVIEW	142,000	83,682
WATER QUALITY	128,223	161,841
COMPREHENSIVE PLAN	144,000	152,484
FLOOD LOSS	11,000	7,356
BASIN OPERATION	50,000	49,321
TOTAL	609,223	609,203
Capital Program	2,000	2,000
Excess Appropriations over Expenditures	—	20**
GRAND TOTAL	611,223	611,223

Non-Budgetary

	Funds Available	Expenditures	Unexpended Dedicated Allotment
Tocks Island Region Environmental Study	119,772	92,532	27,240
Drought Projects	10,301	10,301	0
Wing Dam	430,465	4,993	425,472
Tocks Island Fish Research	50,000	2,286	47,714
TOTAL	610,538	110,112	500,426

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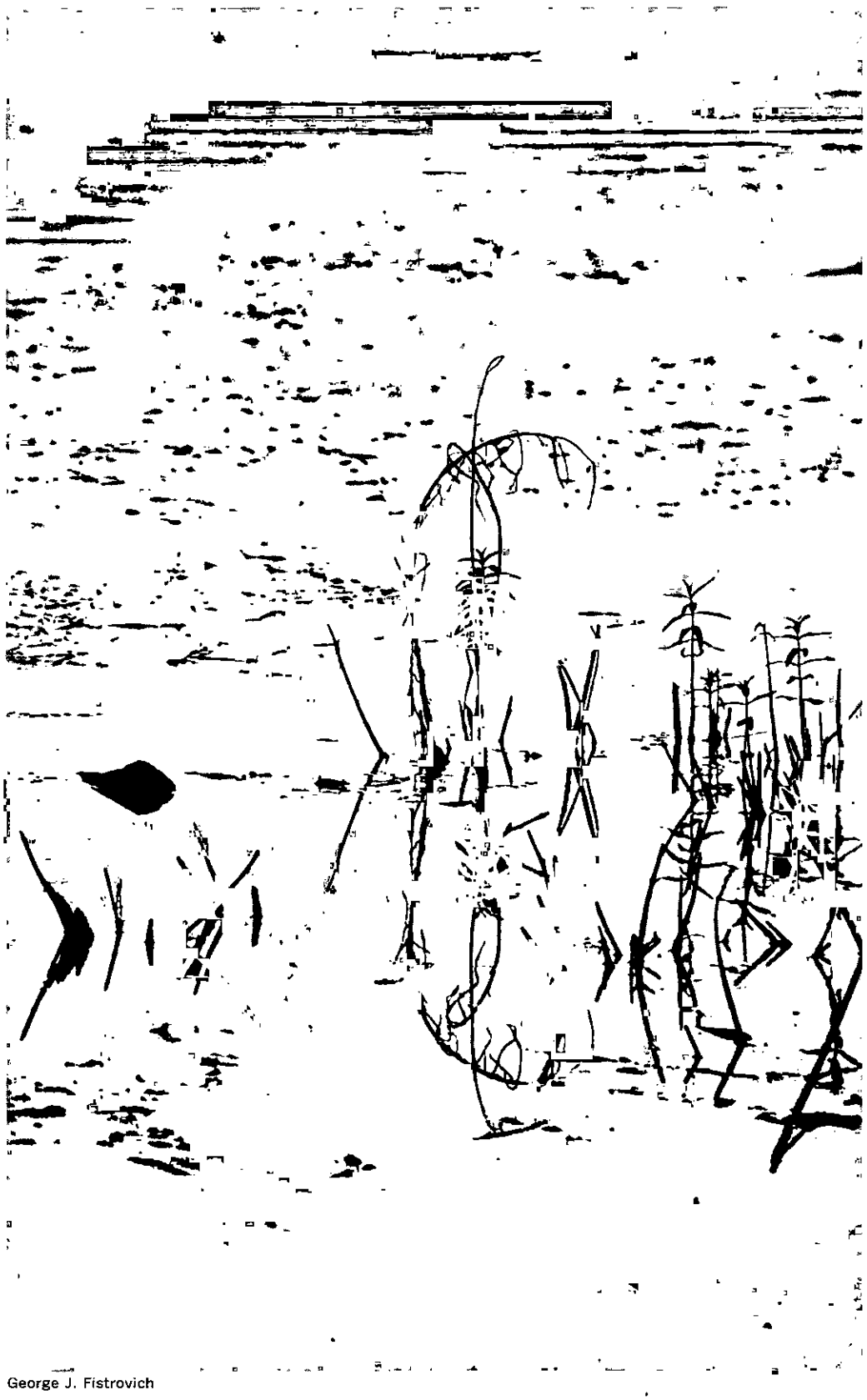

George J. Fistrovich

Delaware River Basin Commission
25 Scotch Road, Trenton, N. J.

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Annual Report 1968

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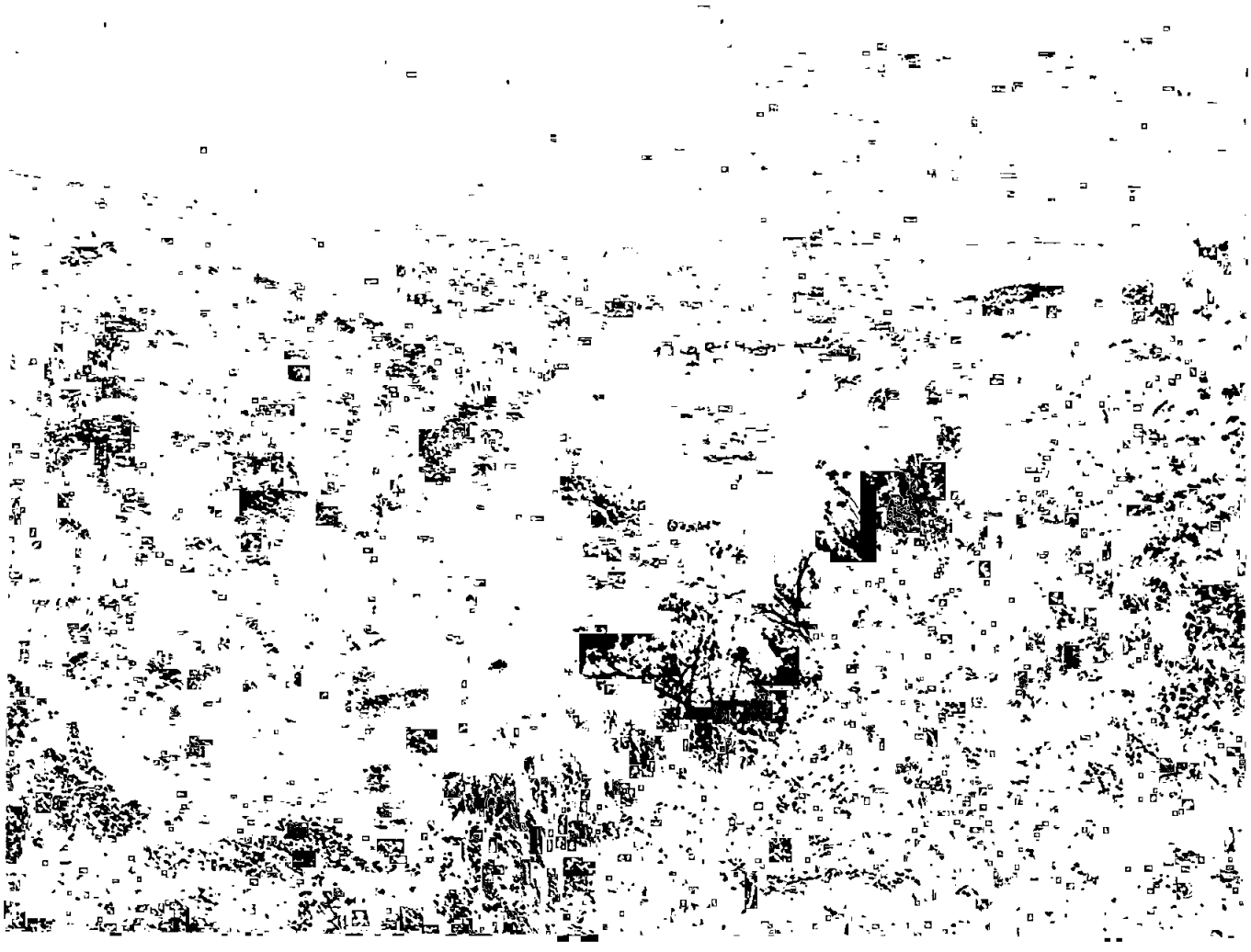

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Cover

On October 2, 1968 President Johnson signed legislation establishing a National Wild and Scenic Rivers System. About 75 miles of the upper Delaware River from Hancock, N.Y., to Matamoras, Pa., and including the Pond Eddy, Pa., area shown here, will be studied for possible inclusion in the System.

Photograph by Interstate Photo Labs

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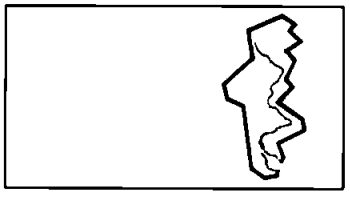
Color photographs (left and opposite page) were taken in the Hawk's Nest area of the upper Delaware that is under study as a National Scenic River.



This is the sixth annual report of the Delaware River Basin Commission, covering the year ending June 30, 1968. It is presented respectfully to the 7 million people of the river basin community, to their fellow citizens of Pennsylvania, Delaware, New York and New Jersey, and to their representatives in the four State Legislatures and in the Congress of the United States.

It relates the activities of the Commission in carrying out its assignment under the Delaware River Basin Compact to attain multi-functional development, balance and protection of the valley's resources for the benefit of the people and institutions that rely upon them. And it describes the management state of water and related natural resources of the 13,000-square-mile drainage area of the river and its tributaries — extending 265 miles from the ocean capes, across the coastal plain, through the rolling hill country above Trenton, and into the popular Pocono and Catskill Mountains.

Full recovery from the work-consuming drought of the 1960s having passed, the Commission's staff and program attentions were directed toward more productive efforts. This year's report reflects a predominance of pollution control activities — just as attention focused previously on the drought and other concerns. But droughts, floods, pollution, recreation, water supply and fisheries are deeply interrelated and work that emphasizes one is not to the exclusion of the others.

The uses and problems of water resources are many-faceted, and water is no respecter of political boundaries. Accordingly, the Compact supplies the Commission with multi-purpose flexibility and responsibility and with a geographic jurisdiction that is conterminal with the basin's natural borders. It is the Commission's hope that it is using these tools for effective resource management in the public interest.

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The Commission 1968

Chairman
Stewart L. Udall*
U.S. Secretary of Interior

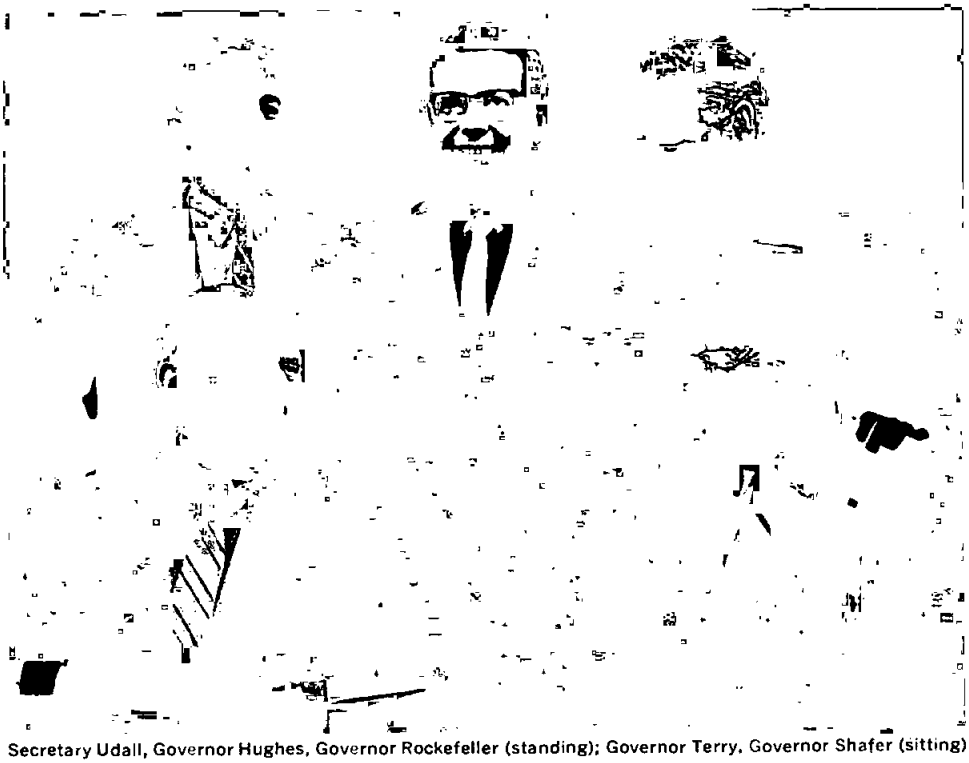
Vice Chairman
Nelson A. Rockefeller
Governor of New York

Richard J. Hughes
Governor of New Jersey

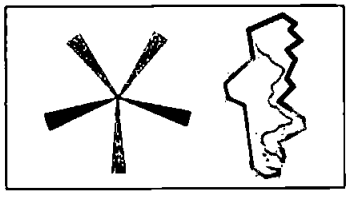
Charles L. Terry Jr.
Governor of Delaware

Raymond P. Shafer
Governor of Pennsylvania

*U.S. Member appointed by the President
Governors serve ex officio

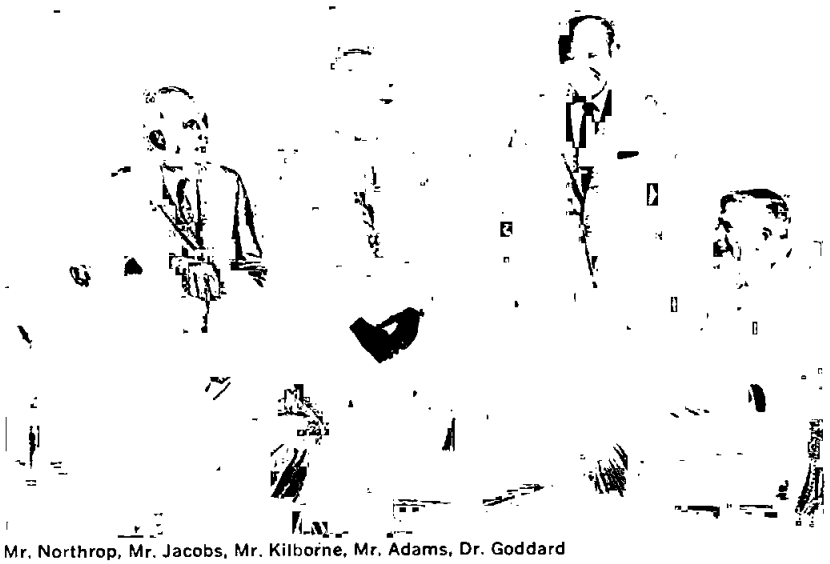


Secretary Udall, Governor Hughes, Governor Rockefeller (standing); Governor Terry, Governor Shafer (sitting)



Alternate Members

Vernon D. Northrop	*United States*
R. Stewart Kilborne	*New York*
H. Mat Adams	*New Jersey*
Harold L. Jacobs	*Delaware*
Maurice K. Goddard	*Pennsylvania*



Mr. Northrop, Mr. Jacobs, Mr. Kilborne, Mr. Adams, Dr. Goddard

Advisors

Col. James A. Johnson	*United States*
Maurice M. Feldman	*New York*
Samuel S. Baxter	*Pennsylvania*

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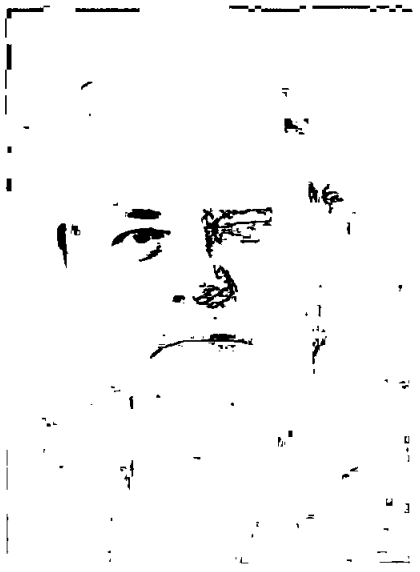
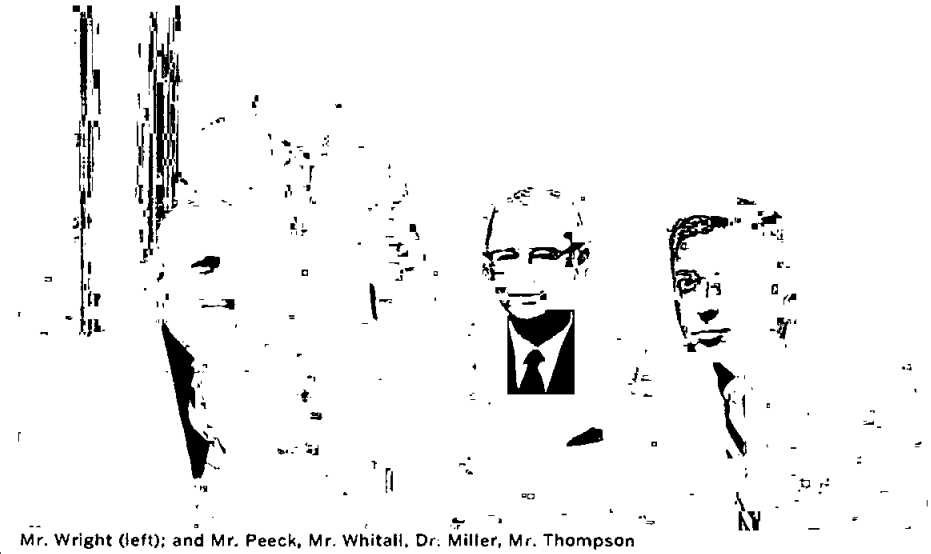
The Staff





Mr. Wright (left); and Mr. Peeck, Mr. Whitall, Dr. Miller, Mr. Thompson

James F. Wright
Executive Director

William Miller
General Counsel

W. Brinton Whitall
Secretary

Dawes Thompson
Public Information Officer

Arthur E. Peeck
Chief Administrative Officer

Planning Division

Mr. Howlett, Dr. Kelley, Mr. Thursby (above)

Mr. Goodell, Mr. Porges, Dr. Hull, Dr. Hastings, Mr. Briganti (right)

Herbert A. Howlett
Chief Engineer

J. W. Thursby
Staff Economist

John W. Kelley
Staff Biologist

Ralph Porges, *Head*
Water Quality Branch

Robert L. Goodell, *Head*
Operations Branch

Theodore Briganti, *Head*
Project Review Branch

C. H. J. Hull, *Head*
V. Stevens Hastings, *Assistant Head*
Program Planning Branch

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7-68

Regional waste remedies pushed as pollution controls gain; Research and watershed management stepped up

The complex and painstaking job of keeping water pollution under control was dominant in the work of the Delaware River Basin Commission in 1967-68.

Not an end in itself, combatting pollution is a big factor in presenting the public clean water supplies and recreation and protecting fisheries and other resources. The 1968 pollution cleanup and prevention efforts thus responded to the Commission's multi-purpose obligations under the interstate-federal Delaware River Basin Compact.

U. S. Interior Secretary Stewart L. Udall declared that only the Delaware among the nation's river basins was moving into "high gear" in its pollution abatement program. He said this following the Commission's 1968 annual meeting at which important cleanup action was taken.

The year's pollution control work represented the opening efforts at attaining the water-use and stream-quality goals established in 1967 with adoption of comprehensive Standards for the four-state river system. Heaviest concentration was directed at upgrading without delay the troubled waters of the 86-mile Delaware estuary between Delaware Bay and Trenton. This effort was made possible in large part by the extensive investigation into the causes and effects of pollution by the Delaware Estuary Comprehensive Study of the Federal Water Pollution Control Administration.

The Commission blazed a new trail in the pollution abatement field with one of its moves. This was the introduction of a cleanup approach that gives each discharger in the estuary a computed fair share of the river's waste assimilative capacity.

During the year, three important steps were taken by the Commission to follow up enactment of the 1967 Standards. They were the adoption of basinwide Regulations for implementing and enforcing the Standards, the assignment of wasteload allocations to each estuary discharger, and the establishment of a broad surveillance program to keep full-time check on discharger effluents and stream quality. (Separate sub-sections appear on each of those three developments as well as a summary of all water quality activities.)

Regional Waste Control

In the Compact's spirit of regionalism, the Commission in earlier years had acted on a number of large regional problems, including an interstate water supply package, adoption of the pollution Standards, launching a fisheries management program, combatting effects of a drought, and developing a basinwide Comprehensive Plan. This year the Commission focused on regionalism of another — but equally important — scale by initiating an all-out drive for regional waste collection and treatment within sub-basins of the Delaware valley. As the year ended, the way was cleared for adoption of a new policy under which the Commission could mandate regional waste systems or build and operate them itself. Even prior to the policy's adoption, the Commission registered some success in persuading communities to join with neighboring waste operations.

Secretary Udall New Chairman

Secretary Udall became the first Commissioner to serve as presiding officer for the second time under the custom of rotating the chairmanship among the five signatory representatives. He succeeded Governor Raymond P. Shafer as chairman at the March 1968 meeting in New York City. Governor Nelson A. Rockefeller is the 1968 Vice Chairman. Colonel James A. Johnson, the new Philadelphia District Engineer of the Army Corps of Engineers, took over from Colonel W. W. Watkin Jr. as Advisor to the United States Member of the Commission and Water Resources Commissioner Maurice M. Feldman of New York City replaced Robert D. Clark as Advisor to the New York State Member.

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Col. Johnson Mr. Feldman

General Lack's Death

General Norman M. Lack, who had been a key figure in working out the federal-interstate partnership as enacted in the Delaware River Basin Compact in 1961, died on April 26, 1968, less than a year after his retirement as Alternate Member from Delaware. In that capacity General Lack represented two governors on the Commission from 1961 to 1967. A frequent mediating influence on critical issues, General Lack also was credited with focusing Commission attention and action on some key matters.

Watersheds-Groundwater

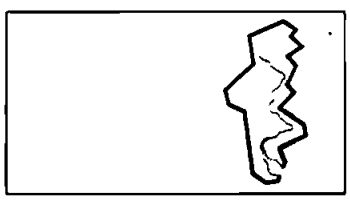
A tenth program was added to the activities of the Planning Division to assure more concerted attention to natural resource problems faced within the scores of tributary watersheds that comprise the four-state basin. Preparations also were under way to expand the program for comprehensive development of the basin's rich groundwater resources.

Research

Research became a larger part of the Commission's operation than previously as several new studies got under way. Many of these are searching for new information on anadromous, resident and shell fish species and are part of the 10-year fisheries research program launched a year ago on recommendation of the Commission's Fisheries and Wildlife Technical Assistance Committee. Other research efforts are integral parts of the Commission's pollution control program, while still others concern collection of important hydrologic data. (This report contains a separate section on research.)

Recreation-Conservation

The Commission continued to promote orderly development of recreational resources throughout the basin. Its fifth Water Resources Program emphasized support for the Evansburg reservoir project in Montgomery County, Pa., Hackettstown reservoir in Northwest Jersey, Nockamixon reservoir and park in Upper Bucks County, Pa. and other joint recreation and water supply projects. It was engaged in exploration of means to protect Tinicum Marsh near Philadelphia International Airport. It was studying methods to minimize effects of a growing number of high voltage power lines that formerly have cut swaths in forests in or near lands dedicated to parks and recreation. It responded to demands that Sunfish Pond be left in its natural state and helped produce a plan to preserve the lake. It added to its Comprehensive Plan two important new outdoor recreation facilities — the Philadelphia marina and a Bucks County recreation area on Prahl's Island in the Delaware. To balance estuarine protection with continued growth, it began developing a long-range biological, pollution and land use planning program for the Delaware Bay area. And it had nearly finished the job of restoring the 130-year-old wing dams that will preserve one of the river's most thriving recreation "lakes" at Lambertville-New Hope.



Project Review

The Commission cleared for construction plans submitted by government agencies, commercial institutions and others for 185 water-related projects which were found after review — and some after modification — not to pose any harmful effects on the basin's resources. The statistics indicate the extent of continued economic and population growth in the Delaware valley and also increased awareness of the need for consolidated public waste facilities. Most numerous were the 75 industrial water supply operations, followed by 41 public water supplies, 29 public sewage works, several with regional tie-ins, and 24 industrial waste installations.

Reservoirs

Despite a general slowdown nationally on domestic civil works, construction of the Beltzville reservoir in the Lehigh valley progressed at full speed. And final preconstruction work moved ahead, but at a reduced rate, on the larger and better-known Tocks Island reservoir and Delaware Water Gap National Recreation Area. (A separate section appears on these projects.)

This was a year when the Commission was getting more deeply involved in matters stemming from these and other reservoirs that are either under construction, on the drawing boards or planned in the basin. Some of the matters posed by the reservoirs resulted in staff work on water supply pricing, identification of consumer areas, post-drought reevaluation of the basin's water crop, hydroelectric power investigations, protecting reservoir areas from contamination, adapting fish environment to dams and other changes, use of dam releases to combat pollution, and many others.

A break has occurred in the land acquisition problems that have delayed development of a series of flood control dams planned for years on upper Brodhead Creek, a Pocono Mountains watershed that suffered heavily in the 1955 flood. When built, the structures will protect an immediate area where nine persons died in that flood. Eventually, they will be part of a larger program, mostly flood protection, covering the whole Brodhead watershed. Stroudsburg and East Stroudsburg, on the lower Brodhead, enjoy protection by flood walls built since 1955. This overall federal-state-local program is part of the Commission's Comprehensive Plan.

Office Building

Preparations for developing the agency's own office building were begun as the State of New Jersey donated to the Commission a 4½-acre site a short distance from the Delaware River just outside Trenton. The Commission authorized the Executive Director to engage an architect to design a building to cost about $650,000. Summer 1970 is the target date for completion. Growth of the Commission this year necessitated the relocation of its water quality branch operation from the agency's offices to other rented quarters two miles away.

Budget and Administration

The Commission's operating expenditures and encumbrances for fiscal 1968 totaled $1,022,543, which supported the nine basic planning programs. This represented a spending increase of $413,340 over the previous year, mostly to pay for stepping up the pollution control program. A $2,000 capital expenditure went into a fund for future water supply.

The Commission also spent $397,155 on special programs and projects not included in the regular operating budget. These were the Tocks Island Region Environmental Study, rehabilitation of the Lambertville-New Hope wing dams and the Tocks Island reservoir fluctuation-fish study. They are being financed by grants and revenue sources other than the regularly allotted state and federal appropriations.

At the end of the year, there were no vacancies in the authorized staff of 52. Eleven new positions were filled, nine of them in the water quality program.

The late Gen. Lack

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Qu • Summary

The intensive program to implement the year-old Delaware River pollution code moved off the starting line in 1968.

The Delaware's headstart over other United States rivers in keeping pace with recently enacted national pollution control laws and programs means that many of the steps taken in the basin are firsts. One major step under way stands out. That is the innovation of equitably dividing the waste assimilative capacity of a river among those who discharge wastes to it.

In 1967 the four-state Delaware valley community, acting through its Basin Commission, cleared the way for the abatement stepup by adopting comprehensive pollution control Standards for the interstate river. The Delaware, heavily overworked and highly polluted in its urban-industrial tidal stretch from Trenton to Wilmington, was earmarked for extensive cleanup over the coming years. The Standards, in effect the pollution abatement law of the basin, established a combination of stream quality objectives and protected river uses including continued public and industrial withdrawals, improved fishery environment, and recreation (including water-contact sports) — all reconciled with continued use of the river for waste disposal under dramatically upgraded treatment levels. The Standards were approved by Washington in 1968 for their conformance with federal law.

The Standards will necessitate chopping daily oxygen demand by wastes discharged to estuary waters from present levels in excess of 1,000,000 pounds down to 322,000 pounds. Industries and communities now produce a daily raw load of 2,500,000 pounds, but treatment removal of organic material cuts this to about 1,000,000 before it is discharged to the river.

1968 Action

Two principal followup actions toward achieving the Standards' goals were pressed this year.

First came adoption of Regulations providing the blueprint for attaining the objectives. These include the assignment of the maximum allowable oxygen-consuming wasteload to each of four zones of the estuary — an 86-mile stretch reaching from the head of tide at Trenton to the upper end of Delaware Bay at Liston Point, Del., below Wilmington. The Commission's unanimous adoption of the Regulations at the annual meeting in New York City carried the weight of the personally-cast votes of the Basin State governors and the Secretary of Interior acting collectively as Delaware Basin Commissioners. (Governor Terry was ill and did not attend, but his concurrence was registered by Delaware's Alternate Member, Harold L. Jacobs.)

With adoption of the implementing Regulations behind it, the Commission's water quality staff turned to a critical phase in estuary cleanup — effecting compliance by individual polluters. (This phase is described in the sections on Allocations and Basinwide Regulations.)

Another major estuary water quality action during the year was the contracting with the three estuary states for surveillance and analysis of the estuary, its tributary waters and waste discharges along the tidal stretch of the river through an extensive sampling program.

As the year drew to a close, the Commission was preparing to enact an important long-range program to promote the consolidation of industrial and municipal waste collection and treatment systems within sub-regions of the Delaware Basin both in and outside the dynamic estuary area.

(Separate sections follow this chapter on discharger allocations, the water quality Regulations, the surveillance-sampling program and regionalization of waste treatment.)

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Estuary c under way; Udall, Governors restate Delaware ; Costs, timetable and community accord discussed

Community-DRBC Cooperation

It is the Commission's policy to settle on a cleanup program that combines effectiveness, economy and efficiency. So, as with its selection of Standards and the forging of implementing Regulations, the staff has consulted and cooperated with the estuary's industrial community and municipal dischargers in determining the allocations. Industries and communities, which have largely accepted the cleanup program, have been helpful in many efforts.

For example, the Commission staff sought and received during the year assistance and recommendations from industry and others on three key phases of the pollution abatement program — joint municipal-industrial waste treatment, financial incentives to cleanup, and seasonal variations in operation of waste treatment plants.

Timetable

At the time of adoption of the Standards in March 1967, the Commission envisioned an implementation timetable that would have had substantial numbers of dischargers in compliance with the high level treatment requirements within their zones by 1972. However, the effect of cutbacks in domestic expenditures on federal waste treatment grant schedules will present obstacles to many dischargers. Nonetheless, the Commission looks to the 1970s to bring a marked improvement in the estuary's water quality.

Under the Regulations, each discharger is submitting his own anticipated compliance schedule, which must be considered on its merits by the Commission staff.

Costs

The estimated cost — public and private — of upgrading treatment during the first 20 years, the period of sharpest improvement, is about $500 million. When the Commission enacted its Standards in 1967, cost estimates for estuary abatement were $245 million for this period, based on 1964 construction costs and pollution levels as used in the federal Study of the estuary. The present program encompasses a far broader spectrum of waste treatment and takes in more than twice the number of dischargers than the earlier package. It also reflects considerable general regional growth.

The estuary and each of its four zones has a limited assimilative capacity, so the constantly increasing raw load volume must be offset by higher degrees of treatment. Two of the new cost factors are keyed to this.

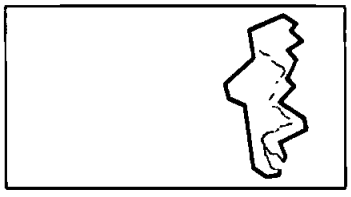
One will be $140 million for new collection and treatment facilities and improvements necessitated by industrial, urban and suburban growth in the tri-state estuary region. Secondly, dischargers initially will have to treat at about 5 percent above the earlier requirements to compensate for additional raw loads, at an extra cost of $49 million.

The cost of treatment by types of processes and for varieties of pollution not covered by the federal study will cost $92 million. These include chlorination for public health, acidity-alkalinity control, instream aeration and debris control.

Commitment Reaffirmed

The Commission's policy commitment to the estuary cleanup — and its costs — was re-enunciated by Secretary Udall and the governors at the 1968 annual meeting.

Secretary Udall noted that the 1966 Federal Water Quality Act looks with "special favor on such river basins organized as the Delaware River Basin Commission" by providing 55 percent of the cost to qualifying municipalities in federal grants "to ease the pain a bit." About two-thirds of the estuary's waste load is municipal.



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Polluters must share river's waste consumption capacity; Sharp load cuts ordered; Many contest allotments

For the first time, the ability of a major river to assimilate wastes, in effect, has been divided among the communities and industries that discharge their sewage and liquid wastes into it.

This is an administrative device that represents a new approach to fair distribution of the responsibility for maintaining an acceptably clean natural resource — and of the privilege of using it for waste disposal under a legal doctrine known as equitable apportionment.

Here is how it works:

The Delaware River Basin Commission, thanks to the Delaware Estuary Comprehensive Study, was able to establish a broad set of stream quality objectives to upgrade the river, or preserve it, for a variety of uses. The Commission determined that present oxygen consumption by pollutants (carbonaceous oxygen demand) must be dramatically reduced, then divided the estuary into four zones, each having a share of the waste-accepting capacity. Finally, each zone's capacity was divided among its dischargers. Within each zone, all wastes must be treated to the same minimum degree for removal of pollutants, whether the municipalities and industries or their raw wastes are small or large.

In June 1968, 81 public and industrial dischargers with 92 plants were assigned a maximum permissible oxygen-consuming waste discharge allocation by the Basin Commission in an action concurred in by the estuary states of Pennsylvania, New Jersey and Delaware. Within the allotted 20-day deadline, 21 dischargers representing 24 plants had filed applications for hearings later this year on their allocations.

New Ground

The allocation of loadings on the Delaware is the culmination of a series of events and activities that represent the breaking of new ground in several aspects of resources management — in law, science, administration and enforcement.

Already, the waste load allocation device is being applied elsewhere. Pennsylvania and New York, both signatories to the Delaware Basin Compact, have moved to use it on rivers in other parts of those states.

At about the same time as the Delaware Basin Compact — the first and, to date, only federal-interstate river development treaty — moved toward enactment, federal authorities responded favorably to requests from the river community for a technical investigation of pollution's causes and effects in the lower river.

Employing computers, that Study's scientists devised a mathematical formulation of the Delaware estuary. Utilizing this model, they were enabled in short periods to collect and analyze technical data involving water quality that earlier would have consumed decades or more. Hence, forecasts of conditions of the river for each of scores of circumstances programmed for the computers were obtained quickly.

By the time the Study neared conclusion two years ago, the Basin Commission had tooled up to exploit the findings in the formulation of a massive cleanup program for one of the most technically complex tidal rivers with serious pollution problems.

The river mathematical model, an untested approach early in this decade, has now become a proven mechanism for application to otherwise unsolvable problems. Approved for accuracy and concept by both scientific and industrial independent authorities, the computerized river model is now a widely accepted device.

Without the speedy results produced by the Estuary Study, the Basin Commission would not have possessed scientific data critical to its administrative judgments on estuary, zone and discharger pollution matters.

The Estuary Study was geared to produce findings on a number of parameters, with emphasis on the most significant measure of stream pollution in a heavily developed area — stream oxygen content. Expansion of these results to encompass acidity and other forms of pollution also has been accomplished

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Procedures set on assuring water uses, controlling effluents; Nontidal streams protected

In March 1968, at its annual meeting, the Basin Commission adopted broad Regulations with procedures for implementing and enforcing the water pollution control Standards enacted a year earlier for the four-state river valley.

The Regulations were designed to control the quality of industrial and sewage effluent discharges and, in turn, protect the uses for which the river's waters — tidal and nontidal — were reserved by the Standards. Water uses to be protected are water supplies for municipalities, industry and agriculture; wildlife, fish and other aquatic life; recreation; navigation; and controlled waste disposal where compatible with the other uses.

Under the Regulations, stream requirements vary within the basin, with higher dissolved oxygen mandated in the estuary when anadromous fish make their runs and in trout waters. Other criteria on which limits are imposed include alkalinity-acidity, water temperature, phenols, odor, detergents, fluorides, turbidity, radioactivity and coliform.

The preparation, review, public hearing and revision of the document represented a major part of the water quality branch's work during the year.

Zone Waste Limits Set

While covering the entire interstate network of the Delaware and its tributaries, much of the document focused on the tidal estuary from below Wilmington to Trenton.

Principal provision of the Regulations was to cut daily oxygen consumption of wastes in estuary waters by two-thirds to 322,000 pounds in conformity to the objectives in the Standards. Here is the breakdown of the 322,000 pounds as limited to each of the four estuary zones:

- Trenton to Pennypack Creek in North Philadelphia (25 miles)—18,600 pounds.
- Pennypack Creek to Big Timber Creek, opposite South Philadelphia in New Jersey (13 miles) — 144,800 pounds.
- Big Timber Creek to Marcus Hook on Pennsylvania-Delaware boundary (16 miles) — 91,000 pounds.
- Marcus Hook to Liston Point, Del., where Delaware Bay begins (30 miles) — 67,600 pounds.

Under the Standards secondary treatment levels ranging initially from 86 to 89 percent removal of oxygen-consuming wastes will be required to keep organic wasteloads within the zone limitations. This compares to current average treatment levels of about 50 percent. During winter months, treatment efficiencies down to 75 percent will be accepted for short periods if temperatures drop enough to affect treatment efficiency without stream impairment.

The Regulations specify procedures under which human wastes must be disinfected to destroy disease-producing organisms.

Each discharger soon must submit to the Commission through his respective state pollution control agency an abatement compliance timetable, including engineering study, construction schedule and operating starting date.

Where standards set by any of the four basin states are more stringent than the Commission's, state standards will prevail, since the Regulations are designed to implement and enforce state requirements where they are higher.

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States are contracted by DRBC to sample and analyze streams as check on cleanup effectiveness, enforcement

Without an alert water quality surveillance and sampling program, effective administration and enforcement of stream pollution abatement is impossible.

In late-1967, the Commission established an extensive sampling operation with the three estuary states of Delaware, New Jersey and Pennsylvania to gauge the cleanup effort's effectiveness by keeping constant check on effluents and stream quality.

Under contracts with the Commission, the three states collect and analyze wastes from about 45 big industrial and municipal sewage treatment plants as well as the waters of 25 tributaries from Trenton to Delaware Bay.

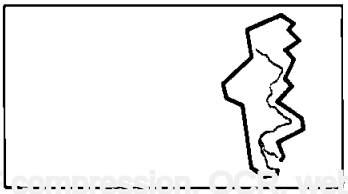
Also under Commission contract, Delaware's Air and Water Resources Commission is making weekly boat runs over a 75-mile stretch of the river from Reedy Island near Delaware City, Del., to Fieldsboro, N. J., taking channel samples at 17 points.

The boat runs are made in a 34-foot cabin cruiser, custom-built for the specialized work. The vessel must move at brisk speeds to permit collection of enough samples at slack water — the brief period of no water movement just prior to change of tide. It carries up to five members of the agency's staff doubling as crew and water technicians. Some tests are performed on board, with more to be added with installation of new equipment.

The cooperative work represents the first continuing, coordinated sampling-analysis program of the lower Delaware and its tributaries on a regional scale and regular schedule with standardized procedures, although other state and federal sampling has been conducted.

Samples are tested in state laboratories for a wide variety of pollution factors, including dissolved oxygen, temperature, acidity, turbidity, odor, bacteria, hardness, radioactivity, organic load, minerals, toxics and alkalinity.

The operation complies with a Delaware Basin Compact requirement that the Commission avoid duplication where state and federal facilities are available to perform necessary work.



Custom-built cruiser makes weekly runs over 75-mile reach of the Delaware estuary to collect channel water samples as part of pollution control surveillance operations.

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Centralized collection and treatment mandated for economy and efficiency; DRBC involvement seen

All projections point to continued growth in population, industrialization and spare-time activities in areas throughout the four-state Delaware River Basin. If pollution is to be controlled, there must be higher degrees of treatment as raw waste load volumes increase along a river system whose assimilative capacity is limited.

Technical efficiency and economy in waste collection and treatment thus are destined to become more vital than ever to the industries and communities that must bear the costs. It is a precept of the waste disposal business that both these advantages are best found through consolidated systems where there is a logical region to be served.

Some consolidated systems already are operating in the Delaware valley, notably Philadelphia's three separate regional operations and Wilmington's. However, the Commission has identified many additional regions as highly prospective candidates for regionalization, under which it may be possible to bring up to 100 major discharge points into perhaps a dozen separate high-efficiency operations.

In direct response to both the problem and the prospective sub-regions, the Basin Commission adopted, following public hearing which produced broad endorsement, a new policy under which it can require collection and treatment on a regional scale and itself finance, build and operate such facilities. (Adoption actually occurred shortly after the end of the 1968 fiscal year.)

Bolsters Abatement Drive

The regional policy represents an enlargement upon the basinwide pollution control Standards of 1967 and implementing Regulations of 1968. Also, its enactment foretells the Commission's utilization of its powers of financing and construction for the first time.

Under the policy, "the use of water pollution control facilities providing optimum combinations of efficiency, reliability and service area will be required throughout the Delaware River Basin to the maximum extent feasible." It further provides that the Commission, with its bonding powers, step into development and operation of such facilities "where other appropriate agencies do not provide such services."

Governor Shafer has said he hopes the Commission's bonding authority can be employed to finance vital regional facilities. He cited advantages in using revenue bonds supported by service contracts for large consolidated works and favored Commission bonding as a device to regularize the flow of federal grants into the basin for maximum early funding.

The Commission is to cooperate with and strengthen the hand of state officials in their efforts to secure conformance locally to a regional approach. Where the Commission enters the picture as an operator, it will contract to provide services to agencies, municipalities and industries.

Federal pollution grant programs, enacted and proposed, are geared to promote regional facilities.

Advantages of Consolidation

Commission studies show that per capita costs for building sewage plants for 500,000 people is only 60 percent that of a facility serving 50,000 persons and that the smaller system costs nearly twice as much to operate for each person served. Further, large central treatment facilities [illegible] versy over site location, larger plants can better handle industrial discharges, sludge disposal is cheaper and easier, and large-plant handling reduces organic waste demands on the smaller streams.

The Commission will weigh these factors in determining if an applicant's project should become part of a regional system:

> Building and operating costs for various size systems; capability of handling industrial wastes with and without expensive pre-treatment; ability to assimilate high peak flows and temporary shock loads or cope with emergency conditions; sludge disposal capability; transmission distance, land use and other site location factors, and the effects on receiving waters.

Some Regional Prospects

Steps toward developing a single system to serve a group of large and small dischargers on the New Jersey side of the river in Gloucester and Salem Counties are already under way. Preliminary regionalization talks also have developed among the Commission, the state and officials and industries of Delaware and Chester Counties in Pennsylvania. Also, Burlington and Camden officials have regional sewerage studies under way in their respective counties. Other possibilities along the tidal estuary include the Trenton area and Lower Bucks County.

Application of the new policy, however, extends far beyond the tidal stretches.

Lehigh and Musconetcong Rivers

Nontidal areas inviting examination for prospective use of the policy can be found along the Musconetcong River, a fast-growing area in Northwest Jersey, and on the highly-developed Lehigh River in Pennsylvania.

From its inception, the Commission had encouraged sponsors of new waste treatment operations to set up regional facilities with their neighbors, but such efforts often were frustrated by late arrival of project review applications and absence of a strong formal policy. It is now required that any agency or industry must submit plans to the Commission for review upon completion of preliminary engineering.

Tocks Island Region

One nontidal area where a regional waste effort got under way in advance of adoption of the new policy is the string of six counties in three states surrounding the Tocks Island reservoir and Delaware Water Gap National Recreation Area. In the face of these projects now in development, the area's present good water quality environment can be protected only by early preventive work.

The three-year Tocks Island Region Environmental Study (TIRES) was initiated in 1966 with cooperation of federal, state, regional and local government agencies with interests and responsibilities in the region. It has entered its final year and soon will produce recommendations for a waste-water collection and treatment system from among five alternative networks under study. The recommended system logically could be built and operated by the Commission under the scope of the new regionalization policy.

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Investigations progress to aid in fisheries, water supply and pollution control work

Essential to any sound policy formulation in water resource management is the accumulation of reliable and complete scientific and statistical information. A good deal of the effort in the Commission's planning and program activities goes into time-consuming research and its evaluation. This work is performed by the Commission staff and through contractual arrangements.

Much of the research activity is linked with the Commission's basinwide pollution abatement effort. A large part also deals with the complex biological problems involved in sustaining a healthy fishery in areas where dam construction, waste discharges and other activities of man tend to alter the natural aquatic environment. Some of this work, too, touches on water quality. Still more research and data collection involves perpetual updating of available facts on precipitation, groundwater and runoff, all vital to effective resource management. The fisheries activities largely fall into the 10-year program adopted last year on recommendation of the Fisheries and Wildlife Technical Assistance Committee:

Following are 11 of the fact-finding projects under way:

Tocks Island Fishery

The water level of the Tocks Island reservoir would rise and fall several feet daily under a utility-sponsored pumped-storage electrical generating proposal for Kittatinny Mountain. A Commission biological research team is using four specially built two-acre ponds near the mountain to determine if fish spawning would be inhibited by the fluctuations. After a year of study, no noticeable harmful effects turned up in these preliminary findings:

One hundred adult sport fish (bluegills, pumpkinseeds, and rock and largemouth bass) were put in the waters of each of a group of fluctuating and non-fluctuating ponds for comparison of the nesting results. In the fluctuating water, the fishes built their nests safely beneath the lowest water level, avoiding locations sometimes left out of water. No significant difference in the number of nests was found in either type pond, and large numbers of healthy juveniles were produced in both. In addition, 1000 fathead minnows were placed in each pond as food for the game fish, and they too avoided nesting in the fluctuating water zone. Next year, non-nesting species will be tested.

Advanced Waste Treatment

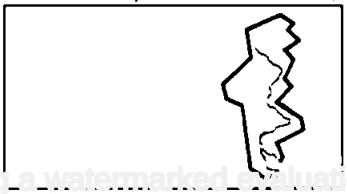
The pursuit of breakthroughs in advanced waste control techniques to improve efficiency and economy is especially vital to the Delaware and other bodies of water with severe pollution problems. The Commission is studying the feasibility of design, construction and operation of a 100,000-gallon per day model of a regional treatment plant to shed light on the problems of handling an unusual variety of wastes.

Nitrification

Another process that consumes Delaware estuary oxygen in large quantity is nitrification. The Commission's estuary cleanup is now geared largely to treatment of the carbonaceous but not nitrogenous content of waste discharges to the river. The Commission, looking ahead to controlling this type discharge, has contracted with Hydroscience, Inc., of New York to evaluate the nitrification process with respect to quality standards and future treatment requirements. This will involve a computerized model of the river.

Bristol Oxygen Sag

Drops in water dissolved oxygen content are usually readily traceable to biological activity spurred by heavy organic waste discharges, as in the Delaware around South Philadelphia. However, an oxygen sag that occurs in the river each summer in the vicinity of Burlington-Bristol has the experts concerned,



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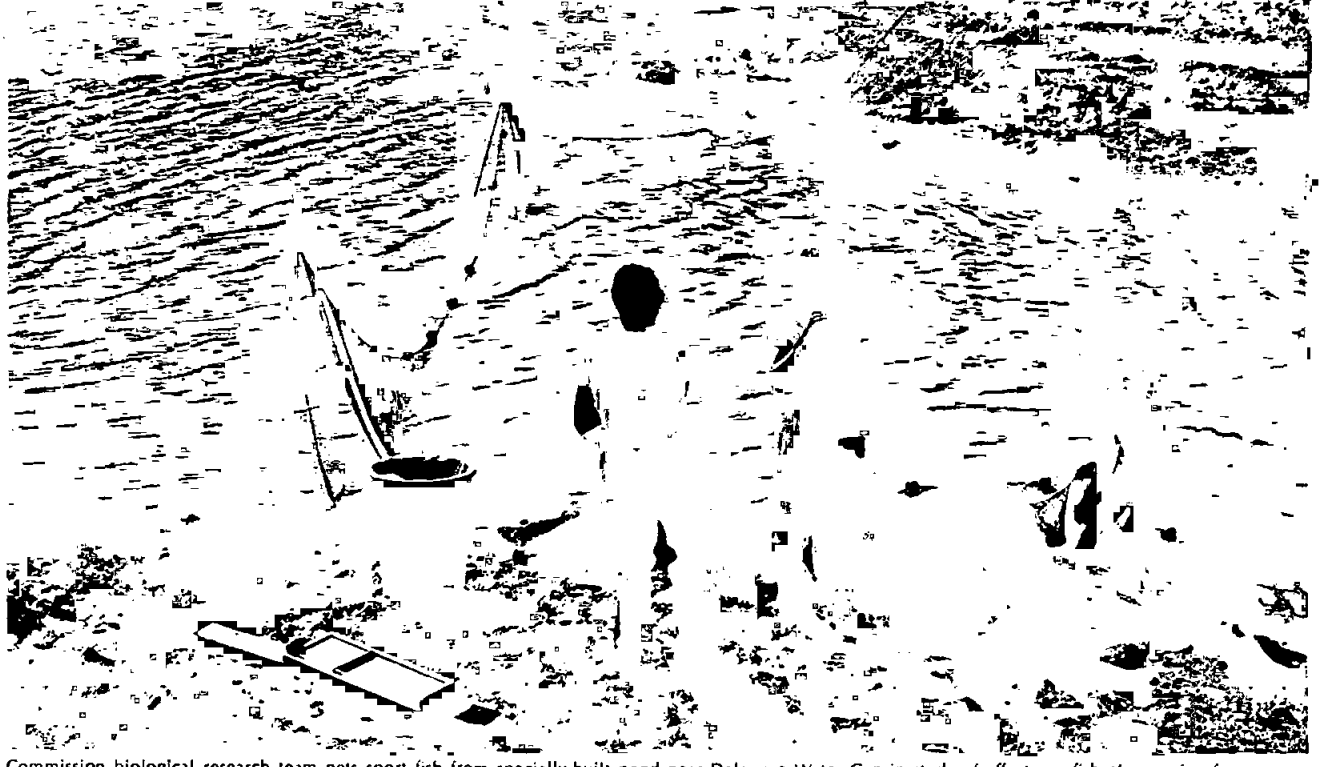

Commission biological research team nets sport fish from specially-built pond near Delaware Water Gap in study of effects on fishes' spawning from reservoir fluctuating water levels.

since the waste load there is not heavy enough to cause the dip. A study into the cause of this sag therefore has been launched by the Commission's water quality branch.

Watershed Quality and Supplies

Waste loadings along the Delaware's principal tributaries for the coming 30 years were projected to provide knowledge needed to plan future flow dilution and reservoir storage. This information will be used in a program to alert local areas up and down the Delaware to the water quality and supply problems they face unless they join in or undertake preventive action.

Estuary Tributaries

A biological pollution research program scheduled for completion in 1969 is investigating the fish and plant environment in 45 Delaware tributaries on both sides of the tidal stretch of the river from Trenton to the ocean. This work has the dual purpose of determining the effects of the tributaries on the river and providing a yardstick for measuring future changes in tributary quality. The study is similar to one published this year by the Commission and Pennsylvania on the Lehigh River that found a close correlation between pollution and poor fish environment.

Shad

A broad investigation into Delaware shad migration problems was begun with explorations by field crews comprising the study's federal coordinator and state biologists. Spawning was observed and eggs and juveniles were netted. A considerable number of juveniles were collected this summer, but total production appeared below that of prior years. Sportfish and commercial catches above Trenton were disappointing. Plans developed for an anadromous fisheries laboratory near Lambertville staffed by the coordinator and other biologists. The program will be expanded in 1969.

Plankton

In an effort to more adequately understand the biological condition of the Delaware River, the Commission has contracted with the Philadelphia Academy of Natural Sciences to inventory plankton (microscopic floating plant and animal life) between Trenton and Easton. The abundance and types of these organisms are important biological indicators of the health of the river, and the findings will be a help in monitoring and evaluating the impact of pollution and other stream alterations.

Fish-Temperature

Still in progress was a three-year project to establish the water temperature tolerance of four fish species (striped bass, shad, blueback herring and white perch) and how varied levels of pollutants, oxygen and salts affect them. The tests are being conducted at Rutgers University in tanks simulating conditions in the river.

Basin's Water Yield

In its final stages is a cooperative study initiated last year to reevaluate the long-recognized "reliable" water yields of the Delaware watershed in the wake of the 1961-66 drought experience. Since the Delaware, with a relatively fixed water crop, inevitably will be confronted by demands of continued growth in population and industrial production, accurate available water knowledge is essential.

Streamflows-Runoff

The Commission and U. S. Geological Survey are cooperating in a "runoff" data collection and analysis program under which the natural streamflows for 40 years — back to the 1920s — are being compiled to provide an uninterrupted record for predicting yields available from reservoirs and any other stream regulation work. Flows are being tabulated at 240 locations in the four-state basin, then adjusted to compensate for dams and other manmade interferences.

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Two Major Reservoirs

Beltzville in construction stage; Tocks Island project, including park, moves ahead

Extensive benefits are in store for the Delaware Basin and its neighboring areas from two federal multi-purpose reservoir projects on which work is progressing. They are Beltzville, on a Lehigh River tributary, and Tocks Island, on the Delaware River.

This marked the second year of construction work by the Army Corps of Engineers on Beltzville, the more advanced project, located northwest of the Allentown-Bethlehem area.

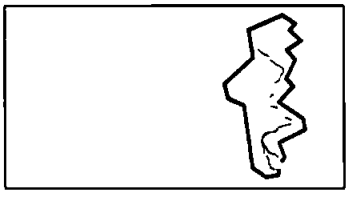
Massive earthmoving and construction activity is under way at Beltzville as work moves ahead on the dam embankment, intake tower and spillway excavation. Road relocations were completed. Diversion of Pohopoco Creek, the water source, through the outlet works is scheduled for Spring 1969, while completion of the job is set for the summer of the following year. This is a flood protection, water supply and recreation project.

Tocks Island Activities

At the site of the larger Tocks Island dam, to be built five miles upstream of the Delaware Water Gap, final planning and engineering work nears completion in preparation for start of construction in fiscal 1970, depending on fund availability.

Besides bringing the first national recreation area to the Eastern United States, this complex facility will provide flood protection which would have reduced greatly 1955 damages on the main stem. It will also add a major water supply source for growing metropolitan areas served by the river, permit regulation of river flows to approach year-round stream uniformity and help control salinity and pollution downstream, and, in addition, could help meet the region's expanding energy needs.

The latest preparations at Tocks Island by the Corps involve extensive geological explorations to determine rock composition at the outlet works and spillway locations on the New Jersey bank. This entails blasting and digging a horizontal 5-by-7-foot tunnel 700 feet into Kittatinny Mountain and four



Looking upstream through area where Beltzville dam is being built in the Lehigh valley, photograph (left) shows work progressing on intake tower and spillway. View from New Jersey side across Delaware River at southern tip of Tocks Island (right) pictures location of 160-foot-high dam which will be erected to create 35-mile-long reservoir.

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vertical holes to depths of 289 feet into which geologists will be lowered in cages to make their observations.

To date, more than $10 million has been spent or committed for land purchases in the Delaware Water Gap National Recreation Area, choking off land speculation activities. Purchase of the damsite is getting under way. The National Park Service has placed into operation a visitor information station on the Jersey side of the Water Gap and is building two other visitor areas across the river. The park will be well into operation in the early 1970s and the dam will start backing up the 35-mile lake in 1975, three years prior to scheduled final project completion.

Despite problems the reservoir and park encountered in Congress early in 1968 over cost escalation and speculation about effects on shellfish, appropriations were approved for both phases of the project to proceed. Also, the Delaware Valley Conservation Association, a group mainly of local residents set up to fight the project, lost a federal court appeal for reinstatement of its suit to have the entire Tocks Island development abandoned.

Both multi-purpose projects are major features of the Comprehensive Plan of the Basin Commission, which acts as a central coordinator during development to assure balance of all project phases and will participate in the projects' operations as part of a basin management program after completion.

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New program readied to apply basinwide management concept on local scale; Urged by private groups

The Delaware River, stretching 330 miles from the Atlantic Ocean to Hancock, N.Y., is the product of scores of tributaries reaching into four states. Ranging from tiny creeks to the large Lehigh and Schuylkill Rivers, each in turn is created by its own tributaries and so on. This adds up to a vast gravity network of thousands of small-to-large, uninhabitated-to-crowded drainage areas that make up the 13,000 square-mile Delaware Basin.

Any natural sub-basin viewed in terms of benefits it can produce or problems it can pose for those who use or live in it is regarded as a local watershed. This in reality is a small-scale river basin with a similar range of natural resource considerations — water supply, recreation, flooding, pollution, fisheries, soil conservation, wildlife and related land use.

The Commission in 1967 added to its planning functions beginning in 1968-69 a new program on local and regional watershed management and engaged a watersheds planner with experience in the Delaware Basin to staff the effort. Addition of a small watersheds program to the Commission's technical operation was urged by the Water Resources Association of the Delaware River Basin, whose series of special reports to the Commission helped in the design of the program, and by the Delaware River Watersheds Association.

Applying its influence and skills as a multi-purpose agency, the Commission aspires to promote comprehensive natural resource programs in local watersheds. It will seek to interweave the activities of the many single-purpose agencies working on water-land matters at local-to-interstate levels, and assist and advise the many private watershed associations that have been organized in the basin. It will promote formation of others where they are needed.

Basinwide Benefits Seen

By guiding many local watersheds toward multi-purpose development in preference to more limited uses, the Commission would promote, in effect, good management of a series of sub-basins functioning for the benefit of the entire basin.

Here is an example of how the Commission could exercise leadership:

Federal-aid programs require local initiative for development of flood protection works in small watersheds. Where these facilities would protect communities outside the watersheds in which they are built, the Commission could represent the interests of downstream beneficiaries.

An early responsibility under the program is consulting with appropriate agencies to develop a watersheds comprehensive plan encompassing, among other things, existing and planned local developments under the federal Watershed Protection and Flood Prevention Acts. Typical of such programs are those on the Brandywine and Neshaminy Creeks in Pennsylvania and Assunpink Creek and Paulins Kill in New Jersey. The plan also will incorporate studies, such as those in progress on the Musconetcong River in New Jersey and Schuylkill River in Pennsylvania, and projects by state and other authorities, such as the Nockamixon State Park and reservoir in Pennsylvania.

Early priority tasks include establishing working contact with local planning agencies and other public and private groups and taking inventory of conservation problems by watershed.

Groundwater Program

The Commission retained the services of a noted consulting hydrologist to assist the staff in its groundwater program. He is investigating the status of existing groundwater knowledge in the basin, the need for additional information, and procedures for needed management and control of the groundwaters.

Some sections of the basin, particularly the coastal plain, have extensive groundwater supplies with large development potential. Most upland areas have less abundant supplies. In both sections, more specific information is needed on these resources' location, conduct and available yields, including facts on possible waste and salinity intrusion, effects of overuse, and effects of groundwater use on surface supplies.

Sustained sub-freezing conditions early in 1968 produced this rugged but beautiful view a short distance below Barryville, N.Y., on upper Delaware.

River C itions

Heaviest precipitation since 1960 brings first full year of recovery from drought

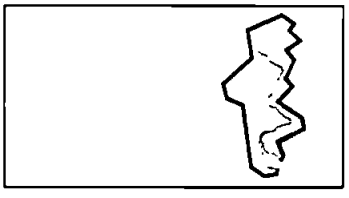
The 12 months ending June 30, 1968 marked the first full year of recovery from the prolonged and record drought of the 1960s.

Only four months after the Commission formally terminated the drought emergency in March 1967, the year covered by this report commenced in the midst of a long period when levels of precipitation, streamflows and reservoir storage were back to normal — or better. The year began and ended with reservoirs overflowing, and its precipitation total of 50 inches was 11 percent better than the long-term average in addition to being the heaviest in seven years. Dilution from heavy flows in Fall 1967 helped improve the quality of water in the polluted estuary below Trenton.

Severe cold weather of January to March brought about picturesque freezing conditions, especially in the mountainous upper basin. This meant a drop for that period of flows, but they were replenished by the spring thaw.

Average flows in the Delaware at Trenton were not quite up to the long-term normal, but this was because precipitation went largely to recharging groundwater levels, which finally were healthy again after years of spotty readings.

Two dry spells early in 1968 brought dips in streamflows (new lows were recorded for two dates in April at Trenton) but were followed by quick recoveries. There was some flooding of Pennsylvania and New Jersey tributaries in May and June, but damages were light.



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"Save Sunfish Pond"

Lake's preservation was assured in power scheme fight; Alternative plan debated

Artist's rendition shows Sunfish Pond preserved in natural state. Alternative plan to using Pond for generating power pictures other reservoir, built larger than planned earlier, behind forested dike.

A small lake that was virtually unknown until the mid-1960s and even unseen except by hardy hikers of the Appalachian Trail has exploded into a symbol of the battle between 20th Century "progress" and natural splendor preservation to the cry of "Save Sunfish Pond."

The lovely 44-acre lake, which developed into a vocal issue at an August 1967 public hearing, sits 1,080 feet high atop Kittatinny Ridge just west of Blairstown in Warren County.

The battle developed over the proposed use of the pond as an upper reservoir in the expanded Kittatinny Mountain pumped storage generating system of three New Jersey electric utility companies. Under the plan, Sunfish Pond would become one of two new mountaintop reservoirs added to a third one nearby that has been operating since 1966. Land for all three was acquired by the companies from New Jersey. Kittatinny Ridge was found to be an attractive pumped storage site in the Army Engineers' report on Delaware valley project needs in 1960. (Upper and lower reservoirs are needed for exchange of water to produce energy for peak-demand hours by pumped storage.)

The volume and intensity of concern over Sunfish Pond's future at the 1967 hearing resulted in an immediate directive by the Basin Commission that the utilities search for an alternative to using Sunfish Pond. The 1967 hearing involved an amendment in the Commission's Comprehensive Plan to redefine the pumped storage authorization at Tocks Island reservoir. The utilities would make use of water at the Tocks Island dam, to be located just below Kittatinny Ridge on the Delaware River, in a manner not now included in the Commission's Plan.

Alternative Plan Disclosed

The new studies indicated that Sunfish Pond could be left undisturbed through construction of the other new upper reservoir with higher dikes or by covering a wider area than planned earlier, in either case compensating for the loss of storage in Sunfish Pond.

Staff contended a suitable alternative arrangement could be achieved while preserving the prospective substantial public benefits from the project. The project could make available low-cost electrical power to pump Delaware River water from the basin for use in Northeast Jersey, and similar arrangements could benefit areas in Pennsylvania. Also, the collection and treatment of sewage and industrial wastes could be made less costly to industry and the basin generally from cheaper energy available through the project.

The Commission staff said it would press for a rigid set of conditions and restrictions, in addition to a flat prohibition against using Sunfish Pond, if the utilities' application were approved, including protection of the pond's watershed, restoration of landscape in keeping with the natural environment, minimum disruption of the surroundings even during construction, underground installation of transmission lines and the water tunnel, payment by the utilities for fish studies or remedies necessitated by the hydro-power installation, and operation of the pumping and generating system in accordance with Delaware River flow schedules and other management procedures.

The Lenni Lenape League, key group in the opposition to disturbing Sunfish Pond, indicated it would oppose even the alternative plan, criticizing the Commission for its stress on economic benefits to the basin.

At the close of fiscal 1968, key issues involving the project and Sunfish Pond were still unresolved: The Commission had not acted on the redefinition of the Tocks Island project, which it must do before the pumped storage proposal can be decided upon. Nor had the final outcome become known on a New Jersey legislative proposal, already approved by the House, to reacquire from the utilities Sunfish Pond and other land on the ridge. In addition, a change in the federal authorization of the Tocks Island project could be necessary to permit pumped storage development.

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le-New e Dams

Work ending on rebuilt structures in bistate project to preserve a lake-on-the-river

This year brought assurance that future generations will continue to enjoy the 130-year-old lake-on-the-river that helps make the New Hope-Lambertville area a popular outdoor recreation and tourist attraction.

Reconstruction of the 19th Century wing dams that back up the busy recreation pool neared completion as the report year ended, with work scheduled to be finished in Fall 1968.

The dams were built originally to create the pond from which water was pumped into the branches of the old Pennsylvania and Delaware-Raritan Canals, which still parallel both sides of the river through the area.

Later employed for industrial power, logging and barging between the canals, the pool gradually came to be used almost exclusively for recreation as its older values became outdated. Eventually, the dams fell into disrepair from decades of neglect and exposure. Parts of the New Jersey wing washed away.

The Delaware Valley Protective Association spearheaded a drive for restoration of the dams in recent years and gained widespread civic support. At the Basin Commission's 1965 annual meeting, Governor Richard J. Hughes of New Jersey and then-Governor William W. Scranton of Pennsylvania announced that the Commission would supervise a bistate restoration project on the dams.

A preconstruction study indicated that loss of the "lake" might mean a drop from $3 million to $1 million in waterfront property values and a corresponding tax yield drop, but that direct recreation benefits alone might exceed the cost of restoration, if the dams were rebuilt.

Work began in 1967 on the $395,000, two-year restoration project, administered by the Basin Commission.

Reconstruction of the dams to a higher elevation than before will restore the old recreation pool for swimming, boating, skiing and fishing. Also, the free-flowing midstream river passage is being narrowed from 450 to 300 feet.

Engineers report that less frequent flooding after construction of the Tocks Island reservoir on the upper Delaware will cut wing dam maintenance costs. Also, stream regulation from Tocks Island will produce a more uniform pool depth behind the wing dams.

BEFORE AND AFTER — 1966 photograph (lower left) reveals disrepair of wing dams after decades of neglect. Color picture shows reconstruction nearing Fall 1968 completion.

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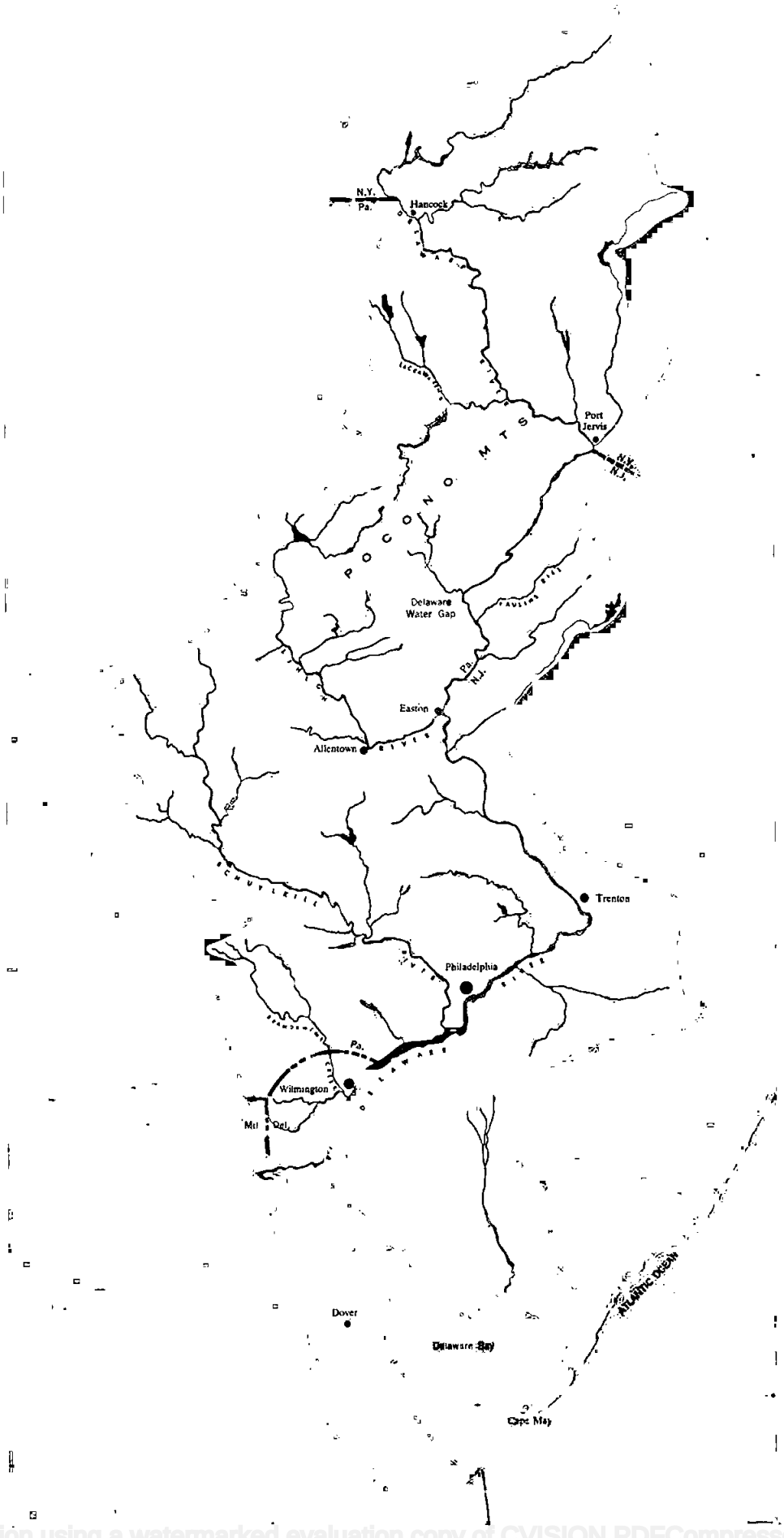
Delaware River Basin



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Fina l ary

1968 REVENUES	
Budgeted	Received
Delaware 58,000	58,000
New Jersey 233,500*	233,500*
New York 192,500	192,500
Pennsylvania 238,500*	238,500*
U. S 134,000	134,000
Public Health Service Grant 250,977	250,977
Miscellaneous 1,500	2,005
Working Reserve 0	0
TOTAL 1,108,977 505**	1,109,482
1,109,482	

*Includes $1000 appropriation for Capital Budget

**Unencumbered balance allocated as follows:
(1) To support Fiscal 1970 Budget—112,600
(2) Transferred to Working Reserve—4,538

The records of the Commission are independently audited each year as required by the Compact.

	1968 EXPENDITURES	
By Organization	Appropriations	Expended
Directorate	142,337	158,748
Administrativ Division	103,129	110,350
Planning Division	861,511	720,846
TOTAL	1,106,977	989,944
By Program		
WATER SUPPLY	56,000	73,001
WATER DEMAND	65,000	30,598
RECREATION	31,000	42,615
POWER	39,000	32,595
PROJECT REVIEW	143,000	90,968
WATER QUALITY	547,977	439,085
COMPREHENSIVE PLAN	140,000	200,634
FLOOD LOSS	12,000	7,816
BASIN OPERATION	73,000	72,632
	TOTAL 1,106,977	989,944
Capital Program	2,000	2,000
Excess Appropriations over Expenditures	—	117,033**
GRAND TOTAL	1,108,977	1,108,977

	Funds Available	Expenditures	Unexpected Dedicated Allotment
Tocks Island Region Environmental Study	113,883	72,451	41,432
Wing Dam	480,472	282,556	197,916
Tocks Island Fish Research	127,715	42,149	85,566
TOTAL	722,070	397,156	324,914

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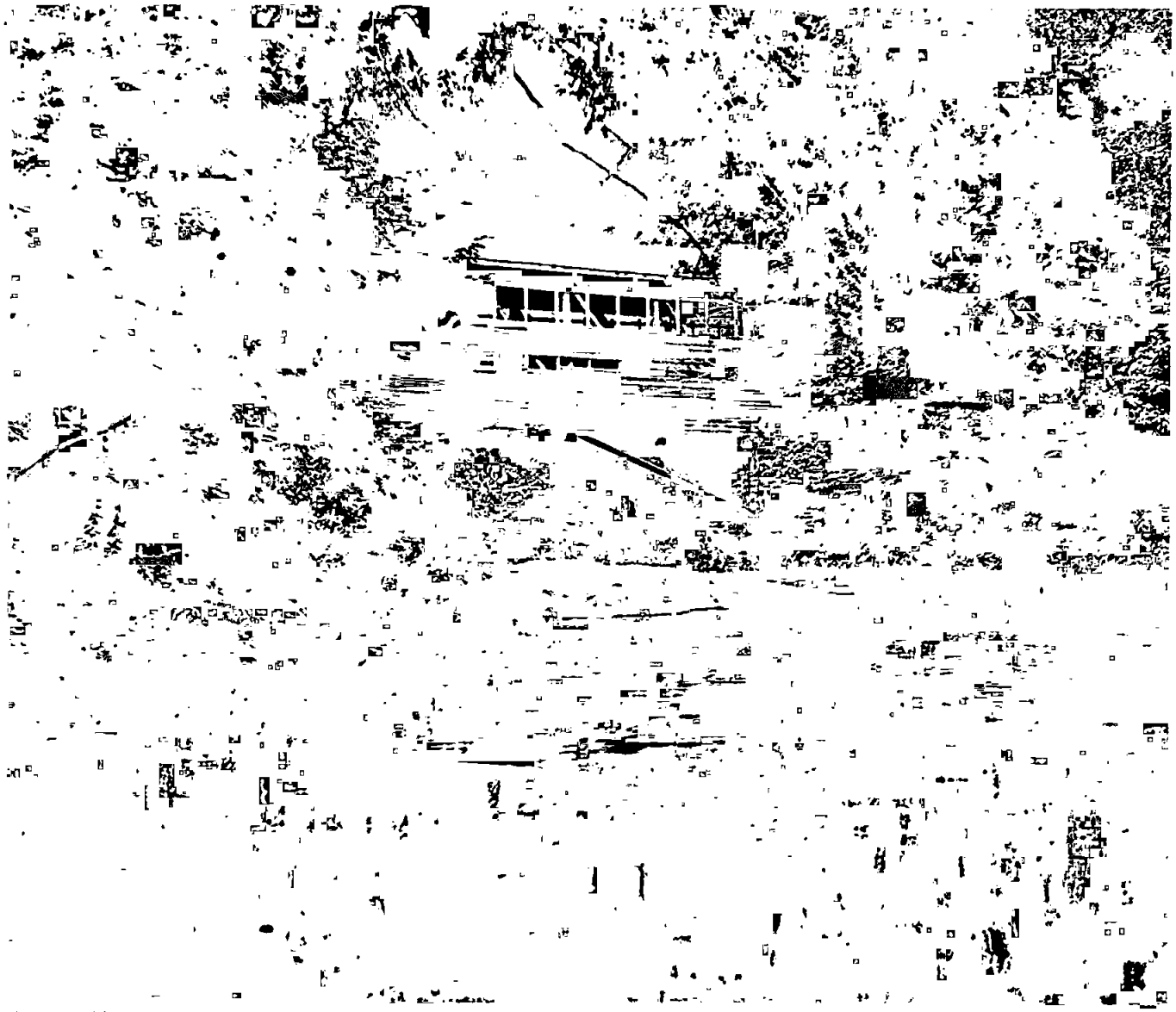

This covered bridge, at a site to be flooded by the Beltzville reservoir, will be relocated over a small stream in the project's Twinflower Recreation Area.

Color photography by James M. Staples and Leigh Photographs

Delaware River Basin Commission
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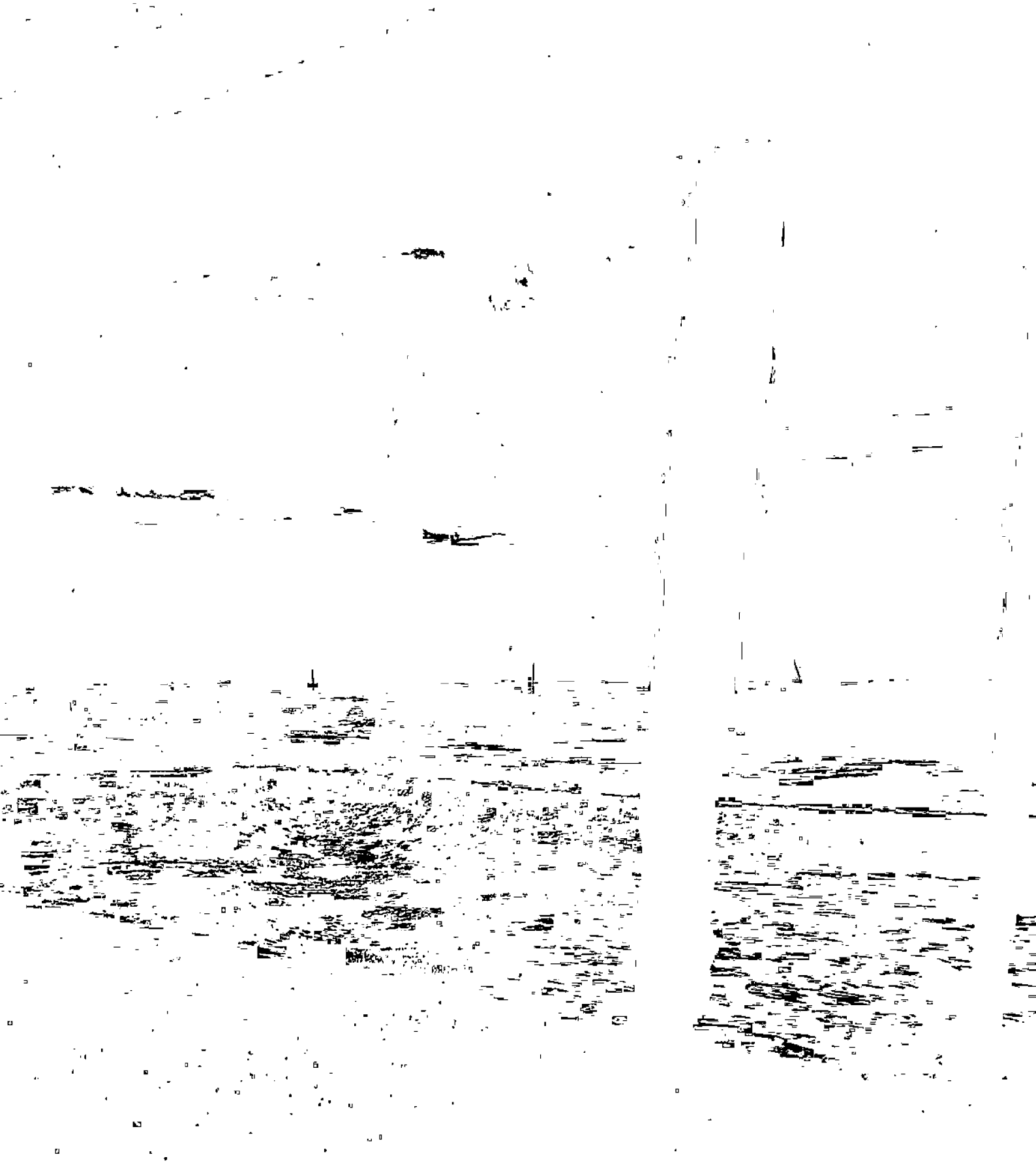

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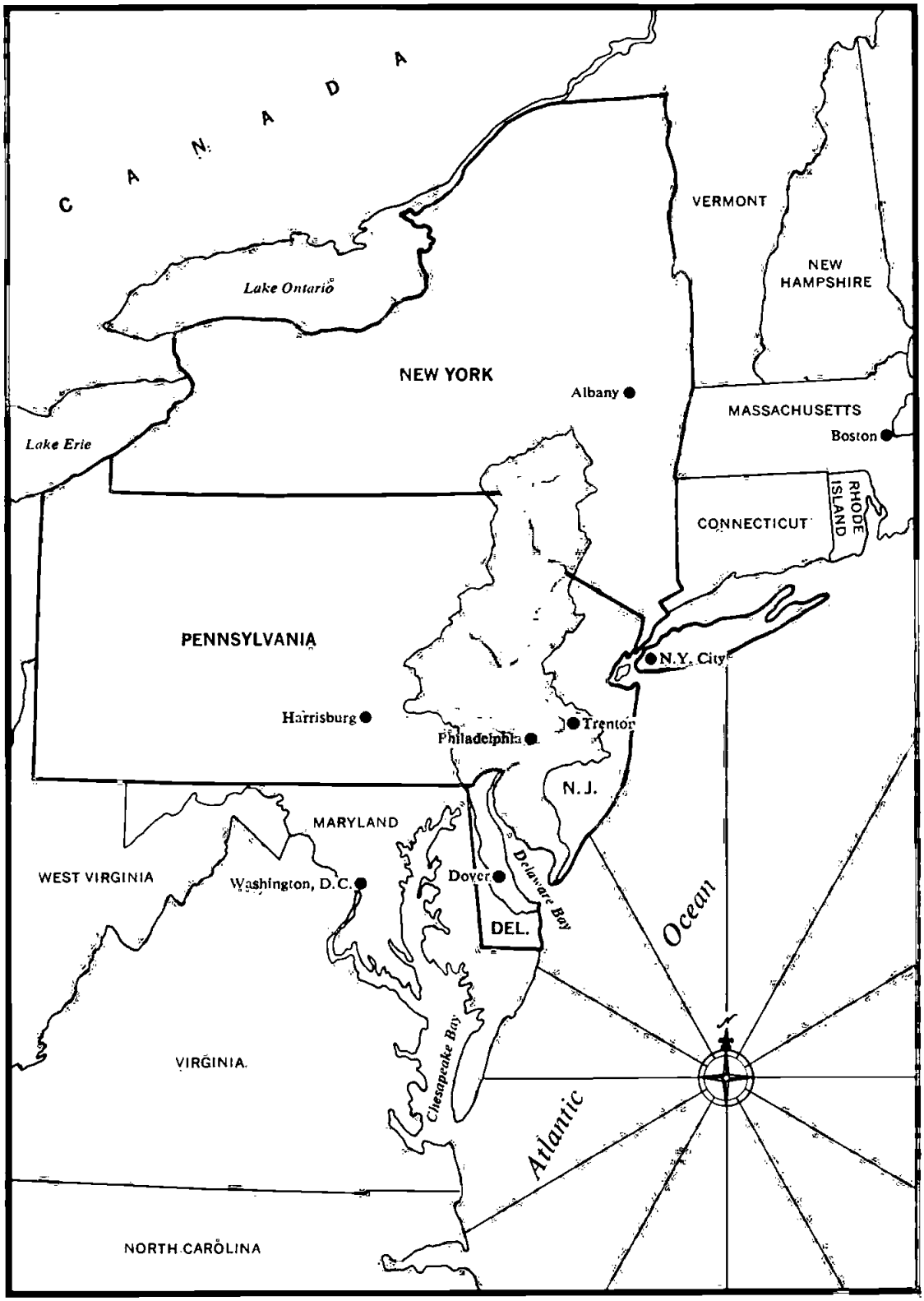

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Cover: Sunset over Delaware Bay from the New Jersey shoreline.

Right: Closeup into the stream edge of a Delaware River tributary near the Water Gap.

Introduction

With the year covered by this report, the interstate-federal Delaware River Basin Commission began the second decade of its assignment to manage the basin's water resources for the optimum benefit of the valley's seven million residents and to achieve a balance between the perennially rival forces for resource preservation and resource development.

The Commission stepped up sharply its environmental protection activities in 1973 with the first year's operation of a new unit that is, among other things, the agency's watchdog in behalf of the letter and spirit of the National Environmental Policy Act.

There was new emphasis also on efforts to reduce losses from flooding through the regulation of land uses and other non-structural means that are the companions of dams and levees in pursuing a comprehensive flood protection program.

And the prospects looked better than ever for having the sparsely developed upper Delaware, where it is the New York-Pennsylvania common border, become a National Scenic and Recreational River dedicated to permanent natural preservation.

Older programs such as reclaiming the Delaware River tidal estuary and assuring water supplies to meet future demands for homes, farms and industries moved ahead on schedule, as did the perpetual, vital yet unsung jobs of data collection, stream monitoring and surveillance, biological investigations, watershed planning, preparation of hydrologic reports and others.

This, the eleventh annual report, records these and other DRBC activities, trends and progress for the year ending June 30, 1973. It is respectfully presented to the residents of the valley in Pennsylvania, New York, Delaware and New Jersey and to their representatives in Washington and the State Capitols.

Report designed by
Louis F. Conant,
DRBC Graphic Artist

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1973 • Review

Secretary Rogers Morton, on becoming chairman of the Delaware River Basin Commission at its 1973 annual meeting in New York City, declared that the "enthusiasm and promise" on which DRBC had been built more than a decade earlier harvested "a competent, interdisciplinary operation geared to performance and achievement" and cited recommendations and recognition from the Advisory Commission on Intergovernmental Relations, Brookings Institution and the National Water Commission.

Yet the new chairman warned that the work ahead in planning for more orderly urban growth while safeguarding the environment "will provide a major challenge to DRBC's adaptability and capability," citing the new mood that refuses to accept "unfettered growth and the business-as-usual attitude."

The challenge of adaptability was in fact at hand, for 1973 already was bringing on one such challenge after another.

It was a year that enactment of a vanguard federal policy on water pollution control changed the rules in mid-game, forcing DRBC to reexamine and modify the entire fiber of its own laboriously forged program that is further along probably than any in the nation.

Subsequent sections in the report describe these and other subjects that highlighted the year's events for the river, including developments on water supply sales, establishing uniform guidelines for using land controls and other non-structural approaches to cut down on flood damages, and preserving the sparsely-developed northernmost 75 miles of the Delaware as a National Scenic River.

It was a year in which DRBC was implored from one side to move faster on nuclear and other power plant applications as the energy pinch became more critical while, at the same time, being assaulted as too willing to submit to the region's big electric utilities.

Issue after issue, not the least of which centered on the Tocks Island reservoir controversy, presented the same "major challenge" so accurately described by a Secretary of the Interior who was under the same pressures on a national scale.

●

Reorganization • At the annual meeting Ex-Governor Rockefeller succeeded Secretary Morton as vice chairman and Delaware's new Governor Sherman W. Tribbitt participated in his first session as a DRBC member.

DRBC gets two new representatives in 1974 with the induction of Governor Brendan T. Byrne in New Jersey and Governor Malcolm Wilson in New York. Mr. Rockefeller had been the only remaining original member.

Two changes occurred in 1973 among the five Alternate Members who act in behalf of the principals on a day-to-day basis, including the regular monthly meetings. Secretary John C. Bryson of Delaware's Department of Natural Resources and Environmental Control and a long-time environmental official there was named by Governor Tribbitt to replace Harold L. Jacobs, who served on DRBC nearly six years, and President Nixon appointed Thomas F. Schweigert to succeed Paul M. VanWegen, who had been the Federal Alternate from 1969. Mr. Schweigert, a forester and land surveyor, had been Federal Co-chairman of the Upper Great Lakes Regional Commission more than two years after being a Michigan State Senator for nine years.

The post of Advisor to the Federal Member also changed hands when Col. C. A. Selleck Jr. took over from Col. Carroll D. Strider as the Army Corps of Engineers' new Philadelphia District Engineer. Col. Selleck, as a younger Corps officer, had helped direct the cleanup of the Delaware Basin after the disastrous flood of 1955.

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Governor Tribbitt's predecessor, Russell W. Peterson, went on to become the new chairman of the President's Council on Environmental Quality.

●

Water Consumption • In his annual report to the Commissioners, Executive Director Wright sounded the staff's increasing concern over the escalating demands on the river and its tributaries for consumptive water uses — those causing water loss through evaporation, mostly in the cooling of electric generators. "Present and near-future levels of demand and supply in the basin clearly suggest that basinwide quality and streamflow objectives cannot be achieved much longer if unrestricted consumptive uses are permitted," the Director stated.

Gov. Byrne

Thus the staff initiated preparation of a prospective new article to the Comprehensive Plan which, in absence of adequate public storage facilities such as Tocks Island, would require that applications for approval of large consumptive water-using operations be accompanied by provisions for privately-built reservoirs or by in-plant water conservation practices.

Such a new article would to some extent formalize as policy an important ad hoc decision made this year on proposals by Public Service Electric & Gas Co. of New Jersey and Philadelphia Electric Co. to build giant nuclear generating stations on the Delaware and Schuylkill Rivers.

Gov. Wilson

Although the Commission was not yet prepared to rule on applications for the controversial stations, the Atomic Energy Commission discontinued its own hearings on the plants and told the companies they could not be resumed unless DRBC first indicated adequate water would be available to support them.

DRBC held hearings, then ruled that streamflows would be adequate to support the plants provided the companies agreed — which they did — to slowdowns or shutdowns in event flows dropped below dangerous levels. DRBC further ruled the companies would have to complete their own reservoirs by 1980 if no ample public storage facilities are then under way. The water availability ruling was made by DRBC with no commitment to approve the still pending A-plant applications, which deal primarily with pollution and water consumption factors.

Col. Selleck

AEC resumed its hearings, but then told Public Service it should abandon its planned Newbold Island site on the Delaware between Trenton and Philadelphia, which it did, in favor of expanding another nuclear operation already under construction on the river in Salem County. The proposed Schuylkill plant is Limerick, near Pottstown.

On a thermal pollution matter also related primarily to electric generating operations, the Commission took under consideration a flat ban on all once-through cooling practices. Under this practice, water is discharged back to the stream hot immediately after being used for reactor, generator or machinery cooling, resulting in both heat pollution and extensive evaporation.

Mr. VanWegen

The Commission also banned future pre-approval construction activity on projects still pending decision to avert situations that have developed in recent years on several power station jobs, some of which have involved millions of dollars in building work prior to clearance by DRBC and other regulatory agencies.

●

Master Plan • Enlargement, reorganization and rewriting of the Basin Commission's Comprehensive Plan into a single, more readable and better presented multi-volume document, a project long under way, is nearing completion.

The old plan has grown from the original Phase I, itself a separate bound volume, into a multitude of standards, policies, projects and programs that sometimes lack uniformity and are not physically incorporated into a single form or place. The new loose-leaf version will be kept current easily and be more accessible to staff and the public.

Mr. Jacobs

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Mr. DeGelleke

DRBC Chief Engineer Howlett (left) discusses a water pollution matter with representatives of the U.S. Geological Survey in a typical interagency consultation.

To further facilitate use of the Comprehensive Plan, a firm was engaged to set up a quick retrieval system for the extensive water use details on file for more than 1,000 projects and facilities in the plan, to which some 200 are added yearly. This will better reveal the impact of project review applications on affected regions in the basin. The system also will produce fast information on pipeline stream crossings and locations and the names and phone numbers of downstream water users in event of spills of oil or toxic materials.

●

Middle River • Director Wright lauded efforts under way to preserve the environmentally high quality of both the Delaware Bay area and the upper main stem bordering the Catskill and Pocono Mountains, but warned that the still-rural middle river region from Trenton to the Poconos has no comparable program to insure retention of its good-quality surroundings.

Four new superhighways joining the river with areas to the east and west will mean unprecedented accessibility inevitably accompanied by intense pressure for development, the Director said. He reported that the staff will thus explore a protection program entailing erosion and sedimentation control, prevention of harmful runoff from developing areas and guides to residential and industrial development.

●

Water Control Projects • Each year brings activity on a larger number of reservoir projects, all components of DRBC's Comprehensive Plan, by state and federal agencies.

Pennsylvania has completed two projects this year. They are Nockamixon on Tohickon Creek in Bucks County, a recreation-now, water supply-later facility, and Marsh Creek, an impoundment built by the state, Chester County and U.S. Soil Conservation Service that will provide water supply for West Chester, Downingtown and other Brandywine Valley communities as well as flood protection and recreation.

Preconstruction work was completed on two multiple-purpose federal projects — Blue Marsh in the Schuylkill Valley, on which construction contracts are being let, and Trexler in the Lehigh Valley, which received no building appropriation for 1974.

Bucks County's pumping station-pipeline project at Point Pleasant on the Delaware is in final stages of detailed design. This facility will divert water from the river to supply fast-growing residential areas in the Neshaminy Valley and also into Perkiomen Creek for cooling purposes at the proposed Limerick nuclear generating station near Pottstown.

●

Publications • Just published and now available at $5 a set are DRBC maps showing the general location of the 1,100 miles of petroleum pipelines in the four-state basin. The basic purpose of these maps is to minimize the occurrence

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This Pennsylvania area detail is from DRBC maps giving the location of known liquid petroleum pipelines throughout the basin, just published to help prevent and cut down harmful impact from spills.

of accidents by promoting awareness of their presence by planners, designers, contractors, industries and government agencies. In the event of accident or failure, such knowledge will also be helpful in issuance of pollution alerts, and minimizing harmful effects on the water resources.

Rising costs for new printings of DRBC's popular outdoor recreation maps of the 200-mile non-tidal stretch of the Delaware necessitated doubling the price to $2 a set. More than 20,000 sets were purchased, principally by canoeists, at the old price, which failed to cover expenses.

●

Fisheries • DRBC's investigation at the University of Delaware into local feasibility of a Japanese technique for growing oysters from suspended submerged objects to protect them from bottom-dwelling predators and silt was concluded with varying but somewhat discouraging results. A limnology survey (into water chemistries, plankton, macroinvertebrates and aquatic plants) was continued in the Delaware and major tributaries in the proposed Tocks Island reservoir area, and a multi-state and federal group of biologists completed a fisheries management plan for the Tocks lake.

●

Metering • To promote water conservation, DRBC voted to require installation of meters on all new public and private housing, commercial, industrial and other developments serving more than 250 connections or using more than 100,000 gallons daily.

●

Visitors from abroad • DRBC and the Delaware Valley continued to attract the attention of water scientists and administrators from around the world. As part of the U.S.-U.S.S.R. environmental exchange program set up in 1972, a team of Soviet pollution authorities spent three days in the valley learning about mathematical modeling for water quality, spray irrigation, watershed management and industrial treatment. Other visitors came from Italy, Brazil, Japan and Hungary.

●

Retirement • Peter DeGelleke retired after a long career with the National Park Service in which he watched his pet project grow from an idea to a famous park well on its way toward development. DeGelleke was the individual most closely identified with the Delaware Water Gap National Recreation Area, which he helped plan and of which he was superintendent from 1966 to 1973.

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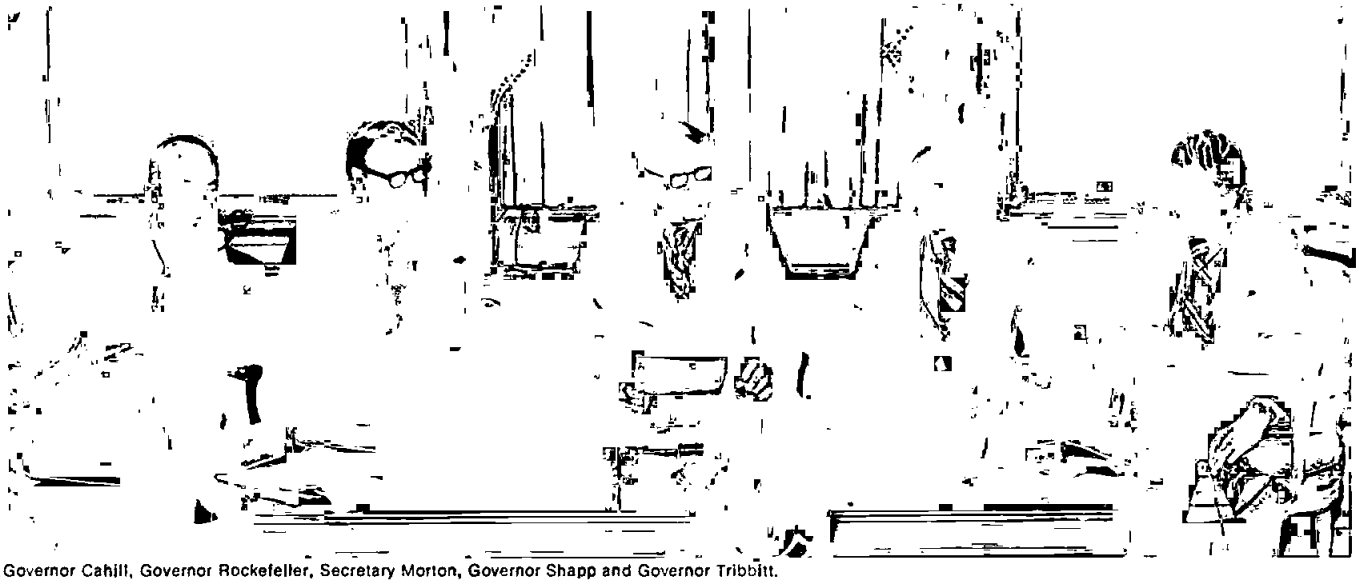


Governor Cahill, Governor Rockefeller, Secretary Morton, Governor Shapp and Governor Tribbitt.

The Commission 1973

Chairman	
Rogers C. B. Morton	*Secretary of the Interior*
Vice Chairman	
Nelson A. Rockefeller	*Governor of New York*
William T. Cahill	*Governor of New Jersey*
Sherman W. Tribbitt	*Governor of Delaware*
Milton J. Shapp	*Governor of Pennsylvania*

U.S. Member appointed by the President · Governors serve ex officio

Alternate Members

Richard J. Sullivan
New Jersey

W. Mason Lawrence
New York

Thomas F. Schweigert
United States

Maurice K. Goddard
Pennsylvania

John C. Bryson
Delaware

Advisors

Col. C. A. Selleck Jr.	*United States*
Martin Lang	*New York*
Carmen F. Guarino	*Pennsylvania*

The Staff

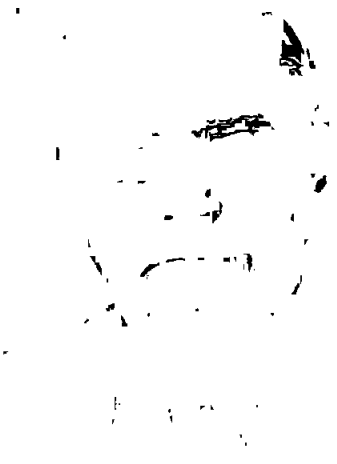
James F. Wright	*Executive Director*
William Miller	*General Counsel*
W. Brinton Whitall	*Secretary*
Dawes Thompson	*Public Information Officer*
Arthur E. Peeck	*Chief Administrative Officer*
Robert L. Mann	*Head, Environmental Unit*

Planning Division

Herbert A. Howlett	*Chief Engineer*
C. H. J. Hull	*Staff Engineer*

Branch Heads

Seymour D. Selzer	*Program Planning*
Ralph Porges	*Water Quality*
Robert L. Goodell	*Operations*
Theodore Briganti	*Project Review*



Mr. Wright

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View looking up the Delaware from downtown Trenton. Buildings in foreground comprise the New Jersey State Capital complex. Pennsylvania is on the left

River Conditions

The report year started with a hydrologic bang on July 1, 1972, with flood waters receding in the wake of Hurricane Agnes, which brought the highest, most destructive torrents in history to the Schuylkill River, the Delaware's largest tributary.

The Delaware main stem was spared by Agnes. However, a National Weather Service report issued a year later declared that the river at Trenton would have suffered flows nearly double those of the record 1955 flood disaster and further that all major points throughout the valley would have been record-crest victims if Agnes had traversed the upper Delaware.

No feasible combination of reservoirs would have provided adequate protection from such a flood, but Tocks Island would have retarded nearly a third of the water and thereby sharply limited the magnitude of inundation of all flood-prone communities on the main stem. (A section of the flooding from Hurricane Agnes appeared in the 1972 report.)

And the year almost ended as it began with the Delaware River cresting just three inches below flood stage behind the State Capitol in Trenton three hours before midnight on June 30, 1973. The near-flood flow reached within 2,000 cubic feet per second of flood stage level, 135,000 cfs. This was the river's closest call yet of several since 1955, which marked a record flow of 329,000 cfs.

Flood Damages Canal • Some upper basin areas and tributaries were not so lucky as the main stem after the June 1973 storming. Delhi and Walton Villages in New York State were severely battered and in Pennsylvania's Bucks County some 250 families were evacuated to escape swollen flows of Neshaminy Creek. And the Commonwealth's historic Delaware Canal, paralleling the river from Easton to Bristol, sustained a major break from the high river water.

Precipitation and runoff both were considerably above normal during the entire year. Upper basin precipitation totaled 54 inches, or 10 inches above normal, while runoff at Trenton averaged 16,500 cfs, almost half again the customary levels.

November 1972 precipitation in the basin above Port Jervis was 8.4 inches, for the highest total in 32 years for that month. Trenton and Philadelphia suffered their heaviest November rainfall since the 19th Century. The upper basin's runoff had not been greater in any November since 1939, nor Trenton's since 1927.

Above-average precipitation was the rule for nine straight months ending in June.

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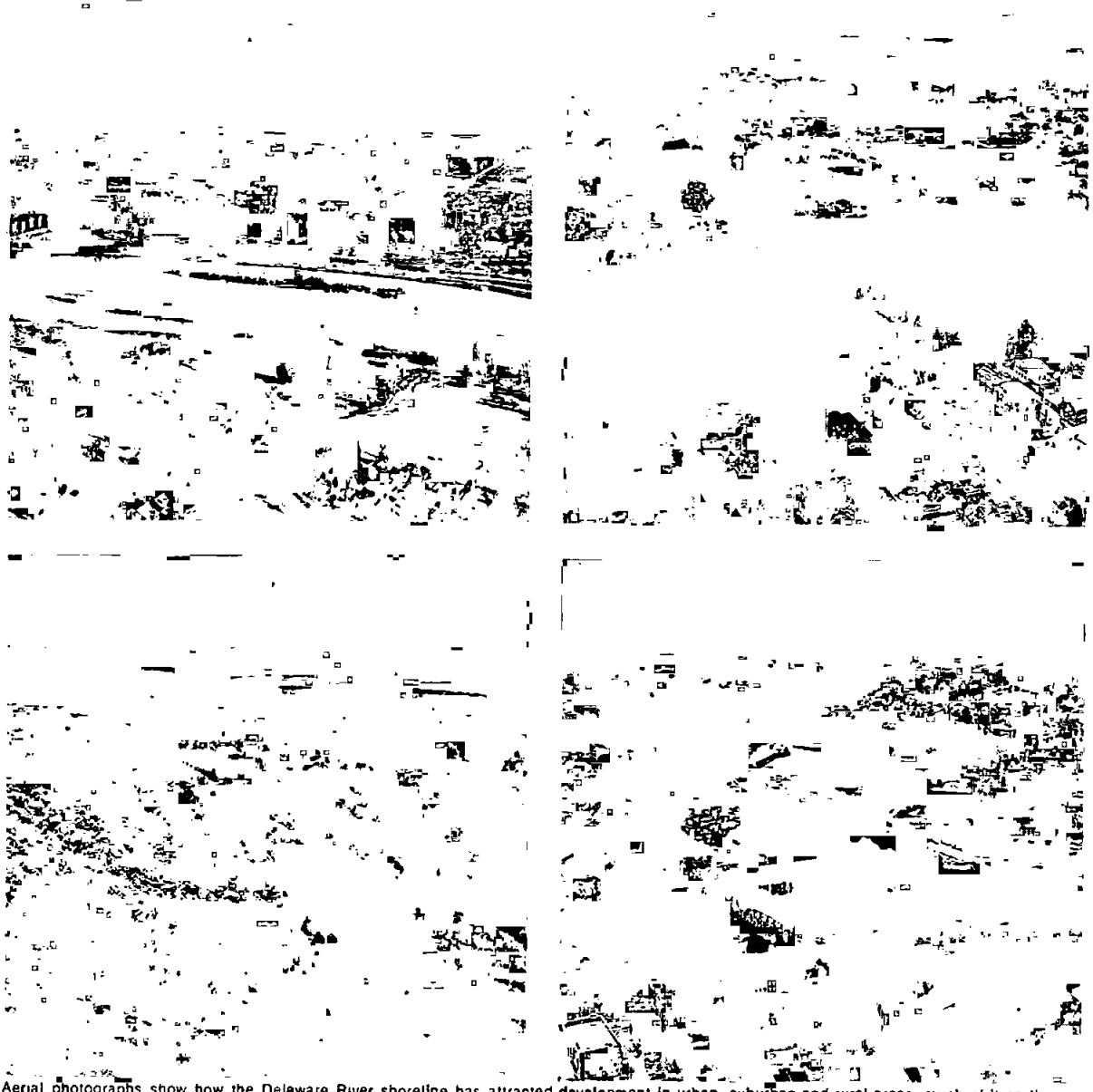

Aerial photographs show how the Delaware River shoreline has attracted development in urban, suburban and rural areas, much of it on the hazardous flood plain. Views are of Morrisville, Pa., and Trenton (top left); New Hope, Pa., and Lambertville, N.J. (top right); Upper Black Eddy, Pa., and Milford, N.J. (bottom left); and Phillipsburg, N.J. and Easton, Pa at the Lehigh River confluence.

Flood Plain Controls

The first step toward achieving a major management system for regulating damage-prone areas throughout the four-state Delaware River Valley has been taken with publication of a recommended basinwide program for flood plain delineation.

A prerequisite to imposing controls over use of any flood plain is an investigation that produces a detailed history of its floods, including dates, frequency, water volume and depths and accurate boundaries of areas inundated. Such histories have been either finished or undertaken for a thousand miles of shoreline along dozens of hazardous streams in the Delaware Basin, but there is little standardization between them.

Probably the principal feature of the recommended new program, which would bring about basinwide uniformity and also be geared to the new

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guidelines of the U.S. Water Resources Council and national flood insurance law, is a suggested set of standards for protecting public health, safety and property through good flood plain use. The standards are proposed for incorporation in the DRBC's basinwide Comprehensive Plan.

As advocated by the Water Resources Council and other authorities, the report is aimed at producing a total management program. This means combining the most effective of both non-structural preventive measures and structural protective projects. These incorporate flood plain zoning and regulation, crest forecasting and warning, evacuation readiness, land treatment and acquisition, tax adjustments, impoundments, dikes, walls, channel improvements and flood-proofing of buildings. The report endorses the Tocks Island reservoir on the upper Delaware, of which flood protection is one of several project purposes, as part of the total management goal.

River Needs Cited • The consultants urge that flood inundation areas be delineated throughout the four-state basin, with high priority given to hazardous stretches of Brandywine Creek and the Schuylkill and Lehigh Rivers. In the summer of 1972 the Schuylkill was struck by its worst flood in the wake of Hurricane Agnes. That storm luckily spared the Delaware main stem, which the National Weather Service said would have suffered flood flows nearly double those of the record 1955 flood if the storm's course had been through the upper valley.

Immediate establishment of a flood plain regulatory program as the first step of a total management system is urged under which DRBC should compel conformity to the Comprehensive Plan; require that federal, state and local flood plain programs be undertaken in conjunction with DRBC; and, where necessary, adopt flood regulations itself for particular lands.

Besides making a series of specific suggestions for DRBC to establish standards and regulations, the report offers three model flood plain zoning ordinances for the assistance of local governments, each embodying the standards that would be added to the DRBC master plan. For varying local situations, the ordinances provide controls for short-term interim needs, longer-term interim regulations for rural areas where precise flood data is currently unavailable, and permanent rules for urban areas where the necessary statsitical information is available.

Largely to help establish eligibility for their residents to purchase flood insurance under the three-year-old federal subsidy program, some 200 communities have either adopted or signified intention to enact flood zoning ordinances, but here again there is a general lack of uniformity that the report urges be remedied. Prior to creation of the federal insurance program, flood zoning ordinances were in effect in only about a score of Delaware Valley communities.

N.J. Controls Enacted • New Jersey adopted this year a statewide law empowering it to move on establishing flood plain regulations where local government neglects or refuses to act, and Pennsylvania's Legislature is considering similar legislation.

It is important that the Commission develop the information necessary for it to make estimations of recurrence intervals of given flood flows for any stream point in the valley, the report stresses.

As an example of how the flood land delineation criteria, standards and procedures can be used, the report applies them for demonstration study purposes to the 82-mile reach of the Delaware from Tocks Island, just upstream of Delaware Water Gap, to Trenton, the end of the non-tidal river. Eleven maps show the river's floodway and also the flood hazard area limits of a 150-year recurrence flood with inundation that would go well beyond any yet experienced, even in 1955. Flood-threatened communities detailed on the maps include Trenton, Yardley, New Hope, Lambertville, Stockton, Frenchtown, Milford, Riegelsville, Phillipsburg, Easton, Belvidere, Portland and Columbia.

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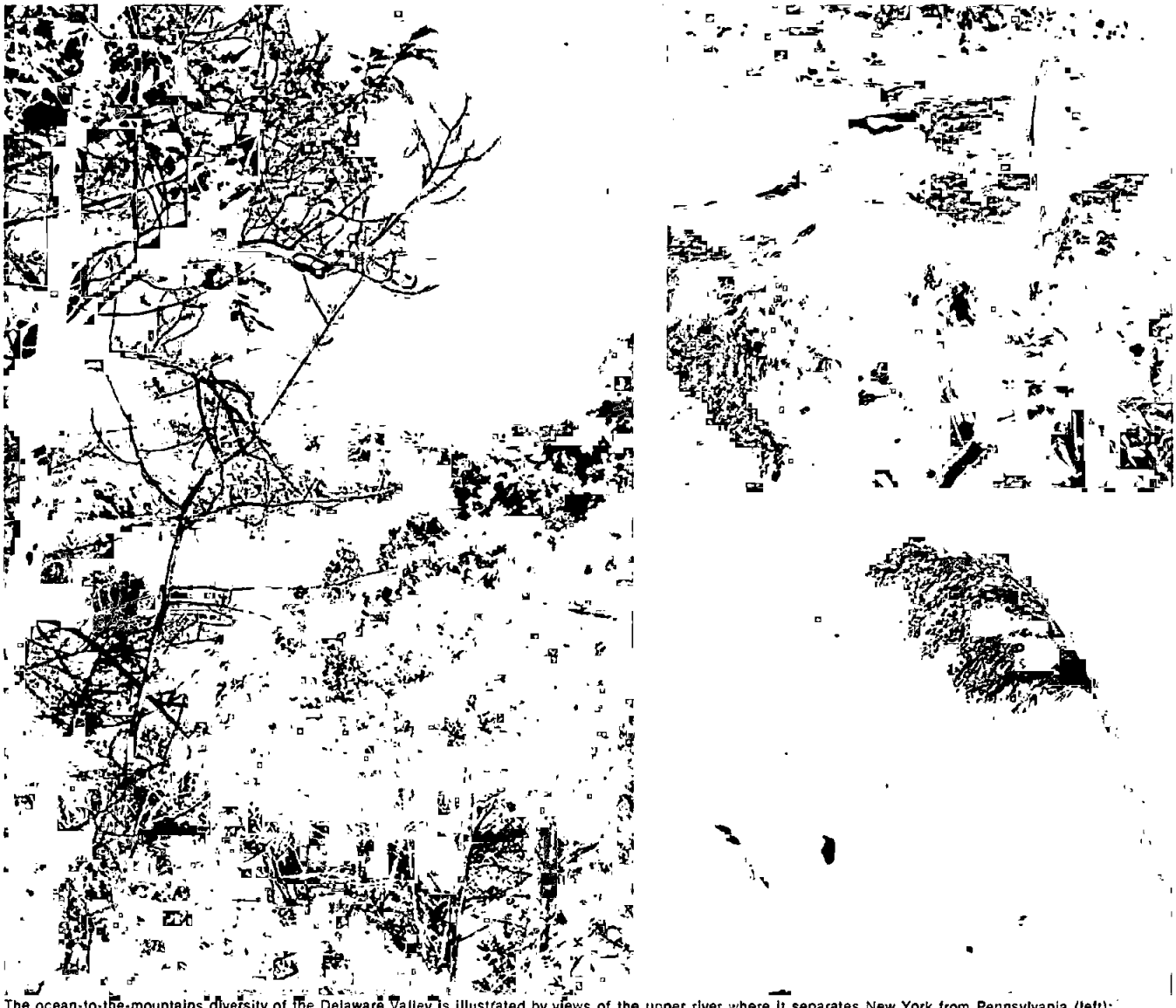

The ocean-to-the-mountains diversity of the Delaware Valley is illustrated by views of the upper river where it separates New York from Pennsylvania (left); a rapid-flowing stream in the Poconos (top right); and Delaware Bay sparkling from sun that is obscured by a five-foot-high plume grass plant.

Environmental Safeguards

Two key sections of the DRBC organization are responsible for keeping water-related activity in the Delaware Valley in step with the National Environmental Policy Act and of assuring that the basin's water resources are not spoiled by the scores of uses to which they are put.

One is the new Environmental Unit, which has completed its first year of operation to the accompanyment of an undreamed-of workload. The other is the older Project Review Branch, which turns out the spadework on which the Commission bases its clearances to proceed for an annual average of about 200 water-using operations by industry, government, agriculture and others.

The Project Review Branch, part of the technically-oriented Planning Division, investigates a wide scope of activities to assure there is no conflict with the Comprehensive Plan and that the water resources are not impaired.

The broader intent of the national environmental law, enacted seven years after the Commission's formation, is that any type activity either undertaken

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or reviewable by a federal agency, including DRBC, be fine-toothed for possible degradation of any phase of the environment.

Encompassing specialized vocations of landscape architecture, economics, biology, regional planning, limnology, ecology and others, the four-member Environmental Unit, working under the Executive Director, screens a steady stream of impact statements prepared by other agencies and in addition authors DRBC impact statements on its own activities or those for which it is the principal federal reviewing agency.

In its initial year, the Environmental Unit processed or commented on 36 impact statements on projects undertaken or reviewed by other federal agencies. The projects involved highways, parks, dredging, an atomic power plant, electric transmission lines, a planned new town, an oil line, a dike, water pollution control systems, hydroelectric power generating plants and a reservoir.

In addition, the new unit turned out the Commission's own impact statements on two big fossil-fueled electric generating systems, a complicated inter-watershed diversion to accommodate both household and industrial water supply demands, and a municipal reservoir project.

Next year will call for publication of impact statements on at least two power generating stations and a highly involved pipeline for transporting petroleum 90 miles through five Eastern Pennsylvania counties from a marine terminal on the estuary to a power producing plant in the Poconos. The unit probably also will start processing environmental reports — on which DRBC impact statements on reviewed projects are based — for one new and one expanded oil refinery, a marine terminal, a coal-fueled power plant and a pumped-storage generating station.

Project Reviews • The 1973 water resource protection work of the Project Review Branch led to formal approval by the Commission of 158 applications, including 78 required pollution control facilities; 56 wells for farms, industries and housing projects; a dozen stream contact operations such as shore stabilization facilities, docks, wharfs and a rerouted creek; and four pipelines, two protection programs for small watersheds, a pair of flood control structures and the Tinicum Marsh preserve.

The statistics, however, tell perhaps only half the story of the work of both these DRBC operations and, in fact, are deceptive.

For example, Project Review cases that reach the public forum of a Commission meeting for vote are virtually all approved. The figures do not show the equal number of cases where the applicant is advised the project is flatly unacceptable or must be amended if approval is to be recommended.

As for the Environmental Unit, the completed impact statement represents only the end product of a long, involved review process. What the impact statement doesn't show is where an applicant's environmental report is rejected outright or bounced for more thorough information or, better yet, for a more environmentally acceptable plan of construction.

The processing of one applicant's report on a major petroleum pipeline proposal has led to significant modifications in the plan. This included relocation of a tank farm from a top quality watershed to a more environmentally acceptable site, rerouting the pipeline alignment to avoid a historic structure, and designing a pumping station for fieldstone construction to blend with the rustic rural surroundings. This review also has led the applicant to engage professional archaeological assistance to weigh historical and other considerations and to consider skirting a possible future reservoir site.

Also, for the first time, the Environmental Unit's work has resulted in consideration of land use factors on a routine basis, an activity that has been urged by outside ecologists.

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Scenic Upper Delaware

If the 37-mile Tocks Island lake plan was at a standstill, the same was not true for the proposal to preserve in its natural state the beautiful 75-mile northernmost reach of the Delaware immediately upstream.

Five years ago Congress enacted the Wild and Scenic Rivers Act establishing a policy "that certain selected rivers of the nation which, with their immediate environments, possess remarkable scenic, recreational, cultural, or other similar values, shall be preserved in free-flowing conditions, and that they and their immediate environments shall be protected for the benefit of present and future generations."

The Delaware was among the rivers designated for study of the desirability of being added to the system, leading to establishment of an Interagency Field Task Force led by the U.S. Bureau of Outdoor Recreation and comprising DRBC, the Pennsylvania Department of Environmental Resources, the New York Environmental Conservation Department and several federal agencies.

Alternatives Offered • The Task Force's work now has culminated in a detailed report recommending that the upper Delaware from Matamoras, Pa., to Hancock, N.Y., be incorporated in the system as a Scenic and Recreational River and offering groups of alternative development, management and administrative arrangements.

The report was expected to be submitted to the Congress and appropriate U.S. Executive Branch agencies.

The proposal appeared to be gathering substantial support in the tri-state region most affected from environmentalists and others, although some opposition, primarily from local property owners, did develop at public information meetings held in the area.

Tocks Island lake proponents contended that the Scenic River proposal would be complementary to and compatible with the downstream reservoir plan, since it would provide permanently that the river remain in its free-flowing state along its least-developed segment. Tocks foes also supported the Scenic River, but pleaded in favor of proceeding with development of the Delaware Water Gap National Recreation Area without the Tocks lake that would be its central feature.

The Scenic River segment would assure unimpairment of the sparsely developed corridor along nearly a quarter of the entire 330-mile main stem of the Delaware from Hancock to the Atlantic Ocean and more than a third of the non-tidal river down to Trenton. It separates Pennsylvania's Pocono Mountains from New York's Catskills and, while still bucolic unlike other parts of the popular ranges, lies within 250 miles of a quarter of the nation's population with ready access from all directions by superhighways.

Recreation Emphasis • Most of the thousands of sets of recreation maps of the river sold by DRBC go to canoeists who find this one of the finest streams in the Northeast. The near pollution-free stream invites swimming in the numerous pool areas, fishing for many species including smallmouth and rock bass, shad and walleye, and other water contact activities.

The preserved stretch would include three recreational sections comprising 48 miles that include most of the river towns and grown-up areas visible from the river. These would be separated by two scenic reaches totaling 25 miles and marked by minimum development.

The development options range from a low investment, minimum control plan to a total management system providing many facilities. Each would involve a different combination of public ownership, scenic easements and local zoning protection inside the proposed project boundary.

A portion of the proposed Scenic and Recreational River (opposite).

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Income from sales under DRBC's water supply program will help pay for the new Beltzville reservoir in the Lehigh Valley (right) and other projects needed to meet household, farm and industrial demands.

Water Sales

The Tocks Island reservoir controversy had a real rival for the main object of public attention to DRBC business this year in the agency's proposed program of instituting charges for water supply sales. And the prospect was that interest in water sales would be sustained into 1974 since they were unresolved at year-end.

It was more than eight years ago that the Commission began paving the way publicly for eventual imposition of charges for certain withdrawals of water from Delaware basin streams for private and public use. And at the widely noticed DRBC annual meeting of 1971, the Delaware Valley Governors and Interior Secretary Morton enacted a broad policy explaining why users would be allocated and charged for using water to be made up from federally constructed reservoirs at DRBC expense.

Yet not until this year was widespread concern expressed by prospective customers over the charges that some of them would begin paying soon. Unlike public hearings on the earlier water sales-related decisions of 1964 and 1971 that drew little attention, the 1973 hearing on adopting pricing regulations was of marathon duration and produced a voluminous record.

The spirited response by water users produced substantial basic objections to the regulations, particularly the restrictive application of exemptions and the tight limit on discounts for water returned to the stream. It also offered a broad variety of suggestions for specific alterations. Some users even challenged the Commission's authority, as bestowed by the Delaware River Basin Compact, to charge for water at all.

Proposal Overhauled • An extensive analysis of the hearing record was ordered by the Commissioners, resulting in a major overhaul of the recommended regulations in certain areas. The revision increased 10-fold the discount for water returned and also increased considerably the number of dischargers eligible for the cut. It also vastly expanded availability of exemptions from charges.

The Commission released the staff's analysis and revisions and announced that the rewritten version would be rescheduled for hearing in the coming year after ample time for public review. Some parties had complained that the four weeks notice provided for the 1973 hearing was inadequate. At year end, the new hearing date had not been set.

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Charges would be made only for new water used. Quantities equal to those capable of being taken as of March 1971 or to those granted by state permits issued before then would continue to be free. Groundwater, that drawn from wells, is not involved.

Municipalities, authorities, water companies and other purveyors of water, and also industries that draw large volumes of water from the streams are affected. DRBC, in effect a wholesaler, will not be selling water to households and other customers of purveyors.

Users throughout the basin would be subject to the charge irrespective of their location in relation to any federal reservoir.

Return Flows Discounted • The anticipated initial basic price is 4 cents per 1,000 gallons. By far the bulk of the revenue would come from the sale of water taken then evaporated, water exported from the Delaware Basin, or that otherwise not returned to the stream — called consumptive uses. These sales would be pegged at the full rate.

Water drawn but returned after being used would be charged at a non-consumptive discount rate of only a hundredth of the consumptive price or about .4 mill. This is 10 times lower than the earlier proposed non-consumptive rate of about .4 cents, which was slashed when calculations based on water use inventories disclosed it would produce revenues exceeding those needed by DRBC to supply the water.

Also, the discarded earlier proposal would have allowed the discount only for water returned in unimpaired quality, mainly after being used for industrial cooling. The newer discount allowance for all water returned, including effluent from sewage and industrial wastes, represents a far broader application of the lower charge.

Agricultural spokesmen argued that irrigation should be granted concessions as an extension of public policy in the region favoring retention of land for farm use. The staff concurred and proposed that this water be exempt from charges except that future additional volumes would be sold on a preferred basis of acres irrigated rather than amounts drawn.

Staff also agreed with objections to charges being made for uses of water made up from storage in reservoirs developed at non-DRBC expense and revised the regulations accordingly.

Based on Federal Law • Action toward imposition of DRBC water sales is necessitated by the development of several federal reservoir projects in the basin that will provide space for water supply storage. Federal law requires that the cost of such space be reimbursed to Washington over a 50-year period, allowing low interest rates. A DRBC formal commitment to assume the reimbursement obligation was made in 1964, and the guidelines for the implementing sales regulations were adopted in 1971.

The policy provides that the water sale price reflect the pooled cost of storage space at all federal projects on the line at a given time. The estimated 4-cent initial rate is based on the tentative final cost of the Beltzville reservoir in the Lehigh Valley, the only impoundment yet completed. The price is to be recomputed with completion of future projects — Blue Marsh in the Schuylkill Valley, now under construction; Tocks Island on the Delaware main stem, which is construction-ready, and Trexler in the Lehigh Valley, which has been designed.

Besides revenues from water sales, DRBC will get funds to meet its annual repayment obligations, to the extent that sales fall short of amounts required, from appropriations already being made by the states as general beneficiaries. The states' share will decrease to zero as sales increase. Any revenues in excess of DRBC repayment obligations and related administrative expenses will be rebated to the users.

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Water Quality

Substantial gains were recorded this year in the massive job of improving the quality of the basin's polluted streams — particularly the tidal estuary — and of keeping the clean ones that way.

It was during this year that Congress enacted the drastic new national water quality policy that set an ultimate goal of virtual elimination of all industrial and nearly all municipal pollution discharges to America's lakes and rivers. Until now, pollution control programs throughout the nation, including DRBC's, have recognized at least some waste assimilation as a legitimate use of waterways, and will continue to do so for municipal wastes. The Commission, as others, was thus faced with the responsibility of making its policies, particularly concerning industries, compatible with the new federal requirements. The job of resolving the differences actually had just gotten under way as the year ended.

Federal authorities agreed that the Commission should continue its system of wasteload allocations, under which cities and factories are allowed small discharges after treatment representing their share of the total wasteload limits to be tolerated in achieving stream quality goals enacted in the 1960s.

The industrial wasteload allocations arrangement appeared to some to be in conflict with the zero discharge goal, but attainment of that end is far off, if at all attainable in some cases technologically and practically. The allocations already assigned to the 100 dischargers along the estuary from Trenton downstream meanwhile serve as a practical interim goal. In effect, each allocation means that the city or industry must remove about 90 percent of its total organic wasteload prior to discharge to the estuary — a big improvement over the 50 percent-minus average treatment practiced before the program began.

DRBC also will continue to review the plans of any town or industry to install or upgrade any waste treatment facilities to assure compatibility with the basin's Comprehensive Plan, of which the pollution control standards are part. Both the continually updated Comprehensive Plan and the project review function are mandated in the Delaware River Basin Compact, the Commission's enabling legislation.

Since the U.S. Environmental Protection Agency and state pollution control units now issue discharger permits under the new law, DRBC's four-year-old program of adopting pollution abatement schedules was transferred to those agencies. Such schedules set down precise deadlines by which cities and industries are legally committed to prepare engineering plans, construct needed facilities, and finally comply with their allocations. Those schedules already adopted will remain in force — and they represent 92 percent of the total wasteload in the 86-mile estuary region.

In four years of this activity, the Commission formally approved 95 schedules, plus numerous revisions. In 1973, 10 schedules were approved. (A list of these appears on page 17.)

Ten-year Cleanup on Course • It was in 1967 that DRBC launched its river cleanup — then and now the most comprehensive reclamation effort on any American river. The standards and rules adopted were based on — and an enlargement of — years of research by the Federal Government and others on cause and effect of the river's pollution.

The target set in 1967 was attainment of the stream quality objectives in a decade, and the program is advancing on schedule toward that goal. The progress is illustrated by charts (page 17) showing compliance in terms of both percentage of total allocated wasteload and percentage of dischargers.

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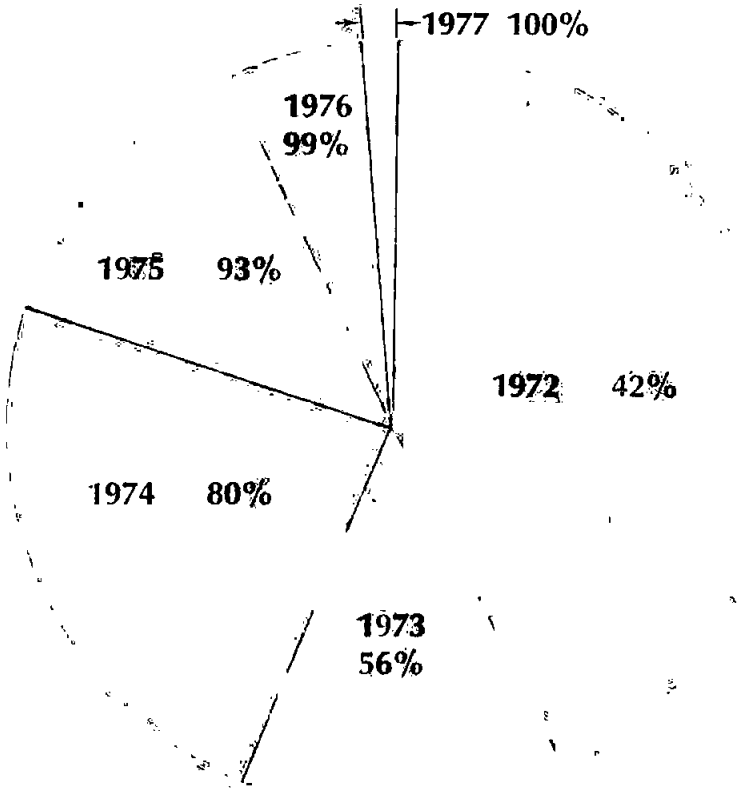
Waste Dischargers
Brought Under Abatement Schedules • 1973

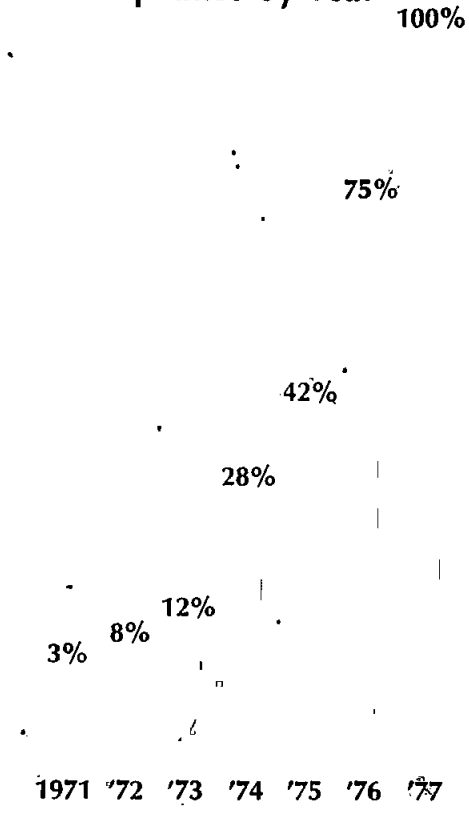
Discharger	Allowable Organic Discharge*	Full Compliance by
Riegel Products Corp., Milford, N.J.	**	December 1973
U.S. Army Ammunition Plant, Burlington, N.J.	***	June 1973
Rollins-Purle, Inc., Logan Township, N.J.	200	September 1974
Shell Chemical Co., Woodbury, N.J.	520	November 1974
U.S. Army, Frankford Arenal, Philadelphia, Pa.	****	December 1972
New Castle County Public Works Department, Delaware City, Del.	36	May 1974
Diamond Shamrock Chemical Co., Delaware City, Del.	35	August 1974
Amoco Chemicals Corp., New Castle, Del.	*****	April 1975
Gulf Oil Company, Philadelphia, Pa.	****,	December 1974
Township of Falls Authority, Bucks County, Pa.	220	December 1975

* Allocation of carbonaceous (first-stage) oxygen demand in pounds per day.
** A non-tidal discharge not under allocation.
*** Allocation withdrawn. Plant operation discontinued.
**** Inorganic discharge, thus not under allocation.
*****/****** Allocation not yet assigned.

Percentage of Delaware Estuary Dischargers Complying with Allocations by Year



Percentage of Delaware Estuary Allocated Load in Compliance by Year



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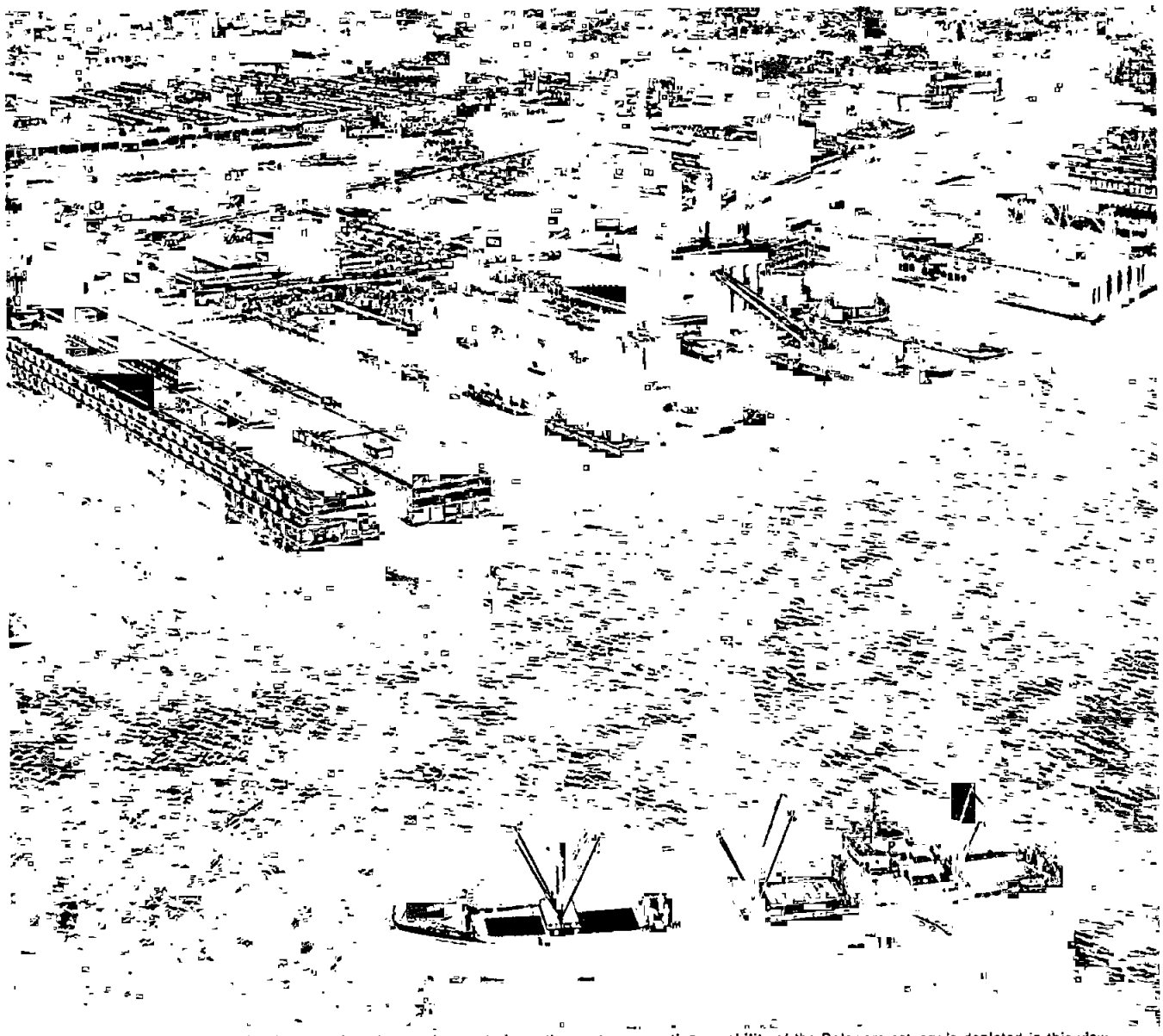

The intense urban-industrial-port development that places a heavy strain on the waste assumption capability of the Delaware estuary is depicted in this view of the Philadelphia waterfront.

While well over half of the 100 industries and municipalities that discharge organic wastes to the tidal estuary already are complying with their load allocations, only about an eighth of the total allocated load is being treated up to specifications. The explanation is that the more numerous smaller installations that emit smaller waste volumes, both private and public, have far fewer problems, mostly technical, in complying with requirements. Thus, they meet them earlier.

On the other hand, for example, the City of Philadelphia, with three giant sewage treatment plants that handle massive household discharges and large volumes of industrial waste as well, is not slated for full-compliance operation until 1977. The City is the source of 45 percent of all organic pollutants going into the estuary, and it forecast three years ago that meeting the Commission's requirements would cost $75 million, likely a conservative estimate in view of construction and financing cost rises since then.

Attainment of the decade cleanup goal sometimes seems elusive due to the myriad of pressures that would appear to make it impossible for industries and cities, especially the larger ones, to avoid some delays. These include high costs, financing difficulties, acquisition of federal and state grants,

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and also environmental constraints, some stemming from air quality requirements. But by no means are all the delays regarded by the Commission or by federal and state authorities as acceptable.

Polluters Cited • At its final meeting of the year, the Commission's concern that about a third of the dischargers under abatement schedules were delinquent was sounded by Maurice K. Goddard, Pennsylvania's Environmental Resources Secretary and Governor Shapp's Alternate on DRBC.

"While in a few instances there may be justifications due to financial, technological or other difficulties for falling behind, it is our view generally that these delinquencies are unnecessary," said Dr. Goddard. Some appeared to be defiant of public cleanup demands in unfairness to the majority that were complying with their allocations and schedules, he said.

The Commission ordered preparation and publication of a report listing the status of each discharger, including the degree of non-compliance, if any. The followup report noted that 44 dischargers had completed their required waste treatment facilities, indicating compliance or near-compliance, and that 16 others were keeping abreast of the timetables in their abatement schedules. On the other hand, 37 were behind — usually a few months, but in some cases more than two years — in their schedules.

The report singled out four industries and nine South Jersey municipalities as particular problem sources. It recommended that the Commission initiate enforcement action against one Pennsylvania industry, which it did, and also against a group of the municipalities but this was deferred when a logjam appeared to be breaking in reaching a regional solution to the local waste problems.

Other Activities • The Commission also took a new type action against a pollution violator when it denied a municipality's request to increase its water supply. Grounds for denial were that it was violating water quality standards by putting about 20 percent more organic waste in the river than allocated. This was, in effect, a pollution control enforcement action tied to DRBC's project review function.

The water quality monitoring and sampling program initiated in the 1960s by DRBC continues as a principal data source for all agencies involved in pollution control work. Soon to be published by the U.S. Geological Survey is a series of reports covering three years of information on stream quality parameters gathered by boat runs conducted for DRBC under contract by the State of Delaware. This material will augment data for 1967 already published.

In 1974, the Commission is slated to receive from a consulting firm a model based on results of an investigation of the good-quality reach of the Delaware from Trenton to above Easton. This model will aid DRBC in assigning wasteload allocations to dischargers, when and if necessary, as was done for those on the estuary below Trenton.

A groundwater quality protection policy was added to DRBC's Comprehensive Plan this year establishing protected water uses and setting water quality objectives. Implementing rules, also adopted, establish enforcement procedures and specify prohibited activities that would degrade the resource. DRBC this year placed on sale for $2 a consultant's report recommending an extensive groundwater investigation and protection program.

Disposal of sludge, that is the solid residue of liquid waste treatment, remains a most vexing problem in the Delaware Valley as everywhere. The search continues for the right environmental solution for ridding the surroundings of unwanted sludge, since all of those now in conventional use lead to further problems — still more pollution from incineration, ocean dumping and landfills. Active research meanwhile must continue on how to make the unwanted substance productive for such as producing heat, organic enrichment of land, and crop fertilization. Meanwhile, temporary approval has been granted by EPA for several dischargers to continue ocean disposal.

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Green Valley Farms, near Downingtown, Pa., is succeeding in disposing of wastes through spray irrigation (seen in background) for crop and woodlot production.

Photo by Dr. Norman F. Reber, Pennsylvania Farmer Magazine.

In Chester County, a dairyman and Pennsylvania ex-legislator, Benjamin J. Reynolds, has carried on a highly successful application of cow herd manure in the form of liquid spray irrigation from lagoons on both farm crops and woodlots at his Green Valley Farms. This cycles wastes without stream pollution and at the same time improves soils, producing more nutritious food for animals and people and better tree growth. The project, endorsed by both DRBC and the Commonwealth, is being watched closely by researchers in the field in the hope that it will prove to have broad application, which Reynolds is confident it will.

A hopeful sign of things to come was the withdrawal of the wasteload allocation assigned to the GAF Corp. plant at Gloucester City, N.J., the result of the waste operation going to full recycling instead of discharging to the river, except for cooling water. Other companies are tightening valves, instituting in-plant controls and reducing overall wasteloads.

The Commission sponsored this year a technical seminar that examined the potential and prospects of closed cycle liquid waste operations by industry as an alternative to meeting increasingly stringent pollution control laws and regulations, especially the zero-discharge goal contained in the new federal water quality law. Some 165 specialists from industry, government, colleges

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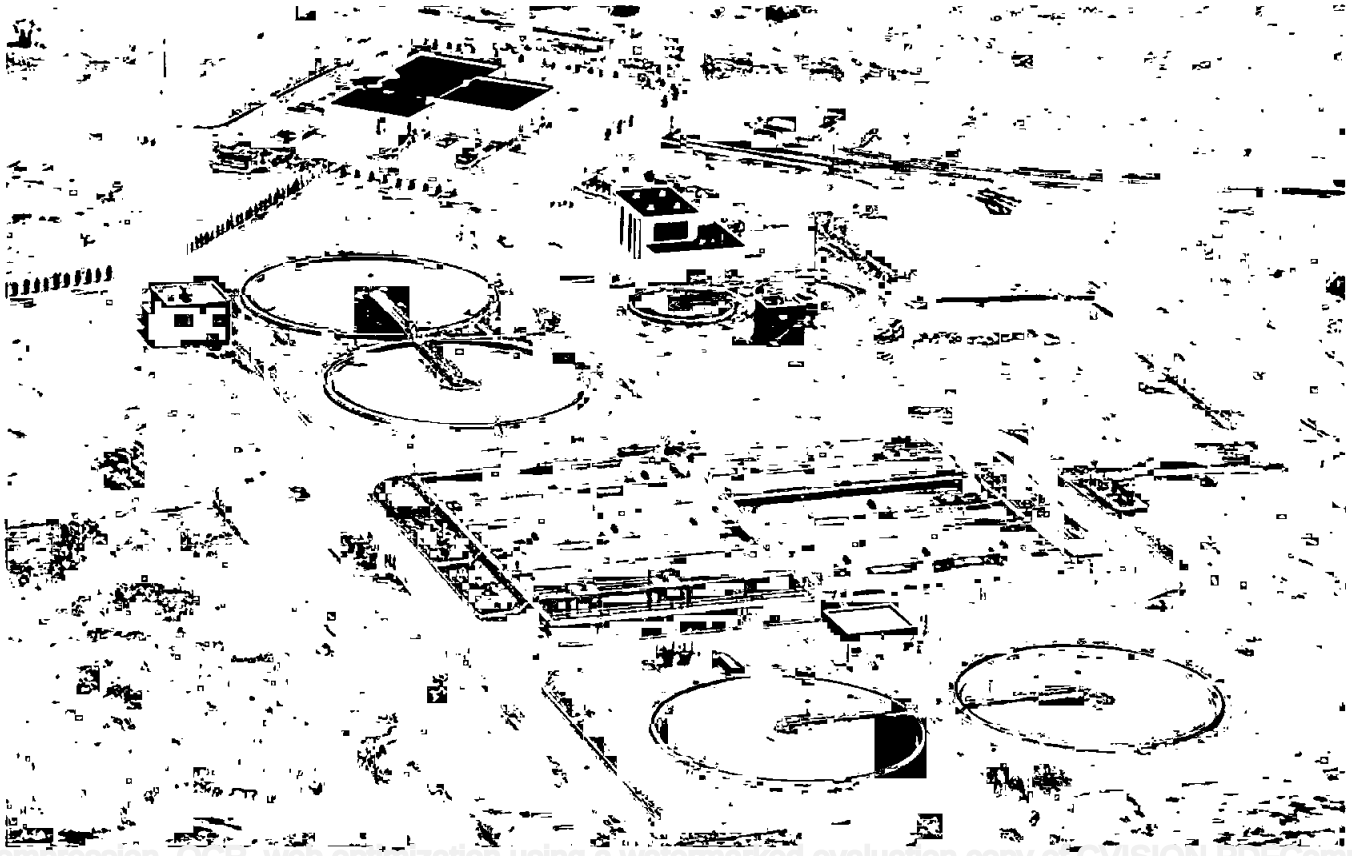
and environmental consulting firms participated in the session, which included presentations on treatment problems in production of petroleum, chemicals, pharmaceuticals, paper and steel, as well as talks on government requirements and latest research and technology. An earlier Commission-conducted seminar had explored the broader subject of industrial waste management generally. (The 1973 seminar proceedings are available for $2.)

Gloucester Regional Plant on Line • A major new contribution toward improving the quality of the tidal waters of the lower Delaware River will be the $41 million regional waste collection and high-level treatment facility of the Gloucester County (N.J.) Sewerage Authority just completed in 1973. This plant, the first of such scope built with funds from New Jersey's 1969 quarter-billion dollar water quality bond issue, supplants some 30 outmoded municipal and industrial plants and will serve 13 communities populated by 135,000 persons. Substantial federal grant assistance helped finance the project also.

Another critically needed regional sewerage system is moving ahead — this one on the Pennsylvania side of the river below Philadelphia in Delaware County, where continued development has brought serious local water pollution problems. There, in accordance with the Commission's Comprehensive Plan, the Delaware County Regional Water Quality Control Authority is implementing a program that will result in the eventual integration of many industrial and local waste treatment plants. Wastes from the northeasterly portion of the county will go to Philadelphia's southwest treatment plant, which is being enlarged and sharply upgraded, and those from the southwesterly portion of the county to the Chester treatment plant, which the Authority is expanding and modernizing. Both the Philadelphia tie-in and the Chester plant construction work are under way. Development of the Delaware County plan was induced and assisted by DRBC, supported by the Commonwealth, Delaware County and local interests.

As soon as the link with Philadelphia is achieved in 1975, the quality of polluted Darby Creek will improve. Completion of the Chester regional plant is slated for 1976.

The newest and most modern water pollution control facility in the Delaware Basin was put into operation in 1973 near Paulsboro, N.J., by the Gloucester County Sewerage Authority.



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Tocks Island

For the Tocks Island reservoir, 1973 was a period of intensive activity to satisfy a series of conditions and demanded assurances before the long-stalled project could enter construction on the Delaware main stem five miles upstream of the Water Gap.

The outcome of this activity was awaited by the Governors of the affected states, the President's Council on Environmental Quality and congressional appropriations committees. Their signal was awaited in turn by the Tocks project agencies so building work could proceed.

Meanwhile, the debate progressed over the alleged environmental defects and whether they would be too high a price to pay for the benefits of water supply, flood protection, lake-based recreation and energy from the massive installation.

The multi-use, 37-mile-long reservoir had been authorized by Congress a decade earlier and the surrounding Water Gap National Recreation Area shortly thereafter, both amid general approbation. When time came to proceed with construction in the late 1960s, other national demands on the available funds took precedence, followed by amplification of environmental objections. What promised to be a short delay has lingered now for six years, during which the cost estimates have soared. Preconstruction work has been completed for some time by the Corps of Engineers, which stood ready to put the job out on bids.

Governor Cahill advised his fellow DRBC members early in the year that New Jersey realized there were no readily available or feasible alternative means of realizing the project benefits that would be "less expensive and less environmentally destructive" than Tocks. However, at the same time the Governor laid down a series of conditions and said that after receiving assurances that they would be met he would give the signal for building to commence.

Governor Shapp of Pennsylvania and U.S. Interior Secretary Morton, the Federal Member, both long-time supporters of the Tocks Island project, joined Governor Rockefeller, representing the third project area state, and Governor Tribbitt in allotting time to resolve the issues raised by Governor Cahill.

In the ensuing months, staff work by DRBC and others was undertaken toward satisfying the Governor's requirements. In addition, lawmaking activity in the Congress bore on a couple of the New Jersey demands.

Meeting the Conditions • Two of the conditions that fell within DRBC jurisdiction were resolved at the Commission's 1973 annual meeting, the second gathering of the Governors in eight months.

Governor Cahill had insisted on decentralization of the proposed regional ring sewerage system, designed to avert reservoir pollution, in favor of separate facilities to serve local population areas. He called also for a scaledown of the park facilities to serve four million visitors a year instead of the 10½ million previously programmed. With Governor Cahill's support, the Commission enacted amendments to its Comprehensive Plan satisfying both conditions.

The Governor said this left two important issues to be resolved. These were the imposition of state land use controls in the New Jersey Tocks impact area, primarily Sussex and Warren Counties, and enactment by Pennsylvania of pending legislation to impose flood plain restrictions. The action sought by Governor Cahill on these two issues actually represented completion of activity already initiated.

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On the flood plain regulation issue, half of the Governor's condition already had been met months earlier with enactment of state controls in New Jersey.

In the case of the land use controls, the Governor already had announced a proposed legislative program, although opposition had arisen locally to state encroachment on home rule prerogatives.

A second condition relating to water quality called for assurances of adequate controls of nutrient runoff from areas upstream of the Tocks project to prevent excessive algae growth, or eutrophication, in the reservoir itself. The Environmental Quality Council had asked for assurances on this same matter from the Tocks region governors before construction could begin.

The DRBC resolution satisfying the Governor's sewerage decentralization condition also addressed the upper basin nutrient problem with this commitment: "Management of non-point sources of water pollution in the area, and drainage areas tributary thereto, shall be in accordance with Environmental Protection Administration policy . . . and with applicable regulations, (but) without limitation thereto, relating to erosion and sediment control, efficient fertilizer use and land disposal of animal wastes."

Nutrient Controls • DRBC and Corps staff investigations and studies conducted by outside experts had been in progress for several years on the matter of Tocks reservoir water quality and continued into 1974. These nutrient-related activities included inventories to determine the magnitude of the diminishing dairy and poultry herds that could be an upstream pollution source, and studies giving baseline nutrient conditions in the streams and measuring the inflow at the upstream end of the reservoir. Also conducted was a series of probes focused on preventives or actual control procedures that could be followed if any harmful eutrophication occurs in the reservoir.

Results indicated that much of the manure-source nutrients never reach the streams and that the water entering the reservoir area is representative of local conditions without upstream uses having an effect that far down-river. DRBC staff concurred that, in the absence of preventive measures, a limited algae problem might possibly develop at Tocks. But it also gave assurances that the state of applicable technology is such that the problem, with near-certainty, would be headed off; however, if some harmful eutrophication were to occur, the studies showed that effective corrective measures are available. Moreover, new federal law mandates that agricultural and non-point pollution discharges be drastically cut or eliminated over the period prior to completion of the Tocks dam, thus further assuring effective nutrient control.

The two other conditions called for federal payments of half or more of the cost of needed access roads and federal "consideration" of payments in lieu of taxes to local government. However, in the wake of the scaledown of the park visitor load, New Jersey's highway planning chief declared that no additional highways would be needed to accommodate the revised recreational facilities and that the state was now concentrating on Northwest Jersey roads needed irrespective of Tocks Island. Meanwhile, the newly-enacted federal aid highway law enabled the Federal Government to pay 70 percent of construction costs of new state primary road jobs.

Governor Cahill's request for federal consideration of payments in lieu of taxes was formally supported by a DRBC resolution sent to Delaware Basin representatives and appropriations leaders in Congress and to appropriate Executive Branch agencies. Such payments by Washington are not customary, but the new Federal Revenue Sharing Act resulted in payments to the two New Jersey counties and their municipalities, starting with $2.4 million in 1972 and increasing in subsequent years.

With preconstruction work completed, funds were available from Congress for it to start building when the water quality and highway issues are resolved. Meanwhile, environmentalists opposing Tocks Island said they were poised to challenge the project in court once construction activity is initiated.

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Financial Summary

Budgetary

1973 REVENUES	Budgeted	Received
Delaware	121,300	121,300
New Jersey	355,900	355,900 [1]
New York	313,900	313,900
Pennsylvania	383,900	383,900[4]
U.S.	216,000	216,000
EPA Grant	234,000	177,400[2]
Flood Control Support	30,000	30,000
Miscellaneous	2,000	6,349
Project Review Fees	0	13,194
TOTAL	1,657,000	1,617,943
		39,057[3]
	1,657,000	1,657,000

(1) Includes $2 000 capital appropriation

(2) $56 600 of grant amount not received

(3) Net revenue loss

(4) Includes $25 000 capital appropriation

(5) Includes $601 unexpended funds
$17 194 Project Review fees
$4 349 excess miscellaneous receipts,
and $39,057 net revenue loss (grant)

The records of the Commission are independently audited each year as required by the Compact

1973 EXPENDITURES	Appropriations	Expended
By Organization		
Directorate	306,516	296,634
Administrative Division	180,954	186,832
Planning Division	1,169,530	1,116,333
TOTAL	1,657,000	1,599,799
By Program		
Water Supply	63,000	32,081
Water Demand	25,000	15,681
Recreation	70,000	64,514
Power	33,000	42,345
Project Review	142,000	135,824
Water Quality	610,000	657,933
Comprehensive Plan	183,000	273,964
Flood Loss	109,000	33,437
Basin Operation	157,000	163,830
Small Watersheds	28,000	11,903
Environmental Analysis	210,000	141,287
TOTAL	1,630,000	1,512,799
Capital Program	27,000	27,000
Excess or deficit in appropriations or receipts over expenditures		57,201[5]
GRAND TOTAL	1,657,000	1,657,000

Non-Budgetary

	Funds Available	Expenditures	Unexpended Dedicated Allotment
Tocks Island Region Environmental Study	8,687	0	8,687
Tocks Island Fish Research	20,317	3,701	16,616
Deepwater Regional Study	69,905	27,942	41,963
TOTAL	98,909	31,643	67,266

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A Delaware Bay sunset.

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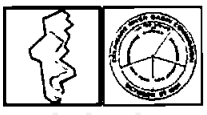

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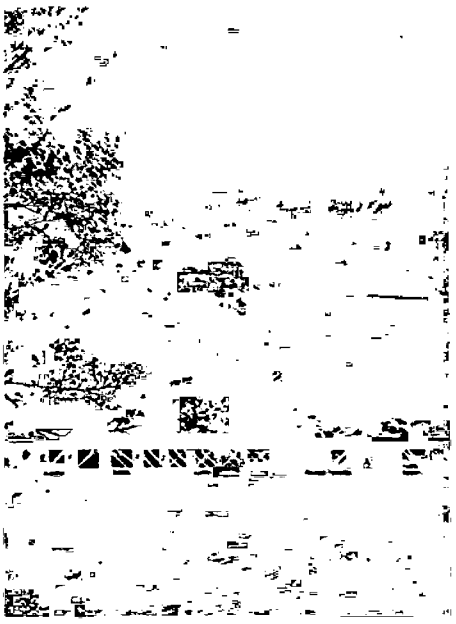

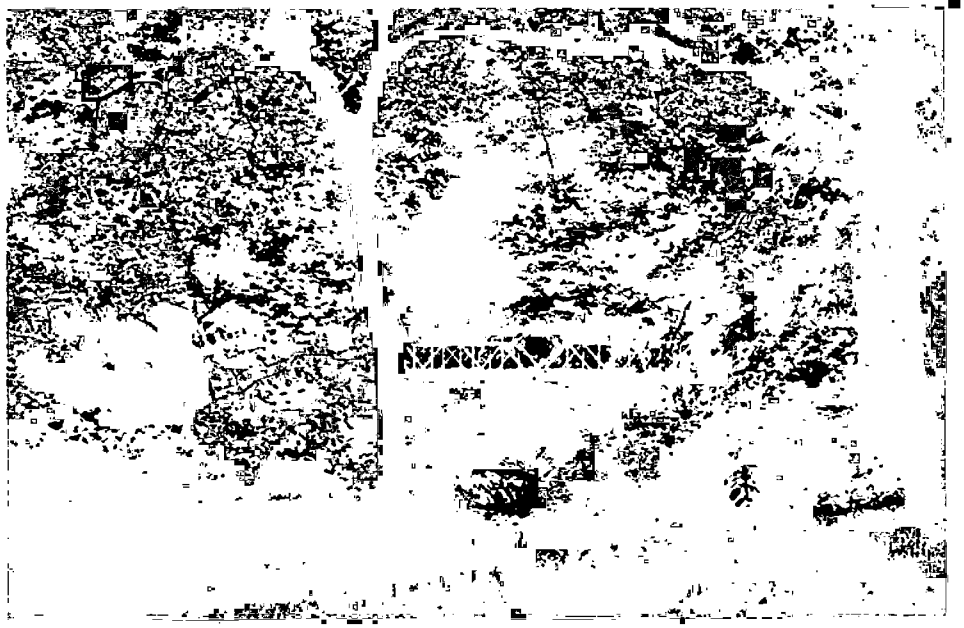

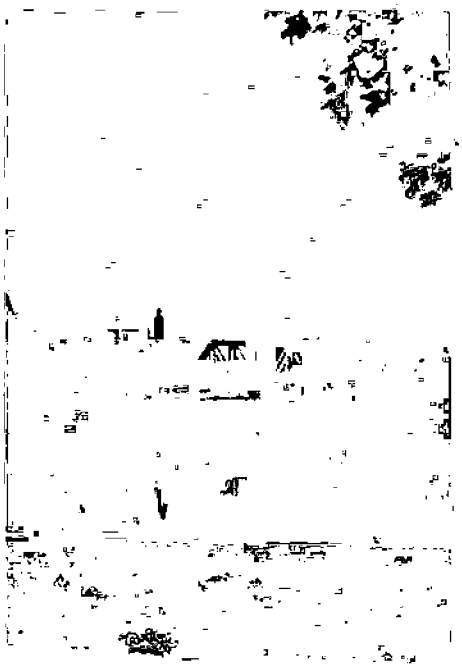

annual report 1976
delaware river basin commission

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On the cover are scenes photographed from several locations along the Delaware's nontidal main stem, each containing a picturesque old truss-type bridge.

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Report designed by Johnny A. Stanton, DRBC graphic artist/illustrator

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introduction

W. B. Whitall

This is the 14th annual report of the Delaware River Basin Commission covering 1976. The Commission and the interstate-federal Delaware River Basin Compact that created it actually turned 15 years of age late in 1976, but the substantive water resources operations of the agency were not in full swing for a year after the Compact's enactment in October 1961.

The report contains a broad account by the retiring Executive Director, James F. Wright, of how the Commission's programs and activities have evolved over the years due to new trends nationally and regionally in resource law, fiscal policies and environmental attitudes.

A major undertaking in 1976 was the launching of a comprehensive study that is to lead to reformulation of DRBC's 15-year-old Comprehensive Plan to reflect not only those new trends but also the Commission's 1975 decision opposing funding to start construction of the big Tocks Island reservoir project on the river's main stem.

Much of the Commission's 1976 staff work was concentrated on individual problems related to the new trends cited by Mr. Wright and also offsetting the loss of Tocks Island. These include planning for non-structural flood loss reduction, controlling intrusion by sea salts up the estuary, protecting diminishing ground water supplies, compensating for inadequate water supply storage and preparing for another inevitable drought.

This report on the Commission's efforts to bring effective water resources management to the four-state river basin is presented to the citizens of the region and their elected representatives in Washington, Albany, Harrisburg, Dover and Trenton. ■

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1976 review

This was the year that the interstate-federal Delaware River Basin Commission embarked on a series of new explorations to ascertain how to deal with escalating pressures in an era that tends to resist tangible solutions.

Reflecting the era's apprehensions, the Commission in 1975 had decided that the biggest multi-benefit water project ever envisioned in the region, the Tocks Island Lake, should not go forward. Instead, it said it wishes to focus on alternative schemes to achieve the same purposes—assuring adequate water supplies, holding down flood losses, providing more public outdoor recreation, sustaining energy generation and more. Implicit was that the goals should be attained with a minimum of structural solutions that are now environmentally unpopular and that the public should be induced to make do with less in resource-consuming services.

So after nearly 15 years on the job, the Commission was pointed on a new course to build on its long record of water conservation and protection accomplishments. In response, program after program was initiated during 1976.

Principally, a timely federal grant was received to launch the new Comprehensive Study that will help the Commission modernize and redesign its existing comprehensive plan in about two years. This special DRBC program is reanalyzing a full range of schemes for meeting all the region's water resource needs — with full consideration of prevalent current viewpoints through broad public participation. The investigation was well under way at year-end.

Public distaste grows for building reservoirs to protect against dry spells. But so does the depletion of surface and underground waters and consequently so does the inability to guarantee against intrusion of contaminating sea salts into the fresh waters of the upper reaches of the tidal Delaware and adjacent aquifers.

To help resolve this anomaly, DRBC petitioned Congress for approval of a scientific exploration of estuary chlorides vs. river flow and sought from the U.S. Water Resources Council money to mount a massive ground water management program. Congress authorized — but has not yet funded — the salinity probe, and it provided strong basin delegation endorsement of the ground water program. Initial phases, at least, of these efforts were expected to get aloft in 1977.

These and other new activities relate directly to the restraints and controls the Commission would impose when the next drought hits. With shortfalls of up to 25 percent in 1976 precipitation in some parts of the basin, there were ominous indicators that a drought already could be upon the region.

Anticipating that water storage facilities on hand will be unable to cope with a deep drought like that of the 1960s, the Commission adopted a policy — to be followed up by regulations — establishing priorities of use during a shortage. Top emergency allocations would go for human consumption and uses associated with health and safety, with activities that would sustain maximum employment coming next. The priorities were adopted jointly with a conservation policy mandating a program to effect reduced future consumption for both domestic and industrial purposes, hopefully restraining excessive withdrawals.

The other side of the hydrologic coin is flooding, and here again the

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Commission moved ahead — with programs in keeping with current preference for non-structural means of holding damages down. Extensive regulations giving the Commission tools to restrict future uses of flood plains, and incorporating aids for local government to do the same, were adopted in 1976.

And Congress responded partially to Commission urging for a federal feasibility study of removing or flood-proofing endangered structures along the main stem above Trenton. The study was authorized but has not been funded.

Also, DRBC concluded local studies in 1976 that will help entitle homeowners in 119 communities to federal flood insurance coverage, and it initiated several more.

Reorganization

As the result of changes of administration in the State of Delaware and in Washington after the 1976 elections, DRBC got two new members early in the new year.

Governor Pierre S. duPont, a fighter for environmental causes while a congressman, took over both as Delaware Member and Chairman from ex-Governor Sherman W. Tribbitt, and former Idaho Governor Cecil D. Andrus was named DRBC's United States Member by President Carter, succeeding Thomas S. Kleppe, his predecessor as Secretary of the Interior.

Governor duPont's former top congressional aide, Austin P. Olney, became his Alternate Member after being named state Director of Natural Resources. Formerly the Alternate was John C. Bryson, veteran water resources administrator, and DRBC supporter, who left his post as Delaware's Secretary of Natural Resources and Environmental Control to become project director for the newly formed Middle Atlantic Fisheries Management Council.

Rocco D. Ricci, Acting Commissioner of New Jersey's Environmental Protection Department, was named DRBC Alternate to Governor Brendan T. Byrne in August, succeeding Commissioner David J. Bardin, who later shifted to a high post in the Federal Energy Administration. Mr. Ricci had been Mr. Bardin's first deputy.

William Miller dies

The premature death of William Miller early in 1977 deprived the Delaware River Basin Commission of the continued extraordinary services of its general counsel of more than 15 years — and of a close and good friend.

Governor duPont

A public affairs specialist and law professor who attained national recognition for his brilliant, crisply written reports and effective recommendations in tax policy, public administration, government charters and other fields, Mr. Miller was nonetheless probably most widely associated with his professional first love — the Delaware River Basin Compact and Commission.

Secretary Andrus

No one had a longer or closer association with the Commission and the vigorous effort, beginning in the mid-1950s, that went into its creation.

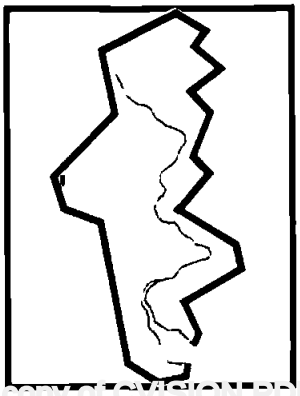
He was author of the Delaware River Basin Compact for the advisory committee that the four basin governors and mayors of New York and Philadelphia set up in 1955 to effect regional water management. It was the nation's first interstate-federal compact for any purpose, and it won unprecedented one-session approval in Albany, Trenton, Harrisburg, Dover and Washington.

Mr. Olney

On December 13, 1961, at DRBC's original meeting, he became counsel, and from that day on he participated in its every consequential decision until illness incapacitated him late in 1976.

A major newspaper paid perceptive tribute to William Miller when it tabulated the many reforms he had influenced in the public interest, earning him the designation of "New Jersey's peaceful revolutionary."

Mr. Miller



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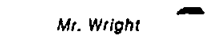
evolution of DRBC programs



Mr. Wright

(Mr. Wright will retire in 1977 after serving 15 years as DRBC's first executive director. A career federal and state administrator, he was selected following a national talent search while first deputy director of California's Water Resources Department. Following is an informative assessment he has made of the Commission's policy and program trends since 1962.)

By James F. Wright

The Commission was organized soon after the Corps of Engineers had developed comprehensive recommendations for the basin emphasizing water supply, flood control and recreation, but not water quality. State water resource responsibilities were then fragmented among separate departments, boards and commissions. There was no systematic federal water pollution control program and pretty much the same could be said of the states.

Early Commission policies and programs fostered the development of structural projects for water supply, flood control and recreation; established early policy for guidance in the comprehensive planning process; called for and reviewed all water resource-type projects under the Compact; and brought into being a water quality program for pollution control within the basin.

With the passage of years, the federal role and involvement in water quality management and pollution control has increased tremendously. Each of the basin states consolidated its water resource management into a single agency, with much more money and staff. Similarly, state water supply and water resource general planning has received increased emphasis. The Commission's role has gradually shifted from preoccupation with reservoir projects and pollution abatement toward a more coordinative and service role while still requiring that the end products of signatory efforts be brought together and incorporated within a broader envelope of comprehensive planning. The Commission is now beginning a reformulation of the Comprehensive Plan for the basin that will reflect changed public attitudes, stronger environmental emphasis and the recent decision not to proceed with construction of the Tocks Island Lake on the Delaware main stem at this time.

Water supply

In water supply, the Commission, while not discarding the development of structural projects, now places increased emphasis on restudy of demands and is currently developing policy which, instead of trying to meet all supply needs under all conditions, emphasizes conservation by users and establishment of priorities for water use in times of shortage. Also in water supply, the Commission has analyzed through the years the need for a coherent plan for the development, conservation and use of underground water, along with surface water, and is now proposing a comprehensive study of ground water resources and future demands that, hopefully, will lead to a plan for conjunctive use of ground and surface waters in contrast to the ad hoc

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consideration of specific projects that characterized earlier efforts.

Water quality

In the field of pollution control, the Commission developed water quality standards, an innovative allocation system and an abatement program. With growth of other federal and state activities, particularly since enactment of the Federal Water Pollution Control Act and the establishment of the program of National Pollutant Discharge Elimination System, the Commission has de-emphasized analysis of individual permits and spent more time coordinating and reformulating water quality standards, reworking assimilative capacity allocations, developing better monitoring programs with the signatory parties, and, on occasion, sitting as a board of arbitration when interstate concerns are involved in specific pollution programs.

Project review

Initially, the Commission's project review activities encompassed a total range of projects in order to insure surveillance over water resource activities within the basin. Increased signatory capabilities, among the states in particular, in this area has resulted in a redefinition of DRBC's role. While retaining general review authority over major projects, DRBC reduces its technical investigations to all but the most important projects and moves into a role of auditing and coordinating the expanded signatory efforts.

Flood control

In flood control, the Commission's early emphasis was on structural measures, with some companion joint effort with the U.S. Geological Survey and the Corps of Engineers in flood plain mapping. This has evolved into a more active Commission role in working with the Department of Housing and Urban Development's flood insurance program, promulgating flood plain regulations to forestall undesirable flood plains development in the future, and exploring non-structural flood loss reduction measures such a flood proofing.

Energy

In the field of power generation, the Commission required the region's utility companies to develop a master siting study, regularly updated, that provides vital information on future electric generating facilities and their water supply requirements. The information is valuable to federal and state agencies also. Growing out of this, the Commission has worked with the signatory parties on other energy siting matters, such as liquified natural gas, and will continue to work with the federal and state agencies to insure that full impacts on water supply and water quality are recognized. Additionally, potential onshore developments arising out of offshore drilling activities are being monitored for impact on related water resources.

Environmental protection

Responsive to the National Environmental Policy Act of 1969 (NEPA), the Commission has assumed an intensely active role of environmental analysis, including continuous cooperation with the Council on Environmental Quality and the Environmental Protection Agency, and other federal sponsoring and regulatory agencies, such as the Corps of Engineers and the Federal Power Commission, and also with the states. DRBC has produced both detailed critiques of draft environmental impact statements of other lead agencies and, in a number of instances, its own environmental impact statements in compliance with NEPA. This role will continually evolve as new regulations and changes in the law require.

New broad study duties

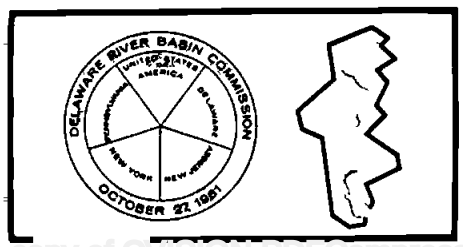
Along with all this, the Commission has been asked by all the signatory parties to play a more active role in various programs, such as the Delaware River Basin Comprehensive Study now in progress toward reformulating DRBC's Comprehensive Plan, institutional arrangements for sludge administration under areawide waste management planning programs, and other planning, all part of the increased activity at all levels of government stemming from the federal water pollution control law

Program development

In coordinating signatory water resource activities, the Commission has moved somewhat away from its early role of developing its programs basically in-house after limited consultation with and review by the signatories. The new pattern is for early planning conferences that produce state and federal recommendations and matrix of program elements that are then reviewed by the Commissioners as a basis for program formulation. This reflects the staff's determination that programs fully respond to the Commission's status as an agency of each of these signatory parties.

In summary, the Commission continues an active direct planning role along with much more recent emphasis on coordination and reconciliation of the work of the other signatory parties. DRBC also continues its early project review role but with heavier reliance on technical review by the signatory parties, resolution of differences, spot checking performance by the signatory parties, monitoring results and development of new mathematical models necessitated as the pollution control program moves ahead. Changes in emphasis that have moved the staff effort away from some of its more detailed planning, review and regulatory activities have been more than offset by the coordinative and cooperative planning responsibilities from changing signatory activities.

In the course of all this, Commission manpower has suffered a reduction of approximately 10 percent, in a reflection of signatory fiscal pressures, and now manages to meet the changing needs of the basin only with a maximum staff effort and a high level of efficiency. ■



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DRBC attainments since 1962

Following is a list of Commission accomplishments and important programs during James F. Wright's 15-year directorship of the Delaware River Basin Commission:

- *Assumed responsibility over—and agreed to reimburse United States for — water supply in federal reservoir network, thus assuring provision of low-cost future supplies of water for region.*
- *Effected cooperative policies at differing levels, bringing common groundrules to waste dischargers and other water users on opposite sides of the river in different states.*
- *Took the results of massive federal pollution study of tidal estuary and transformed them into the far-reaching water quality reclamation program for the intensely developed lower Delaware River.*
- *Imposed rigid spill-prevention requirements during construction of nation's largest cross-country petroleum pipeline, on which work was halted pending compliance.*
- *Invoked emergency authority to control and limit large-scale public and private water use and out-of-basin diversions to protect the Philadelphia metropolitan area's water supplies from salt contamination during the record drought of the 1960s.*
- *Organized and supervised a four-state reevaluation of the basin's water yield capability in wake of the worst drought to improve future planning.*
- *Conducted flood history studies with U.S. Geological Survey and others in several hazard areas, better equipping local government to regulate land uses.*
- *Produced data needed to standardize flood area delineation in the four-state region.*
- *Established controls over rich subsurface water supplies, extending them into some parts of the basin for the first time.*
- *Produced formula averting an interstate dispute on sharing the waters of Brandywine Creek.*
- *Protected a historic small watershed in Pennsylvania from being bisected by a high-voltage overhead transmission line.*
- *Preserved an important reservoir site for New Jersey by requiring the elevated construction of an interstate highway.*
- *Mandated the preparation and publication of a series of comprehensive reports on power plant siting, a national first, to enhance future water planning and management.*
- *Conducted extensive water quality investigation of a tri-state, six-county, 1,000-square-mile region in the upper basin.*
- *Established the feasibility of regional collection and treatment of difficult-to-handle wastes from a large segment of South Jersey. (Unsuccessful funding negotiations forced abandonment of plan.)*
- *Played central role in producing a major regional waste control program in Pennsylvania's Delaware County.*
- *Adopted and implemented far-reaching and comprehensive water quality standards for entire basin, augmenting tidal river program.*
- *Tightened water quality standards by addition of controls over non-organic pollutants.*
- *Adopted "interpretive guidelines" to assist waste dischargers in complying with standards.*
- *Developed a comprehensive 10-year fishery research program and conducted a variety of other shell and fin fish projects.*
- *Acting for New Jersey and Pennsylvania, restored the wing dams that impound a popular recreation lake on the Delaware at Lambertville-New Hope.*
- *Conducted inventories of nutrient sources of upper Delaware and studied their water quality consequences.*
- *Held technical seminars for operators of water quality installations.*
- *Supported and worked toward the designation of the upper Delaware as a National Scenic River.*
- *Established an environmental unit in keeping with the National Environmental Policy Act. Reviewed scores of projects for their environmental integrity and prepared impact statements in many instances where DRBC was the principal federal agency involved.*
- *Mandated water metering of large new commercial, industrial and housing developments.*
- *Assisted in technical research projects aimed at environmental protection and preservation of Delaware Bay.*
- *Enacted — and defended successfully in federal court — a program covering the sale of water supply to finance storage in federal reservoirs.*
- *Promoted coordinated stream pollution control on a basinwide scale through DRBC's Water Quality Advisory Committee.*
- *Required electric utility companies to study cumulative environmental effects of planned generating facilities.*
- *Conducted studies for Upper Delaware River Regional Water Resources Planning Board in New York State on water quality management, municipal and industrial water supply, and water-related recreation.*
- *Published popular recreation maps of 200 miles of the non-tidal Delaware, principally for canoeists. More than 25,000 sets sold.*
- *Promoted and assisted local watershed organizations, and supervised publication of a 24-page guide for the Middle Atlantic Council of Watershed Associations.*
- *Prepared and published maps giving detailed locations of all known petroleum pipelines as a special spill prevention measure.*
- *Concluded Housing and Urban Development Department-financed flood studies in 119 municipalities and initiated more.*
- *Adopted own Freedom of Information policy and regulations.*
- *Published recent document, Water Management of the Delaware River Basin, compiling 14 years of water resources data, planning studies, assumptions, standards and history of the basin.*
- *Coordinated interstate negotiations to produce mutually acceptable program of releases from New York City reservoirs to improve local streams.*
- *Provided impetus and key membership for Study Management Team that established procedures and policies for the conduct of the Congressionally ordered restudy of the Tocks Island reservoir controversy.*
- *Designed and managed extensive one-year public information phase of Congress' Tocks Island restudy.*
- *Promoted use of non-structural means to cut down on flood damages.*
- *Secured Congressional authorization for a study, still unfunded, to more fully explore the prospective effects of salinity intrusion in the estuary so that the volume of fresh water inflows needed to repel salts can be determined with greater precision.*
- *Successfully petitioned U.S. Water Resources Council for funds to conduct a two-year Delaware River Basin Comprehensive Study that will help DRBC modernize and reform its Comprehensive Plan.*
- *Initiated a special program under which DRBC is to recommend an institutional arrangement for handling of the region's sludge disposal problem.*
- *Established water conservation and priorities-of-use policies to be followed in future drought emergencies.*
- *Engaged with states and other regional agencies in programs to carry out areawide wastewater management planning studies.*
- *Established regional advisory committee to improve quality and exchange of hydrologic information.*
- *Prepared a basinwide comprehensive ground water supply proposal pending before U.S. Water Resources Council.*
- *Required electric utilities to develop their own water supply storage to accommodate future nuclear and other generating operations.*
- *Oversaw safe environmental construction of a modern oil pipeline to supply in-basin electric generating operations.*
- *Conducted mathematical model study of the upper river to give a good scientific basis for future water quality programs.*
- *Initiated study to forecast cumulative effects of heat pollution of the upper river.*
- *Started work on a plan to allocate thermal wasteloads discharged to the tidal river.*
- *Undertook special water quality studies for New Jersey.*
- *Assured compatibility of more than 1,000 water-related projects since 1962 with good resource protection policies through project review function.*
- *Streamlined project review procedures.*
- *Initiated reappraisal of many policy issues for guidance in compensating for the deferral or loss of the Tocks Island project.*
- *Imposed streamflow protection requirements on new nuclear generating facilities that are heavy water users.*
- *Enacted flood plain regulation program for all lands adjoining non-tidal streams.* ■

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the commission · 1976

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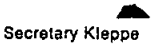
John C. Bryson

Governor Shapp

Maurice K. Goddard



Secretary Kleppe

Thomas F. Schweigert

Governor Carey

Theodore L. Hullar

Governor Byrne

Rocco D. Ricci

delaware

Governor
Sherman W. Tribbitt
Chairman

John C. Bryson
Alternate

pennsylvania

Governor
Milton J. Shapp
Vice Chairman

Maurice K. Goddard
Alternate

Carmen F. Guarino
Advisor

united states

Secretary of the Interior
Thomas S. Kleppe

Thomas F. Schweigert
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Colonel
Harry V. Dutchyshyn, ACE
Advisor

new york

Governor
Hugh L. Carey

Theodore L. Hullar
Alternate

Robert A. Low
Advisor

new jersey

Governor
Brendan T. Byrne

Rocco D. Ricci
Alternate

staff

James F. Wright
Executive Director

William Miller*
General Counsel

W. Brinton Whitall
Secretary

Dawes Thompson
Public Information Officer

J. W. Thursby
Head, Environmental Unit

Arthur E. Peeck
Chief Administrative Officer

** Mr. Miller died March 4, 1977.*

planning division

Herbert A. Howlett
Chief Engineer

C. H. J. Hull
Staff Engineer

branch heads

Seymour D. Selzer
Program Planning

Robert L. Goodell
Operations

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new comprehensive study

A major new planning effort that is expected to be the basis for updating and reformulating the Commission's Comprehensive Plan commenced on its two-and-a-half-year course in October 1976.

The new program, called the Delaware River Basin Comprehensive Study, was approved by the U.S. Water Resources Council and is supported mostly by a federal grant of $1.1 million, to which DRBC and state and local agencies will add $400,000 in matching contributions.

Mr. Longmaid

The study manager is David D. Longmaid, a community planner in water programs on loan from the Philadelphia regional office of the U.S. Environmental Protection Agency and former executive director of the Penn-Jersey Transportation Study and its successor group, the Delaware Valley Regional Planning Commission.

The existing Comprehensive Plan dates to early 1962 when the then member Governors enacted the first phase of the document, borrowed from recommended facilities in the Corps of Engineers' Delaware Basin report and comprising a series of federal and state reservoir projects and local watershed development programs. To it were added later that year a large number of existing sewerage and water supply systems, reservoirs and recreational facilities. In the nearly 15 ensuing years the plan has been enlarged almost monthly by new and proposed public and private projects of public significance and by new policies, most of them implemented by companion rules and regulations or guidelines. The policies relate to pollution control, ground water protection, water supply pricing, flood plain regulations, water priorities and conservation, metering and more.

As DRBC's Comprehensive Plan has grown, as its components have become less systematically related, as institutional attitudes and policies have changed, and as other economic, physical and social conditions have shifted, need for reformulating the policies underlying the plan has escalated. But staff and financial limitations have prevented this. Fortuitous timing and availability of funds through the Federal Water Resources Planning and the Water Pollution Control Acts have provided the opportunity to undertake the job as a single major program.

The project is expected to help assess basic policy issues to be resolved in the wake of DRBC's 1975 recommendation against Congressional funding to start building the controversial multi-purpose Tocks Island Lake. Such issues include controlling salinity intrusion from the ocean, conserving water, establishing priorities of uses during future drought emergencies, limiting water for energy and other uses that deplete supplies, use of non-structural measures to hold down flood losses, scheduling of future reservoir projects, and providing storage facilities to compensate for water exports from the basin.

The program's first phase is a plan of study to determine project goals, division of efforts among participating federal, state and local agencies, scheduling of the study phases, and procedures for public participation and public information.

A high level of public participation and public information is scheduled throughout the study entailing citizen committees, task forces, public forums and hearings and other community involvement relating to specific water resource problems, geographic sub-regions and other factors. ■

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upper basin protection

Local planning, Scenic River and reservoir control efforts advanced

The Upper Delaware River Basin is the sprawling mountainous region lying on both the New York and Pennsylvania sides of the beautiful northernmost 75 miles of the river from Port Jervis upstream. Essentially, it comprises four of the basin's most unspoiled counties — Pike and Wayne in Pennsylvania's Pocono Mountains and Sullivan and Delaware in New York's Catskills.

The upper basin is a bucolic region that most people there would like to keep that way as its popularity escalates among sportsmen, canoeists, vacationers, urban escapees and developers. It is consequently the object of growing efforts by government officials, from local to federal levels, for future guidance and protection.

The water-related assets of the region are among its most attractive, and much of the current protection work is aimed at preserving and even enhancing them. The Basin Commission is very much a part of the effort — both to conserve the good local water resources and to protect the interests of downstream areas so reliant upon them.

The Upper Delaware River Regional Water Resources Planning Board study, a state and local effort in New York to which the Basin Commission has given extensive assistance, completed its Comprehensive Water Resources Plan and submitted it to the state in 1976.

Meanwhile, the Basin Commission continued in 1976 to conduct annual stream limnological studies that it initiated in the upper third of the basin in 1969 to gather important baseline data on that region. The parameters sampled at 10 main stem and 23 tributary stations in three states include water chemistry and living organisms. These have been in addition to DRBC fishery studies in that area.

Two additional areas in which 1976 produced concentrated activity and progress were the plan to add the upper Delaware bordering Pennsylvania and New York to the National Wild and Scenic Rivers System and a drive to improve the quality of some important local streams by revising the operation of New York City's three Catskill area reservoirs.

Scenic River plan advanced

After seven years' study, a task force of federal, state and regional agencies, including DRBC, sent to the Interior Department in Washington its recommendation that the 75-mile reach of the Delaware from Port Jervis to the end of the main stem at Hancock be designated a scenic and recreational river to preserve its natural state. If the White House and Congress accept the plan, the upper Delaware would be the first northeastern river added to the system.

Congressional action on the scenic river plan would mandate imposition of strict land use control measures to prevent intrusion by incompatible development, and anticipating this, the planning agencies from all five counties in two states along the river, including part of Orange in New York, are already ahead of the game.

The planning agencies, organized last year especially for this plan under the name of Upper Delaware Regional Clearinghouse Zoning Guidelines Committee, have prepared a common set of criteria for land use regulations and zoning guidelines that would have to be implemented by the 15 riverside municipalities with land in the scenic river fringe that totals 75,000 acres.

Once the fringe is zoned to federal satisfaction, the National Park Service would purchase up to 20 sites along the river as access centers for river-related recreational activities involving primarily canoeing, row-boating and fishing. It is urged also that the Park Service buy up to 1,000 acres as future needs develop.

The next steps are up to the White House and Congress.

NYC reservoir operations

The movement to improve local stream conditions in New York State through effecting changes in reservoir operations was organized by local fishermen and sportsmen who complained that irregular and inadequate releases have degraded water quality, fish and wildlife, and recreation value of the streams below the impoundments. The cause was picked up by the New York State Environmental Conservation Department and state legislators who guided a bill to passage in 1976 to impose state controls over many reservoirs in the state, including the city's three impoundments on upper Delaware tributaries. The bill was signed into law by Governor Carey and proposed regulations were drawn.

But operation of the city's reservoir system has regional implications that drew the downstream states of Pennsylvania, New Jersey and Delaware into the picture through the Basin Commission, on which they are New York State's fellow members. New York City's entitlement to divert Delaware River water was first established in 1931 — over the other states' objections — by the U. S. Supreme Court. But in exchange for the diversions, the court ruled in a 1954 modification of its decree, the city must guarantee minimum flows in the Delaware River at Montague, N.J., and Milford, Pa., to protect the river interests downstream.

New York City contended it could not conform to the state's proposed requirements that called for increased and year-round distribution of downstream releases and at the same time meet its court-ordered obligations. The downstream states expressed concern that excessive drawdown of the reservoir would leave them unprotected in event of drought.

Further, under the Delaware River Basin Compact that is the Basin Commission's enabling law, no modification of the court's decree is allowed without unanimous consent of the parties to the decree — namely, New York City and the four states.

Negotiations toward arriving at a mutually agreeable schedule for operating the reservoirs, at least during an experimental period, were in progress into 1977 under DRBC auspices with the consent of its state members. Technical assistance on working out a new reservoir release program was contributed by DRBC's Hydrology Coordinating Committee, comprising representatives of agencies of the Commission's five signatory parties. ■

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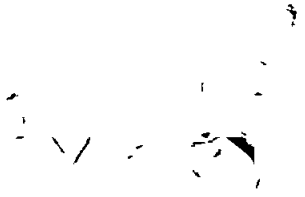

UPPER BASIN — This is an assortment of views of the Delaware in the portion of the main stem between Matamoras, Pa., and Hancock, N.Y., that is proposed for inclusion in the National Scenic Rivers system. Photographs by W. B. Whitall and J. M. Staples.

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sustaining water supplies

Programs deal with salinity, diminishing resources, overuse, priorities and energy

Water supply is a far more complex and comprehensive matter than the withdrawal, treatment and distribution system that the words suggest. To DRBC and other water managers in the Delaware Valley, water supply is a subject that involves incursion up the river of ocean salts, operation of reservoirs 300 miles upstream in New York State's Catskill Mountains, protection of thousands of subsurface aquifers in between, mediation of competing water demands, and many other factors.

Probably the biggest and most complex water supply consideration of all is maintaining a readiness to deal with the next drought. An inevitable natural phenomenon, drought is an ever-present threat for the water planner despite being far from the minds of water users in times of abundance.

No subject received more attention from DRBC in 1976 than preparing the region for drought so that negative consequences to the lives of its seven million inhabitants can be held to a minimum. The concern is not only shortage and deterioration of water for public supplies, but also such water-supported necessities as energy and industrial and commercial productivity.

Salinity

The heavily populated and developed lower basin region that relies so strongly on the tidal estuary probably faces no more critical water threat than that of salinity intrusion from the ocean. With the prospect of developing large reservoirs constantly declining, the salt water danger threat increases as the flows of fresh water into the estuary diminish during dry periods due to rising depletive water use.

Salt water impairs water use for industries and households; it is harmful to water-using industrial installations; it is a health hazard; and it threatens to contaminate the surface water supplies of Philadelphia and the wells that serve Camden and other sections along the estuary. Until remedies are found, estuary salt concentrations will rise gradually as Delaware fresh waters are depleted due to water exports from the basin, evaporation from industrial cooling and to other consumptive use by municipal systems, farm irrigation and lawn watering.

In terms of fresh water inflows to the estuary, DRBC's long-time goal of 3,000 cubic feet per second at Trenton is unattainable during severe droughts without the assistance of substantial volumes of storage based on 1976 levels of depletive use.

At DRBC's urging, Congress has authorized — but not yet funded — a study to determine the level of fresh water flows needed to repel salinity and, at the same time, assimilate wastes treated in compliance with pollution control standards. The Commission continues to press for this work so it will have a better basis than now available for establishing a more precise fresh water flow objective.

As DRBC awaited congressional action, it proceeded to poll the basin's industrial community to determine what would be the economic effect of salt intrusion on factory operations. Also, with funds made available by New Jersey, it prepared to engage a distinguished consultant from Massachusetts Institute of Technology to conduct a mathematical modeling phase of the salinity intrusion work. The congressional funds would be used to conduct counterpart tests at a football field-sized physical model of the Delaware Estuary located at the Corps of Engineers' Waterways Experiment Station in Mississippi. ■

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Ground water management

The Commission submitted to the U.S. Water Resources Council an application for funding of a basinwide planning study to help it develop a regional ground water management plan and implementation program for the basin.

The Delaware Valley has a population of more than seven million persons which, when added to its larger service area of northeastern New Jersey and metropolitan New York City, comprises an eighth of the nation's population. Studies show that surface flows in many areas are inadequate to meet dry-period demands and that ground water levels in the areas of major use are in a downward trend despite, or perhaps because of, increased dependence on them.

DRBC has identified specific concerns with the ground water resources, both with quality and quantity, and the study would include quantitative yield investigations such as monitoring aquifers and examining ground water pollution. It also would tabulate natural and background quality, identify areas of potential and existing contamination, and pinpoint subsurface supplies in danger of salinity intrusion.

The Commission wants a clear policy to determine the best use of the resources without unnecessarily hindering development and to be better equipped to balance the rights of competing well owners. DRBC is being called upon increasingly to settle disputes over competing well supplies. The study would be managed by DRBC with considerable assistance from and coordination with federal, state, regional and local governments.

Priorities and conservation of use

Determined that those in the basin community who need it most shall have first call on water supplies in event of drought and recognizing that the days of cheap and unlimited quantities of water are numbered, the Commission adopted in 1976 two important new policies.

One of the new policies incorporated in the Comprehensive Plan, on priorities of use, provides ground rules to be followed in drought emergencies. The highest rank was assigned to water needed for human consumption and uses associated with public health and safety. After meeting those essential human needs, DRBC would allocate remaining supplies among users according to a system of priorities designed to maintain highest possible levels of employment. Followup planning studies are to be made to develop the general policy into tangible regulations for implementation should the need arise. Any proposed regulations would be subject to hearing.

The companion policy commits the Commission to develop a long-term program for reduced use of water by Delaware Basin communities and industries, since easing up on water demands would benefit both the region's economy and its natural environment. It is thus DRBC's formal view that new planning outlooks must combine storage reservoirs and other water supply structures with regulatory and incentive measures to increase efficiency and economy in using and reusing available supplies.

Population, economic growth, new technology and increased scientific understanding of environmental impacts of water are disrupting the long-enjoyed pattern of boundless volumes of cheap water. It is the experience in some other areas that highly urbanized and industrialized regions like the Delaware can make do successfully with less. DRBC looks to apply techniques here that have worked elsewhere.

Water for energy

Because of the limited prospect for enlarging the Delaware Basin's inadequate water storage network, DRBC sees a potential threat to uninterrupted operation of electric generating indispensable to the region's people, institutions and industries. DRBC directed two leading electric utility companies to develop their own water storage to make up for water to be evaporated in drought periods by two nuclear power plants now under construction. The Commission viewed this as only the beginning of similar requirements as other electric generating installations are built to sustain energy demands, probably necessitating a more formalized and systematic policy.

Anticipating that they would have to develop their own water supplies, the basin's electric utility companies had arranged for a reservoir site search that produced an interim report in 1976. Their consultants identified four suitable locations to be further narrowed down soon to a single location. The four sites are Red Creek in Schuylkill County and Mill Creek in Berks County, both on Schuylkill River tributaries, and Little Martins Creek in Northampton County, all in Pennsylvania; and Merrill Creek in Warren County, New Jersey. Prospects for development of the Red Creek and Martins Creek locations triggered vigorous protests from local residents.

As the year ended, a possibility evolved that a portion of the water supply storage at Trexler, a federal multi-purpose reservoir plan in Pennsylvania's Lehigh Valley that Congress funded for a construction start, could be sold to the utilities for interim use pending local community demands. The power companies indicated this could avert the need for construction of a reservoir of their own, but probably only temporarily.

Water sales upheld

The drought and water supply-related activities of the Commission during the year came in the wake of a federal appellate court ruling upholding the legality of all phases of DRBC's water supply pricing program that had been challenged by a group of county and local officials in Pennsylvania. The Commission had enacted in 1974 its basinwide system of charging for new or increased withdrawals to finance construction of new water supply facilities. Through 1976, income from sales to water authorities and industrial users totaled $325.000. ■

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project and environmental reviews

The project review process, one of DRBC's principal tools for protecting the region's water resources from contamination, over-depletion, encroachment and other abuses, was streamlined in 1976. Effects of the changes will be felt as state procedures are adapted accordingly following a series of briefings by DRBC's staff.

Under the changes, fewer routine projects reach the Commissioners for disposition, allowing them more time to deal with reviews presenting substantive issues and with other important matters.

Over the years, the project review staff has been reviewing about 200 applications annually, sending about half to the Commission for approval, many after modification, to meet environmental requirements. Applications for approval of water-related projects come from industries and other commercial concerns, government agencies and other non-DRBC entities.

The changes build more flexibility into the procedures, disposing of inconsequential projects and transferring much of the technical review work formerly handled by DRBC's staff to larger state agencies.

Only projects assessed by the Executive Director as having substantial effect on water resources are taken before the Commissioners for disposition at a formal meeting. Those evaluated as having no such effect are subject to no further review. Formerly, the Commissioners made this formal determination in each case.

In deciding if a project has a substantial effect, the director is guided by these criteria:

Impact on land area or plant or animal life; potential for inducing changes in population or economic activities; magnitude of water withdrawals or waste discharges in relation to stream quality or quantity; project size and duration of environmental impact; effect on public health, safety, welfare and historic and cultural properties; impact on surface or ground waters in a neighboring state; effect on inter-watershed or inter-basin water transfers; project cost and magnitude of resources required for implementation; and impact on flood flows and storm runoff.

Two new categories of projects were made subject to Commission review. They are regional wastewater treatment plans and state and local flood plain regulations.

Environmental activities

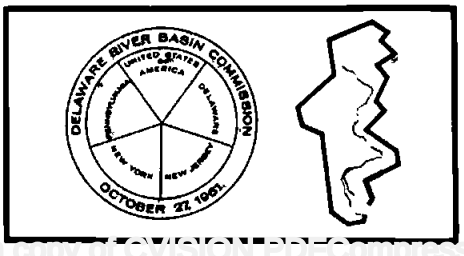
In 1976, the environmental unit, DRBC's other principal review operation, analyzed dozens of environmental reports, assessments and impact statements prepared by other agencies.

It also concluded about half the work on DRBC's own impact statement on a big marine terminal and bulk storage and transfer center that a major chemical corporation plans to build in Burlington County, N.J. The principal concerns with the project are potential impacts on air and water quality and fish food chain.

Actions proposed by some other agencies were modified due to issues raised by the unit's staff, such as DRBC's views that contributed to a restudy by the Federal Power Commission of the proposed location of two liquified natural gas receiving and storage facilities on the New Jersey side of the Delaware estuary.

Concerns raised by the environmental unit over prospective harmful results from sewage treatment plants proposed along small streams alerted policy makers at other government levels to the problem with the result that application modifications were required in many instances.

The environmental group contributed also during the year to DRBC's final policy products on many issues, including those on establishing priorities of water use during droughts, influencing more water conservation and keeping encroachments off flood plains. ■



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a new drought?

25% rain shortfall threatens ground waters; surface supplies ample

Delaware River's largest icejam in decades occurred in winter of 1976-77, as shown in this scene near the Tacony-Palmyra Bridge. *Trenton Times*

Incongruous as it seems, the four-state river valley was stricken by what resources authorities feared might become a serious drought while enjoying abundant water supplies.

The water bounty came in the form of ample up-basin reservoir storage and healthy valleywide streamflows and was due to a good year of precipitation in the northern mountain region. Consequently, freshwater flows into the tidal estuary at Trenton were a desirable 28 percent above normal.

But in the down-basin lowland areas the normal 12-month precipitation of about 40 inches dropped off by nearly 25 percent for a full three-month deficiency and the driest year in two decades. Even the mid-1960s drought years produced more rain and snow, and the area had experienced only two more arid years in 110 years of record keeping.

It was the lowlands' rich subsurface resource that was threatened with drought. Groundwater tables in many key locations fell to alarmingly low levels, especially in the southeastern Pennsylvania Counties of Bucks, Montgomery and Chester and in northern Delaware. And conditions had not improved well into 1977. Northeastern New Jersey was experiencing drought conditions, too, but with surface rather than underground supplies.

The drought effects came at an inopportune time when ground waters already appeared to be over-tapped — and becoming polluted — by more and more users turning to wells due to dropoffs in quality and quantity of surface waters. As more and larger subsurface withdrawals were made, an increasing number of disputes developed between well owners competing for water from the same aquifers.

The lowland precipitation decline did not interfere with the good Delaware main stem streamflows, since those are mainly controlled by upper basin conditions, but neither did the good flows enhance the low water tables.

Early in 1976, and again in the extremely cold 1976-77 winter, unusually heavy icejams developed, affecting streams much farther to the south in the latter. Both produced ice flooding scares, but the thaws came and went with no serious results. ■

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water quality

New effort focuses on disposal of 1,000-plus tons of sludge daily

The inevitable and ironic result of progress in solving one problem seems to be the creation of another. Unhappily, improved treatment of wastewaters from Delaware Valley communities and industries is no exception.

The more that water is purified before being put back in the streams, the more unwanted material there is left behind. This material is called residuals and comprises semi-solid sludge from municipal sewage treatment plants and solid and liquid leftovers from treated industrial wastewaters.

The magnitude of the residual problem is staggering. In the City of Philadelphia alone, 350 tons of sludge is removed every day during treatment of wastewater, representing the combined residuals from the city's human population and industries discharging to the city's system. And the city's two million inhabitants are less than half of those in the lower Delaware Valley. In addition, the region's other industries generate a comparable volume of residuals.

Besides organic materials removed from the wastewaters to prevent subsequent loss of dissolved oxygen in the stream, the residuals comprise the full spectrum of wastes including seriously toxic heavy metals and health problem substances such as PCBs.

Residuals continue to amass as increasingly stringent environmental protection and pollution control laws rule out ocean dumping and incineration. This leaves the still-to-be-developed alternative techniques of land disposal or recycling, reutilization or reprocessing of some sort. These alternatives are often controversial and always costly and difficult. Some of the residual material can safely be applied to land, but the volumes involved are so great that suitable sites are hard to find. Sludge from a well-run municipal treatment plant that processes a minimum of industrial waste is a good and safe soil conditioner, but public acceptance is another thing. Other residuals not desirable for land treatment would require expensive processing to a high technological degree to provide for safe ultimate disposal.

Mr. Carson

In September, DRBC engaged John T. Carson Jr., the former natural resources director for Bucks County, Pa., on a short-term arrangement to put together a program for residuals processing and disposal. The sludge-residuals work is being done by DRBC under a contract with the Environmental Protection Agency as part of the areawide wastewater management studies being conducted by the Delaware Valley Regional Planning Commission (DVRPC) for Southeastern Pennsylvania and for Gloucester, Camden, Burlington and Mercer Counties in New Jersey.

DRBC's responsibility is to provide alternative methods of processing and disposing of the residuals and guide the region in selecting the most effective type agency to carry out the process. Mr. Carson's work entails evaluation of regulatory processes of inspection, control and oversight to insure against environmental degradation.

Early phases of the work showed that treatment and disposal of residuals, both from industry and communities, is perhaps the most serious and vexing water quality problem facing the region. For example, as waste treatment efficiency is improved due to upgrading of Philadelphia's sewage treatment plants to secondary levels, the sludge they produce daily will nearly double. And as industries are required to pretreat wastes before discharging them to municipal sewer systems they will encounter technological problems in disposing of residuals that many of them now have no knowledge how to solve. DRBC thus looks to produce a practical and workable residual program that will enhance the region's environment and economy at the least possible cost burden on its people.

Water quality planning

A section of the Federal Water Pollution Control Act requires that areawide wastewater management plans be prepared throughout the nation for a 20-year period to establish priorities for water quality programs. There are 15 such studies under way covering all 13,000 square miles of the Delaware River Basin, each by an agency designated by the respective state governor or by the state itself.

The areawide plans are to identify sources of and set a regulatory program for control over wasteloads from municipal sewerage operations, industries, storm runoff, agriculture, leachate from landfills, and seepage from lagoons and septic tanks — all for use by new or existing agencies that will administer the implementation phases of the plans. In addition, they are to determine what should be done with local sludge problems and recommend water quality standards. DRBC participates in advisory committee sessions on all 15 studies, each focusing on its own local problems, such as ground water in Burlington, Gloucester and Camden, ground water and toxics in the Cumberland-Salem area, bacteria in the Cape May section, all in New Jersey, and non-point pollution in Delaware. The first of these studies to be completed in the basin is New Castle County's in Delaware. Studies also are in progress in the upper basin, including New York.

DRBC is participating in the DVRPC work also by developing and operating a new empirical mathematical model

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of the estuary. It will build on the model work that was the basis of the standards and waste allocations programs instituted by DRBC for the lower river a decade ago. The newer model will be based on current technology and, when completed, will be the basis for assessing existing programs or developing new ones. During the summer, an extensive sampling program of the Delaware's major municipal and industrial dischargers and tributaries was conducted. These results will be used to verify the model. As part of the modeling work, a stormwater sampling program was undertaken and will be completed in 1977. This is to provide a more sophisticated accounting of the wasteloads from storm runoff, which is widely viewed as a major pollution source.

The Commission published a detailed water quality status report for the river's main stem as it has done for each year beginning in 1974.

The river's quality

DRBC has judged through its monitoring data and other indicators over the past several years that the quality of the river in the depressed estuary region has been improving. Oxygen levels, while far from satisfactory, are now slightly above former warm-weather readings and for more sustained duration. Also, good runs of the river's migrating American shad continue to occur annually, compared with the more spasmodic record of a few years earlier.

In a 1976 report tending to confirm DRBC's own observations, the Delaware Valley Regional Planning Commission stated that the river's quality has improved to levels of the turn of the century. DVRPC cited deterioration that began nearly 100 years ago and reached its worst from 1930 to 1950 and noted that quality subsequently improved sharply as dumping of raw sewage was largely eliminated. The report concurred with DRBC's conclusion that recent industrial progress has been commendable and that the scheduled improvements by Philadelphia in coming years will be the next major factor

Also, the Water Quality Management Bureau of Pennsylvania's Department of Environmental Resources reported in November that the level of compliance with state water quality standards had reached 72 percent in the Delaware River Basin, a substantial improvement over earlier years. This referred essentially, however, to tributary streams of the Delaware rather than the main stem. ■

progress of studies for areawide wastewater management

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floodland rules enacted

The Commission enacted in 1976 regulations laying down minimum standards that must be followed by those engaged in developing flood plains along non-tidal streams throughout the four-state river valley.

The program took effect January 1, 1977, culminating years of work that included a major consulting study, a review and report by an advisory committee of DRBC's five signatory parties, and public hearings that produced some significant changes.

Affected are lands inundated by floods of up to once-a-century severity. The basin's tidal lands that are excluded are those adjacent to Delaware Bay and to the river's main stem as far upstream as Trenton and also to the tidal portions of their tributaries.

The program established standards for the non-tidal flood plains and guidelines for state and local governments to regulate streamside development through compatible zoning to control residential, industrial, business and public works uses. The restrictions are minimums, so state and local governments are free to impose more stringent requirements.

Lands comprising flood plains are divided into categories according to flood severity, each with allowable and prohibited uses. Some examples follow:

Floodway — Defined as the area required to carry off a flood of once-a-century intensity (known as a regulatory flood). Expressly prohibited there are virtually all structures for habitation and excavations of toxic materials. Specifically allowed are farm operations, commercial loading and parking areas, airfield strips and various recreation facilities. All other uses are subject to regulation, such as transient entertainment operations, drive-in movies, excavation of non-toxic materials, boating installations, fish hatcheries, and public facilities including railroads, streets, bridges and pipelines. Pre-existing structures may be kept and repaired within limitations, but not expanded.

Flood fringe — A less hazardous flood plain area outside the floodway set aside for more liberal usage, such as residences built so neither the basement nor first floor would be below the "flood protection elevation" (the 100-year flood elevation plus one foot). Regulated uses on the fringe are elevated or flood-proofed non-residential and commercial structures, industrial buildings flood-proofed to the potential high-water mark, streets and railroads designed to avoid obstructing high waters, and water supply and waste treatment facilities built with anti-contamination allowances in event of flooding.

In the case of investigations DRBC already makes of project review applications from industries, public agencies and others, the standards took effect immediately. DRBC's principal handle on streamside developments is its wide-ranging project review operation.

Commission jurisdiction to review final local flood plain ordinances to assure compliance with the minimum requirements also was immediate. Agreement with the U.S. Department of Housing and Urban Development was anticipated under which that agency will conduct the local ordinance reviews in behalf of DRBC.

Beginning January 1, 1978, DRBC will review some additional projects on flood hazard lands along the main stem and major tributaries provided state or local reviews are not being made instead. These include developments of large-acreage single structures or of 25 or more residences. The additional reviews will also cover mining, manufacturing, processing, storage or disposal developments that would pose a pollution threat if flooded.

Other non-structural efforts

In the face of current public lack of acceptance of many major flood control dams, DRBC is more vigorously pursuing a program of non-structural measures to hold down flood losses as an adjunct to the new regulations. This would encompass all phases of non-dam measures including forecasting flows and issuing evacuation warnings.

Congress has authorized a feasibility study on the use of non-structural means to cut down on flood losses along the Delaware, particularly in the absence of a major flood protection reservoir on the Delaware main stem. No funding has been provided, but there is considerable support for the program among the basin's Congressional delegation.

The study would be conducted by the Corps in coordination with DRBC at a cost of about $2 million. It would inventory the structures threatened because of their flood plain location and estimate the cost of flood proofing, moving or acquiring them.

Local flood studies

The Commission concluded in 1976 studies of local flood plains of 119 municipalities, mostly in Pennsylvania but including some in Delaware and New York. The studies, on which DRBC supervised the work of consulting groups under contracts with the Federal Insurance Administration in the Housing and Urban Development Department, help the towns' property owners qualify to enter the regular federal flood insurance program with its additional layers of coverage.

Work started on four more studies for communities in Delaware and preparations were made to investigate eight additional Pennsylvania municipalities. These are being handled by DRBC's own staff.

Hydrologic committee

The Commission established a Hydrology Coordinating Committee comprising streamflow experts from its five signatory parties to work out a uniform basinwide flood frequency methodology to be used in conducting the HUD flood insurance studies.

The committee, with a life of five years, also is engaged in the negotiations to produce basinwide agreement on a program governing releases from the upper basin reservoirs of New York City to

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reservoirs

Trexler construction resisted; Blue Marsh nearly completed; Tocks debate prolonged

Congress appropriated initial construction funds late in 1976 for the Trexler Lake project, a multi-purpose facility long planned for development on a Lehigh River tributary named Jordan Creek in Lehigh County, a few miles west of Bethlehem and Allentown, Pa.

However, Trexler's future still was uncertain well into 1977 as stiff opposition arose to counter the continued strong support for the project's water supply, flood control and recreation benefits by the Commonwealth of Pennsylvania and local governmental and business groups.

Immediate prospects, at least, for building the construction-ready reservoir appear to hinge on how Congress would react to the 1977 debate in acting on continued construction funding as recommended by the White House. In any case, construction by the Corps of Engineers cannot commence at least until the mid-1977 conclusion of an analysis of a final pre-construction public hearing required of the Corps.

Shortly after Congress appropriated initial construction funds in 1976, the Basin Commission contracted with the Corps of Engineers to repay the federal government the $29.5 million investment cost of including 40,000 acre-feet of water supply storage in the $42 million project.

Funds for the long-term, low-interest repayments by DRBC would come from sale of water after 1990 to the Lehigh County Authority to meet growing local community needs and meanwhile from the interim sale of a portion of the storage to an electric utility group. The power companies' storage would be a standby supply for downstream generating stations in event of a drought severe enough to threaten salinity intrusion into normally fresh waters in the Delaware River's upper tidal estuary below Trenton.

Trexler would be the third project built of a network of eight multi-purpose federal reservoirs authorized in 1962 by the then-new Basin Commission and by Congress. Beltzville, a similar project located on another tributary farther up the Lehigh in Carbon County, was completed in 1971, and Blue Marsh, situated west of Reading, Pa., on a stream feeding the Schuylkill River, is nearing completion. Two others already have been built in Pennsylvania for flood control and are to be enlarged for water supply and recreation. They are the Francis Walter and Prompton Reservoirs.

Tocks Island

The several-year delay in moving Trexler ahead resulted from its being next in line after the more controversial and larger Tocks Island Lake that was long-planned for development on the Delaware upstream of the Water Gap. The Tocks Island fight was resolved — at least partially — in 1975 when three of the four Governors on the DRBC voted against recommending that Congress start appropriating funds to build it.

That DRBC action was followed by a 1976 move by Congressional opponents to Tocks to deauthorize the reservoir but keep the companion Delaware Water Gap National Recreation Area, which continues to develop. Two-thirds of the 72,000 acres originally sought for the lake now has been acquired as park land.

The Tocks deauthorization effort failed. Only one of the four Delaware Basin Governors had wanted construction to start, but three of them urged Congress to keep Tocks on the books. One of the three, however, was replaced in 1977 by a long-standing Tocks Island opponent, Governor Pierre S. duPont of Delaware, who said he would continue to flatly oppose the project as another kill-Tocks attempt developed in Washington. Meanwhile, Tocks remained an undisturbed component of DRBC's Comprehensive Plan.

New Jersey told Congress it wants the authorization frozen until progress is achieved on alternatives to Tocks. It noted considerable work had been accomplished or was under way in controlling flood plain developments, improving North Jersey water supply distribution, developing a New Jersey water master plan and evaluating North Jersey use of Hudson River for water supply.

A side dispute between the two sides of the Delaware River arose in the wake of DRBC's 1975 Tocks Island decision that fascinated resource watchers and portended litigation. The City of Philadelphia and other pro-Tocks forces in Pennsylvania contended that New Jersey, in opposing the reservoir, had legally forfeited its entitlement to continued daily diversions of Delaware water to out-of-basin Northeast Jersey.

The Pennsylvanians argued that the U.S. Supreme Court's permission for New Jersey to divert Delaware water is conditioned on the latter's support of a Delaware main stem reservoir. New Jersey responded that the condition applies not to New Jersey's support for Tocks Island but to another nearby main stem dam location. The second location is in the middle of what would be the Tocks Lake.■

Corps of Engineers photograph shows Blue Marsh reservoir, on a Schuylkill River tributary west of Reading, Pa., in advanced construction.

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financial summary

budgetary

1976 REVENUES	Budgeted	Received
Delaware	$ 112,600	$ 112,600
New Jersey	297,190	297,190
New York	252,800	252,800
Pennsylvania	407,800	407,800
United States	177,000	177,000
EPA Grant	194,700	194,700
Miscellaneous	3,000	8,410
Project Review Fees	—	16,449
Interest Income	—	16,687
Budgetary Revenue Transfer	195,210	51,788
Water Sales	—	130,770
Contractual Services	12,851	12,851
	$1,653,151	$1,679,045
Revenues received as compared to budgeted funds	—	— 25,894
TOTAL	$1,653,151	$1,653,151

The records of the Commission are independently audited each year as required by the Compact

1976 EXPENDITURES	Appropriations	Expended
By Organization		
Directorate	$ 215,034	$ 215,612
Administrative Division	180,568	228,140
Planning Division	1,257,544*	1,177,933*
TOTAL	$1,653,151	$1,621,685
By Program		
Water Supply	33,000	37,974
Water Demand	32,000	21,847
Recreation	48,000	54,566
Power	51,000	25,748
Project Review	185,851	162,103
Water Quality	649,300	716,143
Comprehensive Plan	182,000	231,398
Flood Loss	54,000	86,581
Basin Operation	153,000*	116,673*
Small Watersheds	34,000	8,733
Environmental Analysis	231,000	159,919
	$1,653,151	$1,621,685
Excess of appropriations over expenditures	—	31,466
TOTAL	$1,653,151	$1,653,151

*$25,000 Capital included.

non-budgetary

	Funds Available	Expenditures	Unexpended Dedicated Allotment
Tocks Island Region Environmental Study	$ 3,146	$ —	$ 3,146
Tocks Island Fish Research	10,548	4,850	5,698
Thermal Study	5,891	—	5,891
Flood Plain Contract	1,439,310	1,335,439	103,871
Tocks Island Army Corps of Engineers Study	23,494	23,494	—
Flood Plain Contract (Delaware Counties)	52,356	6,849	45,507
Salinity Study (Estuary)	77,900	—	77,900
New Jersey Water Quality Management	184,140	125,747	58,393
Calibration and Intergovernmental Coordination Studies	103,075	64,301	38,774
Raccoon Creek	15,000	2,661	12,339
TOTAL	$1,914,860	$1,563,341	$351,519

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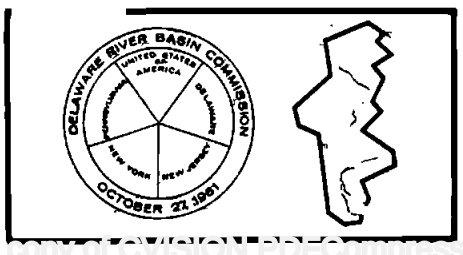

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The Historical Context of Water Quality Management for the Delaware Estuary

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ABSTRACT: The Delaware Estuary, bounded by the states of Delaware, New Jersey and Pennsylvania, is located in one of the most complex urban-industrial regions in the United States. Water pollution of the estuary was observable over two centuries ago and progressively worsened until after World War II. Four distinct governmental responses to the pollution have led to the vastly improved water quality of today. A fifth-generation response, now being initiated, is oriented toward remaining problems, including toxic contamination of the water column, bottom materials and aquatic life. Changes in water quality and the institutional responses to pollution are traced to demonstrate the evolutionary process of water pollution control.

Introduction

The cleanup of the Delaware Estuary represents one of the premier water pollution control success stories in the United States. Once largely a septic river virtually devoid of aerobic aquatic life, the Delaware Estuary now supports a variety of recreational uses, year-round fish populations and an expanding number of key migratory fish species. As a result, the river and its waterfront are becoming a regional focal point for water-dependent recreational uses.

Improving the water quality of the Delaware Estuary has been an evolutionary process spanning two hundred years. Five generations of responses are identifiable; the fifth generation is represented by ongoing programs and concerns (Table 1). The cleanup effort has been a complex endeavor involving four states, a major urban and industrial region, the federal government and two interstate agencies.

The purpose of this paper is to describe the evolution of pollution concerns in the Delaware, the subsequent responses to these concerns, and the results and benefits noted to date.

Description of Delaware Estuary

The Delaware Estuary (Fig. 1) is the 85 mile long reach of the Delaware River running from the head of tide at Trenton, New Jersey, past the Philadelphia, Pennsylvania; Camden, New Jersey and Wilmington, Delaware metropolitan areas to the legally-designated upstream boundary of Delaware Bay. The Delaware Estuary is a tidal freshwater river in its upper reaches and an estuary in its lowest reaches. Sea water annually intrudes into the Delaware Estuary from Delaware Bay, the extent of the intrusion being governed by rainfall and freshwater inflows. The latter are partially regulated by upstream reservoir releases particularly during drought.

The Delaware Estuary is the world's largest freshwater port (Philadelphia Planning Commission 1982) and the second busiest port in the United States in terms of tonnage (Sharp 1983). Along the Estuary is one of the world's greatest concentrations of heavy industry and the nation's second largest complex of oil-refining and petrochemical plants (Council on Environmental Quality 1975). A population greater than 5.7 million people (i.e., a population greater than 40 of the states) resides in the region (United States Dept. of Commerce 1985). Philadelphia, near the center of the estuary, is one of the nation's largest cities. Trenton and Camden, New Jersey, and Wilmington, Delaware are moderately sized urban areas contiguous to the Philadelphia metropolitan area.

The two largest tributaries to the Delaware Estuary are the Delaware River at Trenton and the Schuylkill River at Philadelphia. Together these freshwater rivers drain 65% of the 12,765 square mile Delaware River Basin (United States Geological Survey 1982). Along the Delaware Estuary are approximately 90 major municipal and industrial dischargers, major electric-generating plants (including two large nuclear power plants), over 300 combined sewer overflows, and a myriad of other pollution sources (Albert and Kausch, 1988). A 40 to 35-foot navigation channel is maintained in the estuary by dredging.

In spite of the intense development, the Delaware Estuary serves as a potable water supply for millions of people. The city of Philadelphia obtains

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TABLE 1. Description of the five generations of Delaware Estuary water pollution control efforts.

Generation	Approximate Time Span	Problem	Actions	Prime Participants*
First	1800–1860	Pollution of local water sources	Construction of municipal water systems with river intakes, some sewer line construction	Municipal government
Second	1880–1910	Water borne disease from consumption of river water	Construction of water filtration plants, development of alternative water supplies, sanitary sewer system construction	Municipal government
Third	1936–1960	Gross pollution	Construction of primary wastewater treatment plants after effluent standards adopted	INCODEL, States
Fourth	1960–1980	Substantial pollution	Construction of secondary or higher wastewater treatment plants after wasteloads allocated	DRBC, States and U.S. EPA
Fifth	1980–?	Public health and aquatic life concerns including toxics	Underway. Could include combined sewer correction, more stringent point source controls, non-point source controls, toxic materials controls and other	DRBC, States and U.S. EPA

* The efforts of the federal government prior to the creation of the United States Environmental Protection Agency and the efforts of most cities and industries to clean up their wastes in the third and fourth generation effort are recognized as well.

approximately 230 million gallons of water per day from the estuary via an intake in the northeast section of the city (Delaware River Basin Commission, unpublished data). This system, representing about 50% of the city's water supply, serves suburban service areas as well as the city. Under certain hydrologic conditions, the Delaware Estuary also recharges the Potomac-Raritan-Magothy aquifer along the reach of river running roughly from Wilmington, Delaware, to Camden, New Jersey (Barksdale et al. 1958). This aquifer is the primary source of potable water for the Camden (South Jersey) metropolitan area. Intakes on the estuary also provide water to Bucks County, Pennsylvania, and 38 industrial water users.

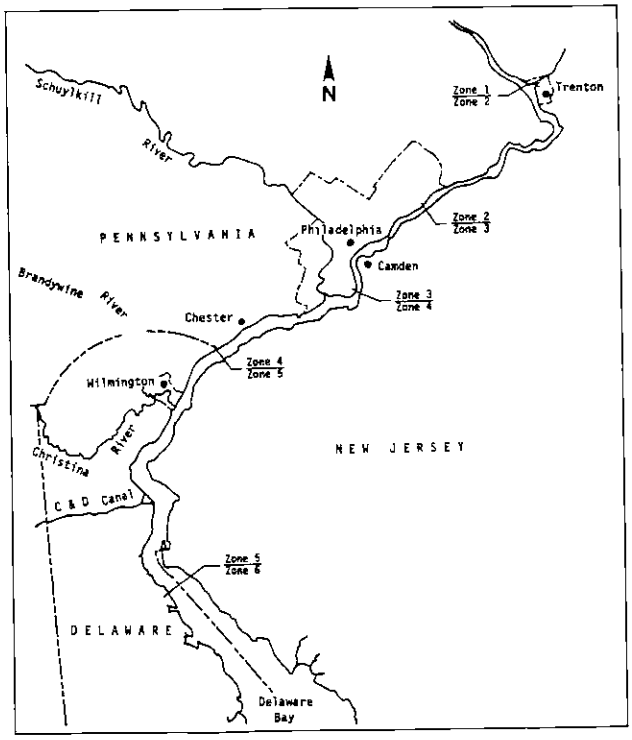

Fig. 1. The Delaware Estuary showing water quality zones adopted by the Delaware River Basin Commission. INCODEL's Zone 3 encompassed DRBC's Zone 3 and 4 and its Zone 4 encompassed DRBC's Zones 5 and 6.

The Delaware Estuary is the boundary between Pennsylvania and New Jersey in its upper reach, and Delaware and New Jersey in its lower reach. The same state boundaries are also the boundary between United States Environmental Protection Agency Regions II and III. Water pollution control entails multiple jurisdictions with various governmental entities sharing responsibilities. Not surprisingly, the Delaware River basin was the first river basin in the nation to have an interstate agency created in response to water pollution.

Early Pollution Concerns and the First Generation Response

When Henry Hudson discovered the Delaware River system in 1609, water quality was presumably pristine. By the early 18th century, however, water pollution was a recognized problem. The first identifiable pollution problem was the contamination of local sources of drinking water: springs, wells and small streams. In 1739, for example, Philadelphia made a concerted effort (which failed) to have slaughter house, tanning and similar wastes removed from Dock Creek which flowed through

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the city (Buckley 1948). By the latter half of the 18th century, pollution was so noticeable in the Philadelphia harbor area that a young Englishman named Isaac Weld, Jr. commented about the "mess" that had been created (Wolman 1941). The concern for water-borne diseases led one of the founding fathers, Benjamin Franklin, to leave money to Philadelphia in his will specifically for developing a municipal water system (Philadelphia Water Department 1987).

In 1799 the first pollution survey was conducted (Albert 1984). The survey noted a variety of pollution sources from the Philadelphia harbor area, including ships, wharves, polluted wetlands and various urban sources. Five years later, a Philadelphia inventor, Oliver Evans, invented what some consider the first automobile. His automobile was actually a dredge on a motorized wagon built specifically for removing the noxious sludge deposits that had formed along the Philadelphia waterfront (Tyler 1955).

The first generation response to the water pollution, addressing public health concerns, was the construction of municipal water supply systems that tapped the Delaware and Schuylkill rivers. Because of their size, these rivers were still much cleaner than the highly-contaminated local sources of water. Philadelphia built its first intake on the Schuylkill River in 1801 and, in 1850, Kensington, now part of Philadelphia, built the first Philadelphia intake on the Delaware Estuary (Blake 1956). By 1860 most citizens of Philadelphia, Trenton, Camden and nearby communities along the Delaware Estuary were drinking river water.

Although minor in comparison to the construction of municipal water supply systems, the first generation response also saw the first sewers built. Many, like Dock Creek cited above, were stream enclosures while others, built by private entities, were crude log pipes discharging to the nearest stream. In 1769, the Pennsylvania Assembly legalized the construction of common sewers discharging into the Delaware River (Neeson 1941), and by 1867, Philadelphia had 67 miles of sewers (Philadelphia Water Department circa 1970). Philadelphia's experience was repeated in other cities on the estuary. The purposes of the first sewer lines were to prevent groundwater contamination of public and private wells still in use while municipal water supply systems expanded and to remove nuisance conditions in local streams.

Second Generation Problems and the Response

Concurrent with the development of municipal water supply systems were tremendous industrial and population growth. Thus, while more people began using surface water, the Delaware Estuary became increasingly polluted. As a result, thousands of city dwellers died from water-borne diseases. For example, in 1864 the annual death rate from typhoid in Philadelphia was over 125 deaths per 100,000 population and rarely was the annual death rate from typhoid below 50 deaths per 100,000 in the 19th century (Webster et al. 1914).

The second-generation response to the pollution included a debate by the citizens of Philadelphia concerning water supply alternatives in the period from 1858 to 1890 before they began construction of the world's largest slow sand filtration plants in 1899 (Albert 1987). Camden used a different approach. That city abandoned the Delaware Estuary altogether and, in 1897 and 1898 the city drilled over 100 wells in the Potomac-Raritan-Magothy aquifer (Bascom 1904). Actions similar to Philadelphia's and Camden's were taken by other communities, and by 1915 most had a safe water supply. In Philadelphia, the death rate from typhoid fell nearly 90% as a result (Webster et al. 1914).

The Third Generation Response to Estuary Pollution

The provision of safe water supplies solved the public health concerns but did nothing about the pollution itself. Although pollution was evident in the 18th and 19th centuries and was considered a problem, it appears that the greatest degradation occurred sometime after 1900. At the turn of the century, for example, the Delaware River shad fishery was still one of the best of any river system along the Atlantic coast, but within two decades the shad populations had all but disappeared (Miller et al. 1982). The trend of declining populations in the 19th century with a collapse in the early part of the 20th century was experienced by other major fish species as well. Although other factors contributed to these declines (e.g., overfishing, loss of spawning grounds), water pollution was a major cause (Kiry 1974).

The rapid degradation of the Delaware Estuary (occurring over several decades) can be attributed to several related factors. The first was undoubtedly population and industrial growth. Through the second half of the 19th century, Philadelphia and the estuary region consistently maintained a population growth rate of 20% or greater per decade (Board of Consulting Engineers 1945). By 1900, Philadelphia itself reached 1.5 million and the region had a population greater than 2 million which was still growing rapidly. Related to this growth in population was a similar increase in industrial growth, particularly heavy industry, such as ship building, oil refining, metals, chemicals, paper and manufacturing. All of the industries dis-

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charged their wastes into the Delaware Estuary or its tributaries.

The expansion of the urban water and sewer systems was another major factor which resulted in the rapid degradation of the Estuary. In Philadelphia, for example, water demands in the 1885–1905 period increased on a per capita basis at a rate that greatly exceeded the city's growth in population (Board of Consulting Engineers 1945). In the same two decades, the length of sewer lines increased over 400 percent (Webster et al. 1914). By building sewers, Philadelphia hoped to reduce the pollution being discharged upstream of its intakes. The length of sewer lines would continue to grow tremendously in the ensuing decades, spreading out to serve suburban as well as urban areas.

The increasing water use resulted in increasing amounts of wastewater being discharged, via the newly constructed sewers, directly into the Delaware Estuary. The growth in population, industry, water usage and sewer line mileage resulted, by 1914, in a dissolved oxygen level as low as 1 mg l^{-1}, or less than 15% saturation, within the estuary (Webster et al. 1914). Surveys in 1929 and 1937 indicated that the entire estuary from Trenton to below Wilmington was "substantially" polluted, with a zone of "gross" pollution in the Philadelphia-Camden area (INCODEL 1940). By the outbreak of World War II dissolved oxygen levels near zero were being observed (Kiry 1974).

World War II put even greater stress on water quality because of the increased industrial activity along the estuary. Anecdotal accounts of wartime pollution episodes from the Delaware Estuary region are legendary. Widespread areas of anoxia existed. The anoxic conditions produced gases that discolored paint on buildings and ships, tarnished metal, corroded parts in manufacturing plants and ship engines, sickened dock workers and sailors and, allegedly, could be smelled by Navy airplane pilots in the air above Philadelphia (Selby and Selby 1946). Wastes from the river clogged ship engine cooling systems and fish kills were frequent and often massive. A typical story is that of the freshly-painted Red Cross ship that turned a rainbow of colors after several days on the Delaware. It was no longer identifiable as a hospital ship and required repainting before leaving for sea. In 1946, surveys by United States Fish and Wildlife Service personnel recorded the all-time worst condition—an area of anoxia running shore-to-shore and top to bottom for twenty miles (Ellis et al. 1947).

The third-generation response to the pollution began in 1936 with the decision to create the Interstate Commission on the Delaware River Basin (INCODEL), an advisory commission formed by Delaware, New Jersey, New York and Pennsylvania. The highest priority on INCODEL's agenda was the cleanup of stream pollution (INCODEL 1936). Through INCODEL, the states hoped to augment and coordinate the water pollution programs of the states which had been particularly ineffective in the region. Until the creation of INCODEL, all wastewater added to the estuary was discharged without treatment except for the city of Trenton and a small section of Philadelphia which had primary treatment plants.

INCODEL initiated a cleanup program as part of a basin-wide program. Through INCODEL, the first set of interstate water quality standards was adopted in the 1939–1945 period (INCODEL 1938). The standards divided the Delaware Estuary into three zones: Zone 2 from Trenton to the northeast section of Philadelphia; Zone 3 from Zone 2 to the junction of the Pennsylvania, New Jersey and Delaware state boundaries near Marcus Hook, Pennsylvania; and Zone 4 from Marcus Hook to the Atlantic Ocean (Fig. 1). Dischargers in Zone 2 were required to effect removal of 85% of the biochemical oxygen demand (BOD) (i.e., secondary treatment), in Zone 3 35% BOD removal (i.e., primary treatment), and in Zone 4 primary treatment was required although no BOD removal rate was stated. The intent of the INCODEL standards was to restore dissolved oxygen levels to at least 50% of saturation in the worst part of the estuary and to achieve at least some level of wastewater treatment at the 100 or so major discharges.

As a result of the INCODEL program, new sewage treatment plants were built throughout the Delaware River basin in the post-war period. By the end of the 1950s, the number of basin communities with "adequate" sewage treatment had risen from 20% to 75% (Albert 1984). These included the major cities (Table 2) which generated over 60% of the municipal sewage discharged into the basin (INCODEL 1940). Also notable was the cleanup of the coal siltation problem in the Schuylkill River. This program, one of the first nonagricultural, nonpoint source control programs in the nation, resulted in the dredging of 30 to 40 million tons of coal silt from the Schuylkill River and the Delaware Estuary, and the construction of desilting basins at coal mines in the upper Schuylkill River basin. INCODEL also promoted the studies which established, by the end of the 1950s, that the Delaware Estuary recharged the Potomac-Raritan-Magothy aquifer under certain hydraulic conditions (Barksdale et al. 1958). The fear of contaminating this aquifer by the pollutants in the estuary had stimulated these important studies. As the result of all these efforts, water quality in the Delaware Estuary improved. In the worst part of the grossly-polluted Delaware Estuary, dis-

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solved oxygen levels rose at least 1 mg l^{-1} (Fig. 2). Pollution was still a problem but the river was no longer anoxic.

The Fourth Generation

The fourth generation effort was indirectly caused by a massive flood of the Delaware River in 1955. As a result of this flood, the United States Army Corps of Engineers initiated a comprehensive river basin planning effort in 1956—the first such study by the Corps of Engineers in the nation (Albert 1987). The United States Public Health Service was assigned the responsibility for the water quality portion of the study. As an outgrowth of this activity, the Delaware Estuary Comprehensive Study (DECS) was launched in the early 1960s. DECS was a pioneering study of water pollution control involving the development of one of the first water quality models for an estuary (Federal Water Pollution Control Administration 1966).

Another response to the planning effort of the Corps of Engineers was the creation of the Delaware River Basin Commission (DRBC) in 1962. DRBC is an interstate, federal water resources agency (the first of two nationwide) with five members: the four states of the Delaware River basin and the federal government. The Commission is distinctly different from the Title II river basin commissions that were created by the Federal Water Resources Planning Act of 1965 (P.L. 89-80) and abolished by Executive Order in 1981. DRBC was created by concurrent state and federal legislation (i.e., the Delaware River Basin Compact). Unlike INCODEL and the Title II river basin commissions, DRBC is not an advisory agency but one which is accorded broad responsibilities including regulatory authority in all facets of water resource management.

Using the DECS model, DRBC adopted new, higher water quality standards in 1967. INCODEL's Zone 2 was kept, but Zone 3 was split into two new zones: Zones 3 and 4. Likewise, INCODEL's Zone 4 became DRBC Zones 5 and 6, with the former comprising the lower reach of the Delaware Estuary and the latter Delaware Bay. Dissolved oxygen standards were adopted as follows:

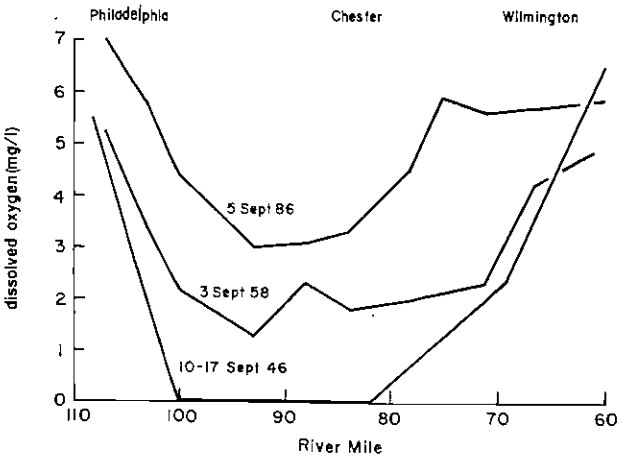

Fig. 2. Forty year change in dissolved oxygen concentration in the Delaware Estuary. 1946 data from Ellis et al. (1947). 1958 data from INCODEL (1962). 1986 data from the DRBC boat run monitoring program (unpublished). Measurements were made under similar conditions of tide, temperature and freshwater discharge.

a 24-hour average of 5.0 mg l^{-1} in Zone 2, 3.5 mg l^{-1} in Zones 3 and 4, and from 3.5 mg l^{-1} to 6.0 mg l^{-1} in Zone 5 with the former applying in the upper boundary of the zone and the latter 19.3 miles downstream (i.e., with a transition area in-between). Other standard changes included the adoption of bacterial standards for primary-contact recreation (bathing and similar activities) in the upper 16 miles of Zone 2 and the lower 11 miles of Zone 5. Secondary-contact recreation (boating and similar activities) and associated bacterial standards was adopted as a use in Zones 3 and 4 and the adjacent sections of Zones 2 and 5. Recreational uses had not been included in the INCODEL standards.

To meet these standards, DRBC issued wasteload allocations in 1968 to some 90 municipal and industrial dischargers (Delaware River Basin Commission 1987). The wasteload allocations were developed using the predictive capabilities of the DECS model. To meet the water-quality standards, modeling studies determined each zone's assimilative capacity for first-stage (or carbonaceous) oxygen demand as follows: Zone 2—18,600 lbs day^{-1};

TABLE 2. Treatment history of municipal discharges over 20 million gallons per day (MGD).

Plant	Design Size[a]	Primary Treatment	Upgraded Secondary	Notes
Trenton, NJ	20 MGD	1927	1983	Secondary—1962
Philadelphia, N.E.	210 MGD	1951	1985	60 MGD primary—1923
Philadelphia, S.E.	112 MGD	1955	1986	
Philadelphia, S.W.	200 MGD	1954	1980	
Camden-Main	75 MGD	1952	1987	
DELCORA (PA)	44 MGD	—	1980	County regionalization
Wilmington, DE	90 MGD	1951–1954	1974	Advanced primary—1960s

[a] Current design size.

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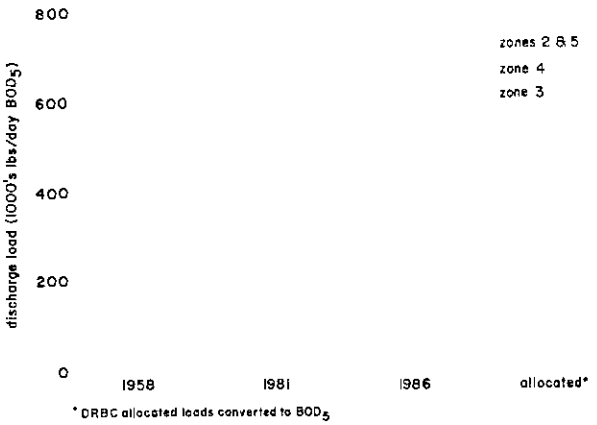

Fig. 3. Trend in oxygen-demanding wastes discharged to the Delaware Estuary. See Fig. 1 for location of zones.

Zone 3—144,800 lbs day^{-1}; Zone 4—91,000 lbs day^{-1}; and Zone 5—67,600 lbs day^{-1}. Zones assigned the highest assimilative capacities were those with the lowest dissolved oxygen standards.

After setting aside 10% of the assimilative capacity of each zone as a growth reserve, the assimilative capacity of each zone was allocated proportionately to each discharger based on waste flow. The individual allocations in lbs day^{-1} allowable discharge corresponded to a carbonaceous BOD removal rate of 88.5% in Zone 2, 86% in Zone 3, 89.25% in Zone 4, and 87.5% in Zone 5.

In addition to the initial allocations, an administrative program was established to handle new dischargers and other changes affecting allocations. Critics of the wasteload allocation system stated that it was too expensive and that nitrogenous oxygen-demanding wastes should have been addressed (Ackerman et al. 1974). The system nevertheless served as a prototype nationally for how complex water pollution control problems could be handled.

DRBC, as a multistate, federal agency, was not, of course, working unilaterally. Its program, like INCODEL's, was being conducted cooperatively with the four state water pollution control agencies and the Federal Water Pollution Control Administration (successor to the United States Public Health Service, later the United States Environmental Protection Agency). Commission standards were subsequently adopted as state standards, and their allocation and other requirements became part of state and federal discharger permits.

Concurrent with DRBC's actions was increased public concern regarding water pollution. This concern culminated nationally in the passage of the 1972 Federal Water Pollution Control Act amendments which provided construction funds, added enforcement and other incentives which ensured the implementation of the DRBC, state and federal water pollution control efforts. Notable among the benefits derived from the 1972 legislation were the over one billion dollars in construction grants obtained by estuary communities, an action of the United States Environmental Protection Agency led enforcement that forced the city of Philadelphia to upgrade their treatment facilities in a timely fashion, and Section 208 funds which resulted in the development of a second-generation Delaware Estuary water quality model. This model, one of the few tangible benefits of over $10 million dollars of Section 208 funds spent in the estuary region, is a sophisticated, time-varying, two-dimensional model developed by the United States Environmental Protection Agency with assistance from DRBC and other agencies. The new model is currently being used by the DRBC to evaluate existing and future wasteload allocations (see discussion below).

As a result of the fourth-generation pollution control program, new municipal and industrial wastewater treatment facilities were built. Completion of the Camden plant in 1987 (Table 2) essentially marks the end of this response to pollution of the Delaware Estuary.

The Results of Delaware Estuary Water Pollution Control

The dissolved oxygen (DO) level has always been of particular concern in the Delaware Estuary. Improvements in oxygen levels have occurred in three ways: the minimum levels have risen, the areal extent of the dissolved oxygen sag curve has lessened, and the duration of the critical dissolved oxygen depression has decreased. The fourth-generation improvements in dissolved oxygen concentrations (Fig. 2) correlate with the decrease in the amount of oxygen-demanding wastes being discharged into the estuary (Fig. 3).

Based on automatic monitor data collected at Chester, Pennsylvania, a one to three month decrease has occurred since 1962 in the duration of the critical DO depression condition (Fig. 4). Although not as dramatic, upstream locations also indicate a decrease in the duration of the critical dissolved oxygen season. This improvement is probably even greater as the new Philadelphia Southeast and Camden County wastewater treatment plants were not fully operational until mid 1986 or 1987.

The improvements to dissolved oxygen levels have benefited fish populations. The first major evidence of this has been an increase in the population of Delaware River American shad and an expansion of their spawning areas. Prior to the recent improvements in dissolved oxygen, shad

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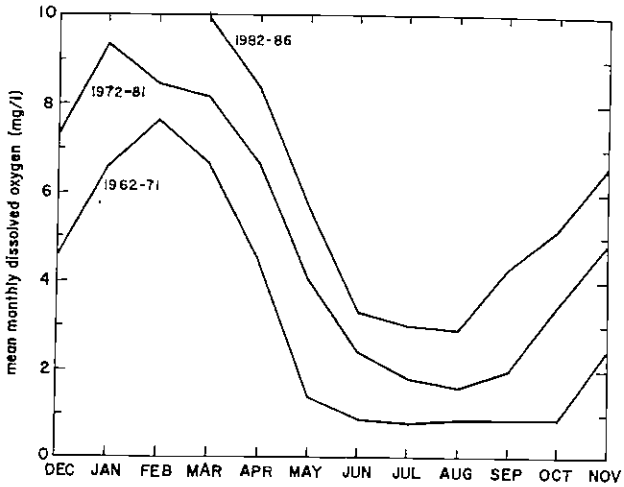

Fig. 4. Decreases in the duration of the critical dissolved oxygen period and changes in mean monthly concentrations at Chester, PA (from Vogel 1987).

spawned no lower in the Delaware River than the Delaware Water Gap, about 80 miles upstream of the head of tide at Trenton, New Jersey (Miller et al. 1982). Shad that might have spawned farther downstream in the river were kept from reaching these areas by the annual onset of low dissolved oxygen conditions in the late spring. The onset of these conditions stopped further migration through the estuary. With improved dissolved oxygen levels, shad spawning was observed 25 miles upstream of Trenton by 1982–84 (Maurice et al. 1987) and in the upper estuary below Trenton by 1987 (Versar Inc. 1987). A 1986 estimate of the recreational value of the spring shad sport fishery is $3.2 million annually (Miller and Lupine 1987).

The second major evidence of improved fisheries comes from fish population surveys conducted by the Pennsylvania Fish Commission in 1985 and 1986 (Summers 1987). In these two years, the Commission found 36 species of fish in Zone 3 during the August and September months. By comparison a summary of 1959 to 1982 fish studies identified only 16 species of fish residing in the zone (United States Environmental Protection Agency 1983). More surprising was the abundance of some fish species and the different life stages observed. During the critical warm months of the year, recreational fishing is now observed at locations where dock workers once experienced nausea from the septic river.

The improvement is reflected by other parameters as well. Based on fecal bacterial studies conducted by DRBC in 1986 and 1987, 34 miles of Zones 2, 4 and 5 have recently been recommended for upgrading from secondary-contact recreation to primary-contact recreation (Huff 1987a, 1987b).

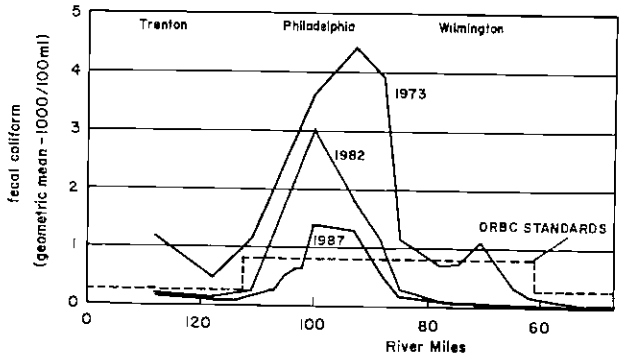

Fig. 5. Decrease in annual mean fecal coliform levels in the 1973–1987 period.

In the remaining 24 miles of secondary-contact recreational waters, the attainment of primary-contact recreation uses requires the correction of dry and wet weather combined sewer overflows (Kratzer and Albert 1988). In 1987, fecal coliform levels were the lowest ever observed in spite of troubles at one of the largest treatment plants (Fig. 5). Other improvements noted have been a decline in phosphorus concentrations, a shift in nitrogen species from unoxidized ammonia to nitrate (Sharp, personal communication) and changes in pH, alkalinity and acidity (Albert 1984).

Like many waterfront areas, the waterfront along the Delaware Estuary is currently in the midst of a renaissance. New public and private development, annual river-oriented festivals, and increasing water recreation are occurring. As a result of water quality improvement, the Delaware Estuary is becoming a focal point of the region. Over time the extensive investment in new wastewater treatment facilities will likely be returned by the economic implications of this renaissance.

The Fifth-Generation Response to Emerging Concerns

It would be an error to suggest the Delaware Estuary is problem-free. A fifth-generation effort is currently responding to the remaining problems and emerging concerns. For example, in early 1986, the Delaware River Basin Commission, with assistance from the basin states and the United States Environmental Protection Agency, initiated the two-year Delaware Estuary Use Attainability (or DEL USA) Project. The goal of the DEL USA Project is to determine what is needed to make the entire estuary "fishable and swimmable" as defined by the federal Clean Water Act. For swimmable water quality, answers to the combined sewer overflow problems need to be addressed in Zone 3 and the upstream section of Zone 4. Other reaches have attained swimmable water quality as discussed above and standards will likely be raised.

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Dissolved oxygen is still a major concern in spite of the improvements to date. Approximately 40 miles of the estuary has designated uses and dissolved oxygen standards which are less than fishable. The DEL USA Project has demonstrated that portions of this 40-mile reach can be reclassified for fishable uses and standards, without further pollution controls (Albert and Davis 1987). In other reaches, particularly Zones 3 and 4, higher dissolved oxygen levels will require more stringent treatment requirements. That fishable water quality is attainable at all, however, is a major finding. Previous studies (United States Environmental Protection Agency 1973) suggested that fishable water quality standards were unattainable in the Delaware Estuary. If the decision is made to strive for higher dissolved oxygen levels, reductions in the nitrogenous component of the wastewater will be needed.

Toxic materials are a newer concern. Previous studies have shown the presence of toxics in the estuary system (sediments, water column, and biota) and studies done by the DEL USA Project have reaffirmed these findings (Henshaw 1987; Delaware River Basin Commission 1988). As a result of these concerns, control of toxic materials will be a major thrust of the fifth generation effort. At this time a multi-year study of the fate and effects of toxics is underway by the Academy of Natural Sciences of Philadelphia. This study, largely funded by major estuary industries, is nationally significant. Also being initiated is an interstate toxics assessment and control program. Toxics concerns will undoubtedly lead back to point source, nonpoint source, and combined sewer overflow issues, and public health concerns similar to those experienced in the latter part of the 19th century.

A highly visible manifestation of the fifth generation effort will likely be the conduct of a Delaware Estuary National Estuary Program (NEP) study (the NEP was established by the 1987 federal Clean Water Act). The Delaware Estuary was one of the eleven named estuaries that are to be given priority consideration by the U.S. EPA for the national program. The governors of Delaware, New Jersey, and Pennsylvania nominated the Delaware Estuary for the National Estuary Program at signing ceremonies held on the estuary at historic Newcastle, Delaware, on May 31, 1988. The program, approved in July 1988 by U.S. EPA, will be a five-year or more effort which will address many of the remaining water quality issues in the estuary and emerging issues as well.

Discussion

Pollution has been a recognized problem in the Delaware Estuary for over 200 years and the subject of pollution abatement programs for over 50 years. The Delaware Estuary, like many rivers and estuaries in the United States, has better water quality today than anytime in this century. The benefits of this cleanup are recognizable as waterfront redevelopment and the increased enjoyment of the water by the public at large. Dramatic improvements in aquatic life have also been observed.

The evolutionary process of water pollution control is not often recognized. An understanding of the historical context of water pollution is important for all persons involved in water quality management including the public at large. The cleanup of water pollution is a multi-step process involving years of effort. This is an important consideration when new efforts are planned and initiated.

Equally important is the knowledge that water quality degradation can be relatively rapid if the response to pollution concerns is piecemeal. The rapid degradation of the Delaware Estuary by building sewers without treatment at the end of the pipe, for example, was predictable at the time sewer construction programs were initiated. By 1914, the degradation had reached the point where Philadelphia's engineers developed the three treatment plant system used today. It took four decades to build them, however, and another three decades to upgrade them. That degradation can occur much quicker than the resulting pollution control response is still relevant. The maintenance of existing water quality levels and the improvement of these levels, if unsatisfactory, remain the primary goals of water quality managers.

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Literature Cited

Ackerman, B. A., S. Rose-Ackerman, J. W. Sawyer, jr., and D. W. Henderson. 1974. Uncertain Search for Environmental Quality. Macmillan, New York. 386 p.

Albert, R. C. 1984. Water pollution control: Progress on the Delaware River. *Water Pollut. Control Assoc. Pennsylvania Magazine* 17:10–17.

Albert, R. C. 1987. Damming the Delaware, the Rise and Fall of Tocks Island Dam. Pennsylvania State Univ. Press, University Park, Pennsylvania. 224 p.

Albert, R. C., and J. F. Davis. 1987. Preliminary Report on the Attainability of Fishable Water Quality. Delaware River Basin Commission report, W. Trenton, New Jersey. 24 p.

Albert, R. C., and R. C. Kausch. 1988. A river reach profile of mid-1980s water quality of the Delaware River. Chapter 3. *In* Ecology and Restoration of the Delaware River Basin. The Pennsylvania Academy of Science, Easton, Pennsylvania.

Barksdale, H. C., D. W. Greenman, S. M. Lang, G. S. Hilton, and D. E. Outlaw. 1958. Ground Water Resources in the Tri-State Region Adjacent to the Lower Delaware River. N.J. Dept. Conv. Econ. Dev. Spec. Rep. 13. 73 p.

PDF compression, OCR, web optimization using a watermarked evaluation copy of CVISION PDFCompressor

BASCOM, F. 1904. Water Resources of the Philadelphia District. U.S. Geol. Surv. Water Supply and Irrig. Pap. No. 106. 75 p.

BLAKE, M. N. 1956. Water for the Cities. Syracuse Univ. Press. Syracuse, New York. 256 p.

BOARD OF CONSULTING ENGINEERS. 1945. A New Water Supply from Upland Sources. Rep. to the Philadelphia Water Commission. 170 p.

BUCKLEY, T. 1948. The Philadelphia project. *In* Proceedings of the INCODEL Annual Meeting. INCODEL, Philadelphia. 66 p.

COUNCIL ON ENVIRONMENTAL QUALITY. 1975. The Delaware River Basin—An Environmental Assessment of Three Centuries of Change. GPO, Washington, D.C. 87 p.

DELAWARE RIVER BASIN COMMISSION. 1987. Current Status of Allocations. Delaware River Basin Commission report, W. Trenton, New Jersey. 19 p.

DELAWARE RIVER BASIN COMMISSION. 1988. Fish Health and Contamination Study. Delaware River Basin Commission report, W. Trenton, New Jersey. 111 p.

ELLIS, M. M., B. A. WESTFALL, D. K. MEYER, AND W. S. PLANTNER. 1947. Water Quality Studies of the Delaware River with Reference to Shad Migration. U.S. Fish and Wildl. Ser. Spec. Sci. Rep. No. 38. 56 p.

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION. 1966. Delaware Estuary Comprehensive Study: Preliminary Report and Findings. Federal Water Pollut. Control Admin., Philadelphia. 94 p.

HENSHAW, F. 1987. Toxics Review of the Delaware Estuary. Delaware River Basin Commission report, W. Trenton, New Jersey. 77 p.

HUFF, W. R. 1987a. Zone 2 and Upper Zone 3 Bacterial Study. Delaware River Basin Commission report, Trenton, New Jersey. 55 p.

HUFF, W. R. 1987b. Report on the Lower Zone 4 and Upper Zone 5 Bacterial Study and other 1987 Data Collection Activities. Delaware River Basin Commission report, Trenton, New Jersey. 40 p.

INCODEL. 1936. Articles of Organization. INCODEL, Philadelphia. 5 p.

INCODEL. 1938. The Delaware River Basin—Water Pollution. INCODEL, Philadelphia. 19 p.

INCODEL. 1940. The Delaware River Basin—Physical Facts. INCODEL, Philadelphia. 43 p.

INCODEL. 1962. Preliminary Report—Water Quality Survey of the Delaware Estuary. INCODEL, Philadelphia. 68 p.

KIRY, P. R. 1974. An Historical Look at the Water Quality of the Delaware River Estuary to 1973. Academy of Natural Sciences of Philadelphia, Philadelphia. 133 p.

KRATZER, T. W., AND R. C. ALBERT. 1988. Combined Sewer Overflow Report. Delaware River Basin Commission report, W. Trenton, New Jersey. 41 p.

MAURICE, K. R., R. W. BLYE, AND P. L. HARMON. 1987. Increased spawning by American shad coincident with improved dissolved oxygen in the tidal Delaware River, p. 79–88. *In* Proceedings of the International Symposium on Common Strategies of Anadromous and Catadromous Fish. Am. Fish. Soc., Bethesda, Maryland.

MILLER, J. P., AND A. J. LUPINE. 1987. Angler Utilization and Economic Survey of the American Shad Fishery in the Delaware River. Delaware River Shad Fishermans Assoc., Bethlehem, Pennsylvania. 26 p.

MILLER, J. P., F. R. GRIFFITHS, AND P. A. THURSTON-ROGERS. 1982. The American Shad in the Delaware River Basin. Delaware Basin Fish and Wildl. Man. Coop. 130 p.

NEESON, J. H. 1941. The Philadelphia program. *In* Water Pollution Abatement in the Delaware River Basin with Special Reference to the City of Philadelphia—A Symposium. INCODEL, Philadelphia. 56 p.

PHILADELPHIA PLANNING COMMISSION. 1982. Philadelphia's River Resources. Philadelphia Plan. Comm., Philadelphia. 145 p.

PHILADELPHIA WATER DEPARTMENT. Circa 1970. Clean Streams for Philadelphia. Philadelphia Water Dept., Philadelphia. 36 p.

PHILADELPHIA WATER DEPARTMENT. 1987. 1986 Annual Report. Philadelphia Water Dept., Philadelphia. 25 p.

SELBY, E., AND D. SELBY. 1946. Clean-up on the Delaware. In January 5, 1946 issue of Colliers. Reprint by INCODEL. 7 p.

SHARP, J. H. (ED.) 1983. The Delaware Estuary: Research As Background for Estuarine Management and Development. Univ. Delaware, Newark. 326 p.

SUMMERS, P. 1987. Fish Population Study. Delaware River Basin Commission report, W. Trenton, New Jersey. 4 p.

TYLER, D. B. 1955. The Bay and River Delaware. Cornell Maritime Press, Cambridge, Maryland. 244 p.

UNITED STATES DEPARTMENT OF COMMERCE. 1985. Statistical Abstract of the United States 106th Edition. GPO, Washington. 985 p.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY. 1973. Delaware Estuary Water Quality Standards Study. U.S. EPA Region II, New York. 174 p.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY. 1983. Philadelphia/Camden Port Environmental Enhancement Plan. U.S. EPA, Philadelphia. 278 p.

UNITED STATES GEOLOGICAL SURVEY. 1982. Water Resources Data, Pennsylvania Water Year 1981, Volume 1. Delaware River Basin. U.S. Geol. Serv., Harrisburg, Pennsylvania. 327 p.

VERSAR, INC. 1987. Studies of Striped Bass Spawning and Stock Assessment in the Delaware River Between Philadelphia, PA and Trenton, NJ During Spring 1987. Versar, Inc., Columbia, Maryland. 66 p.

VOGEL, K. L. 1987. Water quality of the Delaware Estuary, p. 73–86. *In* S. P. Sauer, W. E. Harkness, and B. E. Krejmas (eds.). Report of the River Master of the Delaware River. U.S. Geol. Surv. Open-File Rep. 87-250.

WEBSTER, G. S., G. E. DATESMAN, AND W. L. STEVENSON. 1914. Report on the Collection and Treatment of the Sewage of the City of Philadelphia. Philadelphia Dept. of Pub. Wks., Philadelphia. 187 p.

WOLMAN, A. 1941. The implications, p. 31–42. *In* Water Pollution Abatement in the Delaware River Basin with Special Reference to the City of Philadelphia—A Symposium. INCODEL, Philadelphia. 56 p.

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GERALD M. HANSLER
EXECUTIVE DIRECTOR

HEADQUARTERS LOCATION
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DEC 1 [illegible]

December 12, 1978

Dr. Maruice K. Goddard, Secretary
Department of Environmental Resources
P. O. Box 1467
Harrisburg, Pennsylvania 17120

Dear Commissi r Goddard:

Under the provisions of Article 5, Pollution Control, of the Delaware River Basin Compact, the Commission issued waste load allocations to Delaware Estuary dischargers during 1967. This interstate allocation program conforms to the DRBC water quality standards (part of the DRBC Comprehensive Plan) and is consistent with Section 303(d) of the Federal Water Pollution Control Act, PL 92-500 (FWPCA), with reference to total permissible maximum daily loads.

Our allocation program is currently being updated, and will utilize a new two-dimensional Estuary model which can be run on both dry weather and storm condition river flows. Thereafter, following determination of maximum permissible total daily loads and apportionment among various source categories, revised individual waste load allocations will be established. This activity is carried out under the Commission's Section 106 FWPCA grant program with staff participation of concerned Federal and State agencies and is closely coordinated with the Section 208 FWPCA program.

In 1973, the Commission relinquished its program of pollution abatement schedules in favor of the NPDES and State programs. Initial NPDES permits generally recognized the Commission's Estuary allocations as the minimum permissible discharge requirement, and included limitations consistent therewith. Coordination was continued by submitting DRBC comments on proposed NPDES permits. Recently, however, inconsistencies with DRBC allocations have developed during reissuance of NPDES permits and transferal of NPDES permit authority to the states. Some NPDES permits have been based on design rather than actual flows, maximum effluent concentration or percentage 5-day BOD removal rather than the DRBC allocation limits, or interim compliance limits based on current treatment efficiencies or BPT guidelines rather than DRBC allocations.

Attainment of a consistent pollution abatement program for the interstate Delaware Estuary requires uniformity in NPDES requirements. This can be achieved by again factoring DRBC waste load allocations into NPDES permits of dischargers to the Delaware Estuary. The

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Commission was formed to provide a legal mechanism for providing comity amongst and between the parties to the Compact. Utilization of this mechanism to apportion assimilation capacity of the estuary continued to be the most logical route.

I am hereby requesting that you designate one or more representatives to attend a meeting at our offices to be held early in January, to discuss this matter in detail.

Sincerely,

Gerald M. Hansler

Enclosures

cc: Commissioners Hullar, O'Hern, Olney
Commissioner Tribbitt
Mr. J.J. Schramm, EPA, Region III
Mr. E.C. Beck, EPA, Region II

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E ERSTATE C ISSION THE D AW E R .. BAS

GAN ATION . OG DELAWARE R..ER B IN COMMISSION

J s F. Wright,
ecuti D' ector,
law e River B in Co. ission

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G ATION A . R S D L W E R . BAS I COMM SION

J es F. Wright
ecutive D ector
Delaw e River Basin o ission

You ve he d m y fine speeches in the last two days. You have he d so cle and e osito , so i olved and technical, some proud and optimistic, some frighteni in t potential, and n mine which will not be very tec ical, won't be the most interesting, won't be the most pess istic, but 'll be the most welco because it is t last one.

The Delaw e River Basin Co ission at the moment is a fledgling ency which has no d ficulty in seeing, especially at this traditional Co erence, that its work got u er w a long t before it rived on t scene d ing the past ye .

T ks to the work of o fore nn org ization, Inc el, and t state feder agencies, o Co ission will ve plenty to build on as it emb ks upon the signed mission of coordinating a ssive progr for de lop- i t reso ces of the beautif Delaw e and its tribut ies.

The Co ission is mi f , so, that it is the ent of the Basin's millions of res ents. This n Co ission is not like the o Incodel had proposed f the Delaw e River sin ne ly a decade ago. But f the lack of approval of one legislati branch in 19 , t comp t agency inspired by c el might long since have been on t job and Herb Howlett a I would still be in Cal or a.

Inc el has done much to bri into focus the Basin's needs that o Co ission will be t i to lfill. We ve alrea profited by ass iation with Inc el. We ho that o plans to absorb it into o org ization se as a le ev ence that we do not intend to t n o cks on the achievements of o predecessor inter ate org ization. We ve a foun- dation which we appreciate. I also authorized by the Co sion to s t t

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we w t to continue t relationship w th t leg' lati co ittees of Inc 'el. in viso capacity which have pro n so valuab e to the staff of codel in the past d t d this end we s ll be working d in t e ne few mont .

is is a good opportunity to elaborate on the sub ect of Co ission's relation with ot rs. Those attendi this Co erence largely represent organi-zations or agencies whose p poses m e them allies of t Co ission and whose functions may appe to o rlap with o s at ti s. So concern has been e denced that the Co ission might be tryi to ert e work now pro rly reg ded as the o 'nce of existing state agencies. To this I can only say that you don't kn co issioners ve well.

T fr ers of the co ct were acutely aware of the situation and were f t ight in establishi a policy that t foll in o relations 'th public agencies with om we ve an identity of interest. y a rehension t t the Co ission 'll be doi any ' dictional poachi should be allayed th' statement in the co act: "It is the p pose of the si ato p ties to preserve and utilize t f ctions, p ers and d ies of existi offices d encies of G e ment to the tent not inconsistent th t comp t the Co sion ' authorized d d' ected to utilize and ploy ch offices and a ncies for t p poses of this compact to the llest ent it finds feasible and vantageous". This is a clear and d' ect order and there is no intent to dep t om it.

I might i icate t t we have already dealt with a situation ich I thi evidences o full faith and co idence in t 's p ticular. I refer to the i-State Fisheries Reso ce St y which was launched in 19 by Pennsylvania, New Jers , New York and the United States Fish and Wildl' e Se ice. fo ye s, this progr s produced a mass of ' ormation on the upper sin's fish ecies, includi in nto , fluctuati population, a , th rate d spa ing eas, as well as river ch ist , ow d temperat e. t not until this i o ation ' analyzed a evaluated c decisions de on h

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river develop nt i t ations c st desi ed and located to protect opogate fish crops and promote m e fishi activity.

We might have ertaken this pro ect o selves, but ter c e l consideration, o Co ission, last month, adopted a resolution reco ending that t Feder Fish & Wil e rvice do the job d be given t wherewithall by Co ress d t eau of the b get with the f l c peration pledged by the interest states d t Co ission t work le ing up to t final a ysis.

Under the ique feat es of t compact which the Feder ver ent a p t r in o border crossi age y, we especially welco t opportunity to work in r with age ies of t Feder er ent. We so reco ize o obligations to help encies of the participating j isdictions, as well as to res ct the bo d ies of interest.

We ow that we have a co on interest th ma non-gover e al oups, watershed org ations d other i ortant org izations, whose work involves the 's nat reso ces. Co ission c e ected to maintain its close assoc tion and coo rative effo s th these ups t as it is do 'll continue to do th t Water Reso ces Association.

I ve been asked to outline briefly to you how we e going to be g ed d what o s we will c ry on. We are org ized into an Executive Division, which will be the policy division of the Co ission, d will co ern itself with t "i tower" thinki , with the " agineeri ", if we may e the te , of the oblems ead, with t relationships between the Co ission d the v ious state d federal agencies a th the d ection coord tion of t tec ic rk. This 'll be pported by an inistrative v ion of m e less sta d f ctions ich I will not elaborate

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re ll gi ering - Pl ning Division, at this time co osed of t ee br ches. One will be t e Pro ect Pl ning Branch, one will the Project Review Br ch and one ll be the Water uality Branch. The focus of t work of these t ee branc s ll be in the Chief ann ng Engineer, . . Howlett, whom you he d talk yesterday.

I would re ly li to discuss in some detail with you t ecific progr s that we ve pl ned to dertake for t remai der of this fiscal ye and for the ne fiscal ye .

We have ident ied at this t nine progr s.

o No. one (1) o continuing i vento of water supply. om data collected f m n rous agencies which is not n co letely combined in a form suitable to ento o water pply from the vie oint of t Co iss- ion, we hope to put to ther a summa of sign ic t water supply i ormation. To t maximum e ent possible we e ect to e established agencies for raw terial. f ction will not iginal collection, but rat r co ilation a analysis.

O seco p (2) ll be co erned with ysis of population d requ e nts for l d water e. As in the case of ogr one (1) we will not dupl ating t work of t agencies eady carrying out th function, but w l be putti together om y so ces the sign icant facts about water requ ements that relate to o basin eds.

ogr No. t ee ( ) ll devoted to annual requ ements for recreati fish and dl e within t basin. We ed to develop here a centr aw eness of t y progr being maintai d by each of the states d by at least a -dozen feder agencies -- to cast them into rspective and to eva uate the of these progr s in relation to other water resou e projects being conc r t developed thin t fr ework of t ster pl .

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· o No. fo ( ) i olves analys· of t hyd electric p er potential a t r t dem ds for p er ·thin the bas· . We ·sh to s e, in conformance with o objective to x· ize each p pose of o multi-p pose projects, t t f l co · eration will be ·ven to the p er that can ge ra d within the basin ha onious with ot r p oses of the m ter pl .

o No. five ( ) enco asses the investigation of the projects proposed or unde aken by age ies ot r th the co ission and which are not n spe-c· ically embodied within the present phase of the comprehensive pl . We must develop principles d policies concerning the classes of o ects that need to be submitted to t Co ission for its rev· w. We m t de lop t les, pro-ced es, d fo s necess y to c out this review e ditiously. Th p -

will envisage frequent and most const t liaison ·th public d private agencies working on water-related tters of t bas· and will requ· e re ·ew of p cts which m t submitted to t Co ission to dete ine co. atibili , to t co ensive pl .

o No. s· ( ) conte lates a cont· uation of the basic p poses of Incodel, e ded as may be cess to et t major legal requ ements assigned to t Co ission u er the co act. It will enco ass f ·li ization ·th work c ried o state he th dep t nts and federal agencies in the field of stre class· ication and q ity standards because of the necessity of updating a m ernization. It ·ll, of co se, requ· e t t close liaison with l feder agencies, particularly blic Health Service d Geological S vey, maintained to ins e full i erch ge of i ormation on quality co itio . It w l requ e the order· g of all such information into a com-pre nsive pattern for each of the appr riate reaches or sections of the basin. It ·ll cessitate t · te ation of water qu ity and waste disposal plans with other progr s for u of water reso ces ·thin the basin.

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Progr No. seven (de s with flood loss reduction pla ing. We sual-
ize the necessity for compl enting t work of the Corps of Engineers, Soil
Conser tion Se ice and other agencies in pro ding flood co rol st ct es
for co el y pro ams of a non-struct al nat e to promote x reduction
flood loss. efforts re ll be lar ly concer d with study and
ysis of meth s ich can be used r local j isdiction for their own
protection. In all progr s we will, of co se, c efully investigate the nature
d extent of simil activities ing c ied out state, feder and other
agencies wor on th problem, d cooperate with them to determine the
most effective way in ich Co ssion efforts can be directed tow s better
developing those local protections that ll reduce flood dangers and losses.

eighth) program h to do with basin operation planning. Consistent
th of t ideas that have been outlined in the disc sion of the studies
c ntly u er w at ard, we feel that we should be n to cons er --
well ahead of the ti when these planned projects ll beco a re ity --
t th s to be used to ins e inte ated operation of all the projects within
t basin as conte lated by t co rehensive plan. As in all ot r pro s,
we hope to f iliarize o selves with t o rational a ects of the projects
being pl ned or co tructed by each of the states d the federal agencies
involved, d, m all of this, find coo rative sch es for sin operation
that w l produce the atest yields d best uses of water reso rces. Such
a o in d 's society ll requ e increased use of electronic data pro-
cessing d electronic co ut g equipment.

n th ( ) and last ogr is concer d th the development, inten-
ce a custo of t co rehensive pl and the water resources pro am.
Wit n th r we w l pro de ection to the v ious studies en sa d
in the other co onent progr s previously described. We will i tiate udies
alternate economic d fiscal alysis to dete i t basic allocation of

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costs a priorit s to ev te compatible and incompatible uses of the ri r st . We wil develop and reco end an a u water res rce o am-- a state nt of pply er dem ds a listing of w ks proposed for co st ction by a a ncy d ing the en i s years -- an reco end end- ments to the comprehe ive pl . Within t s progr we hope to tie together the related but sep ate tivities encompassed in the progra previously described.

n I co ider the task befo , th l that has been done so f , with so much ledge to be assimilated d correlated, with so many d ferent agencies, with so much m e to le n, a with so little control of eat t al forces, I think we seem so t es like prisoners co unicati by shouts and by ocking from cell to cell, u er t str ge illusion t t we e there o rating t penitenti o sel s. But when I consider how ch s en do , not only in p sic l works, but in the free and f ll ex- ch ge of pl s a ledge and p ose in the concessions of soverei ty d in the joint otection mutual ri ts and i erests, I t t we shall succeed, go forw d together.

* * *

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Administrative Manual – Part III
WATER QUALITY REGULATIONS

WITH AMENDMENTS THROUGH
DECEMBER 4, 2013

18 CFR PART 410

Delaware River Basin Commission

DELAWARE NEW JERSEY
PENNSYLVANIA · NEW YORK
UNITED STATES OF AMERICA

DELAWARE RIVER BASIN COMMISSION
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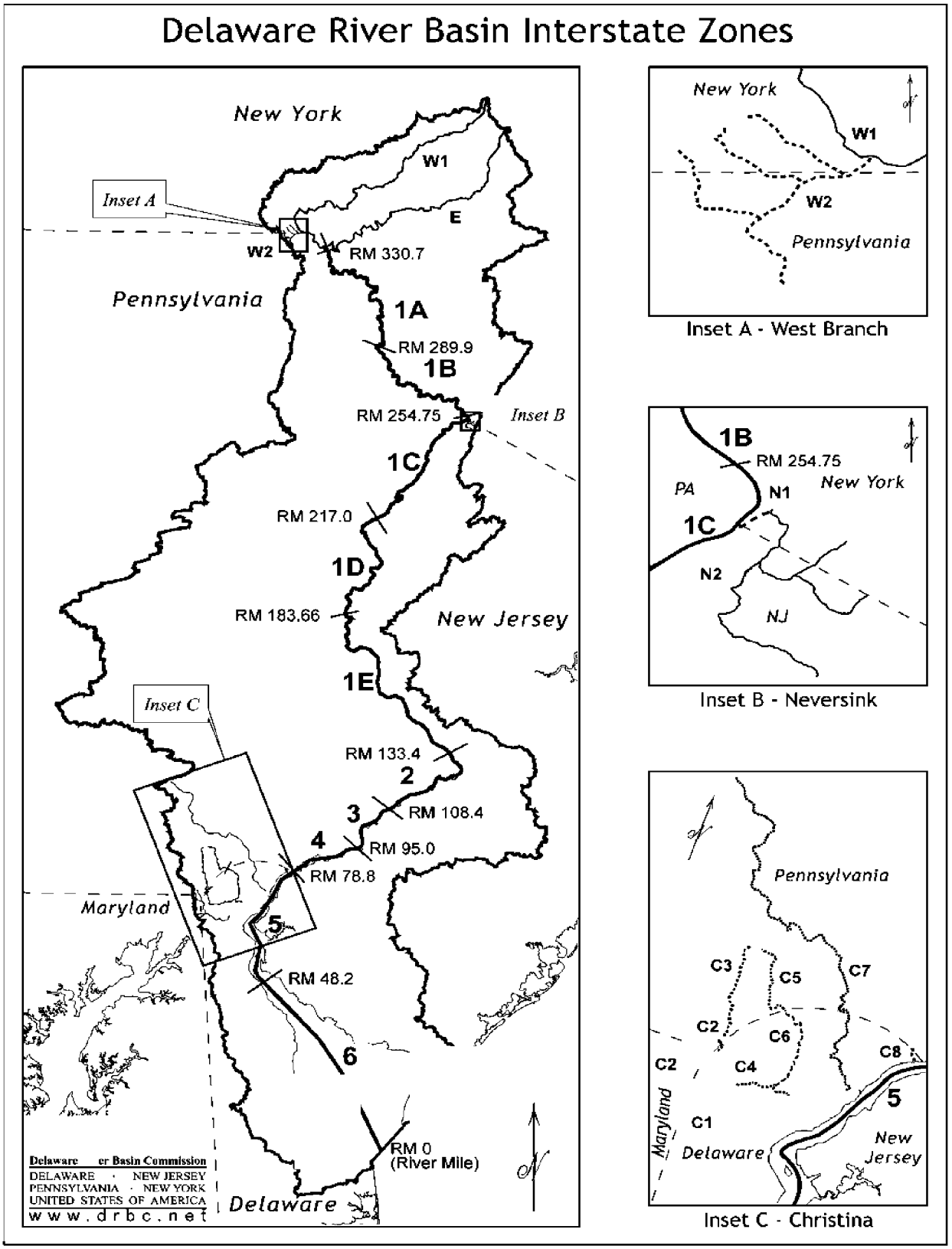

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PREFACE

For reference purposes, following is a summary of Commission actions on water quality standards and regulations to date:

Resolution	Date	Subject
1962-14	July 25, 1962	INCODEL Standards added to Comprehensive Plan.
1965-03	February 24, 1965	Primary treatment required as a minimum, Basinwide.
1967-02	March 2, 1967	Water quality standards for tidal waters.
1967-07	April 26, 1967	Water quality standards for non-tidal interstate streams; Resolution 67-2 recodified and incorporated; Resolution 65-3 repealed; Secondary treatment required as a minimum; Allocation of assimilative capacity policy; INCODEL Standards repealed to the extent inconsistent with this resolution.
1968-02	March 7, 1968	Water quality regulations; Allocation of assimilative capacity procedures; Abatement schedule procedures; Resolution 67-7 incorporated and recodified.
1968-06	July 31, 1968	Regional policy for wastewater management.
1968-08	September 25, 1968	Minor change in regulations on allocation procedure.
1970-03	March 26, 1970	Nondegradation policy; Addition to water quality criteria; Minor changes in definition of secondary treatment.
1970-24	November 24, 1970	Changes in dissolved oxygen and temperature criteria for trout waters.
1972-01	January 26, 1972	Interpretive Guideline No. 1.
1972-14	December 12, 1972	Groundwater quality standards.
1973-04	January 24, 1973	Groundwater quality regulations.
1973-11	October 31, 1973	Abatement schedules transferred to appropriate signatory agencies.
1974-01	February 27, 1974	Amendments primarily to be consistent with Federal Law (P.L. 92-500); Recodification, reflecting all above amendments, including the INCODEL Standards saved from repeal by Resolution 67-7, and also including Resolution 72-1.
1978-07	May 24, 1978	Intermittent stream policy; Changes in total dissolved solids standards; Changes in effluent color regulation; Policy for dilute industrial process wastewater.
1978-08	May 24, 1978	Confirmation of groundwater standards and policies in Comprehensive Plan.
1980-02	March 10, 1980	Suspended solids effluent requirement; INCODEL Standards for Zones 1 and 2 repealed.
1983-11	June 29, 1983	Changes in chloride criteria and addition of sodium criteria for tidal waters.
1985-03	January 30, 1985	Effluent requirements for oil and grease.
1986-08	May 28, 1986	Disinfection requirements for intrastate streams deleted.
1986-18	July 30, 1986	Temporary suspension of disinfection requirements for discharges to Zones 2, 3 and 4, from October 1, 1987 to April 30, 1988.
1991-06	May 22, 1991	Recreational stream criteria and uses for tidal waters based on Use Attainability Assessment recommendations.
1992-21	December 9, 1992	Special Protection Waters policies.
1994-02	February 23, 1994	Control of Nonpoint Sources of Pollution in Special Protection Waters.
1996-12	October 23, 1996	Control of Toxic Pollutants from Point Source Discharges to the Delaware River Estuary.
2005-02	January 19, 2005	Temporary Designation of the Lower Delaware River as Special Protection Waters.

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2005-09	May 18, 2005	Pollutant Minimization Plan Requirements for Discharges of Toxic Pollutants.
2005-15	September 26, 2005	Extending SPW designation for the Lower Delaware through September 30, 2006.
2006-22	September 27, 2006	Extending SPW designation for the Lower Delaware through September 30, 2007.
2007-13	September 26, 2007	Extending SPW designation for the Lower Delaware through May 15, 2008.
2008-09	July 16, 2008	Permanent Designation of the Lower Delaware River as Special Protection Waters.
2010-13	December 8, 2010	Updating stream quality objectives for toxic pollutants in Delaware Estuary and Extending these Objectives to Delaware Bay
2013-8	December 4, 2013	Revising stream quality objectives for total polychlorinated biphenyls (PCBs) in Delaware Estuary and Bay for protection of human health from carcinogenic effects
2013-9	December 4, 2013	Updating stream quality objectives for pH for the non-tidal Delaware River, the Delaware River Estuary and Delaware Bay

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DELAWARE RIVER BASIN COMPACT:

A REVIEW WITH RESPECT TO

ENVIRONMENTAL QUALITY

* * * * * *

Ann L. Strong, Professor of City and Regional Planning
John C. Keene, Associate Professor of City and Regional Planning
Jon Hillsberg, Research Assistant
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Mary Aspin (Autumn, 1970)

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April, 1971

REPRINTED BY THE

DELAWARE RIVER BASIN COMMISSION

MAY 1971

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V

The Scope and Adequacy of the Enforcement Powers of the Commission with Respect to Water Pollution Abatement and Control

RESEARCH MEMORANDUM

1. Summary

The Commission has been given adequate enforcement powers under the compact, and no amendment thereto is needed, at least until considerable additional experience has been acquired with present powers.

The Commission has concentrated its enforcement activities on those who discharge directly to the estuary and who are under abatement schedules. It should review the general policies which govern the allocation of overlapping powers to abate and control water pollution between the Commission, on the one hand, and the signatory powers, on the other, especially in view of the recent significant revisions of state water pollution control laws in the four signatory states.

After such a review, it should articulate its policies for monitoring, responsibility for emergency action, and determining when it will assume jurisdiction for enforcement because of inadequate performance by the state water pollution control agencies. To the extent indicated to be necessary, the Commission should adopt regulations, pursuant to Section 5.2 of the compact, relating to monitoring, emergency action and assumption of jurisdiction. Such regulations would then provide the basis for more highly articulated enforcement action.

2. Current and Prospective Actions of Other Public Agencies

A. In the Delaware Basin

(1) State Action

The review which follows of state powers and programs in the water pollution control field is general,

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corporation, or unit of government the unlimited right to sue any defendant whose activities may be endangering natural resources, without having to show any direct or special individual damage. Once the plaintiff introduces evidence showing the existence or threat of pollution the burden shifts to the defendant who must show either (1) that it is not polluting and will not pollute or (2) that there is no "feasible or prudent alternative" to its activity, and that such activity is "consistent with the promotion of the public health, safety and welfare in light of the state's paramount concern for the protection of its natural resources . . . ." The Act is currently being tested in several lawsuits.

Illinois' new Environmental Protection Act does not go quite as far as Michigan's on the question of the citizen's right to sue, but it does give citizens the right to file a complaint with both the State Pollution Control Board and the Environmental Protection Agency, and be assured that an investigation will be made. State and local law enforcement officers are given broad authority to enforce the provisions of the act.

3. Enforcement Powers of the Delaware River Basin Commission with Respect to Water Pollution Abatement

Article 5 of the compact sets out the general scheme within which the Commission may regulate water pollution. Section 5.2 authorizes the Commission to adopt (1) standards of treatment for the various waters of the basin and (2) rules and regulations in accordance with which adherence to these standards shall be achieved. Section 5.4 authorizes the Commission, after investigation and hearing, to issue an order to a polluter prescribing a schedule of construction for sewage treatment facilities.

The article grants the Commission two types of general enforcement powers. First, § 5.1 provides that the Commission may "invoke as complainant the power and jurisdiction of water pollution abatement agencies of the signatory parties." Second, § 5.4 authorizes the Commission to bring an action in its own name in any court of competent jurisdiction to compel compliance with (1) any provision of Article 5; (2) any rule or regulation issued pursuant to Article 5, or (3) any order issued under § 5.4.

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Section 5.3 also commits the signatory states to a policy of controlling pollution in the basin, so that where, as in Pennsylvania, the Attorney General is authorized to bring suit to abate pollution which violates the relevant water quality standards and to secure a temporary injunction halting pollution which endangers the public health, the Commission can request the Attorney General to institute such actions.

In addition to the enforcement powers granted to it by Article 5, the Commission is given the power in § 14.17 to impose fines of up to $1,000 for each day of violation of one of its rules, regulations or orders, if no similar fine is provided for by state law.

Thus, it appears that the Commission is authorized to exercise any enforcement power which a state water pollution control agency has. Of course, pursuant to the policy of § 1.5, the Commission has chosen not to do this, but, instead, to rely on the state agencies to exercise the initiative in this field. Where the Commission has investigated the activities of a polluter and, after a hearing, issued an order setting forth a schedule by which pollution will be abated, and then establishes that the polluter is not complying with that schedule, the Commission is authorized to bring suit to secure a court order directing such compliance. Finally, even without investigation and a hearing, the Commission may bring suit to compel compliance with its general water quality regulations. Such a course of action would be appropriate, for instance, where an industrial plant was discharging highly toxic materials which constituted a menace to public health, a condition forbidden by Article I of the Water Quality Standards.

4. Opinions of Interviewees

Those interviewed were virtually unanimous in thinking that the Commission has been given adequate powers under the compact to deal with water pollution abatement and control. Some mentioned the need for better procedures for dealing with emergencies because they felt that the present hearing process was too lengthy and cumbersome for such a purpose. Others believed that the Commission had the power under the compact to establish summary enforcement procedures but simply had failed to issue the necessary regulations.

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R. Timothy Weston

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The Delaware River Basin: Courts, Compacts and Commissions

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Boundaries and Water: Interjurisdictional Issues

Natural Resources Law Center
University of Colorado School of Law
June 5-7, 1989

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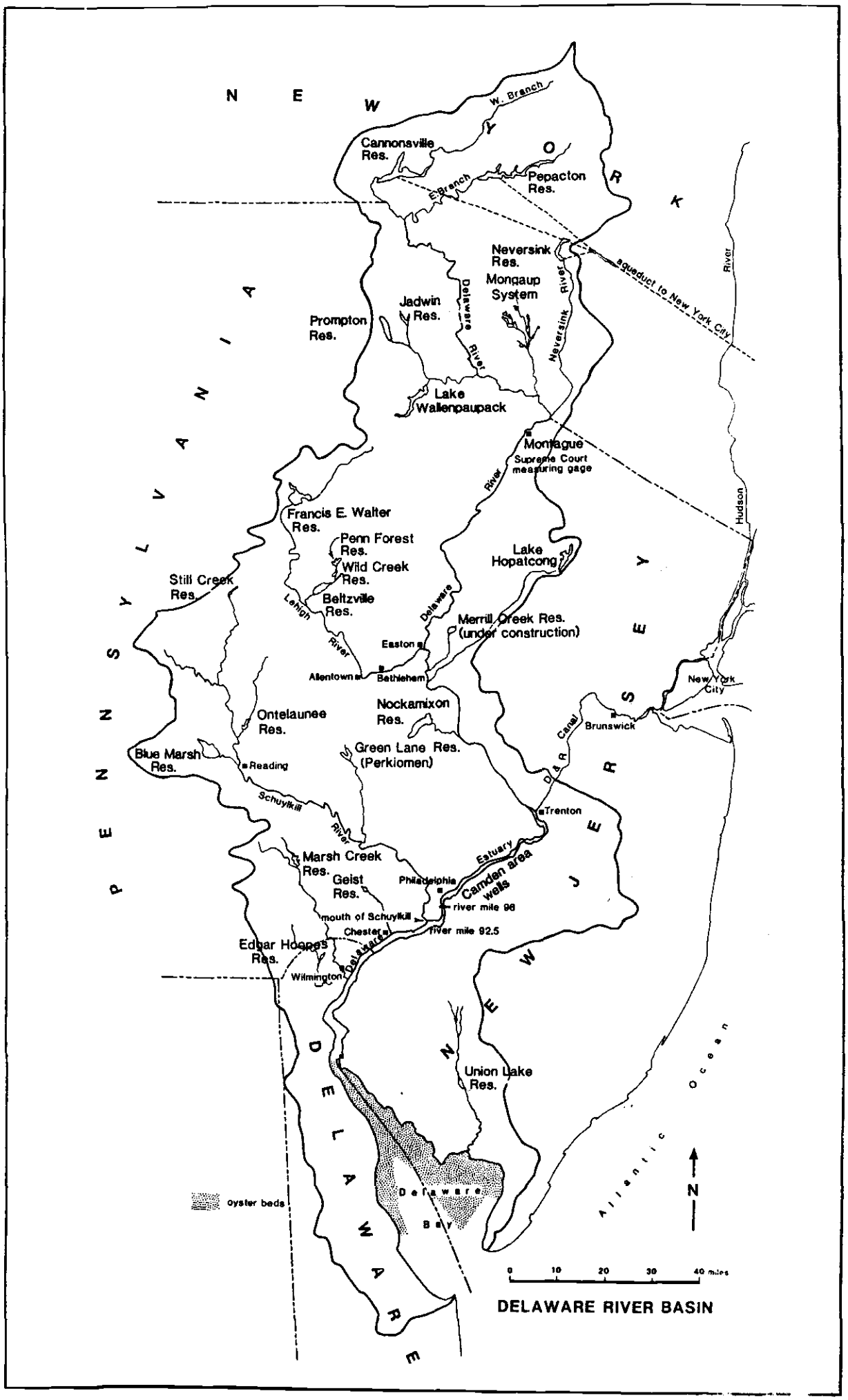

DELAWARE RIVER BASIN

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The Delaware River Basin: Courts, Compacts and Commissions

R. Timothy Weston

I. Introduction

A. Summary

The Delaware River Basin provides the Nation with perhaps the best case study of experience with alternative methods for resolving interstate conflicts over the water rights and water management. Over the past 70 years, the Delaware Basin States and their citizens have resorted to virtually every conceivable approach for addressing interstate disputes over water - short of invasion and civil war - in the continuing search for viable management of precious and limited water resources. Yet, today - confronted with such divergent and conflicting interests, and in the face of a seven decade history of litigation and negotiation - the Delaware Basin stands as the prime example of interstate cooperation and commitment to dynamic, regional water resources management.

Following six decades of U.S. Supreme Court litigation, the four Delaware Basin States and the Federal Government finally evolved a new legal arrangement - the Federal-Interstate Compact. The Delaware River Basin Commission serves as partnership of Federal and State government committed to joint water resources management and action.

Faced with serious challenges and changing conditions, the DRBC has proven a relatively effective water management tool. DRBC takes credit for key achievements in (1) developing a unified drought management plan; (2) adopting a joint reservoir operations program; (3) resolving interstate conflicts over water allocations and transfers; (4) implementing comprehensive water quality standards; (5) promulgating water conservation standards; and (6) providing a vehicle for joint investment in new water management facilities.

DRBC continues to confront significant water management problems. The Commission's challenge ahead lies in sustaining public and member government support for the long-term solutions identified in the Basin Comprehensive Plan.

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B. General References

1. Delaware River Basin Compact, Pub. L. 87-328, 75 Stat. 688.

2. R. C. Albert, Damming the Delaware (1987).

3. R. A. Hogarty, The Delaware River Basin Drought Emergency (Inter-University Case Program #107) (1970).

4. Delaware River Basin Commission, The Delaware River Basin Comprehensive (Level B) Study (May 1981) ("DRBC Level B Study").

5. Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission Pursuant to Commission Resolution 78-20, signed by Governors DuPont (Del.), Cuomo (NY), Kean (NJ) and Thornburgh (PA) and Mayor Koch (NYC) (July 1984) ("Good Faith Agreement").

6. C. H. Weidner, Water for a City: A History of New York City's Problem from the Beginning to the Delaware River System (1971).

II. Basin Facts and Background

A. Basin Resources and Water Uses

The Delaware Basin watershed forms the major water source for almost 20 million residents of the Northeast Metropolitan Corridor from New York City to Wilmington, Delaware. In relative terms, the Delaware is a small watershed. The Delaware Basin drainage area encompasses only 12,765 square miles, draining one percent of the United States. (See Figure 1.)

With an average annual precipitation of 45 inches,

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the Basin is blessed with adequate resources in normal years.

The residents of the Delaware Basin and its service area use 5.7 billion gallons each day to produce electricity for homes and factories, and another 4.3 billion gallons is withdrawn daily for industries, agriculture and public water supply.

B. Key Issues

In the Delaware Basin, the fundamental issue is the balance of out-of-basin diversions to New York and northcentral New Jersey, in-basin consumptive water use through power generation, industry and agriculture, and the minimum flows needed to protect lower basin water supplies located in the Delaware Estuary from salinity intrusion and contamination from numerous point and nonpoint sources.

III. History of Delaware River Litigation

A. Early Efforts at Cooperation and Compacts

During the first two decades of this Century, basin area governments commissioned a series of studies to identify existing and potential water sources to serve growing metropolitan and industrial centers. New York City authorities, after some extensive studies, recommended diversion of upper Delaware Basin water for municipal supply in preference to the polluted sources of the lower Hudson. Simultaneously, New Jersey and

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Pennsylvania looked to the Delaware's upper basin with increased urgency as a critical source of their future water supply.

In 1924, the three Basin States appointed commissioners to negotiate a compact or agreement governing the allocation, use, and conservation of the River's waters. The commissioners agreed to a compact, which was ratified by New York, but rejected by the Pennsylvania and New Jersey legislatures. A second appointment of commissioners was made, and a second compact unanimously recommended. Again New York ratified the draft compact in 1927, while the legislatures of Pennsylvania and New Jersey refused to adopt the agreement.

B. New Jersey v. New York, 283 U.S. 336 (1931).

New Jersey sued New York and New York City seeking to block plans to divert up to 600 mgd, claiming that any out-of-basin diversion violated riparian rights. Pennsylvania intervened and proposed a more flexible approach, based on the principle of compensating releases to maintain downstream flows as a quid pro quo for allowing consumptive water use and interbasin transfers.

After hearings before a special master, the Supreme Court ruled that the doctrine of riparian rights does not govern interstate water disputes

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(Connecticut v. Massachusetts, 282 U.S. 660, 673 (1931). Mr. Justice Holmes delivered the classic pronouncement of the equitable apportionment doctrine: "A river is more than an amenity, it is treasure. It offers a necessity of life that must be rationed among those who have power over it ...." He emphasized that each State has "real and substantial interests in the river that must be reconciled as best they may be. The different traditions and practices in different parts of the country may lead to varying results but the effort always is to secure an equitable apportionment without quibbling over formulas." New Jersey v. New York, 283 U.S. 336, 343 (1931).

Based on this view, the Court rules that New York could divert up to 440 mgd (less than the amount requested by the City), subject to a release plan proposed by Pennsylvania. This downstream flow maintenance program was geared at providing releases from the New York reservoirs sufficient to assure a minimum flow in the Delaware of 1535 cfs at Port Jervis (the tri-state border) and at least .50 c.s.m. (3400 cfs) at Trenton. The maximum release was to be 30% of the average diversion area yield, or 402.6 cfs. The Court further ordered New York to undertake a series of pollution control measures to correct sewage discharges from New York municipalities in the upper basin, and

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assure waters flowing to the downstream States was in usable condition.

Essentially, the Court's 1931 Decree established New York's right to a diversion, subject to compensating releases necessary to avoid demonstrated injuries (primarily focused on salinity intrusion and recreation impacts). It affirmed Pennsylvania's request that the New York diversion not constitute a prior appropriation, or confer any superiority of right over New Jersey or Pennsylvania in the use and enjoyment of Delaware Basin waters. In addition, the Supreme Court provided for future review and modification of the Decree under the Court's continuing jurisdiction.

C. INCODEL

The 1931 Decree failed to establish a framework for long-range planning and management. A general basin investigation conducted by the Corps in 1934 noted the growing regional water need, and recommended the advantages of an interstate agency to exercise unified control over water planning and development in the Basin. (Report No. 308, House Document No. 179, 73 Cong., 2d Sess. (Jan. 3, 1934)).

Following the devastating floods of 1936, a meeting of representatives from the four Basin States resulted in the organization of the Interstate

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Commission on the Delaware River Basin (INCODEL), as an advisory body in the field of interstate water issues. With limited powers and an uncertain mandate, INCODEL proceeded in response to legislative requests to develop studies for coordinated water supply development in the region. The resulting INCODEL plan called for phased construction of an eight reservoir system. (Interstate Comm'n on the Delaware River Basin, Report on the Utilization of the Waters of the Delaware River Basin (1950)). Failing to receive unanimous support from the Basin States, the proposal collapsed.

D. New Jersey v. New York, 347 U.S. 995 (1954)

1. The Claims: In April 1952, New York City petitioned the Supreme Court to amend the 1931 Decree, to allow an increased diversion of 800 mgd, subject to a proposed new release formula. to augment low flows on the Delaware. Pennsylvania and New Jersey disputed the allegation that New York's increased water requirements were critical, and asserted countervailing claims on behalf of the River-dependent lower basin. The Lower Basin States demanded New York City undertake metering and develop alternative supplies in the Hudson watershed.

2. New York-New Jersey Settlement: Initial negotiations between New York and New Jersey led to a "settlement" under which New Jersey agreed to the

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City's 800 mgd request, provided that New Jersey was allowed to divert up to 250 mgd out-of-basin without compensating releases to serve the northcentral Jersey metropolitan area. Pennsylvania strenuously objected.

3. New Jersey-Pennsylvania Settlement: Pennsylvania conditioned its consent to diversion of an average of 100 mgd without compensating releases upon the enactment by New Jersey of legislation which would allow the Commonwealth to develop an impoundment on the mainstem at Wallpack Bend (one of the keystones of the INCODEL Plan), together with certain diversion dams at locations in the lower Delaware. New Jersey Acts of 1953, Ch. 443.

4. The Consent Decree: New York City was authorized to divert up to 800 mgd. As compensation, the City was required to make releases from its three Upper Delaware Reservoirs (Neversink, Pepacton, and Cannonsville) sufficient to maintain a minimum flow of 1750 cfs at the stream gage located at Montague, New Jersey (Milford, Pennsylvania). New Jersey was allowed to divert up to 100 mgd through the Delaware & Raritan Canal to serve the northern Jersey metropolitan area, provided that the State of New Jersey agreed to the development of the mainstem reservoirs and dams specified in the 1953 legislation, and joined with Pennsylvania in submitting that compact legislation to

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Congress for its consent. To administer the Decree, the Court appointed an officer of the U.S.G.S. to serve as Delaware River Master with powers to monitor and enforce the diversion and release provisions. The parties explicitly reserved the right to return to the Supreme Court, and petition for amendment of the Decree's provisions.

IV. Development of the Delaware River Basin Compact

A. The Delaware Basin Comprehensive Study.

Following the 1955 Connie/Diane floods, Congress ordered the Corps of Engineers to undertake a comprehensive survey of the flood control, water supply, and other needs of the Delaware River Basin. It was the Corps' first truly comprehensive basin study. U.S. Senate Comm. on Public Works Resolution, 84 Cong. 2d Sess., February 29, 1956; U.S. Army Corps of Engineers, Phila. Dist., Delaware River Basin Report, House Document 522, 87 Cong., 2d Sess. (1962).

B. The Delaware River Basin Advisory Committee and Syracuse University Study

The Problem of Water Resources Administration with Special Reference to the Delaware Basin (Maxwell School of Public Admin, Syracuse University) (1959), reprinted in R. Martin, et al., River Basin Administration and the Delaware (1960) - Proposed development of a Federal-interstate compact.

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V. Delaware River Basin Compact

A. Commission Organization, §§ 2.1 - 2.7.

1. Membership: 4 Governors + 1 Federal member appointed by the President.
2. Alternates: 1 Alternate appointed by each Governor; Federal alternate appointed by the President.

B. Voting Powers

1. Most matters are determined by majority vote.
2. Unanimous votes required for: modification of diversions, release formulas or other rights and obligations under the 1954 U.S. Supreme Court Decree, and for apportionment of Commission's annual budget among Signatory Parties.

C. Planning Functions, §3.2

1. Comprehensive Plan: DRBC must establish and maintain a comprehensive plan for the "immediate and long range development and uses of the water resources of the basin."

2. Water Resources Program: Each year, DRBC must develop a water resources program, based upon the Comprehensive Plan, including a systematic presentation of quality and quantity needs, "balanced by existing and proposed project required to satisfy such

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needs." The program is to identify both public and private project, and separate list those projects to be undertaken directly by DRBC.

D. Project Review Authority, §3.8

1. Any project having a "substantial effect on the water resources of the basin" must be submitted to and be approved by DRBC.

2. Project is defined to include:

> "any work, service or activity which is separately planned, financed, or identified by the commission, or any separate facility undertaken or to be undertaken within a specified area, for the conservation, utilization, control, development or management of water resources which can be established and utilized independently or an addition to any existing facility, and can be considered as a separate entity for purposes of evaluation."

"Project" includes not only physical facilities, but certain Federal and State regulations, water quality and quantity management program, and plans.

3. DRBC regulations define projects subject to §3.8 review to include:

- Construction, enlargement, or removal of impoundments with storage capacity > 100 million gallons.
- Any surface water or ground water withdrawal with a daily withdrawal rate in any month > 100,000 gpd.
- Construction or expansion of any sewage treatment facility or industrial wastewater treatment facility with a capacity > 50,000 gpd.
- Any change in ground cover on major ground

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water infiltration areas involving > 3 $mi.^2$

- Drainage, filling, or alteration of wetlands involving > 25 acres (or lesser area if no Federal or State wetland regulatory program is applicable and the DRBC Executive Director determines the project may have significant regional impact).

- Regional wastewater treatment plans (Clean Water Act §§208 and 201 plans).

- Federal, State and local government facilities, such as highways, affecting water and related land resources.

- Projects which substantially encroach on a stream or the 100-year flood plain of the Delaware River or its tributaries.

E. Regulation of Withdrawals and Diversions

1. Protected Area Program, §10.2

a. DRBC may delineate areas within the Basis where demands upon resources "have developed or threaten to develop" to such a degree as to create a water shortage or to impair or conflict with the Comprehensive Plan.

b. Within protected areas, DRBC may administer special permit programs regulating ground and/or surface withdrawals "so as to avoid ... depletion of the natural stream flows and ground waters ... as will adversely affect the comprehensive plan or the just and equitable interests and rights of other lawful users of the same source ...." DRBC Compact §10.5.

c. Southeastern Pennsylvania Ground

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Water Protected Area, 18 C.F.R. Part 430.

2. Emergency Powers, §10.4

> In the event of a drought or other conditions which may cause an actual and immediate shortage of available water supply within the basin, or within any part thereof, the commission may, after public hearing, determine and delineate the area of such shortage and declare a water supply emergency therein. for the duration of such emergency as deter-
> by the commission no person, firm, «*p555Xmined corporation or other public or private entity shall divert or withdraw water for any purpose, in excess of such quantities as the commission may prescribe by general regulation or authorize by special permit granted hereunder.

F. Powers Related to the 1954 Supreme Court Decree

1. Equitable Apportionment: DRBC is empowered, in accordance with the doctrine of equitable apportionment, to allocate Basin waters to and among the signatory States and their subdivisions, and to impose conditions, release requirements and other obligations related to such allocations. §3.3

2. 1954 Decree Rights Protection: Without unanimous consent of the Decree parties (including New York City), DRBC may not impair, diminish or adversely affect diversions, compensating releases, or other rights provided in the 1954 Decree. §3.3(a)

3. Special Emergency Powers: In the event of a drought or other emergency, DRBC may after consultation with the River Master and with the unanimous

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vote of its members (the 4 States and Federal Government, but not NYC), declare a state of emergency and direct an increase or decrease in any allocation, diversion or release provided under the Decree.

4. Appeals of DRBC Decree-Related Actions: Any "proper party deeming itself aggrieved" by DRBC actions related to out-of-basin diversions or compensating releases may invoke the original jurisdiction of the U.S. Supreme Court for de novo adjudication or determination.

5. Waiver of Rights to Return to Court: Each Signatory State waived and relinquished for the 100-year duration of the Compact the right to apply for modification of the terms of the 1954 Decree to increase or decrease diversions or releases. §3.4. However, a party may institute a proceeding to modify the decree to increase diversions or releases as necessary to effect a Commission action under §3.3.

G. Water Supply

1. DRBC is empowered to develop and implement plans and project for the use of water for domestic, municipal, agricultural and industrial water supply, including the power to acquire, operate and control projects for storage of and release of waters and for flow control. §§4.1-4.2.

2. No Signatory Party may permit any

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augmented flow to be diminished by any diversion or withdrawal. §§4.2(b).

H. Pollution Control

1. DRBC may adopt regulations and standards to control water pollution, and to require treatment of sewage, industrial and other waste. §5.2.

2. Signatory Parties are pledged to prohibit and control pollution and "to cooperate faithfully in the control of future pollution" and "abatement of existing pollution," and further covenant to adopt any necessary legislation to enable the State to implement such pollution control objectives. §5.3.

3. DRBC is given independent authority to enforce Commission water quality standards and to prosecute violations. §5.4.

4. DRBC was among the first agencies to adopt and enforce comprehensive basinwide water quality standards. B. Ackerman, S. Ackerman & D. Henderson, Controlling Pollution Along the Delaware River, 121 U. Pa. La. Rev. 1225 (1973); B. Ackerman, J. Sawyer, The Uncertain Search for Environmental Policy: Scientific Factfinding and Rational Decisionmaking Along the Delaware River, 120 U. Pa. L. Rev. 419 (1972).

I. Flood Protection

1. DRBC may plan, design, construct and operate projects for flood damage reduction. §6.1.

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2. DRBC may adopt "recommended standards" relating to the nature and extend of land uses in flood prone areas. Such standards do not impair powers of signatory States and municipalities to adopt zoning and other land use regulations "not inconsistent" with DRBC standards. §6.2. See 18 C.F.R. Part 415, Basin Regulations-Flood Plain Regulations.

J. Watershed Management

practices of watershed management to promote sound

2. DRBC may sponsor projects to encourage soil conservation and to control erosion, to maintain and improve fish and wildlife habitat. §§7.1-7.2.

3. Although instructed to cooperate with other agencies in a coordinated program of watershed management, DRBC may not operate a project unless no other suitable unit or agency is available to operate the project on reasonable conditions. §7.4.

K. Recreation

1. DRBC may provide for development of water-related public recreational facilities, through direct projects or in cooperation with signatory parties, municipalities or other agencies. §8.1.

2. DRBC is barred from operating recreational projects unless it finds that no other suitable agency is available. §8.2.

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L. Hydroelectric Projects

1. DRBC is empowered to develop and operate, or to authorize other agencies to develop and operate, dams and related facilities for hydroelectric power. §9.2.

2. DRBC may engage in wholesale marketing of power derived from such project, but may not engage in direct sale to consumers. §9.3.

M. Project Financing and Cost Recovery

1. Capital Financing: DRBC is empowered to issue tax-free bonds, bearing interest at a rate determined by the Commission, with a maximum maturity period of 50 years. Such bonds may be secured by a pledge of revenues from fees and charges assessed and collected by the Commission. DRBC Compact, Art. 12.

2. Project Cost Allocation: DRBC is mandated to establish uniform standards and procedures for evaluating benefits, and for allocating the costs of project affecting the basin. §11.4 Under such a cost-sharing plan, signatory parties may loan, grant, appropriate or advance capital funds to the Commission for construction or operation of any project. §12.20.

3. Rates and Charges, §3.7:

> The commission may from time to time after public notice and hearing fix, alter and revise rates, rentals, charges and tools and classifications thereof, for the us of facilities which it may own or operate and for products and services rendered thereby,

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without regulation or control by any department, office or agency of any signatory party.

4. Federal Reservation on Water Charges: In adopting the Compact, Congress added a "reservation" prohibiting DRBC from imposing any charge for water withdrawals or diversions that could have been made lawfully without charge on the effective date of the Compact (i.e., precompact water users were grandfathered). Pub. L. 87-328, §15.1(b).

VI. Experience Under the Compact

A. The First Comprehensive Plan

Concurrent with the adoption of the Compact, the Corps formally reported to Congress in 1961 on its six year comprehensive study. (U.S. Army Corps of Engineers, Phila. Dist., Delaware River Basin Report, House Document 522, 87 Cong., 2d Sess. (1962).) The Corps recommended, and in 1962 Congress authorized, the development of a system of mainstem and tributary multipurpose reservoirs,, the centerpiece of which was the Tocks Island Lake Project. (Flood Control Act of 1962, P.L. 87-874) The Corps plan thus became the basis for DRBC's initial Basin Comprehensive Plan, adopted in March 1962. (DRBC Resolution No. 62-4 (March 28, 1962))

B. The 1960's Drought

No sooner was DRBC organized, than it confronted

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the record drought of 1962-66. DRBC and parties were slow to recognize the emergency conditions, and a carryover of prior adversarial attitudes culminated in direct confrontation. As storage in the City's reservoirs plummeted during 1965, on June 14 New York City unilaterally suspended its Decree-mandated augmentation of flows in the Delaware, while maintaining out-of-basin diversions. By June 21, the Delaware River Master reported to the Supreme Court of the City's violation of his orders to cease all diversions, and a week later, New Jersey threatened to seek court sanctions. A special summit meeting of the State Governors and the Secretary of the Interior was convened on July 7 and hard choices were made. A basinwide emergency was declared under the Compact, Decree mandated diversion and release rates were adjusted, and the Basin muddled through.

C. Lessons of the 1960's Drought

1. The assumptions of resource availability and yield underlying the Court's prior decisions were rendered obsolete. New York City's Delaware Reservoir system proved physically unable to meet the full diversion and flow objectives at Montague during the record drought conditions of the 1961-67 period. The combined safe yield from the City's three Delaware reservoirs was 40% less than previously estimated. DRBC, "Report

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of the Coordinating Comm. for the Reappraisal of the Water Supply Resources of the Delaware River Basin and Service Area" (March 7, 1969).

2. For the southeastern New York area, diversions from the City's Delaware reservoirs provide some 39% of total system yield, and about 50% of the water supply during normal hydrologic conditions. For the lower Delaware Basin, these same reservoirs represent 90% of the total basinwide reservoir capacity, and releases under the Montague formula account for as much as one-half of the flows at Trenton during drought periods.

3. With a record of only 50 years, even the "record drought" would likely be exceeded in the not unforeseeable future.

D. Basin Water Supply Development, 1960-1980

1. Beltzville and Blue March Reservoirs: Under contracts with the Corps of Engineers, DRBC sponsored development of 54,430 acre-feet of water supply and water quality/flow augmentation storage on the Lehigh and Schuylkill subbasins.

2. Fate of the Tocks Island Dam

For 30 years, a mainstem dam at Tocks Island and vicinity served as the keystone project of the INCODEL Plan and DRBC Comprehensive Plan. With an at-site yield of 980 cfs, Tocks would have provided a capacity

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exceeding the yield of all other Basin reservoirs combined.

1962	Tocks Island Dam Project authorized by Congress.
1964	First appropriations for project.
1965	Delaware Water Gap National Recreation Area surrounding dam site authorized by Congress.
1965-70	Appropriations delayed by Vietnam War.
1970	Adoption of National Environmental Policy Act.
1971	Construction delayed because of incomplete Environmental Impact Statement.
1972	Congress delays dam construction until environmental issues are resolved.
1974	Congress appropriates $1.5 million for Tocks review study.
1975	DRBC votes 3 to 1 against proceeding with immediate construction of Tocks, but rejects a motion to seek deauthorization of the project.
1975-77	Bills in Congress to deauthorize Tocks fails.
1978	U.S. Dept. of the Interior and President Carter recommend designation of the middle Delaware River as a component of the Wild and Scenic Rivers System; Pennsylvania sues Carter for failure to prepare an environmental impact statement.
1978	Congress enacts legislation designating the Middle Delaware Scenic and Recreational River, 16 U.S.C. §1274(20).

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E. DRBC Level B Study

Recognizing the dilemma created by effective preclusion of the Tocks project, DRBC began work in 1977 on the Level B Study, with major funding support from the U.S. Water Resources Council. The Level B Study was designed to take a new look at the Basin, to review possible alternative reservoir projects and actions, and to provide the technical bases and concepts necessary for revision and updating of the Commission's Comprehensive Plan.

F. New York State Conservation Release Act and the 77-20 Study

In the same time frame, the State of New York undertook to implement a new State law requiring New York City to increase the "conservation releases" from the City's reservoirs in order to improve fishery resources and recreational opportunities below the reservoirs. Such substantially increased conservation releases (made on days when releases are not required under the 1954 Decree to meet the Montague objective) threatened to further reduce the already inadequate yield of the City's system to meet Decree mandates. The lower Basin States objected to any unilateral action. Subsequent negotiations led to an interim "experimental" release program, but tied to an agreement by New York State and City to join the lower Basin

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States in the consideration of drought emergency criteria and conservation measures. N. Y. State Dept. of Env. Conserv., DRBC Dkt. No. D-77-20 (May 25, 1977); DRBC Task Group Report, "Appraisal of Upper Basin Reservoir Systems and Conservation Measures" (March 1979).

G. Good Faith Negotiations

1. Initiation of Negotiations: With passage of the Middle Delaware scenic river designation, Pennsylvania felt itself most aggrieved by the failure of the parties to render and implement decisions. The Commonwealth threatened once again to return to the Court if the Compact arrangements failed to produce meaningful results. The result, as intended, was an agreement by the parties to once again engage in concerted "Good Faith" negotiations regarding the future of water resources management in the region. DRBC Resolution No. 78-20 (December 13, 1978).

2. Key Studies as Input to the Negotiations:

- DRBC Task Group Report, "Appraisal of Upper Basin Reservoir Systems and Conservation Measures" (March 1979).

- Camp Dresser & McKee, Daily Flow Model of the Delaware River Basin, U. S. Army Corps of Engineers, Phila. Dist. (1981).

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- M. Thatcher & D. Harleman, Development and Application of a Deterministic Time-Varying Salinity Intrusion Model for the Delaware Estuary, Delaware River Basin Comm'n (November 1978).

3. Negotiating Process: Rather than focusing constantly on striking positions and splitting differences, the parties attempted to follow a process for "getting to yes" - a process involving assessment of underlying interests and development of creative solutions which serve common interests. Surprisingly, there was little disagreement over the wide range of issues that required decision, and substantial progress was made early in the process (although the discussions themselves extended well beyond the original October 1979 deadline self-imposed by the parties).

H. The 1980-82 Drought

1. DRBC Resolutions No. 80-20 (Oct. 17, 1980); No. 80-24 (Nov. 19, 1980); Nos. 81-1 to 81-5 (Jan. 15, 1981); Nos. 81-8, 81-9 (Feb. 18, 1981); Nos. 81-11, 81-12 (March 25, 1981).

2. Step-by-step actions: With the agreement of all parties, diversions to New York and New Jersey were cut in stages, up to 30%. The Montague flow objective was also reduced in stages and linked to the location of salinity in the lower Basin. A joint drought emergency was declared by the four State

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Governors, in their capacity as DRBC Commissioners. Comparable bans on nonessential water uses were adopted and enforced in each of the States. State and Federal reservoirs were brought into a coordinated operation scheme, with the Delaware Commission serving as steam master to assure adequate flows while conserve storage.

3. Over the next six months, these drought emergency measures conserved some 60 billion gallons of water. Supplies began to stabilize and slowly recovered. The crisis was confronted; the common ground was found.

H. The Good Faith Agreement

Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree to the Delaware River Basin Commission Pursuant to Commission Resolution 78-20 (November 1982): Following public hearings in mid-1982, the Good Faith Agreement was finally signed by the Basin States Governors and the Mayor of New York and formally transmitted to DRBC in February 1983.

VII. Management Elements of the Good Faith Plan

A. Salinity standard for the Delaware Estuary. DRBC Resolution No. 83-11 (June 29, 1983). An interim operating objective was established to provide a reasonable degree of protection to the aquifers serving the Camden area. As additional reservoir storage

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capacity becomes available in the Basin, it will be used both to augment water supplies provide a more protective salinity standard.

B. Management Criteria. DRBC Resolution No. 83-12 (June 29, 1983) adopted the drought of record as basis for determination and planning of dependable water supply. It was agreed that the Basin's water management system should be capable of providing and protecting reliable supplies for essential uses during the drought equal to the record drought of 1961-67. This does not mean all demands will be met at all times. It does mean that DRBC's plans and actions (including conservation measures, controls on diversions, and projects) will be designed to work through a record drought.

C. Drought Identification Criteria. DRBC Resolution No. 83-13 (June 29, 1983) adopted criteria to identify the onset and stages of a drought, using the behavior of the combined storage in the 3 New York City reservoirs as an index of basin hydrology.

D. Basic Drought Management Plan. DRBC Resolution No. 83-14 (June 29, 1983) incorporates an operating formula which, at given stages of drought warning and drought, reduces allowable out-of-basin diversions to New York and New Jersey, reservoir releases, and instream flow objectives. These flow

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objectives and release requirements, in turn, are linked to the location in each season of the "salt front" in the Delaware Estuary (defined by the 7-day average, 250 mg/l chloride isochlor). The further upstream the salt front moves toward Camden and Philadelphia, the greater the flow objectives and releases mandated to counter salinity intrusion.

E. Coordinated Reservoir Operations. DRBC Resolution No. 84-7 (April 25, 1984): To complement the operations of the New York City reservoirs, the parties developed a plan for coordinated drought operation of other major Federal, State and utility reservoirs in the Basin, including Lake Wallenpaupack (Pennsylvania Power and Light Co.); Lake Nockamixon (Pa. Dept. of Environmental Resources); Blue Marsh, Beltzville, F.E. Walter and Prompton Reservoirs (U.S. Army Corps of Engineers/DRBC). The operations plan places a series of facilities under DRBC's emergency jurisdiction, includes specific schedules and sequences of release and refill geared to maintain key flow and salinity control objectives.

F. Drought Conservation Measures. DRBC Resolution No. 83-14 (June 29, 1983): The drought plan storage curves provide an index triggering the initiation and declaration of emergency actions. If storage drops below the drought operating criterion for five or

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more days, a regional emergency is automatically declared. Conservation measures will be undertaken with the objective of reducing overall consumptive and depletive used by 15%. Each State is pledged to develop and carry out contingency plans, involving comparable measures and emergency regulations to conserve water, to be implemented in phases through warning and emergency periods.

G. **Depletive Water Use Budget.** The Good Faith Agreement directs DRBC to develop and adopt a water use budget, incorporating a regulatory program to limit future consumptive use in such a way as to balance existing, new and expanded uses with the actual availability of storage capacity required to meet salinity objectives and compensate for the consumption. Applications for new or expanded depletive uses within the Basin in excess of the "budget" amount available for allocation will not be approved by the States or by the Commission unless (1) new storage capacity is brought on line, (2) existing uses are proportionally reduced by conservation or abandonment, or (3) the new or expanded uses are offset by water imported from outside the Basin. This element has not be implemented to date.

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H. Development of Additional Reservoir Storage.

The Good Faith Agreement commits the parties to a series of early action projects (F. E. Walter, Prompton, Cannonsville, and Merrill Creek) to improve storage capacity and increase flow maintenance capability. Three of the four high priority reservoir projects concentrate on modifications or additions to existing dams.

Project	Target Completion Date	Status
F. E. Walter Reservoir Modification	12/31/90	Delayed due to financing arrangements.
Prompton Reservoir Modification	12/31/95	PA, NJ and DEL have not agreed to arrangements for financing. Congressional support for implementation is questionable.
Merrill Creek Reservoir	12/31/86	Delayed, but construction is nearing completion.
Cannonsville Reservoir Enlargement	1990	Implementation was subject to a feasibility study, which indicated expansion was not cost-effective.

I. Financing Arrangements for Projects

Black & Veatch, Report on Relative Benefit Allocation and Alterative Water Charge Schedules for Commission Sponsored Reservoir Projects, Volumes 1 and 2, prepared for the Delaware River Basin Commission (1987); Final Summary Report and Recommendations of the Water Project Financing and Water Charges Advisory Committee, prepared pursuant to DRBC Resolution No. 85-35. DRBC, Recommendations for Alternative Financing

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and Water Charging systems for the DRBC-Sponsored Water Storage Projects of Beltzville, Blue Marsh, and Francis E. Walter Resrvoirs (April 7, 1988)

VIII. Reflections on the Delaware Experience

- Dynamic water management problems require flexible and dynamic institutional arrangements.

- Establishing a regional entity is not a solution; it is a vehicle to solutions. A compact commission, on the DRBC model, can be an effective forum for management, if it is used regularly and with vigor.

- To be successful, a regional compact and institution must go beyond planning and prophetic pronouncements. The power to make a decision and see it implemented is essential.

- It takes time and political will to create attitudes and institutions which, in the words of the Delaware Compact, can serve as a vehicle for the exercise of the joint sovereignty of the States over common natural resources.

Appendices

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Water Quality Programs of the Delaware River Basin Commission

Delaware River Basin Commission

DELAWARE • NEW JERSEY
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Photos from top, left to right:

1. (from left to right) DRBC interns Taylor Krolik and Julia Ragazzo and DRBC Water Resources Scientist Elaine Panuccio collect Delaware River samples at the Calhoun Street Bridge in Trenton, N.J. to be analyzed for nutrients. Photo by DRBC.
2. DRBC Geologist Bob Damiani collects a water sample from a Delaware River tidal tributary for nutrient analysis. Photo by DRBC.
3. (from left to right) DRBC Water Resource Planner Doug Rowland, DRBC intern Andrew Garcia, and DRBC Water Resources Scientist Elaine Panuccio (underwater—snorkel) perform biomonitoring on the Delaware River. Photo by DRBC.
4. DRBC Sr. Environmental Toxicologist Ron MacGillivray, Ph.D. (left), and Sr. Geologist Greg Cavallo, PG, collect a sediment sample from a tidal tributary to the Delaware River. Photo by DRBC.
5. DRBC interns Julia Ragazzo (left) and Megan Andreason (right) monitor the Delaware River from Kittatinny Visitor Center's beach near the Delaware Water Gap as part of DRBC's Scenic Rivers Monitoring Program. Photo by DRBC.
6. DRBC staff perform nutrient monitoring of the Delaware River from the Calhoun Street Bridge in Trenton, N.J. Photo by DRBC.
7. DRBC Water Resource Modeler Dr. Li Zheng (left) and Water Resource Modeling Manager Dr. Namsoo Suk collect surface water samples for nutrient analysis. Photo by DRBC.
8. DRBC Water Quality Assessment Manager John Yagecic, P.E. (front) and former intern Eric Wentz prep samples collected for radiochemistry analysis for the lab. Photo by DRBC.
9. DRBC Water Resources Scientist Elaine Panuccio holds the net used to collect macroinvertebrates (aquatic bugs) underwater during a biomonitoring sampling event on the Delaware River. Photo by DRBC.

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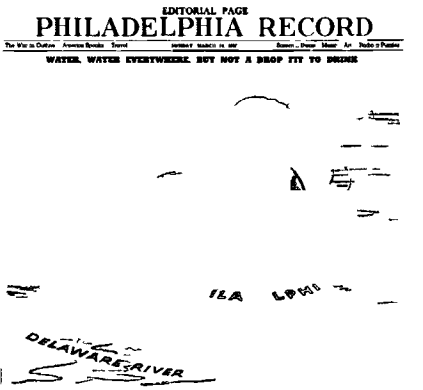
Water Quality Programs of the Delaware River Basin Commission

Introduction

A Historical Perspective

Pollution in the Delaware River, particularly in the tidal reaches of its urban centers, began to be a recognized problem by the eighteenth century and continued to be a serious issue over the next 200 years. This was mostly due to rapid population growth and increased industrial activities, which used the river as an open sewer and dumping ground. Severe pollution was most evident by the prevalence of waterborne illnesses and in the sharp decline of migratory fish populations, such as the American shad and Atlantic sturgeon. Parts of the estuary were considered dead zones, almost or completely devoid of oxygen needed for the survival of aquatic life.



The 1937 *Philadelphia Record* editorial page cartoon depicts the time when the tidal Delaware was an open sewer, where pollution in some stretches robbed the river of all its oxygen needed to support fish and other aquatic life.

What Was Done?

In the late 1930s, these problematic conditions prompted the formation of the Interstate Commission on the Delaware River Basin, or INCODEL, by Delaware, New Jersey, New York, and Pennsylvania. Cleaning up the severe water pollution in the Delaware Estuary was at the top of this advisory commission's priorities. The first set of interstate water quality standards was adopted through INCODEL, initiating the creation of new sewage treatment plants and also the completion of dredging the Schuylkill River and Delaware Estuary of coal silt, which was one of the nation's first non-point source pollution control programs.

Building on the experiences of INCODEL, the Delaware River Basin Commission (DRBC or commission) was established in October 1961 when the Delaware River Basin Compact became law. The commission was formed well before the 1970 creation of the Environmental Protection Agency, the 1972 passage of the federal law commonly known as the Clean Water Act, and the formation of many state environmental agencies. Like INCODEL, the commission's members are the four basin states (Delaware, New Jersey, New York, and Pennsylvania), but the DRBC includes a fifth representative, the federal government.

However, DRBC is distinctly different than the advisory INCODEL, as it acts as a regional body with the force of law to manage the water resources of the Delaware River Basin without regard to political boundaries. The compact's signing marked the first time that the federal government and a group of states joined as equal partners in a river basin planning, development, and regulatory agency. The *ex officio* commission members are the basin state governors and the

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commander of the North Atlantic Division of the U.S. Army Corps of Engineers, who represents the federal government and all federal agencies.

DRBC delved head-first into its water resources management role, initially focusing on cleaning up the tidal river's polluted waters. In 1967 it adopted comprehensive water quality standards, including bacterial standards for primary and secondary contact recreation (i.e., swimming and boating, respectively), and standards for dissolved oxygen. The standards were tied to an innovative waste load allocation program which factored in the waste assimilative capacity of the tidal Delaware River (the predecessor to today's "total maximum daily loads", or TMDLs).

(seated left to right) Governors Robert Meyner of New Jersey, Elbert Carvel of Delaware, and David Lawrence of Pennsylvania joined President John F. Kennedy at the White House on November 2, 1961, to participate in a ceremonial signing of the Delaware River Basin Compact.

A year later in 1968, the DRBC adopted regulations for implementing and enforcing the standards. The Clean Water Act of 1972 further assisted the implementation of water pollution control efforts in the basin by establishing technology-based and water quality-based standards and enforcement programs and creating the National Pollutant Discharge Elimination System (NPDES), which regulates point source discharges into surface waters via a permitting system. Funds for constructing municipal and wastewater treatment facilities were also provided by government partners. Later modifications to the Clean Water Act focused on the important issues of toxic pollutants and non-point source pollution.

> "Only the Delaware among the nation's river basins is moving into high gear in its program to combat water pollution."
>
> 1968—Stewart Udall, Secretary, U.S. Dept. of the Interior (1961–1969)

By the late 1980s, over one billion dollars had been spent on improving wastewater treatment facilities in the Delaware River Basin, which benefited communities along the river and strengthened fish populations. DRBC began its Delaware Estuary Toxics Management Program in 1989 to develop methods to control the discharge of toxic pollution from wastewater treatment plants into the estuary. New rules were adopted in 1996 that added many toxic substances to what was originally regulated in wastewater treatment plant discharge. DRBC's toxics criteria was most recently updated in 2010, and a revision to its water quality criteria for polychlorinated biphenyls (PCBs) was approved in December 2013.

In contrast to the conditions found in the more heavily developed estuary, monitoring demonstrated that water quality in the non-tidal Delaware was already better than standards. DRBC in 1992 launched its Special Protection Waters (SPW) program, which set regulations in place to "keep the clean water clean" in the 121-mile stretch of the Delaware River from

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Hancock, N.Y. to the Delaware Water Gap. In 2008, SPW designation was expanded to include the Lower Delaware Scenic and Recreational River, making the entire 197-mile non-tidal Delaware. This is believed to be the longest stretch of river in the nation with an anti-degradation policy program in place.

> "Water quality in the non-tidal portion of the Delaware River is perhaps the purest of all the large rivers in the mid-Atlantic and northeastern United States."
>
> 2012 – National Park Service, *Delaware River Basin Wild and Scenic River Values* (Sept. 2012)

How About Now?

Today, the clean-up of the Delaware is hailed as one of the world's top water quality improvement success stories. The river now supports year-round fish populations, as well as those returning to their natal waters to spawn. Bald eagles, which depend on fish as their primary food source, reside and nest throughout the basin from the river's headwaters to the bay. Pleasure craft marinas line waterfronts once visited only by commercial vessels, and river-based recreation is one of the region's top economic sources. Officially designated water trails exist for the non-tidal Delaware and a portion of the tidal river, as well as for the Lehigh and Schuylkill rivers, the two largest tributaries to the Delaware.

These improvements, as well as other DRBC accomplishments, over the past fifty-plus years are rooted in the Delaware River Basin Compact's chief canon: that the waters and related resources of the basin are regional assets vested with local, state, and national interests that all share joint responsibility to maintain and protect. DRBC stresses the importance of partnerships as a wise leveraging of public dollars and a way to work together towards this common goal.

However, this accomplishment does not mean that the work is over. While water quality is still in need of improvement in some sections of the river, it is better than standards in other stretches and needs to be maintained at these higher levels. As new technology enhances DRBC's ability to detect, monitor, track, and model pollution in the river, the commission's policies, programs, and abatement efforts must adapt and evolve in order to continually improve the basin's water quality for future generations.

Learn more about DRBC at http://www.nj.gov/drbc/about/.
Learn more about DRB water quality at http://www.nj.gov/drbc/quality/.

The Foundations of DRBC's Water Quality Initiatives

Article 5 of the Delaware River Basin Compact defines the commission's water quality mandates, which direct the DRBC to take the lead on water quality matters pertaining to the basin by adopting regulations:

> "…to control such future pollution and abate existing pollution, and to require such treatment of sewage, industrial or other waste within a time reasonable for the

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construction of the necessary works, as may be required to protect the public health or to preserve the waters of the basin for uses in accordance with the comprehensive plan." (Compact, §5.2)

The commission's first Water Quality Regulations were adopted in March 1967 and are divided into two main sections: Article 3 - Water Quality Standards for the Delaware River Basin and Article 4 - Application of Standards. Standards were created for main stem water quality zones and also for the basin in its entirety. The regulations, which have been updated and revised periodically, are a part of the commission's Water Code and are an important mechanism by which commission members work together to manage the water resources of the basin. Three of the four basin states (not NYS) utilize these standards either directly or if they are more stringent than state standards.

The Compact also provides that no project having a substantial effect on the water resources of the basin shall be undertaken unless it shall have been first submitted to and approved by the commission (Compact, §3.8). The commission reviews projects that withdraw from or discharge to the basin's waters over certain thresholds. In accordance with Section 3.8 of the Compact, the commission is required to approve a project whenever it finds and determines that the project would not substantially impair or conflict with the comprehensive plan, i.e., not adversely impact the water resources of the basin. The commission provides by regulation for the procedure of submission, review, public input, and consideration of projects and for its determinations pursuant to Section 3.8.

Learn more about DRBC's authorities, regulations, and guidance at http://www.nj.gov/drbc/about/regulations/.

DRBC Tenets for Integrated Water Resources Management

There are several self-evident truths about integrated water management that the commission adheres to when managing the basin's water resources, including its water quality. First, water does not respect political boundaries and should be managed on a holistic, watershed basis that takes into account surface water and groundwater and also stormwater and wastewater. Second, what happens on the land affects the water and what happens upstream affects downstream users. Third, water management is collaborative; all levels of government, including federal, state, interstate, and municipal, as well as local stakeholders, must be engaged in the process. And, lastly, water management must be adaptive to changing conditions, new science and technology, and the changing of regional priorities.

The commission works with various federal, state, and local agencies, non-profit organizations, and other stakeholders. The commission oversees various advisory committees and subcommittees that bring together all of these partners to share information on a variety of issues. Several, including the Monitoring Advisory and Coordination Committee, the Toxics Advisory Committee, and the Water Quality Advisory Committee, focus specifically on addressing water quality topics. This coordination amongst its many varied stakeholders,

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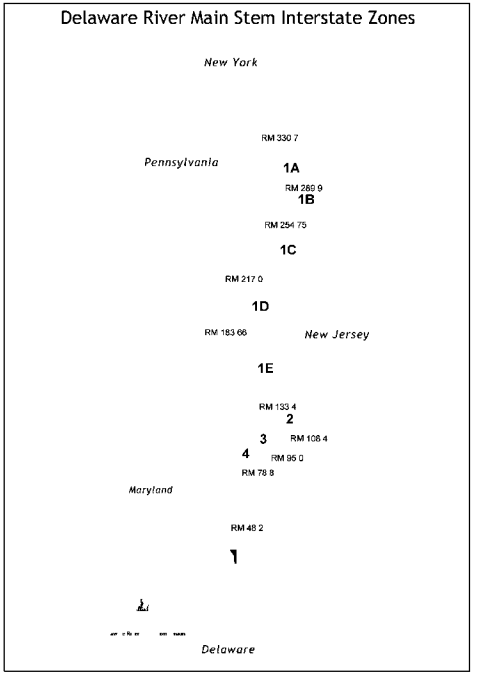
regardless of political boundaries or agendas, demonstrates DRBC's ability to be a forum to address issues that affect the watershed as a whole.

The DRBC framework allows its five members to come together to jointly determine what is needed to best improve and protect the basin's water resources and how to accomplish this in an integrated, non-duplicative, and adaptive manner based on sound science. The nature of DRBC's water quality management activities relies on this interstate coordination and cooperation. For instance, the agency maintains agreements with all four basin states regarding project review. Projects that lie within the basin must comply with DRBC standards as well as state standards; whichever standard is stricter applies. All docket approvals and new or amended DRBC regulations are considered by the commission after an open process that includes holding public hearings and inviting public comment. All commission regulatory decisions are made at public meetings.

DRBC's Water Quality and Monitoring Programs: You Can't Manage What You Don't Measure

The commission uses a multi-faceted strategy to water quality regulation that provides a rational approach to protecting and restoring water quality in the basin. The waters of the basin are protected for designated uses through established water quality criteria that specify what levels of individual parameters are appropriate to protect the uses for the different water quality zones of the river (see map on right). Criteria have been established to protect both human health and aquatic life. DRBC's monitoring programs provide a mechanism to evaluate how those criteria are being met, and assessment of collected data provide the link to how well the designated uses are being protected.



In addition to monitoring to ensure compliance with established water quality standards, DRBC staff scientists monitor to maintain existing water quality in Special Protection Waters, where water quality is above standards. Monitoring is also undertaken to develop total maximum daily loads (TMDLs) and assimilative capacity determinations, to establish and calibrate water quality models, and to track the salt front for reservoir operations. Additionally, monitoring helps evaluate emerging threats to the water resources of the Delaware River Basin.

Every other year DRBC compiles the Delaware River and Bay Water Quality Assessment Report for the U.S. EPA to assess the Delaware River and Bay's

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support of various uses, such as aquatic life, drinking water, fish consumption, and recreation, which are protected by the DRBC's Water Quality Regulations and the federal Clean Water Act. The most recent assessment report was submitted to the U.S. EPA in 2016.

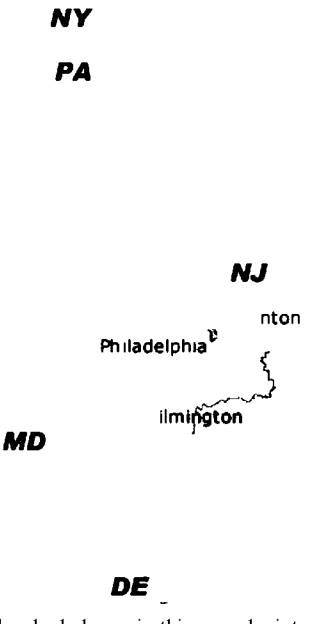
Learn more at http://www.nj.gov/drbc/programs/quality/.

Brief Summaries of DRBC Water Quality and Monitoring Programs

Special Protection Waters (SPW): Keeping the Clean Water Clean

The SPW program, initially adopted by the DRBC in 1992 and expanded in 1994 and 2008, is designed to prevent degradation in streams and rivers where existing water quality is better than the established water quality standards through stricter control of wastewater discharges and reporting requirements. Currently, the entire 197-mile non-tidal Delaware River from Hancock, N.Y. to Trenton, N.J. is considered Special Protection Waters, three-quarters of which is also included in the National Wild and Scenic Rivers System.

The program states that there will be no measurable change in existing water quality (EWQ) of SPW waters except towards natural conditions. This is accomplished by taking a watershed approach, looking also at the drainage area of the designated waters, and by regulating both point and non-point source discharges. It allows new or expanded pollutant loadings as long as they do not measurably change the existing water quality and considers the cumulative impacts of these loadings, rather than just looking at them individually.



The shaded area in this map depicts the drainage area to SPW.

SPW regulations are unique in that they require monitoring to determine if measurable change is occurring at designated interstate and boundary control points where existing water quality has been defined. This monitoring program is conducted through an informal partnership between the National Park Service (NPS) and the DRBC called the Scenic Rivers Monitoring Program. Data collected are also used in computer models developed for priority tributaries, i.e. those that have a high number of existing discharges or are expected to have new growth and associated wastewater discharge needs. The models are used to predict possible changes to water quality and to establish discharge limits to prevent a measurable change.

DRBC believes that these regulations establish an anti-degradation policy on the longest stretch of any river in the nation. Ensuring that the level of water quality in Special Protection Waters

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is not degrading over time is the ultimate goal of the program: to keep water quality above existing standards, or, simply, to keep the clean water clean.

In 2016, DRBC published the *Lower Delaware Water Quality Assessment*, which compared water quality data initially collected from 2000-2004 to the assessment period of 2009-2011. The report showed that for most water quality parameters at most locations, there were no measurable changes to EWQ in this 76-mile stretch of river from Portland, Pa. to Trenton, N.J. These results demonstrate that DRBC's Special Protection Waters (SPW) program is working and plays an important role in managing water quality in the Delaware River Basin.

Also in 2016, DRBC released a technical document entitled *Existing Water Quality Atlas of the Delaware River Special Protection Waters*. This report compiles EWQ for 85 locations on the entire upper, middle, and lower Delaware River SPW. The primary use of the Atlas will be to document site-specific water quality, allowing the commission to monitor for measurable changes in the river and track SPW program effectiveness over time.

Learn more about SPW at http://www.nj.gov/drbc/programs/quality/spw.html.
Learn more about the Lower Delaware Water Quality Assessment at
http://www.nj.gov/drbc/programs/quality/lower-delaware_EWQassessment2016.html.
Learn more about the SPW Water Quality Atlas at
http://www.nj.gov/drbc/programs/quality/spw_ewq-atlas.html.

DRBC/NPS Scenic Rivers Monitoring Program and Lower Delaware Monitoring Program

DRBC and NPS partner in this effort to monitor and manage the water quality in the Special Protection Waters and National Wild and Scenic River segments of the Upper Delaware Scenic and Recreational River (UPDE), the Delaware Water Gap National Recreation Area (DEWA), and the Lower Delaware Scenic and Recreational River (LDEL). All of these river segments are considered to have exceptionally high scenic, recreational, ecological, and/or water supply values.

NPS staff lead the monitoring programs in UPDE and DEWA, while commission staff are in charge of the LDEL program. The goals are to assess compliance with EWQ targets and to determine whether EWQ is currently being maintained in SPW. Throughout the 197-mile non-tidal river, close to 60 sites are sampled between May and September and analyzed for nutrients, dissolved oxygen and other conventional pollutants, solids, and bacteria. Samples are taken from the main stem river and also at tributary confluences and are analyzed by academic institutions or state laboratories.

DRBC staff collect water samples from the Lower Delaware for the Scenic Rivers Monitoring Program.

Learn more at http://www.nj.gov/drbc/programs/quality/spw.html.

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DRBC Biological Monitoring Program

DRBC's biomonitoring program began in 2001 and includes the development and implementation of methodologies for assessing ecosystem health and biological water quality criteria to support evaluation of water quality in the non-tidal Delaware River. Each year, typically during August and September, commission staff collect samples at 25 riffle habitat sites from Hancock, N.Y. to just above the head of tide at Trenton, N.J. These sampling efforts include collection and identification of benthic macroinvertebrates (aquatic bugs); certain species are more sensitive to pollution and finding these are a good indicator of water quality. Benthic periphyton (alga) are also sampled and habitat characteristics are documented to provide a complete overview of the diversity and health of the aquatic life community.

DRBC staff collect a macroinvertebrate sample as part of DRBC's biomonitoring program.

The biomonitoring program also gathers information on other significant natural resources of the Delaware River Basin, such as fisheries, aquatic plants, mussels, and invasive species (both aquatic and riparian plants and animals). In addition, staff support the member states and the U.S. EPA in their regional biological monitoring surveys. Samples are analyzed by the Academy of Natural Sciences of Drexel University in Philadelphia, Pa.

Learn more at http://www.nj.gov/drbc/quality/reports/biomonitoring.html.

Monitoring for the Invasive Didymo

In the spring of 2012, the invasive aquatic alga *Didymosphenia geminata* (aka Didymo, or rock snot) was discovered throughout the non-tidal portion of the Delaware River. While Didymo had been found in the cold, moving waters of the river's east and west branches and sections of the upper main stem since 2007, this rapid proliferation throughout the entire non-tidal river was surprising because of the alga's potentially detrimental effects on ecosystems and the ease of which it can be transferred from one waterway to another.

A rock covered in Didymo, collected from the Delaware River at Matamoras, Pa. in 2012.

Once Didymo is found in a body of water, there is no known way to fully eradicate it; containment and education become the main priorities. Over the remainder of the spring and summer of 2012, DRBC staff and scientists from New Jersey, New York, Pennsylvania, and the NPS coordinated sampling efforts to monitor its presence and densities at various locations and the extent of its spread. As the Delaware River warmed during late spring and summer, Didymo began to die-off throughout most of the river. However, as expected, Didymo persisted in the colder temperature regions where it had been found in previous years.

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The complex seasonal changes in Didymo and other stalked diatoms, as well as how nutrients may impact the alga's morphology, continue to be studied by DRBC staff, with many questions remaining about the role of Didymo in the Delaware's ecosystem.

Learn more at http://www.nj.gov/drbc/home/spotlight/approved/20120531_didymo.html.

Monitoring to Establish Baseline Conditions in the Upper Delaware Basin in Advance of Potential Natural Gas Development

The commissioners' decision in 2010 to place a de facto moratorium on shale gas drilling in the basin pending adoption by DRBC of new regulations specific to natural gas development allowed time for staff to conduct monitoring in order to characterize pre-gas drilling baseline conditions in the upper section of the Delaware River Basin. In this region, the Marcellus Shale underlies the commission's Special Protection Waters drainage area, where regulations require no measurable change to the existing high water quality. By establishing pre-gas drilling conditions, DRBC will be in a stronger position to minimize impacts from gas development activities should they commence and to compel remedial action if impacts to water resources do occur.
The five main focus areas for baseline characterization included:

- Reanalysis of frozen samples for hydraulic fracturing-related parameters: As part of the Scenic Rivers Monitoring Program, the Academy of Natural Sciences froze over 700 samples collected in 2009 and 2010. Thanks to funding by NPS and the Haas Foundation, DRBC contracted with the Academy to thaw these frozen samples and reanalyze them for chemical parameters related to hydraulic fracturing, such as barium and strontium.
- Deployment of HOBO® continuous conductivity meters: Six meters were deployed in the upper Delaware watershed from 2012-2014 to collect continuous water quality data to provide a better understanding of baseline conductivity and temperature ranges over a variety of flows and conditions. The data collected will allow DRBC to better differentiate between conductivity spikes that may arise due to natural gas drilling-related activities versus background conditions.
- Collection of new biological samples to fill gaps in existing monitoring efforts: Funded by a grant from the Haas Foundation, DRBC staff collected new biological monitoring samples at over 100 locations in Pennsylvania and New York in the spring and summer of 2011. These new samples, collected using state-specific monitoring protocols, provide a strong baseline from which to define pre-gas drilling biological conditions.
- Evaluating appropriate toxicity tests: Working with the Stroud Water Research Center and American Aquatic Testing, DRBC completed a study to determine whether or not selected toxicity test methods and species are appropriate to measure baseline ambient water conditions in SPW waters, to monitor cumulative effects of natural gas development in surface water (including accidental releases), and to monitor wastewater from treatment plants receiving flowback/production water.

DRBC intern Carey Wu works on a HOBO® meter deployed in the Oquaga Creek in 2013.

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- Radiochemistry monitoring: DRBC received a grant in 2013 from the William Penn Foundation to conduct radiochemistry monitoring in the upper and middle Delaware River. In 2014, 32 locations were sampled quarterly for gross-alpha, gross-beta, Radium-226 and Radium-228. A final report and analytical results can be downloaded via the below link.

Learn more at http://www.nj.gov/drbc/programs/natural/baseline-monitoring.html.

Lower Delaware River Mussel Study

In the summer of 2013, to help fill the gap in understanding freshwater mussel occurrence and species distribution, the DRBC and the USGS Northern Appalachian Research Laboratory leveraged NPS monies, other funding resources, and in-kind contributions to conduct mussel surveys of the non-tidal lower Delaware River. The surveys began near the Portland-Columbia footbridge (river mile 208) and extended 75 miles downstream to the head-of-tide at Trenton, N.J. Surveys were conducted in three phases, totaling seven weeks. A final report was completed for the NPS in 2014.

Freshwater mussels are filter feeders and very important for water quality.

Learn more at http://www.nj.gov/drbc/home/spotlight/approved/20131115_mussels.html.

Monitoring for PCBs & Pollutant Minimization Plans

Polychlorinated biphenyls (PCBs) are a class of carcinogenic chemicals present in the waters of the Delaware Estuary at concentrations up to 1,000 times higher than the water quality criteria. Widely used in transformers, capacitors, and other electrical equipment, the U.S. banned the manufacture of PCBs in 1976. Existing uses were permitted, however, and their chemical stability allows them to persist in the environment to this day. There are numerous sources of PCBs in the Delaware Estuary, which enter fish and other wildlife through absorption or ingestion, and accumulate in their tissues at levels many times higher than in the surrounding water and sediment and at levels unsuitable for human consumption.

Because high levels of PCBs have resulted in state-issued fish consumption advisories for certain species caught in the Delaware Estuary, these waters were and continue to be listed as impaired, requiring the establishment of a PCB total maximum daily load (TMDL). A TMDL expresses the maximum amount of a pollutant that a water body can receive and still attain water quality standards.

At the request of the three estuary states and the U.S. EPA, DRBC, working closely with its Toxics Advisory Committee and others, developed the technical basis for the Stage 1 PCB TMDLs for the Delaware Estuary (DRBC WQ Zones 2-6). The U.S. EPA established the Stage 1 PCB TMDLs for Zones 2-5 in 2003 and for Zone 6 in 2006. To support the

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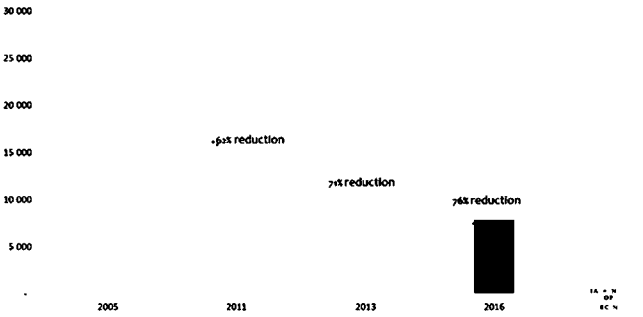
implementation of the Stage 1 TMDLs, DRBC monitors ambient waters, sediment, and fish tissue to provide precise and defensible data on the PCB concentrations in the Delaware Estuary.



In addition to checking water, sediment, and fish for PCBs, DRBC requires Pollution Minimization Plans (PMPs) to reduce or eliminate PCBs where they are known to exist. The PMP rule, adopted by the commission in May 2005, establishes a non-numeric approach requiring the track down and reduction of point source and non-point source discharges of PCBs in the Delaware Estuary. The goal of this program is to work toward meeting water quality standards and to eliminate fish consumption advisories due to PCBs. PMPs require biennial PCB sampling and submission of an annual report summarizing PCB loading reduction efforts.

Recent reports show that the PMPs required by DRBC are working. The top ten dischargers responsible for 90% of the point-source PCB loading have reduced their contributions 76% from 2005-2016. This improvement hopefully will be reflected as reduced amounts of PCBs found in fish tissue in future years.

In December 2013, DRBC approved a revision to its human health water quality criteria for protection from carcinogenic effects of PCBs in Zones 2 - 6 of the Delaware Estuary. With DRBC's adoption of revised PCB criteria, it is anticipated that the U.S. EPA will establish new TMDLs (Stage 2 TMDLs) corresponding to the updated criteria.

Learn more about PCBs at http://www.nj.gov/drbc/quality/toxics/pcb.html.
Learn more about PMPs at http://www.nj.gov/drbc/programs/quality/pmp.html.

Non-Tidal Lower Delaware River Metals Sampling

The DRBC's Toxics Advisory Committee has recommended that the DRBC adopt toxics criteria for the non-tidal lower Delaware River. In 2012, a project plan was developed for sampling 13 sites for metals and supplemental physical-chemical data; sampling began in 2013. The resultant data from this monitoring effort will inform a sound technical approach for developing protective and applicable water quality criteria for metals in these non-tidal freshwaters.
Learn more at http://www.nj.gov/drbc/quality/toxics/monitoring-metals.html.

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Assessment of Metals in Estuarine Waters

DRBC monitors metals, such as copper, zinc, nickel, and mercury, in ambient water, sediment, and tissues of aquatic life of the Delaware Estuary to ensure compliance with water quality criteria. Water quality assessment of metals is complicated by factors such as field sampling techniques, analytical issues with contamination, detection limits associated with routine analytical procedures, and the applicability of freshwater or marine criteria in the river's estuarine waters. DRBC works to ensure the use of the most appropriate methods and procedures for the conduct of monitoring studies in the basin.

DRBC staff collect a filtered sample during a July 2012 special copper survey in the Delaware Estuary.

In water quality Zone 5 of the Delaware River, which extends from the Pa.-Del. state line south to Liston Point, Del., copper concentrations continue to be near water quality criteria with several apparent exceedances of the marine criteria in the vicinity of Pea Patch Island, Del. In 2012, the DRBC performed additional data collection for copper, zinc, and nickel using enhanced analytical methods and modified collection procedures in this section of the Delaware River. The technique used is called "Cleans Hands/Dirty Hands" and results in very low contamination of the sample by other metal sources. The information collected as part of this study will provide additional data to help determine metals concentrations in ambient water and whether the commission's metal criteria are exceeded.

Learn more at http://www.nj.gov/drbc/quality/toxics/monitoring-metals.html.

Monitoring Toxicity in the Delaware Estuary

Monitoring toxicity is an essential component of programs designed to protect water quality and assess compliance with regulatory standards. Based on DRBC's water quality regulations for the estuary to protect against short-term (i.e. acute) and long-term (i.e. chronic) effects on aquatic life from toxic pollutants, no adverse effects should be observed in toxicity tests with undiluted ambient water. As part of ongoing programs to control toxic substances in the Delaware Estuary, the DRBC conducts periodic monitoring of ambient water toxicity in the estuary and has requested monitoring of acute and chronic effluent toxicity by dischargers.

Learn more: http://www.nj.gov/drbc/quality/toxics/ambient-tox.html.

Delaware Estuary Boat Run Water Quality Monitoring Program

Initiated in 1967, *the Delaware Estuary Boat Run Water Quality Monitoring Program is one of the longest running monitoring programs in the world.* Each year, DRBC contracts with the Delaware Dept. of Natural Resources and Environmental Control to collect surface water

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samples in the Delaware Estuary, from the head of tide at Trenton, N.J. to the mouth of the Delaware Bay. Samples are collected at 22 stations to manage water quality and ensure that criteria are being met. The goals of the program are to provide accurate, precise, and defensible estimates of the surface water quality of the Delaware Estuary and to allow assessment of water quality criteria compliance. Sample analysis includes routine and bacterial parameters, nutrients, dissolved oxygen, heavy metals, chlorophyll-a, dissolved silica, and volatile organics.

Bacterial sampling results are posted on the commission's web site, and the other data are inputted into U.S. EPA's water quality database, STORET, which is available to the public.

DRBC staff developed an interactive application that allows the user to explore water quality data collected from the DRBC Delaware Estuary Boat Run Water Quality Monitoring Program from 1999-2016.

Learn more and use the data application at http://www.nj.gov/drbc/quality/datum/boat-run.html.

Contaminants of Emerging Concern

Contaminants of emerging concern (CECs) are chemicals that have entered the environment through human activities and are not routinely monitored for and are currently unregulated. They have been detected in humans or other organisms and have been found to persist in the environment. Examples include pharmaceuticals and personal care products (PPCPs), hormones, flame retardants (PBDEs), and flame repellents/non-stick surface coatings (PFASs).

DRBC's Dr. Ron MacGillivray collects surface water samples to analyze for PFCs, a contaminant of emerging concern.

Although most of these compounds have been detected in surface waters at very low concentrations, there is concern about how CECs may impact drinking water and the river's ecology. Increased interest in these substances and their toxic effects by scientists, the public, and regulators is occurring due to improved analytical methods and a growing body of information on the adverse effects of CECs.

A number of efforts have been undertaken within the Delaware River Basin to identify, understand, and prioritize CECs, including a three-year effort by DRBC to investigate the presence and concentration of PPCPs, PFASs, and PBDEs in the ambient waters of the tidal Delaware River. The commission has an ongoing monitoring program for PFAS/PFC in the main stem Delaware River, examining surface water, fish tissue, and sediment.

Learn more at http://www.nj.gov/drbc/quality/reports/cecs.html.

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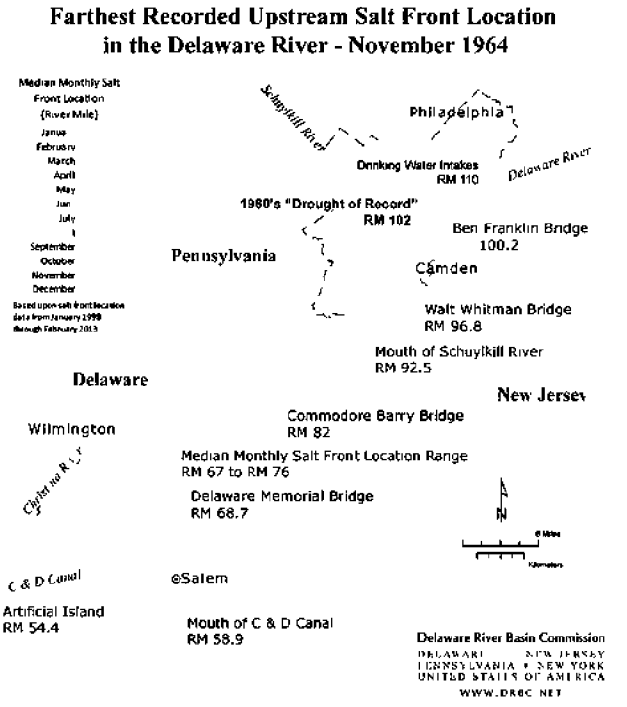
Fish Tissue Monitoring

Since 1990, DRBC has periodically sampled tissues of resident fish species in the non-tidal and tidal portions of the main stem Delaware River. In the non-tidal portion, samples of smallmouth bass and white sucker are collected at three locations: Milford, Pa. (river mile [RM] 246), Easton, Pa. (RM 183), and Lambertville, NJ (RM 149). In the tidal portion of the river, samples of channel catfish and white perch are collected at five locations: Crosswicks Creek (RM 128), Tacony-Palmyra Bridge (RM 107), Woodbury Creek (RM 91), Raccoon Creek (RM 80), and Salem River (RM 58). The samples are analyzed for PCBs, chlorinated pesticides, dioxins/furans, flame retardants, perfluorinated chemicals, mercury, and other metals. These data are used to track the progress of the PCB TMDLs that were established by the U.S. EPA in 2003 and to identify chemical compounds that may pose a risk to human health through fish consumption. These data are also forwarded to state agencies for their use in establishing fish consumption advisories for fish caught in the Delaware River.

Learn more at http://www.nj.gov/drbc/quality/datum/fish-tissue.html.

Chloride Monitoring

DRBC has adopted criteria and monitors chlorides as part of the commission's flow and drought management program, which focuses on controlling the upstream migration of salty water from the Delaware Bay during low-flow conditions. As salt-laced water moves upriver, it can increase treatment costs for public water suppliers and corrosion control costs for surface water users, particularly industry. Salinity levels also affect aquatic living resources.



The seven-day average location of the salt line, the 250 mg/L chloride concentration based on drinking water quality standards originally established by the U.S. Public Health Service, is routinely tracked as it fluctuates along the tidal Delaware River in response to changing flows, which either dilute or concentrate chlorides in the river.

Learn more at http://www.nj.gov/drbc/quality/conventional/chlorides-monitoring.html.

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DRBC Modeling Efforts

DRBC develops and applies various models for basin waters. Examples of models created and utilized by DRBC staff include the following:

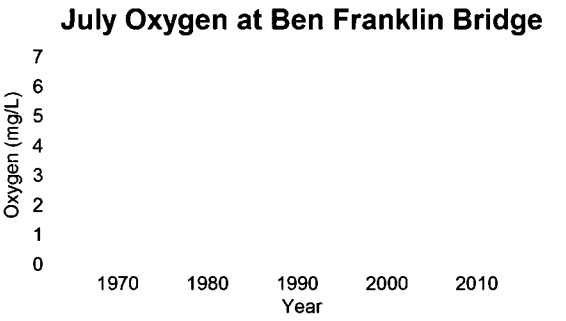
- A real-time flow and transport model, which is run nightly and tracks the movement of water in the tidal Delaware River. If a spill occurs, the most recent model run can be used along with a water quality model to predict where the pollutant will go and what the concentrations will be. This is especially important to protect drinking water intakes in the tidal Delaware River;
- Models to determine mixing zones for total dissolved solids, toxic pollutants, and heat dissipation areas for regulated discharges;
- Assimilative capacity determinations for a water quality parameter of concern;
- TMDL development to support basin states and the U.S. EPA; and
- No Measurable Change evaluations for dischargers in Special Protection Waters.

Learn more at http://www.nj.gov/drbc/quality/reports/models.html.

Dissolved Oxygen and Nutrient Levels in the Delaware Estuary

Most forms of aquatic life need dissolved oxygen (DO) to respire or "breathe," and it is important to maintain adequate levels for both migrating and native fish species, juveniles and adults. Oxygen enters water both by direct absorption from the atmosphere and as a by-product of photosynthesis by algae and aquatic plants.

Warmer water generally contains less oxygen than colder water, so the amount of DO naturally varies seasonally and daily as water and air temperatures change. Salinity also affects DO; saltier water carries less oxygen than fresh water. Other things that can decrease the amount of dissolved oxygen in water include wastewater discharges, decaying leaves and algae, some chemical compounds, and nutrients.



This graphic depicts how dissolved oxygen levels in the Delaware River at the Ben Franklin Bridge have improved dramatically since the late 1960s.

Although the worst of the dissolved oxygen problems have been addressed by the commission over the past 50 years, DO conditions in the Delaware Estuary remain a concern even today. Automatic monitors track dissolved oxygen levels at four locations, and although current conditions typically meet the criteria, mid-summer DO is, at times, only 50% or less of full saturation levels in the areas near the Ben Franklin Bridge.

The commission is examining whether current criteria for dissolved oxygen may need

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revision to be better protective of fish reproduction. And, looking ahead, temperature and salinity in the tidal river may increase due to sea level rise and global climate change. This could potentially lower the river's oxygen carrying capacity, therefore making other water quality improvements necessary just to maintain the current, yet still highly changeable, levels of dissolved oxygen in the estuary.

Additionally, DRBC and its partners in state and federal agencies, the regulated community, and the environmental community are studying the connections between dissolved oxygen and nutrient levels in the estuary. Nutrients, such as nitrogen and phosphorus, are natural, essential components of aquatic ecosystems, assimilated by living things to promote growth.

DRBC interns Andrew Garcia and Megan Andreason collect water samples, which will be analyzed for nutrients.

While nutrients are good at certain levels, high levels can overstimulate the production of plants and algae, which utilize dissolved oxygen as they decompose, therefore reducing oxygen levels in the water. This leads to poor conditions in streams and reduced water quality. According to the U.S. EPA, "high levels of nitrogen and phosphorus in our lakes, rivers, streams, and drinking water sources cause the degradation of these water bodies and harm fish, wildlife, and human health."

Nitrogen and phosphorus pollution comes from fertilizers, animal waste, septic systems, storm runoff, and sewage treatment plants. This type of pollution is reported to be a problem in more than half of the water bodies in the nation, including the Delaware Estuary which has an area of reduced dissolved oxygen in the urban river corridor. Elevated levels of nitrogen have been identified as a potential cause.

DRBC serves as the lead coordinating agency among the U.S. EPA and the basin states for evaluating nutrient conditions in the shared interstate waters of the Delaware River and the Delaware Estuary. The DRBC also is the lead agency in determining the nutrient criteria or nutrient-related criteria, if appropriate, that are needed to protect aquatic life, public and industrial water supplies, and recreational uses of these shared resources.

DRBC is currently working to identify appropriate levels of nutrients and necessary measures to take, especially in relation to dissolved oxygen. To address both nutrients and dissolved oxygen, a process has been initiated to measure the point sources of nutrients and oxygen-depleting materials and to build a water quality model to integrate this information and forecast future scenarios for the Delaware Estuary. Although the results from such efforts are not yet available, the goal is to select an appropriate path towards a healthy, functioning ecosystem in all parts of the Delaware Estuary.

Learn more about dissolved oxygen at http://www.nj.gov/drbc/quality/conventional/DO.html. Nutrients info: http://www.nj.gov/drbc/quality/conventional/nutrients-monitoring.html.

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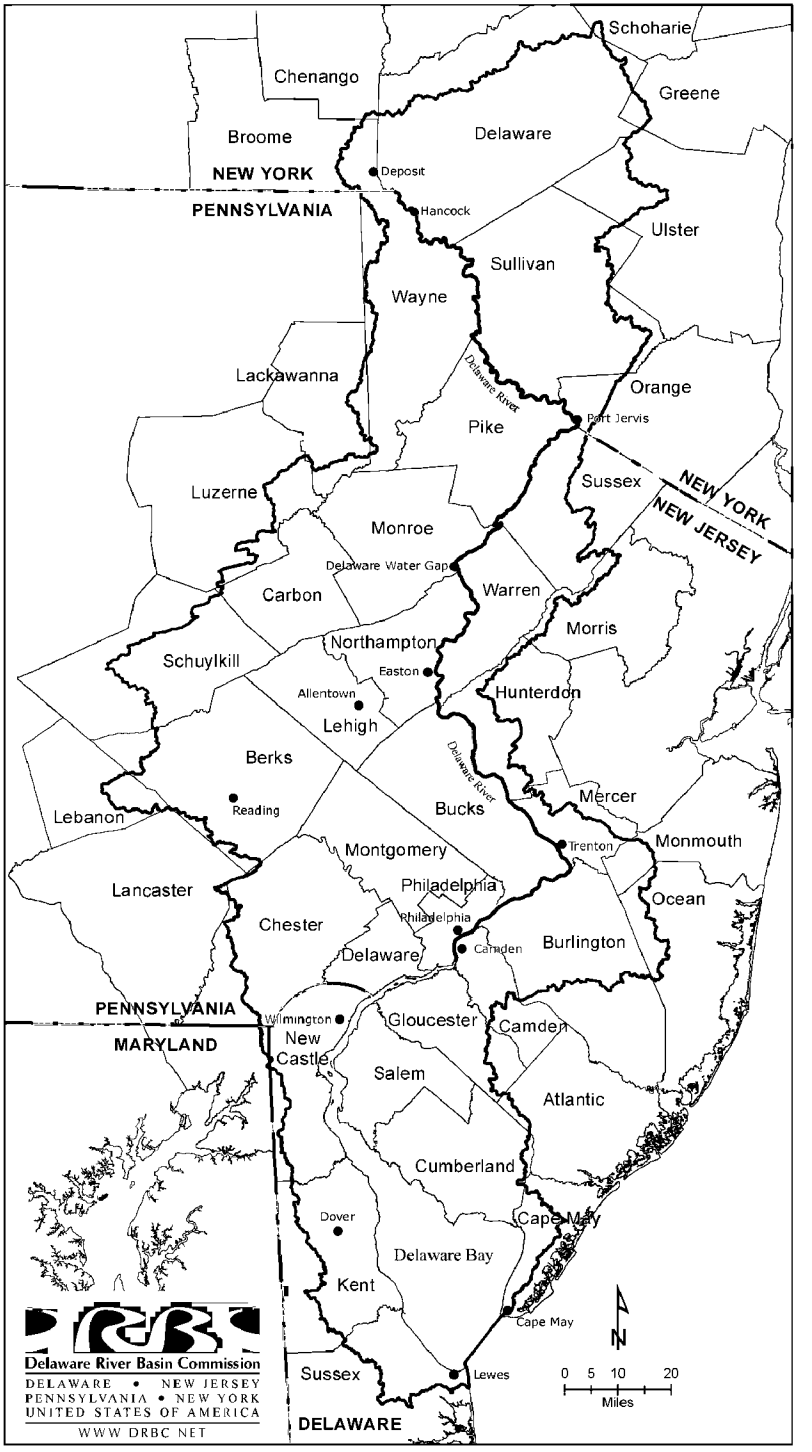

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