UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	
	)	

APPLICANT'S ANSWER TO MOTION OF DEL-AWARE UNLIMITED, INC. TO COMPEL ANSWERS TO INTERROGATORIES

Preliminary Statement

On July 21, 1982, intervenor Del-Aware Unlimited, Inc. ("Del-Aware") served discovery requests upon Philadelphia Electric Company ("Applicant"). On July 27, 1982, Applicant filed objections to certain interrogatories and requests for production of documents and also a motion for a protective order seeking to delimit the scope of discovery to the three contentions granted to Del-Aware by the Atomic Safety and Licensing Board ("Licensing Board" or "Board") in its Special Prehearing Conference Order ("SPCO"), dated June 1, 1982, and its subsequent Memorandum and Order on reconsideration, dated July 14, 1982.

A telephone conference call among, inter alia, the Chairman, counsel for Applicant and counsel for Del-Aware took place on August 2, 1982 regarding Applicant's objections. As a result, Del-Aware filed a motion to compel answers to its interrogatories on August 9, 1982. The

Chairman requested that Applicant respond to the motion by August 13, 1982.

Applicant opposes the motion to compel, which once again is based upon the fundamentally erroneous proposition the Licensing Board has consistently rejected, to wit, that the NRC will engage at the operating license stage in a full-scale review of supplemental cooling water alternatives to the Point Pleasant diversion. However earnest Del-Aware may be in its attempt to reach this broader issue, the Licensing Board has ruled and reaffirmed that it will not expand the scope of Del-Aware's admitted contentions beyond specific issues concerning the operational impacts of the existing plans for the Point Pleasant Pumping Station and Bradshaw Reservoir. The Board should adhere to its previous rulings and refuse to compel the requested discovery, which would far exceed the scope of these three admitted contentions. Accordingly, the motion to compel should be denied.

Argument

For the convenience of the Board and parties, Applicant will respond to each specific request seriatim. For the sake of brevity, the arguments contained in Applicant's previously filed Objections and Motion for a Protective Order ("Objections") (July 27, 1982) will not be repeated at length here. Applicant hereby incorporates and respectfully refers the Licensing Board to this pleading for a further explanation of the reasons discussed below.

Interrogatories 1(d), (e) and (f). In these interrogatories, Del-Aware is requesting information based upon the hypothetical premise that DRBC may alter the conditions it imposed for diversion of water at Point Pleasant for Limerick. Applicant submits that, for the reasons analyzed in its previous pleadings and as determined by the Board in its orders, it is beyond the jurisdiction of the Licensing Board to speculate about possible revisions to the DRBC docket decisions approving the Point Pleasant diversion plan. The Board should not permit discovery on the mere possibility that certain contingencies may occur, resulting in unanticipated changes. Obviously, no one can forecast with certainty what changes in conditions might persuade DRBC to ease or tighten existing limitations on withdrawal of Delaware River water at Point Pleasant.

It is unnecessary for the Commission to engage in such speculation, since its environmental review under the National Environmental Policy Act of 1969, 42 U.S.C. §4231 et seq. ("NEPA") need only encompass reasonably foreseeable environmental consequences without undue speculation or conjecture about uncertain future events. 1/

Delaware raises three points in support of its argument that such conjectural events should be considered. First,

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1/ Environmental Defense Fund, Inc. v. Hoffman, 566 F.2d 1060, 1067-68 (8th Cir. 1977; Minnesota Public Interest Research Group v. Butz, 541 F.2d 1292 (8th Cir. 1976), cert. denied, 430 U.S. 922 (1977); Scientists' Institute for Public Information, Inc. v. AEC, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

Del-Aware speculates that discretionary actions might be taken by DRBC because of possible droughts or because DRBC would not force a "shutdown of Limerick, and risk a blackout." [2/] There is no basis for assuming that DRBC would ignore the important statutory functions it has been delegated by Congress and the parties to the Compact to safeguard and fairly allocate the water resources of the Delaware River Basin. The Board has already ruled that such decisionmaking is beyond its purview.

A second item cited by Del-Aware in speculating that some change in withdrawal conditions might be adopted is a draft report of recommendations prepared by the DRBC members which examines contingent water conservation and drought management actions. The report is entitled "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" (July 1982). [3/] Although the report does consider upstream diversions by New York City and New Jersey in the event of drought conditions, there is no indication that DRBC has even considered the possibility of relieving Applicant from the withdrawal conditions applicable to Limerick. Accordingly, there is no basis for the supposition by

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2/ Del-Aware Motion to Compel at 3.

3/ In the interest of a complete record, Applicant has attached a complete copy of the report, including the accompanying background report.

Del-Aware that any such contingency plans, even if adopted, would result in "permitting PECo to further draw down the flows at Point Pleasant." 4/

In dismissing a challenge to DRBC's final approval of the Point Pleasant diversion plan, the United States District Court for the Eastern District of Pennsylvania further provided an effective answer to such speculation. Addressing itself directly to the claim that DRBC had not adequately factored in possible ramifications resulting from the ongoing "good faith negotiations" cited by Del-Aware above, the court in Delaware Water Emergency Group v. Hansler, 536 F. Supp. 26, 44 (E.D. Pa. 1981), stated:

> Plaintiffs suggest that no action should be taken until there is some final resolution of the so-called "good faith negotiations" by the States of New York, New Jersey, Pennsylvania and Delaware, engendered by the 1954 decree of the United States Supreme Court in New Jersey v. New York, supra. These negotiations have been continuing for many years. There is no certainty or assurance when, if ever, there will be any agreement as to a change in the Supreme Court decree. To suggest that these §3.8 applications (and presumably all other such applications or revisions to the Comprehensive Plan), which scale down previously approved plans for water use from the Point Pleasant pumping station, should be suspended or indefinitely delayed in the vague hope that the four involved states will resolve amicably a readjustment of water withdrawals and allocations, is unrealistic. It would completely defeat and stifle the purposes and direct

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4/ Del-Aware Motion to Compel at 4.

> mandate of the Compact to "develop and adopt . . . a comprehensive plan for the immediate and long range use of water resources of the basin" which DRBC "may from time to time review and revise." (Compact §13.1).
>
> The difficulty with plaintiffs' position from a purely practical viewpoint is, that there have been, are now, and undoubtedly will continue to be for an indefinite number of future years, continuing studies by DRBC and other governmental and private agencies concerning all aspects of the Delaware River and utilization of the waters of this great natural resource. Many studies overlap each other both as to time span, content and agencies involved. The situation will never be fixed or static. There will always be population changes, varying needs and demands for water and continuing industrial, commercial and residential relocations. The whole concept of the Compact compels DRBC to make continuous study of both immediate and long range needs and "from time to time review and revise" the Comprehensive Plan in order to meet the needs of the basin. If plaintiffs' suggestions are adopted, it is quite apparent that it would be virtually impossible to ever amend the Comprehensive Plan or approve the construction of any substantial projects because of incompleted on-going studies.

The final point upon which Del-Aware bases its speculation relates to NWRA's diversion of water for its own water supply needs. Here, again, Del-Aware resorts to the discredited argument that environmental impacts associated solely with NWRA's diversion of water for its sole use should nonetheless be attributed to Limerick because "[b]y facilitating the construction of the intake at Point Pleasant, PECo is directly causative of NWRA's continuing

ability to operate the intake. . . ." 5/ In its prior orders, the Board has expressly ruled that the existence of the NWRA components of the Point Pleasant diversion plan "but for" Limerick is irrelevant. No reason is shown by Del-Aware for departing from these rulings, which now constitute the law of the case. 6/

Accordingly, each of the three reasons advanced by Del-Aware for requesting this particular discovery is based wholly upon speculation and conjecture. There is no justification for assuming that DRBC will not require Applicant to abide by the restrictions it has set in granting formal approval to the Point Pleasant project. To the contrary, the NRC should presume that all orders of DRBC will be enforced and that any possible revisions thereto will be in strict accordance with sound management principles and the public interest, including a thorough analysis of any possible environmental consequences. There is certainly no need for the NRC to prejudge these matters by assuming circumstances to exist before DRBC has even reached any final, binding decision. 7/

5/ Del-Aware Motion to Compel at 4.

6/ See Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2) Docket Nos. 50-443 and 50-444, ALAB "Memorandum and Order" (February 12, 1982) (slip op. at 7).

7/ In a supplement to its motion filed beyond the deadline without the Board's permission and received by

(Footnote 7/ continued on next page)

Interrogatory 1(g). Del-Aware seeks information relating to sources which will provide compensatory water equivalent to water withdrawn at Point Pleasant. Del-Aware states that it needs this information "to predict the frequency and extent to which flows may be reduced below 3000 cfs." [8/] As discussed above, the speculation by Del-Aware that any such changes in withdrawal conditions will occur is an invalid basis for admitting discovery. Further, the Merrill Creek Reservoir would only provide compensating water, e.g., 65 cfs into the Delaware River if 65 cfs is withdrawn at Point Pleasant for Limerick. There is no impact upon downstream fish or boating and recreation in the area of the intake that could result from this flow compensation. The flow level at Point Pleasant whenever any compensatory water is provided upstream will be whatever it otherwise would have been if no withdrawal at Point Pleasant for Limerick had been made.

7/ (Continued)

Applicant's counsel on August 12, 1982, Del-Aware argues that, if the Merrill Creek Reservoir for which an application is presently pending before the DRBC is approved, Applicant may utilize the intake structure at Point Pleasant at river flows below 3000 cfs as measured at the Trenton Gage so long as compensating discharges were made at the Reservoir. While Del-Aware treats this as "newly discovered" information, DRBC considered and approved this mode of operation in Docket No. D-69-210 CP (Final) (November 5, 1975) (pp. 9-10).

8/ Del-Aware Motion to Compel at 6.

Interrogatory 1(i). This interrogatory seeks information relating to operation of the Point Pleasant Pumping Station when the intake is operated solely for the benefit of NWRA during low flow periods. In its motion Del-Aware once more relies upon allegations pertaining to the financial relationship between Applicant and NWRA for construction of the Point Pleasant facilities, a matter which the Board has already ruled to be irrelevant. 9/

Del-Aware notes the Board's ruling that all operational impacts attributable to the joint use of the pumping station may be considered. However, this determination resulted only from the Board's finding that it could not meaningfully segregate the environmental impacts associated with the respective withdrawals. 10/ In this instance, the diversion of water from the Delaware River by NWRA for its own use is clearly distinguishable from any utilization of the facility for Limerick. Under the rationale expressed by the Board, there is no need for the NRC to consider this particular use of the facility pursuant to NEPA, which concerns only major

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9/ Memorandum and Order at 8 (July 14, 1982).

10/ The Board stated: "Further, it appears likely that environmental impacts of a jointly used intake system and reservoir result from the total size and operation of the system and that they cannot meaningfully be separated. In the absence of such a methodology permitting separation, we will consider the total environmental impacts of the Point Pleasant intake and pumping station, the transmission main to the Bradshaw Reservoir, and the Bradshaw Reservoir itself." SPCO at 75.

federal actions, in this instance, the operations of Applicant as an NRC licensee.

Interrogatory 3. This interrogatory seeks information relating to debris and ice conditions which allegedly will necessitate dredging and maintenance activities. No basis in fact has been shown for this assumption, nor is Applicant aware of any such basis. Accordingly, Applicant submits, for the reasons previously discussed in its Objections, that this line of inquiry is wholly irrelevant to conditions and components pertinent to the Point Pleasant intake structure.

Interrogatory 5. This interrogatory asks for information regarding downstream impacts of the water withdrawal at Point Pleasant which have been considered in conjunction with other studies on such matters as control of salinity intrusion. Del-Aware concedes that the Board has rejected this line of inquiry in refusing to admit proposed Contention 16, based upon the binding effect of DRBC's determinations in granting Section 3.8 approval to the Point Pleasant project. 11/ Nonetheless, Del-Aware attempts to

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11/ Del-Aware Motion to Compel at 8. Elsewhere in its motion Del-Aware recognizes that, for the same reasons, it may not seek information "to evaluate the extent or nature of the impact of reduced flows on salinity or . . . [other] matters which are more related to the larger issue of diversions from the Delaware River . . . ." Id. at 6.

(Footnote 11/ continued on next page)

justify this expansion of the issues by stating that the Board has held that it will "consider alternative locations for the withdrawal" to mitigate environmental impacts. 12/

Reference to the Licensing Board's SPCO demonstrates that this explanation is entirely specious and attempts to take the Board's rulings out of context. Thus, the portion of the Board's SPCO relating to mitigation of environmental impacts did not suggest that the Board would consider alternative sites for a supplemental cooling water system for Limerick, but only that it would consider operational impacts of any design change in the existing plans, which were approved in concept by the NRC at the construction permit stage and subsequently given final approval by DRBC. The Board stated:

> Therefore, the Appeal Board found that there were no environmental costs unique to the river follower method of supplementary cooling. However, environmental costs ascertainable only as the plan gained greater concreteness after the construction permit was issued have not been considered by the NRC. It is appropriate that they be considered now, because the plan is now more definite and measures to mitigate impacts may be more apparent. However, absent a determination of significantly increased environmental impacts, we will not consider issues concerning the overall acceptability of the river follower method of cooling. This does not mean we are precluded from considering adjustments to the design

12/ Del-Aware Motion to Compel at 8.

> used for this method of cooling. For example, we may consider the impacts of a change in intake location, but not the fundamental alternative of dry cooling towers. 13/

It is therefore crystal clear that "the plan" to which the Board referred was the existing Point Pleasant diversion plan considered by the NRC at the construction permit stage and granted final Section 3.8 approval by DRBC, and not some unidentified alternative "plan" that could be proposed by an intervenor. In other words, the Licensing Board meant that minor adjustments to the location of the intake at Point Pleasant a bit upstream or downstream might be considered as a design feature in order to optimize the facility's benefits while reducing, if possible, any adverse environmental impacts. Applicant submits that the Board certainly did not envision litigating the desirability of entirely new sites located many miles down the Delaware River near Philadelphia or elsewhere. The same analysis applies to other portions of the Licensing Board's SPCO cited by Del-Aware on this point. 14/

13/ SPCO at 61-62 (emphasis added).

14/ Thus, at page 71 of the SPCO, the Board again refers to possible changes "in the plan" requiring consideration. Likewise, at page 88, the Board's reference to "changes since the construction permits were issued" is directed at the existing Point Pleasant diversion plan. The

(Footnote 14/ continued on next page)

cooling water. The Board expressly rejected the "but for" test, 17/ and subsequently rejected attempts by Del-Aware to probe into the financial arrangements for the project, stating:

> Del-Aware argues that the NWRA is financially dependent on the Applicant for completion of the entire system and that the NWRA portion, thus, lacks independent financial utility. This is simply another way of restating the argument that but for the Applicant's participation in building part of the system, the part utilized only by NWRA would not be built. As we explained previously, the "but for" test is not the correct test in this situation. (SPCO at 76-77). Nor do we find financial dependence to be the equivalent of lack of physical independent utility, and we have found no case equating the two. 18/

Accordingly, any alleged "economic interdependence" is irrelevant to the admitted contentions.

Further, for the reasons discussed in response to Interrogatory 5, supra, the Board has not granted any contention encompassing an issue of alternative intake locations beyond the Point Pleasant area. Therefore, any financial factors bearing upon such alternative sites are a fortiori irrelevant.

Interrogatory 12. Del-Aware states in its motion that the information in this interrogatory was requested "to enable Del-Aware to provide additional information to the

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17/ SPCO at 76.

18/ Memorandum and Order at 8-9 (July 14, 1982).

Board" regarding the reasons for the commencement of construction at Point Pleasant in December 1982. 19/ By Del-Aware's own admission, therefore, the information is requested for a purpose other than discovery on the admitted contentions. Since discovery is limited to information tending to prove or disprove contentions, or reasonably calculated to lead to such information, as Del-Aware acknowledges, 20/ the interrogatory is deficient on its face. If the Board believes that further information as to the construction schedule is necessary, it can pose its questions directly to the parties.

Interrogatory 13. This interrogatory relates to operating plans for the Point Pleasant intake and Bradshaw Reservoir. In view of the qualification contained in Del-Aware's discussion of this interrogatory in its motion, it appears that there is no disagreement with the partial objection raised by Applicant as to "proposed releases to the Perkiomen Creek." As noted in Applicant's Objections, Contention V-16b, the only one of possible relevance, pertains solely to seepage from the Bradshaw Reservoir and has nothing to do with releases to the Perkiomen Creek.

19/ Del-Aware Motion to Compel at 12.

20/ Del-Aware Motion to Compel at 2.

Accordingly, any plans for operating the Bradshaw Reservoir are irrelevant insofar as they pertain to such releases. 21/

Interrogatories 17(a) and (b). In its Objections, Applicant explained why these interrogatories, which pertain to the necessity of discharge permits under the Clean Water Act, are clearly irrelevant to any of the three admitted contentions. Del-Aware has sought by other interrogatories, requests for production of documents and in depositions to discover information relating to the operation of the intake structure. Applicant, of course, has provided such information as relevant to the issue of operational impacts upon possible fish population as well as boating and recreational activities in the area.

However, whether or not the design and construction of the intake structure components also satisfy the "best available technology" requirements of Section 316(b) of the Clean Water Act is not for the Licensing Board to determine. Rather, the Board must determine, within the bounds of the three admitted contentions it has allowed, whether environmental impacts have been properly considered under NEPA, a totally different statute. Del-Aware can develop a full record on the design and structure of the intake

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21/ As Del-Aware concedes in stating the obvious, "the reservoir cannot discharge flows that have not been diverted to it." Del-Aware Motion to Compel at 13. Therefore, information as to discharges from the Bradshaw Reservoir into the Perkiomen Creek cannot possibly shed light on the nature of impacts associated with operation of the intake structure.

regardless of any subsequent determination, if any, regarding "best available technology" requirements. Any determination by EPA or the Pennsylvania Department of Environmental Resources ("DER") acting in its stead under Section 316(b) is irrelevant, therefore, to any of the admitted contentions.

In any event, as Applicant informed the Board and parties in its initial objection to this interrogatory, DER has determined that no such discharge permit will be required for the Point Pleasant facilities.

Interrogatory 20. Del-Aware has clarified this interrogatory to be limited to a request for any evaluations or reviews by Applicant of information submitted by Del-Aware or its experts regarding the admitted contentions. The clarification appears to meet Applicant's objection, and there is apparently no dispute between the parties as to this interrogatory.

Interrogatory 21. Although Del-Aware has not discussed this particular interrogatory in its motion, it is listed among those for which an answer is requested in the motion's summary. Applicant therefore stands upon its previously stated objection. In any event, it appears that the clarification provided by Del-Aware as to Interrogatory 20 may also have resolved any differences as to Interrogatory 21. Applicant will respond to the extent indicated in its objection to this interrogatory.

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Conclusion

For the reasons discussed above, the Licensing Board should deny the Motion to Compel as seeking information beyond the scope of the three admitted contentions the Board has granted Del-Aware and therefore irrelevant. Expansion of the issues into unauthorized areas will create unavoidable delay, contrary to the express desire of the Licensing Board to conclude this aspect of the proceeding within an abbreviated schedule. The motion should therefore be denied in all respects.

Respectfully submitted,

CONNER & WETTERHAHN, P.C.

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Robert M. Rader

Counsel for the Applicant

August 12, 1982

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicant's Answer to Motion of Del-Aware Unlimited, Inc. to Compel Answers to Interrogatories" dated August 12, 1982 in the captioned matter, have been served upon the following by deposit in the United States mail and by Federal Express, as indicated below, this 12th day of August, 1982, and by hand delivery as indicated below for delivery on August 13, 1982:

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DRAFT

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

(WITH APPENDICES)

New York
New Jersey
Pennsylvania
Delaware
New York City

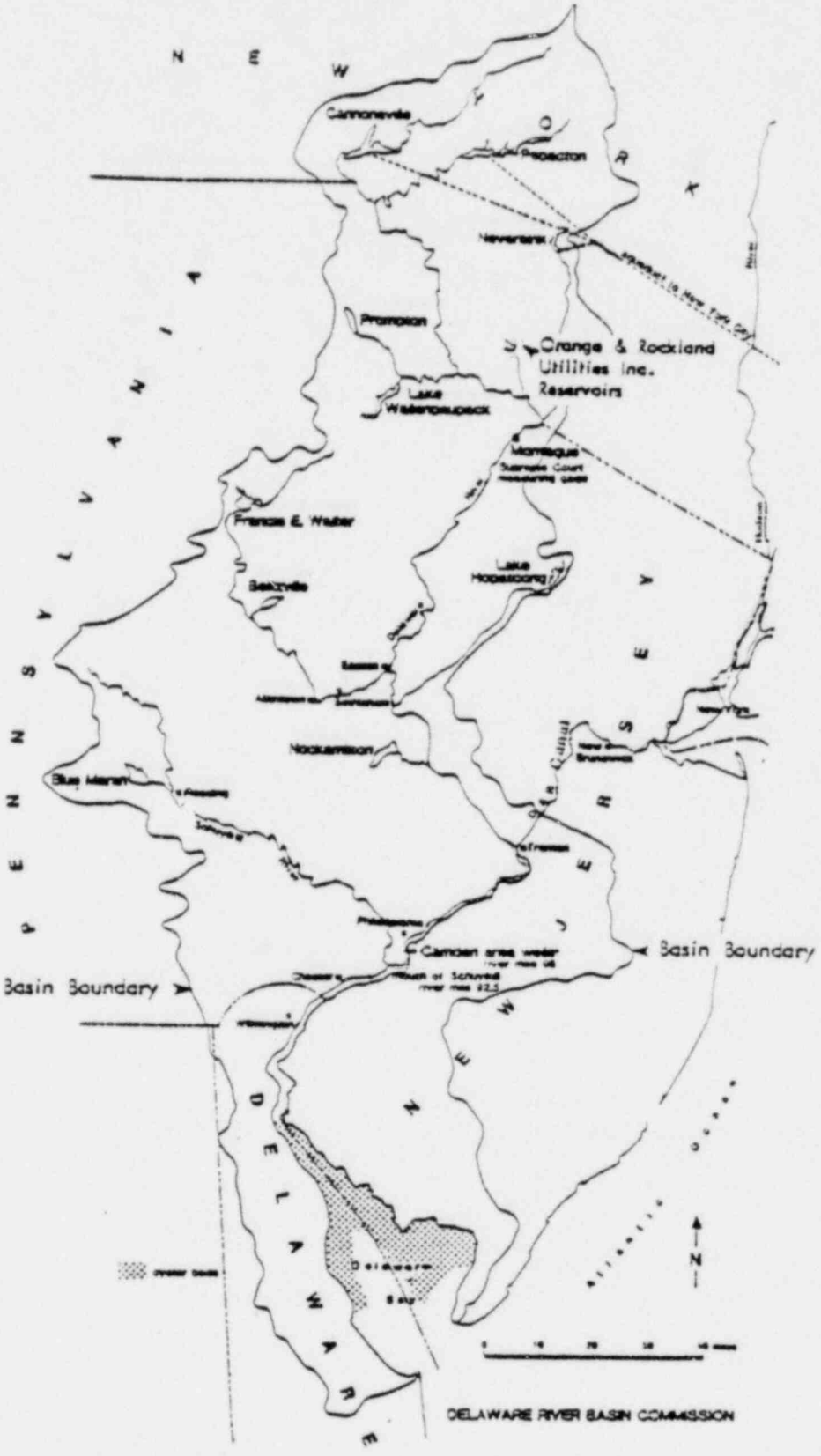
JULY 1982

CONTENTS

INTRODUCTION

Conditions in the Delaware River Basin have changed substantially over the past two decades. The drought emergency of the mid-1960's and the decision of 1975 not to proceed at that time with construction of the Tocks Island dam, were major background events giving rise to Commission action in 1978 calling upon the parties to enter into good faith discussions (page 25).

The recommendations that follow constitute a series of interrelated management steps designed to respond to changed conditions in the Basin. They are organized around a long-term salinity standard to be achieved through the development of new reservoir storage and flow augmentation capacity, water conservation actions, a drought management plan, and the regulation of new or expanded depletive water uses. Modified conservation releases from the New York City reservoirs to protect and enhance recreation below the reservoirs are proposed to be made permanent, but with required reductions during drought periods.


N E W
Canonsville
Projection
Newfoundland
Promotion
Orange & Rockland
Utilities Inc.
Reservoirs
Lake
Wallenpaupack
Montague
Francis E. Walter
Lake
Hopatcong
Belvidere
Blue Mountain
Phillipsburg
Camden area water
Basin Boundary
Basin Boundary
Delaware
Bay
Atlantic Ocean
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DELAWARE RIVER BASIN COMMISSION

SECTION I

MANAGEMENT STANDARDS AND CRITERIA

Recommendation 1

The Commission should amend its Comprehensive Plan to include a revised salinity objective. The amendment should include a set of interim and long-term salinity objectives. The interim operating obejctive should be to limit salinity to a maximum 30-day average of 180 mg/l of chlorides and a maximum 30-day average of 100 mg/l of sodium at River Mile 98 (i.e., one mile upstream from the Walt Whitman Bridge). Through a set of step-by-step actions, a more protective objective should be established by the year 2000 to limit salinity to a maximum 30-day average of 150 mg/l of chlorides and a maximum 30-day average of 83 mg/l of sodium at River Mile 98.

As additional reservoir facilities and storage capacity become available in the Basin they should be used both to augment water supply, and to improve environmental conditions, water quality, and salinity protection. A portion of the new storage capacity recommended in recommendation 5 should be committed to salinity protection. As each unit comes on line, the operating salinity objective should be revised until the year-2000 objective is reached. Simultaneously, a series of depletive water use allocation budgets should be adopted at each stage. Each budget should be designed to meet the operating salinity objective with the capacity of the storage facilities then available.

The salinity objective should be periodically reviewed by the Commission in light of existing conditions and knowledge.

The parties join in this recommendation, in view of the fact that they are also committed to the implementation of the depletive water use budget set forth in recomendation 13, to the implementation of a drought operating formula and conservation programs, as set forth in recommendations 3, 4, 10, 11, and 12, and to the development of projects set forth in recommendations 5, 6, and 7.

All of the parties recognize the benefits of the salinity standards proposed in recommendation 1, but New York City abstains from supporting this recommendation because establishment of salinity standards is properly a matter for decision by the Commission. However, the City does agree with the specific drought operating schedules set forth in recommendation 3, which will assist in controlling salinity during drought periods over the course of this agreement.

Recommendation 2

The Basin's water management system should be capable of providing and protecting reliable water supplies for essential uses during a drought equal in severity to the drought of record, which occurred in the period 1961-1967. The Commission should amend the Comprehensive Plan to include a specific management criterion that the drought of record will be used as the basis for determination and planning of dependable water supply.

SECTION II

DIVERSIONS, RELEASES AND RESERVOIR MANAGEMENT DURING DROUGHT

Recommendation 3

Pursuant to section 3.3 of the Compact, for purposes of management during a drought, the Commission should amend the Comprehensive Plan to include a schedule of phased reductions in diversions, releases, and flow objectives as set forth in Tables 1 and 2. The formula is based upon a differentiation between "normal," "drought warning" and "drought" conditions as defined by the combined storage levels shown on the operation curves for Cannonsville, Neversink and Pepacton reservoirs (page four). The diversion of the drought warning zone into upper and lower halves is defined as a physically equal division, or 20 billion gallons in each zone.

TABLE 1

Interstate Operation Formula for Reductions In Diversions, Releases, and Flow Objectives During Periods of Drought

NYC Storage Condition	NYC Div mgd	NJ Div mgd	Montague Flow Objective cfs	Trenton Flow Objective cfs
Normal	800	100	1750	3000
Upper Half-- Drought Warning	680	85	1655	2700
Lower Half-- Drought Warning	560	70	1550	2700
Drought	520	65	1100-1650*	2500-2900*
Severe Drought (to be negotiated based on conditions)				

*Varies with time of year and location of salt front as shown on Table 2.

During drought conditions as defined by the operation curves shown on page four, the Montague and Trenton flow objectives should vary according to the location of the salt front (250 mg/l chloride isochlor 7-day average), in accordance with the following table:

TABLE 2

Flow Objectives for Salinity Control
During Drought Periods

Seven-day Average Location of "Salt Front," River-mile*	Flow Objective, Cubic Feet Per Second At:					
	Montague, N.J.			Trenton, N.J.		
	Dec-Apr	May-Aug	Sept-Nov	Dec-Apr	May-Aug	Sept-Nov
Upstream of R.M. 92.5	1600	1650	1650	2700	2900	2900
Between R.M. 87.0 and R.M. 92.5	1350	1600	1500	2700	2700	2700
Between R.M. 82.9 and R.M. 87.0	1350	1600	1500	2500	2500	2500
Downstream of R.M. 82.9	1100	1100	1100	2500	2500	2500

Diversions and releases under this drought operation formula should go into effect automatically whenever combined storage in the City reservoirs declines below the drought warning line and remains below that level for five consecutive days. When the combined storage (including the projected water runoff equivalent of actual snow and ice) reaches a level 15 billion gallons above the drought warning line, and remains above that level for five consecutive days, the drought operation formula should automatically terminate and normal operations provided for in the Decree should be resumed.

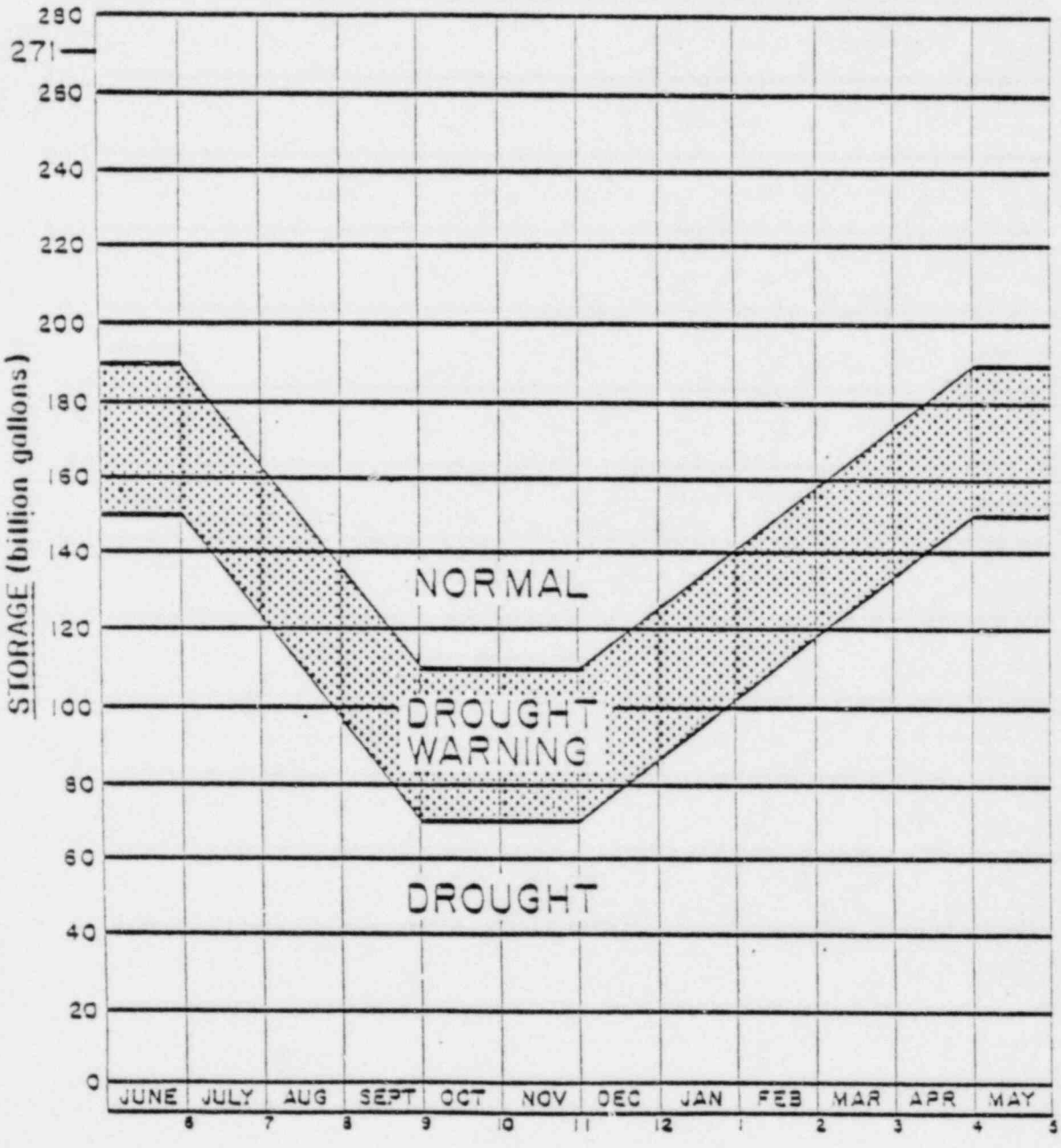
Whenever the drought operation formula goes into effect it should be binding on all parties for not less than 180 days following the triggering of drought warning operations, unless terminated automically by improved storage conditions, as noted above. During the 180-day period, the parties will convene no less frequently than once each month to review current conditions, and they may extend, modify, or extend as modified the formula recommended here. If no unanimous agreement as to a continuing drought operation formula is reached within the 180-day period, all parties shall be released from the terms of the formula contained in this agreement and may pursue their rights and obligations under the Delaware River Basin Compact and the U. S. Supreme Court Decree.

The City of New York joins in recommendation 3 but does not by doing so accept any general responsibility under the doctrine of equitable apportionment or otherwise to vary releases from the City's reservoirs in accordance with the location of the salt front.

*Measured in statute miles along the navigation channel from the mouth of Delaware Bay.

OPERATION CURVES FOR

CANNONSVILLE, PEPACTON AND NEVERSINK RESERVOIRS



Recommendation 4

The Commission should develop a plan for coordinated operation of other existing impoundments during drought periods to complement the operating formula for the New York City reservoirs, as outlined above, in order to maintain reliable supplies for essential uses, to conserve water, and to control salinity.

The plan should include operating criteria for the Beltzville, Blue Marsh, Walter, Prompton and Nockamixon projects, and the hydroelectric power reservoirs in the Basin of the Pennsylvania Power and Light Company and Orange and Rockland Utilities, Inc. Criteria for defining a lower Basin drought warning and drought should be prepared and made part of the plan. The plan should be completed by July 1, 1983, and made part of the Commission's Comprehensive Plan.

SECTION III

WATER STORAGE, WATER SUPPLY AND FLOW AUGMENTATION PROJECTS

The parties agree that the Basin needs additional flow augmentation facilities if the region is to grow and the risk of saline contamination in the estuary is to be held within reasonable bounds. Development of new facilities according to schedules recommended here will allow the Basin to accommodate to projected demands for new water use and at the same time realize the year 2000 salinity objective. But achievement of these goals will also require careful monitoring of increased depletive water use and rigorous application of conservation measures during drought periods.

Recommendation 5

It is recommended that the parties individually and collectively endorse and promote construction or modification of the following projects for water supply, and flow augmentation for salinity control according to the timetable specified:

-- Enlargement of the Francis E. Walter reservoir in Luzerne County, Pennsylvania. Design studies are currently underway by the U.S. Army Corps of Engineers. Construction should be completed by 1990. Estimated additional yield: 290 cfs.* The Commission should amend its Comprehensive Plan by adding an updated description of the Francis E. Walter project. A proposed revised Comprehensive Plan description is made part of this report as Appendix A, page 12.

-- Enlargement of the Prompton reservoir in Wayne County, Pennsylvania. Design studies should be initiated so that the project can be completed by 1995. Estimated aditional yield: 130 cfs. Pursuant to section 3.3 of the Compact, the Commission should amend its Comprehensive Plan by adding an updated description of the Prompton project, including the following operating policy provision:

*This and the following yield figures are initial estimates and subject to change during engineering design. They are based on complete and uniform drawdown of increased storage over a 120-day period (115 days for Merrill Creek).

(1) When New York City is releasing from its reservoirs by direction of the River Master to meet Montague flow objectives--

(a) inflow to Prompton may be passed through the reservoir and released downstream with no change in the Montague flow objective, or stored in the reservoir with an equivalent reduction in the Montague flow objective; and

(b) releases may be made from Prompton storage to meet Trenton flow requirements, and such releases will not be counted as part of the Montague objective.

(2) When New York City is not releasing from its reservoirs to meet Montague flow objectives--

(a) inflow at Prompton may be stored (except for minimum conservation releases); and

(b) releases may be made from Prompton storage to meet Trenton flow requirements, and such releases will not be counted as part of the Montague objective.

A proposed revised Comprehensive Plan description of the Prompton project is made part of this report as Appendix B, page 14.

-- Construction of the Merrill Creek reservoir in Warren County, New Jersey, if determined to be practicable by feasibility and environmental studies, which are currently underway. Subject to the outcome of these studies, construction should be completed at the earliest possible date, which is estimated to be 1986. Estimated additional yield: 200 cfs. Subject to completion of the NEPA process, the Commission should amend its Comprehensive Plan by adding a description of the Merrill Creek project. A proposed Comprehensive Plan description is made part of this report as Appendix C, page 16.

Recommendation 6

It is recommended that the State of New York enlarge the Cannonsville reservoir in Delaware County, New York, if determined to be practicable by feasibility and environmental studies. Subject to the outcome of these studies construction should be completed by 1990. The requirements of Section IIIB of the U. S. Supreme Court Decree of 1954 relating to excess releases should be waived as to the additional storage included in the Cannonsville modification project. Additional project yield should be used primarily to maintain conservation releases. Secondary purposes should be to support the Montague flow objectives and diversions to New York City within the limits of the 1954 U. S. Supreme Court Decree. The Commission should amend its Comprehensive Plan by adding an updated description of the Cannonsville project. A proposed revised Comprehensive Plan description is made part of this report as Appendix D, page 18.

Recommendation 7

It is recommended that New Jersey undertake a study to examine potential solutions to the Camden Metropolitan area water supply problems and the related overpumping of the Raritan-Magothy aquifer system. Alternatives to be explored should include the proposed conjunctive use of ground and surface water; pumping of ground water from the Cohansey Sands aquifer; and interconnection with and water transfer from the City of Philadelphia.

This study should be completed and an alternative or some combination of alternatives should be selected by the end of 1985. The selected alternative(s) should be implemented by 1990.

Recommendation 8

It is recommended that the Commission evaluate the recommendation of its ground water consultants that a field demonstration be made to gather further physical information about the effects of pumping from glacial alluvium to supplement flow augmentation capacity during drought periods.* Possible development of such new sources of supply should be considered as a standby alternative, for use in emergency after the year 2000.

Recommendation 9

The parties are agreed that Tocks Island should be held in reserve status for development after the year 2000 if needed for water supply. The Commission should amend its Comprehensive Plan by adding an updated description of the Tocks Island project. A proposed revised Comprehensive Plan description is made part of this report as Appendix E, page 19.

SECTION IV

CONSERVATION

Conservation during drought periods requires extraordinary measures not justified under normal hydrologic conditions. In order to protect public health, economic activity and the environment, conservation of depletive use is of special importance in the Delaware. It is the depletive uses of both surface and ground waters that impact quantitatively upon minimum flows and the Basin's capability to maintain them.

Recommendation 10

Storage conditions in the New York City Delaware Basin reservoirs should be the principal consideration of the Commission in declaring a basinwide drought emergency under the Compact, and the initiation of emergency conservation measures. The operation curves shown on page four should be the basis for such a declaration by the Commission based upon storage conditions. The Commission should include within its Comprehensive Plan a statement of general policy that a drought emergency will be declared for purposes of imposing mandatory in-Basin conservation measures whenever combined storage in the three reservoirs falls into the drought zone shown on the operation curves and remains in that zone for five consecutive days. The statement of policy should also provide that termination of a drought emergency will be considered by the Commission whenever combined sotrage in the three reservoirs reaches 40 billion gallons above the drought warning level and remains above that level for 30 consecutive days, and that the drought emergency will be terminated by the Commission whenever the combined storage remains above that level for 60 consecutive days unless the Commission unanimously agrees to extend the emergency.

*Special Ground Water Study of the Upper Delaware Basin." A draft report prepared for the Delaware River Basin Commission by R. E. Wright Associates, Inc., March 1982.

This recommendation is not intended to extend, impair, or conflict with the Commission's authority under the Compact to declare or terminate a drought or water shortage emergency in the Basin, or sub-region thereof, in other instances as conditions may require.

Recommendation 11

The Commission should include within its Comprehensive Plan a statement of general policy that conservation measures in the Basin designed for implementation during drought periods shall be based upon the objective of reducing overall depletive use of fresh water by 15 percent.

Recommendation 12

Each State should prepare drought contingency plans for phased implementation during periods of drought warning and drought. Such plans should be coordinated with action by the Commission in announcing a drought warning and in declaring a drought emergency under the Compact, and should be designed to achieve a target 15 percent reduction in depletive use at drought stage. Contingency plans should be completed no later than December 31, 1983, and should include:

-- Identification of those restrictions on non-essential water uses, such as car washing, lawn watering, et cetera, that can be effectively and practically applied; and outline procedures for coordinated initiation and termination of public controls over such uses as drought conditions develop and subside.

-- Contingency plans by large water users that provide for phased reduction of use as drought conditions worsen.

-- Proposed or existing legal authority to establish emergency conservation programs with enforcement powers, including fines and penalties.

-- Effective and timely public information services concerning the drought and the necessity for conservation by all classes of water users.

If adequate legal authority does not exist to implement contingency plans, including the foregoing features, the parties should seek such authority prior to December 31, 1985.

SECTION V

DEPLETIVE WATER USE BUDGET

Realization of the year-2000 salinity objective recommended in section I of this report will require that depletive use in the Basin not be allowed to increase in the absence of offsetting storage capacity sufficient to maintain minimum streamflow objectives. In the absence of additional storage facilities, new depletive use coupled with increases in existing depletive use will steadily reduce the ability of existing storage facilities to maintain streamflows needed to realize salinity control objectives. The Basin cannot continue to authorize new depletive use and at the same time defer actions to create new storage capacity.

Recommendation 13

The Commission should develop a regulatory program to limit future depletive water use in such a way as to balance existing, new, or expanded depletive use with the availability of storage capacity required to meet salinity objectives. The principal features of such a program should be:

-- The control area in which the regulatory program would operate would be that area of the basin downstream of the Montague gage and upstream of the Chesapeake and Delaware Canal.

-- Water available for allocation to new or expanded depletive uses within the control area would be limited to that which is in excess of the flows needed to maintain the applicable salinity control objective during drought periods.

-- Applications for new or expanded depletive water uses within the control area that would be in excess of the amount available for allocation would not be approved by the permitting agencies of the States or by the Commission unless new storage capacity is brought on line or existing uses are proportionately reduced by conservation or abandonment, or unless such new or expanded uses are offset by water imported from outside the Basin.

-- Water available for allocation to new or expanded depletive uses would be allocated either among the States in proportion to the percentage of the control area within each State, or to the common pool for use without regard to political boundaries.

-- If the Commission's regulatory program follows the State-by-State option, water available for allocation to a State would be increased (1) to reflect new storage capacity constructed and financed by that State, its agencies or subdivisions, or (2) to reflect that portion of new storage capacity constructed or financed by the Commission in accordance with agreements among the parties for each project.

-- If the Commission's regulatory program follows the "common pool" option, allocations to the pool would be increased as new storage units are constructed and water becomes available for new or expanded uses in accordance with existing State and Commission permitting programs.

A depletive water use budget should be adopted and implemented by the Commission no later than 1985.

SECTION VI

CONSERVATION RELEASES NEW YORK CITY RESERVOIRS

Table 3 shows the program of augmented conservation releases from the New York City Delaware Basin reservoirs that has been in effect since 1977 on an experimental basis. The purpose of the releases is to protect and enhance the recreational use of waters affected by such releases.

TABLE 3

Reservoir and Operative Dates	Basic Conservation Release	Augmented Conservation Release
Neversink		
4 / 1 - 4 / 7	5 cfs	45 cfs
4 / 8 - 10 / 31	15	45
11 / 1 - 3 / 31	5	25
Pepacton		
4 / 1 - 4 / 7	6	70
4 / 8 - 10 / 31	19	70
11 / 1 - 3 / 31	6	50
Cannonsville		
4 / 1 - 4 / 15	8	45
4 / 16 - 6 / 14	23	45
6 / 15 - 8 / 15	23	325
8 / 16 - 10 / 31	23	45
11 / 1 - 11 / 30	23	33
12 / 1 - 3 / 31	8	33

Recommendation 14

The Commission should amend docket D-77-20, as necessary to authorize on a permanent basis the augmented conservation release schedules at the three reservoirs, as shown in Table 3. The revised docket, a draft of which is attached as Appendix F, page 21, should reflect the following conditions:

- An additional quantity of water up to 6000 cfs-days should be provided for the relief of thermal stress on aquatic life in the river downstream of the reservoirs and on the mainstem of the Delaware River, designed to prevent to the extent practicable, any water temperature higher than 75°F or daily average water temperature higher than 72°F in the designated downstream areas as determined from measurements at Callicoon, Harvard, Woodbourne, and Hale Eddy gaging sites during the period May 1 to October 31, inclusive. Releases for this purpose should be at the direction of the New York State Department of Environmental Conservation. In order to conserve available water in storage, no thermal stress releases should be made when the reservoirs are in drought warning or drought condition.

- Whenever combined water storage conditions in the three reservoirs decline to drought warning or drought levels, as shown on the operation curves (page four), the augmented conservation releases should be reduced to the basic rate in effect prior to 1977 for each reservoir, except that larger volumes of water would be released during those periods when the River Master is directing releases to meet the Montague flow objectives. This reduction would be for the purpose of conserving available water in the reservoirs.

- Conservation releases should be returned to normal augmented levels when combined storage in the three reservoirs reaches 25 billion gallons above the drought warning level, as shown on the operation curves (page four), and remains at or above that level for 15 consecutive days.

-- Increases in the augmented conservation release levels should be made only in accordance with the allowances provided for in the Stipulation of Discontinuance in The City of New York vs The State of New York Department of Environmental Conservation, Index No. 5840-80, and should be subject to approval by the Commission.

SECTION VII

ENFORCEMENT

This agreement is considered by the parties to be a whole. Each recommendation of this agreement is considered material to the entire agreement, and failure to implement or adhere to any recommendation may be considered a material breach.

Proposed Revised Comprehensive Plan
Description of Francis E. Walter Project

Description

The Francis E. Walter project, completed in 1961 as a single-purpose flood control project (with incidental recreation use), will 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 the Lehigh River 77 miles above its confluence with the Delaware River and about 5 miles north of White Haven, Pennsylvania. At this location the dam controls 288 square miles of drainage area.

The modifications to the existing dam, as originally proposed by the Corps of Engineers to make it serviceable for long-term storage in addition to the present flood control storage involve:

(1) Moving and raising the spillway crest.

(2) Raising the dam.

(3) Adding a concrete conduit to the downstream end of the outlet tunnel.

(4) Constructing new dikes and raising existing dikes north of the dam.

(5) Clearing of reservoir land and relocating roads subject to inundation.

The modified dam will rise about 263 feet above the stream bed and have a length of about 3,500 feet. The spillway will be raised 31 feet and cut through rock to the north of the dam, and farther north a dike will fill a swale in the reservoir rim. Multi-level outlet works will be provided in the new project. The reservoir for long-term storage of 69,500 acre-feet of water would have a maximum depth of about 185 feet and would extend about 7.0 miles up the Lehigh River and about 4.0 miles up Bear Creek from the dam. Modification of this reservoir will necessitate the purchase of land to be inundated on which flood easements have already been taken and require the acquisition of additional flood easements at high elevations. No economically valuable mineral deposits would be flooded. Relocation of about five miles of Bear Creek Road would be required.

Functions

Supplies of Water. The modified project will augment the flow of the Delaware River at Trenton by 290 cfs on the basis of complete and uniform drawdown of flow augmentation storage (69,500 acre-fet) over a 120-day period.

Reduction of Flood Damages. The 108,000 acre-feet of existing short-term storage is 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. Damage centers in the reach from Lehigh Gap to Allentown, Pennsylvania, include industrial and residential areas located in the vicinity of the towns of Northampton, Hokendauqua, Catasauqua, Allentown, Bethlehem, Freemansburg and Easton, Pennsylvania. The flood control storage will be preserved as previously authorized, and flood reduction benefits will be unaffected by the modifications.

Recreation. The modified Francis E. Walter project will provide for public ownership of the desirable shore area and provide space for development of recreation sites. Operation of the project will consider the downstream flow requirements for stream fisheries and the management of the impoundment for lake fisheries.

Schedule

Modification of the existing Francis E. Walter project is scheduled to be completed by 1990.

Proposed Revised Comprehensive Plan
Description of Prompton Project

Description

The Prompton project, a single-purpose flood control project (with incidential recreation use) completed in 1960, will 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 the Lackawaxen River about one-half mile upstream of the confluence of Waymart Branch with the river, and about four miles west of Honesdale, Pennsylvania. The present dam controls 60 square miles of drainage area, and is 1,300 feet long and 140 feet high.

The long-term storage and operation for multiple-purposes will require the following additions or modifications to the existing structures:

(1) A control tower with gates to control releases from the reservoir and a service bridge.

(2) A blanket of impervious material on the valley wall and floor upstream of the dam.

(3) Widening of the spillway.

(4) Clearing of reservoir land and relocating roads subject to inundation.

The reservoir to be created by long-term storage will extend about 4.4 miles upstream of the dam.

Functions

Supplies of Water. The modified project will augment the flow of the Delaware River at Trenton, by 130 cfs on the basis of complete and uniform drawdown of flow augmentation storage (30,900 acre-feet) over a 120-day period.

Reduction of Flood Damage. Flood heights on the Lackawaxen River are substantially reduced by the existing flood control storage of 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 of Middle Creek and Wallenpaupack Creek with the Lackawaxen River, and several villages and townships located on the lower reaches of the Lackawaxen River are protected. Conversion of the Prompton dam and reservoir to a multiple-purpose development will preserve the flood control function of this project as originally authorized, and flood reduction benefits will be unaffected by the proposed modification.

Recreation. Due to the lack of suitable terrain, recreation potential at this project is limited. However, lands suitable for day-use recreation may be included in the plan of improvement. 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.

Operating Policy

Releases from the project shall be coordinated with releases from the New York City reservoirs and accounted for at the Montague gaging station in accordance with the following policy:

(1) When New York City is releasing from its reservoirs by direction of the River Master to meet Montague flow objectives--

(a) inflow to Prompton may be passed through the reservoir and released downstream with no change in the Montague flow objective, or stored in the reservoir with an equivalent reduction in the Montague flow objective;

(b) releases may be made from Prompton storage to meet Trenton flow requirements, and such releases will not be counted as part of the Montague objective.

(2) When New York City is not releasing from its reservoirs to meet Montague flow objectives--

(a) inflow at Prompton may be stored (except for minimum conservation releases);

(b) releases may be made from Prompton storage to meet Trenton flow requirements, and such releases will not be counted as part of the Montague objective.

Schedule

Modification of the existing Prompton project is to be completed by 1995.

Proposed Comprehensive Plan
Description of Merrill Creek Project

Location

Merrill Creek Reservoir would be located on a tributary of Pohatcong Creek in Harmony Township, Warren County, New Jersey. The site, which includes an existing small dam and reservoir, is approximately 5.2 miles east-northeast of Phillipsburg, New Jersey. Merrill Creek begins on a small plateau about 1,200 feet above sea level some 3 miles east of the Delaware River. It flows in a southerly direction through a valley to a small existing reservoir. The channel narrows considerably below the existing reservoir and passes through a gap in Scotts Mountain about one mile long. Merrill Creek then enters the Pohatcong Valley and joins Pohatcong Creek four miles south of the existing dam. The stream north of the existing reservoir is 4.3 miles in length and has a drainage area of 3.1 square miles.

To create Merrill Creek Reservoir, a dam would be constructed in the Scotts Mountain gap just downstream of the existing dam. The drainage area above the new dam would be 3.2 square miles.

Functions

The primary function of the Merrill Creek project would be to replace water that is consumptively used by electric generating stations in the Basin, as required by the Commission. During severe drought periods, releases to the Delaware River would be made for this purpose. The project would also provide incidental recreation benefits, and a recreation area is planned for the northeast side of the reservoir. Floodwaters from the upper 3.2 square miles of the Merrill Creek drainage area would be contained in the reservoir. Flood peaks at the Route 57 crossing of Merrill Creek would be reduced by 70 percent, and at the Strawchurch Road crossing by 30 percent.

Description

The project layout is based on facilities necessary to obtain reservoir storage required for a yield of 200 cfs during critical drought periods, and provide for safe operation of the project under all conditions. The layout includes the main dam, saddle dikes, relief spillway, and construction diversion and conservation outlet. As natural runoff from Merrill Creek is inadequate to refill the reservoir (drainage area 3.2 square miles), a tunnel/pipeline, an inlet/outlet tower, a one-way surge tank and a pumphouse at the Delaware River are provided to insure filling under all hydrologic conditions.

The reservoir is to be formed by placing a compacted earth and rock-fill dam across the Scotts Mountain gap. The maximum height of the main dam is approximately 260 feet. The embankment is approximately 2,450 feet in length along the crest. The width at the crest is 30 feet. Three saddle dikes, two on the northwest side and one on the southeast side are needed to seal off low areas along the reservoir rim.

The probable maximum flood (PMF) can be stored in the reservoir above elevation 923.0 above mean sea level, the design operating level. In the unlikely event of additional inflow into the reservoir and that discharge through the tunnel/pipeline cannot be implemented, a relief spillway excavated in rock is to be provided to release excess water to Lopatcong Creek. The relief spillway will have a length of approximately 400 feet along the crest at elevation 929.0 on the reservoir upstream side, sloping down to elevation 923.0 a distance of 600 feet to the downstream end.

The inlet/outlet tower, having a hoist house at the top, is to be constructed at the upper end of the tunnel/pipeline running between the reservoir and the Delaware River to house piping, valves, and necessary equipment to admit and release required flows. This reinforced concrete sloping structure is to be located along the northwest rim of the reservoir near Northwest Saddle Dike 1, some 5,000 feet upstream of the main dam. This location will minimize the length of required tunnel through Scotts Mountain, which connects the tower to the pipeline.

The inlet/outlet tower will be approximately 300 feet long and will contain multiple inlet/outlet ports. Each port will be at a different level so that water can be released from that reservoir level at which water temperature and quality most nearly match that of the Delaware River. The hoist house is to contain all necessary controls for operation of the valves, other ancillary equipment, and water quality monitoring devices. The inlet/outlet tower will be unmanned except for maintenance purposes, but will be provided with a security system.

The existing Merrill Creek channel has insufficient capacity to carry all the released flows to the Delaware River. Therefore, a separate conduit is required to carry water between the reservoir and the river. Since a pipeline is also needed to carry the water pumped from the river to the reservoir, a single conduit to serve both purposes is provided.

The inlet/outlet tower is to be connected to the pumphouse by approximately 17,000 feet of pipeline, 1,400 feet of which will be installed in a tunnel. The tunnel will have a finished dimension of 96 inches. The pipe will have a diameter of 57 inches, and except in the tunnel, will be buried a minimum of six feet below the ground surface. The conduit is sized to carry the design pumping rate of 145 cfs to the reservoir and 200 cfs flow from the reservoir back to the river. A one-way surge tank will be installed along the pipeline route to prevent water column separation in thepipelinefollowing motor-pump failure.

A pumphouse to enclose equipment needed to refill the reservoir will be located on the Delaware River (R.M. 192) near Keifer Island. The equipment will have the capacity, utilizing two pumps, to transmit water at the design pumping rate of 145 cfs from the river to Merrill Creek reservoir. Three pumps with electric motors will be provided, one as a stand-by. Each pump is equipped with shut-off and control valves. The pumphouse will have an ice barrier and fixed screens to prevent ice, fish and debris from entering the pump well. Adjacent to the pump chambers, energy dissipator chambers will be in operation during the release of water from the reservoir to the river. The manifold at the end of the water conduit is provided with two sleeve valves, which will control discharge of water to energy dissipating sumps. The sumps, in turn, release the water to the river through overflow weirs.

The gas pipeline that crosses the west edge of the reservoir will be relocated. Relocation will be coordinated with the pipeline owners.

Existing public access to the area will be maintained to the greatest extent feasible. The secondary road through the valley from Route 57 may be terminated near the dam site. Secondary roads from Phillipsburg and Harmony may be connected by a new secondary road along the west ridge of the reservoir. Relocation and termination of these roads will be subject to review and approval of local officials.

Schedule

The Merrill Creek project is scheduled to be completed by 1986.

Proposed Revised Comprehensive Plan
Description of Cannonsville Project

Cannonsville reservoir, part of the water supply system of the City of New York, is located on the West Branch of the Delaware River in Delaware County, New York, about four miles upstream of the Village of Deposit. It was financed and constructed by the City of New York and placed in operation in 1967.

Cannonsville dam is approximately 2,800 feet long (at the top) with a maximum height of about 175 feet above the original river channel. It has a top width of about 45 feet and is of the compacted (rolled) earth type. At its northerly contact with the valley wall there is a spillway. Spillage is directed into a channel, through a stilling basin, and into an outlet channel that guides the flow into the West Branch of the Delaware River.

Cannonsville reservoir covers roughly 4,800 acres at flow line elevation 1150 feet above mean sea level with a capacity above sill elevation 1027.5 of some 97 billion gallons, and impounds the runoff from a watershed of about 450 square miles. The yield therefrom is used for supplying water to the City of New York, for conservation releases to the West Branch Delaware River, and, together with releases obtainable from the Neversink and Pepacton reservoirs, for meeting the Montague formula of the Supreme Court Decree of 1954.

Cannonsville reservoir will be investigated for modification to increase the storage as described generally in a report of the Temporary Commission on the Water Supply Needs of Southeastern New York (Dec. 15, 1973). The reservoir level would be increased by the installation of gates in the existing spillway, if determined practicable by feasibility and environmental impact studies, which should be completed at the earliest possible date. Subject to the outcome of these studies construction should be completed by 1990.

Modification of Cannonsville would add approximately 13 billion gallons of additional storage capacity. Additional project yield would be used primarily to maintain conservation releases. Secondary purposes would be to support Montague flow objectives and diversions to New York City within the limits of the 1954 U.S. Supreme Court Decree.

Proposed Revised Comprehensive Plan
Description of Tocks Island

Description

The Tocks Island project would be for multiple-purpose development to provide water supplies, flood control, electric power, and recreation. The dam site is on the Delaware River about five miles upstream from the Delaware Water Gap, at the upstream end of Tocks Island. The contributing drainage area is 2,912 square miles, exclusive of 915 square miles that contribute to the Neversink, Pepacton, and Cannonsville reservoirs of the City of New York. The dam would contain about three and one-half million cubic yards of earth and rock, would be 3,000 feet long, and would rise 160 feet above the river bed to elevation 455. Consideration would be given to the development of hydroelectric power including pumped storage. Storage allocations, as determined from studies by the Corps of Engineers, indicate 96,300 acre-feet of inactive long-term storage to elevation 356; 425,600 acre-feet of active long-term storage for supplies of water, power, recreation, and other uses to elevation 410; and 323,500 acre-feet of short-term storage for flood control to elevation 432. The reservoir would extend approximately nine miles up Flat Brook and 37 miles up the Delaware River to Port Jervis, New York. It would necessitate the relocation of affected roads and Delaware Water Gap National Recreation Area facilities. The Town of Matamoras, Pennsylvania, at the upper end of the reservoir would be protected by a dike. The 37-mile section of the Delaware River that would be covered by the reservoir is a component of the National Wild and Scenic Rivers System.

Functions

Supplies of Water. Use of 425,600 acre-feet of active long-term storage at Tocks Island project would augment the flow of the Delaware River at Trenton by 1790 cfs on the basis of complete and uniform drawdown of flow augmentation storage over a 120-day period. Net yield at the site on a year-round basis would be about 980 cfs.

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 mainstem 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. Dmaages in this reach would be substantially reduced by system operation of the flood-control storage at Tocks Island with other projects in the Comprehensive Plan; the stage of the 1955 flood at Trenton would be reduced by six feet.

Power. The Tocks Island project was originally considered for a conventional hydropower installation of 46,000 kilowatts, a dependable capacity of 20,000 kilowatts, and an average production of 281.5 million kilowatt-hours. Reevaluation of conventional and pumped-storage power schemes resulted in deletion of the conventional hydropower installation from the Comprehensive Plan. In light of current and future uncertainties regarding energy supplies, a full reevaluation of power would be called for when the project is reconsidered after the year 2000.

Recreation. Recreation capacity and facilities of the existing Delaware Water Gap National Recreation Area, developed under P.L. 89-158, would be altered to an extent to be determined by future studies. Reservoir operation would consider fisheries within the impoundment and downstream of the dam. Passage for anadromous fisheries would be provided and consideration given to additional flow augmentation from this project in

October and November for moving fish population through the zone of low dissolved oxygen in the estuary.

Schedule

The Tocks Island project is placed in reserve for development when needed after the year 2000.

DRAFT

DOCKET NO. D-77-20 CP (REVISED)

DELAWARE RIVER BASIN COMMISSION

MODIFICATION TO THE RELEASE SCHEDULES FROM CANNONSVILLE, PEPACTON, AND NEVERSINK RESERVOIRS DELAWARE AND SULLIVAN COUNTIES, NEW YORK

Proceedings

The New York State Department of Environmental Conservation (NYDEC) adopted regulations in 1977 to modify the schedule of conservation releases from Cannonsville, Pepacton, and Neversink Reservoirs. The regulations provided for the new schedule of releases to be tried on a limited experimental basis.

The Delaware River Basin Commission (DRBC) approved the experimental release program on May 25, 1977, by Docket decision D-77-20 and extended that approval through May 31, 1983, by Resolution 82-7. Docket decision D-77-20 also directed the parties to the 1954 Decree to develop criteria defining the onset and stages of drought emergencies.

NYDEC proposes to amend the experimental regulations by removing the automatic termination date, deleting the relationship to the "excess quantity" as established by the U. S. Supreme Court Decree (347 U. S. 995 (1954)) and limiting releases according to a reservoir storage curve in time of drought warning and drought.

Research findings and comments from fishermen and recreationists indicate that the program has had a beneficial effect. The DRBC held a hearing on May 28, 1980, on the amended release regulations and a proposal that the Commission's approval of the schedule of augmented releases be made permanent.

Reservoir Release Program

A. New Conservation Releases

In place of the previous New York City schedule of conservation releases, a new conservation release schedule on a year-round basis has been tried as an experimental program and is proposed to be continued on a permanent basis. Under this schedule, the minimum releases from Cannonsville, Pepacton, and Neversink Reservoirs will be as follows:

	April 1 - June 14 Aug. 16 - Oct. 31	June 15 - Aug. 15	Nov. 1 - March 31
Neversink	45 cfs*	45 cfs	25 cfs
Pepacton	70	70	50
Cannonsville	45	325	33
	160 cfs	440 cfs	108 cfs

*cubic feet per socond

These total conservation releases break down as follows:

TABLE 1

Reservoir and Operative Dates	Column 1 Basic Conservation Release	+	Column 2 Proposed Augmented Conservation Release	=	Column 3 Total New Conservation Release
Neversink					
4 / 1 - 4 / 7	5 cfs		40 cfs		45 cfs
4 / 8 - 10 / 31	15		30		45
11 / 1 - 3 / 31	5		20		25
Pepacton					
4 / 1 - 4 / 7	6		64		70
4 / 8 - 10 / 31	19		51		70
11 / 1 - 3 / 31	6		44		50
Cannonsville					
4 / 1 - 4 / 15	8		37		45
4 / 16 - 6 / 14	23		22		45
6 / 15 - 8 / 15	23		302		325
8 / 16 - 10 / 31	23		22		45
11 / 1 - 11 / 30	23		10		33
12 / 1 - 3 / 31	8		25		33

B. Basic Montague Release

At all times, New York City would be required to make such releases as directed by the River Master designed to maintain a minimum basic flow of 1750 cfs at the Montague gaging station, or the excess release rate during the seasonal period, as already required by the Decree.

C. Special Thermal Stress Releases

Special releases may be made from one or more of the reservoirs in order to relieve thermal stress conditions which pose a threat to fisheries. The total volume of such releases shall not exceed 6,000 cfs-days from all reservoirs. Thermal releases, with a one-day lead time, would be made whenever the maximum water temperature in designated downstream areas as determined from measurements at Callicoon, Harvard, Woodbourne, or Hale Eddy is projected to exceed a maximum of 75°F, or a 72°F daily average. If the 6,000 cfs-days reserve is not used by October 31 of any year it will not be used thereafter. No releases for relieving thermal stress would be required from November 1 to April 30 of any year. Releases for purposes of relieving thermal stress shall be at the direction of NYDEC.

D. Drought Warning and Drought Conditions

The augmented conservation release will be reduced to the basic conservation release (shown in Table 1) during drought warning and drought periods as defined by the attached reservoir storage curves marked "Appendix A - Operation Curves for Cannonsville, Pepacton, and Neversink Reservoirs" except that when the Delaware River Master directs releases according to the provisions in the 1954 U. S. Supreme Court Decree, New York City shall make such releases from Cannonsville, Pepacton, and Neversink Reservoirs as are

necessary and sufficient to maintain the constant minimum flows specified in "A" above on the West Branch Delaware River, East Branch Delaware River, and the Neversink River, and provided that the total amount of water released from the three reservoirs does not exceed the amount directed by the Delaware River Master. If the amount of directed releases by the River Master is not sufficient to maintain the augmented releases from all three reservoirs, the releases from each reservoir will be determined at the discretion of NYDEC and New York City -- Department of Environmental Resources (NYC - DEP).

Conservation releases shall be returned to normal augmented levels following a drought. Return to normal augmented levels shall not be made unless and until combined storage in the three reservoirs reaches 25 billion gallons above the drought warning level, as shown by storage curves in Appendix A, and remains at or above that level for 15 consecutive days.

Findings

The NYDEC's Amended Part 671 Regulations entitled, Reservoir Release Regulations: Cannonsville, Pepacton, and Neversink Reservoirs adopted May 2, 1980, are consistent with this proposed action.

The Monitoring and Evaluation Program during the experimental reservoir release period has been reported in two performance reports by NYDEC. One for the year July 1, 1977, through June 30, 1978, and a second for the July 1, 1978 through December 31, 1979 period. These evaluations indicate that the conservation release program has been very effective and beneficial and should be continued. The report includes an estimate that an additional 52,500 -- 65,500 angler-trips annually could result from the release program. The economic value of these additional angler trips could range from $1,650,000 to $2,066,000 annually.

The project does not conflict with nor adversely affect the Comprehensive Plan. It provides beneficial use of the water resources and does not adversely influence the present or future use and development of the water resources of the Basin.

Decision

I. The project, as described above, with modifications specified hereinafter, is hereby added to the Comprehensive Plan.

II. The project is approved pursuant to Sectino 3.8 of the Compact, subject to the following conditions:

a. Approval is subject to all conditions imposed by NYDEC.

b. Monthly summaries of reservoir operations submitted by NYC-DEP to NYDEC shall also be submitted to the DRBC.

c. Detailed operational records of each reservoir, maintained by both the City and State Reservoir Release Managers, shall be available to the DRBC upon request.

d. The provisions of the reservoir release program approved herein shall not be applicable to any action taken by NYC-DEP or NYDEC with regard to the operation of the Cannonsville, Pepacton, or Neversink Reservoirs in any emergency situation where there is a threat to the continued existence or safe operation of the dams or tunnels or to any appurtenant structures or to the public health or safety. Any emergnecy action shall continue only for such time as is necessary to avert the threat and is subject to the approval of the Executive Director of the DRBC.

e. Increases in the augmented conservation release levels may not be made except in accordance with the allowances provided for in the Stipulation of Discontinuance in The City of New York vs The State of New York Department of Environmental Conservation, Index No. 5840-80, and shall be subject to approval by the DRBC.

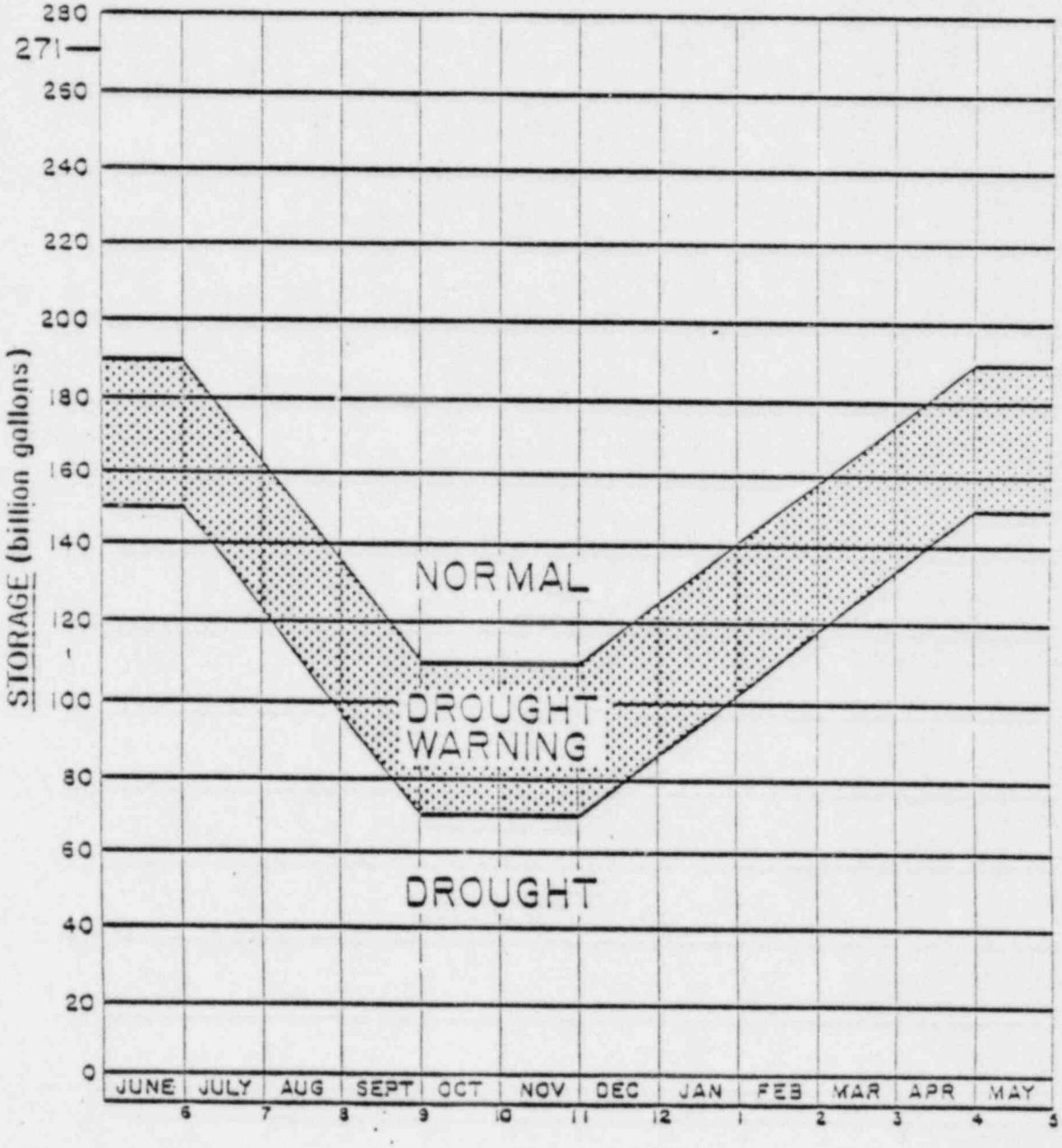
f. Releases under emergency conditions. The Commission retains its power under Section 3.3(a) and Article 10 of the Compact to declare a drought emergency after consultation with the River Master, in order to conserve the waters in the Delaware River and its tributaries and in the reservoirs of the Upper Delaware River Basin, in order to protect water supply, health, and safety of the residents of the Delaware River Basin and its service area. The River Master retains all of his powers under the Decree including the powers under Article VII, B.1 of the 1954 Decree to conserve the waters in the river, its tributaries, and in reservoirs owned by the City of New York, or in reservoirs developed by other parties to the Decree after 1954.

BY THE COMMISSION

DATED:

Appendix A

Operation Curves for
Cannonsville, Pepacton and Neversink Reservoirs



RESOLUTION NO. 73-20

BE IT RESOLVED by the Delaware River Basin Commission:

1. The Commission invites each of the parties to the 1954 Supreme Court Decree in their individual capacities to enter into serious good faith discussions to establish the arrangements, procedures, and criteria for management of the waters of the Delaware Basin consistent with the Compact.

The Commission also invites the participation or assistance of the United States to the extent it shall be requested by the parties.

2. To assist the parties, the Commission staff shall provide technical information as requested by the parties.

3. The Commission urges the parties to undertake these discussions promptly with the view of concluding by October 1, 1979, unless extended by the agreement of the parties. At the conclusion of the discussions, the Commission invites the parties to submit any agreement reached to the Commission for approval pursuant to the Compact.

4. The Commission requests the chief executive and legal officers of the respective parties to the 1954 Decree to exchange letters agreeing to enter into good faith discussions consistent with this Resolution by December 31, 1978.

5. Each of the parties participating in these discussions preserves any rights, claims or defenses which exist as of the date of this Resolution. This Resolution shall not be deemed an action which shall alter, impair, diminish or adversely affect the rights, powers, privileges, conditions or obligations contained in the Compact or 1954 Decree.

Signed/
Sherman W. Tribbitt, Chairman pro tem

Signed/
W. Brinton Whitall, Secretary

ADOPTED: December 13, 1978

DRAFT

Background Report

Concerning the 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

(WITHOUT APPENDICES)

New York
New Jersey
Pennsylvania
Delaware
New York City

JULY 1982

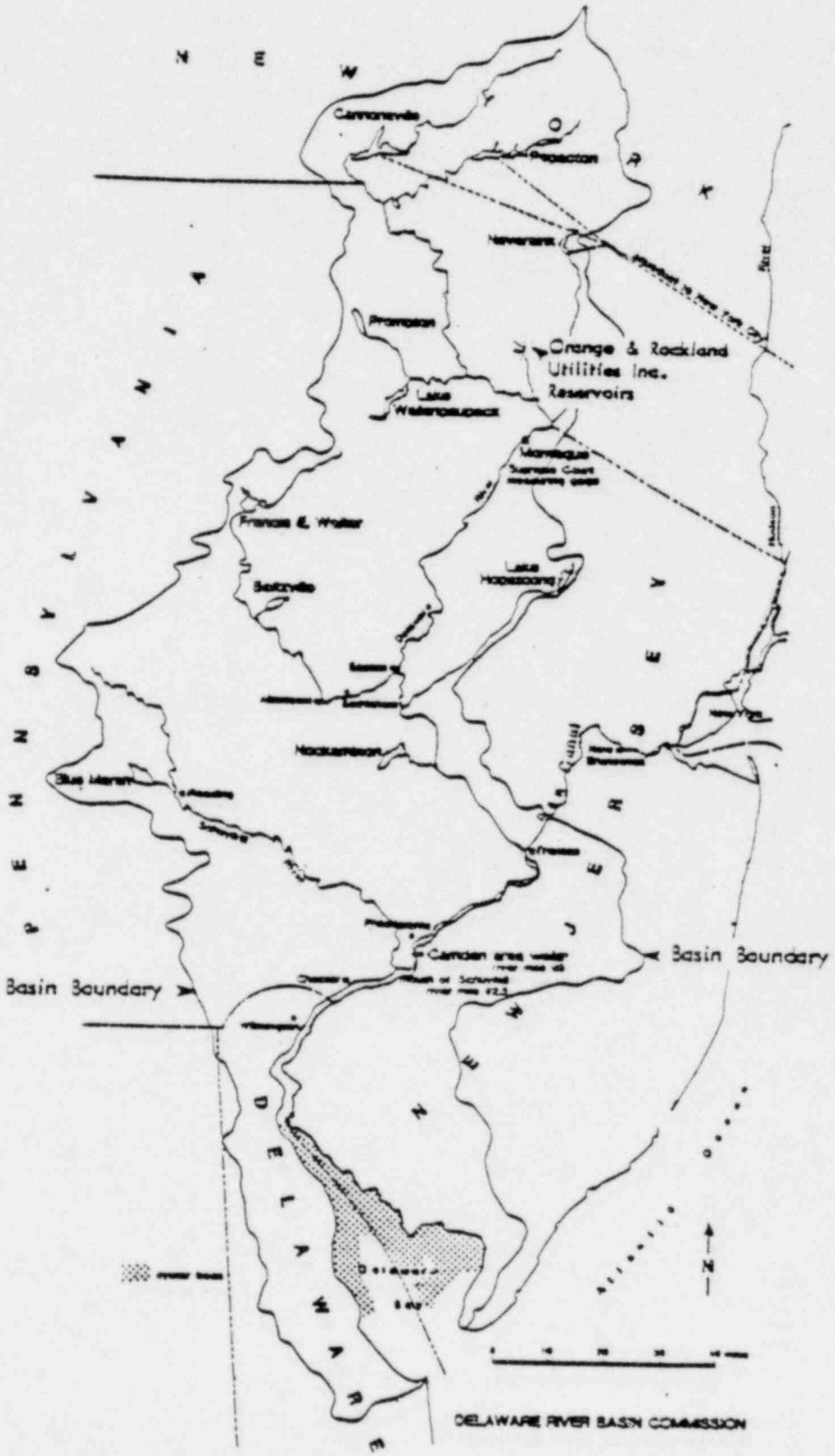
Prepared by Staff of the Parties and
the Delaware River Basin Commission

CONTENTS

INTRODUCTION

The parties to the U. S. Supreme Court Decree of 1954 are the States of New York, New Jersey, Pennsylvania and Delaware, and the City of New York. Representatives of these parties have submitted recommendations to the Delaware River Basin Commission pursuant to Commission Resolution 78-20 calling upon the parties "to enter into serious good faith discussions to establish the arrangements, procedures and criteria for management of the waters of the Delaware Basin consistent with the Compact." The recommendations that have been proposed have come to be known as the "good faith" agreement among the parties.

This report presents selected factual and interpretive materials relating to each recommendation and a brief summary of significant background events leading up to the action of the Commission calling upon the parties to enter into good faith discussions. It is intended to provide an explanatory context for the recommendations that have been proposed by the parties.


Basin Boundary
Basin Boundary
Orange & Rockland Utilities Inc. Reservoirs
DELAWARE RIVER BASIN COMMISSION

BACKGROUND OF NEGOTIATIONS

In the broadest sense it can be said that the good faith discussions arose from the uncertainties of changing circumstance. Water management in the Delaware Basin is subject to dynamic forces, and events move as inexorably as the river itself. The amended U. S. Supreme Court Decree apportioning the waters of the upper Delaware is almost 30 years old. Two decades have passed since the Commission adopted its initial Comprehensive Plan. Over these years two serious droughts have outdated some earlier technical assumptions. New knowledge and data analysis made possible by high-speed computers have become available. Changed public opinion has altered old priorities and the requirements of political consensus. There has been increased water use in the Basin States. Mindful of its obligation under the Compact "to promote interstate comity and remove causes of present and future controversy," the Commission has responded to these changed conditions by supporting negotiations among the parties.

Within this generalized background three interrelated events warrant particular explanation as important determinants of the good faith discussions: recent droughts, the Tocks Island decision, and the Level B Study.

Drought

The amended Supreme Court Decree[1/] set the ground rules for diversions of water from the upper Delaware by New York City, and the compensating downstream releases to the Delaware that the City must make from the three reservoirs it built and paid for: Neversink, Cannonsville and Pepacton. In return for the right to divert 800 mgd, the City must provide releases designed to maintain a minimum flow in the Delaware of 1750 cfs measured at Montague, New Jersey.

The City's Delaware reservoir system proved physically unable to meet the full diversion and flow objectives at Montague under the drought conditions that occurred in the 1961-67 period. A similar, but less drastic, shortfall was experienced in the 1980-81 drought. Reservoir yield studies following the 1960's drought concluded that the combined safe yield from the City's Delaware system was 40 percent less than previously estimated.[2/] In this fact is the issue drawn. Reduce diversions to the City? Reduce releases downstream to the Delaware? Reduce both in equal measure? For the City, the three Delaware reservoirs provide about 39 percent of its total system safe yield without pumping and about 50 percent of the water supply during normal hydrologic conditions. For the Delaware Basin itself, the same reservoirs provide about 90 percent of available reservoir storage, and releases from them have accounted for as much as one-half of the flow at Trenton during drought periods.

In 1977, the Commission undertook review of a proposal by the State of New York to require the City of New York to increase the conservation releases from its reservoirs in order to improve the fisheries resources and recreational opportunities below the reservoirs.[3/] A task force was again set up by the Commission and its assignment included,

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1/ New Jersey v. New York, 347 U. S. 995 (1954).

2/ "Report of the Coordinating Committee for the Reappraisal of the Water Supply Resources of the Delaware River Basin and Service Area," Delaware River Basin Commission, March 7, 1969. Original computation of revised yield appeared in "Report to the Delaware River Master of the Delaware River, for the Period December 1, 1966 to November 30, 1967," Washington, D. C., June 1968.

3/ Commission Docket D-77-20, May 25, 1977.

among other things, consideration of drought emergency criteria and conservation measures. The report[4/] of the task group two years later provided an important technical background for the good faith discussions and for many of the management decisions made during the 1980-81 drought.

Thus it can be seen that for more than a decade it has been recognized that some way must be found to accommodate the impact of severe droughts upon the operation of the upper Delaware reservoirs under the Supreme Court Decree. The good faith discussions have benefited from previous awareness of this problem, and the results of earlier technical studies. A formula for operation of the reservoirs during drought periods is proposed by the parties in Recommendation 3.

Tocks Island Decision

Proposals to build storage dams across the mainstem of the Delaware River go back more than half a century. An impoundment at Tocks Island was included in a report to the Congress by the U. S. Army Corps of Engineers in 1933. Mainstem impoundments at Wallpack Bend (PA-NJ) and Barryville (NY) were major components in an interstate water supply plan recommended by the Interstate Commission on the Delaware in 1950. Construction of a dam at the Wallpack Bend site was an aspect of the interstate agreements made in connection with the 1954 Supreme Court Decree. The Corps of Engineers again recommended Tocks Island in its survey of the Delaware following the major floods of 1955, and the project was authorized by Congress in 1962. In the same year it was included in the Commission's Comprehensive Plan with unanimous support of the four Basin States and the Federal government. Scheduled by the Commission to be in operation no later than 1975, Tocks Island was then seen as the keystone reservoir in the water resource management plan for the Delaware Basin.

Tocks Island enjoyed widespread public support and official endorsement throughout the 1960's. By the early 1970's local opposition to the project had spread, greatly strengthened by changing public priorities reflected in the new environmental emphasis. By 1975 some of the parties had withdrawn their earlier support, and in July of that year a majority of the members of the Commission recommended against congressional funding to begin construction. Proposals to officially deauthorize Tocks Island were considered by the Congress but not enacted. In 1978 Congress designated the 37-mile middle Delaware River a component of the National Wild and Scenic Rivers System. As intended by its supporters, this designation created substantial procedural and policy impediments to the future construction of any dam in that reach of the river.

With an at-site net yield capability (980 cfs) greater than the combined yield of all other planned reservors in the Basin system, deferral of Tocks Island as a near-term option created a major void in the Basin water management capability. The parties were in disagreement about scenic river designation and dispute was provoked among them as to their obligations under the Supreme Court Decree with respect to construction of a mainstem reservoir. Failure to move ahead with a major storage project in the lower Basin intensified concern over operation of upper Basin reservoirs during drought times. The Tocks Island decision underscored the need for the Level B Study and led directly to the good faith discussions.

4/ "Appraisal of Upper Basin Reservoir Systems, Drought Emergency Criteria and Conservation Measures," Task Group Report to the Delaware River Basin Commission, March 1979.

Level B Study

In 1977 the Commission began work on the Level B Study with major funding support by the United States Water Resources Council. As noted before, the decision not to proceed with construction of Tocks Island removed a key unit from the Basin's water resource management plan: long-standing and major assumptions as to lower Basin storage and flow augmentation capability could no longer be relied upon. The Level B Study was designed to take a new look, to review possible alternative reservoir projects, and to provide the technical bases and concepts necessary for revision and updating of the Commission's Comprehensive Plan, some parts of which date back to 1962.

The good faith discussions began when the Level B Study was midway along, and relied heavily upon data generated by the study team and cooperating agencies of the parties. The information needs of the negotiators, in turn, provided a "real world" context and helped to focus some of the major issues of the Level B Study. Information developed by the Commission at the request of the good faith participants was made available to the Level B program staff and is reflected in the final Level B report,[5/] particularly in those sections concerned with flow maintenance. All of the good faith recommendations of the parties have a reference point in the Level B report.

5/ Delaware River Basin Comprehensive (Level B) Study," Delaware River Basin Commission, May 1981.

SECTION I

MANAGEMENT STANDARDS AND CRITERIA

Recommendation 1.—Salinity Objectives

The Commission should amend its Comprehensive Plan to include a revised salinity objective. The amendment should include a set of interim and long-term salinity objectives. The interim operating objective should be to limit salinity to a maximum 30-day average of 180 mg/l of chlorides and a maximum 30-day average of 100 mg/l of sodium at River Mile 98 (i.e., one mile upstream from the Walt Whitman Bridge). Through a set of step-by-step actions a more protective objective should be established by the year 2000 to limit salinity to a maximum 30-day average of 150 mg/l of chlorides and a maximum 30-day average of 83 mg/l of sodium at River Mile 98.

As additional reservoir facilities and storage capacity become available in the Basin they should be used both to augment water supply, and to improve environmental conditions, water quality, and salinity protection. A portion of the new storage capacity recommended in recommendation 5 should be committed to salinity protection. As each unit comes on line, the operating salinity objective should be revised until the year-2000 objective is reached. Simultaneously, a series of depletive water use allocation budgets should be adopted at each stage. Each budget should be designed to meet the operating salinity objective with the capacity of the storage facilities then available.

The salinity objective should be periodically reviewed by the Commission in light of existing conditions and knowledge.

The parties join in this recommendation, in view of the fact that they are also committed to the implementation of the depletive water use budget set forth in recomendation 13, to the implementation of a drought operating formula and conservation programs, as set forth in recommendations 3, 4, 10, 11, and 12, and to the development of projects set forth in recommendations 5, 6, and 7.

All of the parties recognize the benefits of the salinity standards proposed in recommendation 1, but New York City abstains from supporting this recommendation because establishment of salinity standards is properly a matter for decision by the Commission. However, the City does agree with the specific drought operating schedules set forth in recommendation 3, which will assist in controlling salinity during drought periods over the course of this agreement.

Explanatory Notes

Water management policy in the Delaware is conditioned by key, underlying objectives. The need for new storage projects, for example, is largely dependent upon the level of flow maintenance capability required. Flow requirements, in turn, depend in large part upon salinity characteristics in the estuary and the degree of salinity concentration that can be tolerated at specified locations. Excessive salinity can increase sodium in drinking water supplies and cause adverse health effects for some people. Salinity can also increase operating costs for some industries. Protection against salinity intrusion requires a volume of fresh water flow into the estuary and improved management on the part of those water users who are subject to the effects of salinity. Overarching all aspects of any system is the question of what degree of adverse environmental condition should the system

be designed to protect against? Should the Delaware Basin seek controlcapabilityto protect against the worst known drought, a lesser drought, or a drought that is worse than anything previously experienced? What is a sound margin of safety?

The Commission's existing salinity standard (equivalent to 72 mg/l of chloride at River Mile 98) cannot be met during drought periods with the flow augmentation capability presently available. To meet this existing standard under projected year-2000 conditions would require more than twice the new storage capacity recommended by the parties in Section III. By the year 2000, with projected increases in depletive uses, meeting this existing standard would require a minimum flow at Trenton of about 3900 cfs, compared to the current capability of about 2500 cfs. The revised standard proposed in recommendation 1 thus represents a relaxation of the existing standard, and acceptance of limited risk of chloride/sodium contamination in the estuary and adjacent aquifers that feed from it. That risk will be greater during the interim period before new flow augmentation facilities are constructed and the more protective control objective goes into effect.

The interim salinity objective (180 mg/l chlorides/100 mg/l sodium at R.M. 98) can be met during a drought with existing flow capability at Trenton. To meet the year 2000 salinity objective (150/83 at R.M. 98) will require a minimum flow capability of about 2900 cfs at Trenton if depletive uses increase as projected.6/ This means that the Basin faces an estimated flow capability shortfall by the year 2000 of about 600 cfs, even with allowance for substantial reduction in depletive use through conservation. Meeting that projected shortfall condition is the purpose of the new projects and regulatory measures recommended by the parties.

Sodium concentrations in drinking water can impact on public health. Sodium intake in excess of physiological need is an important factor in inducing age-related increase in blood pressure that culminates in hypertension in generally susceptible people. The prevalence of hypertension in the adult population of the United States is 15 to 20 percent among Caucasians and substantially higher among blacks. Persons with this health problem are usually advised to limit their intake of sodium. Sodium has also been implicated in other diseases, including cirrhosis of the liver, toxemias of pregnancy, hypernatraemia, and Meniere's disease.7/

In colonial times water from the Potomac-Raritan-Magothy aquifer system flowed from the aquifer to the Delaware River. Because of heavy pumping, the hydraulic gradient has been largely reversed. The aquifer is now significantly recharged from the Delaware River, particularly upstream of River Mile 98. The aquifer system provides water supplies to over one million people in New Jersey and Delaware. In normal water years, with current pumping rates, about 50 percent of the water withdrawn from these aquifers in the south-central New Jersey area is induced flow from the river. In dry years this may rise to as much as 70 percent or greater. Sodium levels in portions of the aquifer near the river are thus strongly influenced by sodium concentrations in the river water and the duration of contact between river water of excessive sodium concentrations and the aquifers. Present New Jersey drinking water standards set a maximum sodium level of 50 mg/l.

6/ Projections of future depletive water use, population size, level of industrial activity, and other technical background assumptions in this report are drawn from the Level B Study.

7/ Results of research on the effects of elevated sodium levels were reported to the parties by Dr. Robert W. Tuthill of the School of Health Sciences at the University of Massachusetts. For more detailed discussion of the effects of sodium see the EPA statement, "Basis and Purpose for Proposed Amendments to the National Interim Drinking Water Regulations and Proposed Special Monitoring Requirements," July 1979.

Current studies by the U. S. Army Corps of Engineers have examined the annual salinity-related costs to municipalities and industry in the estuary. This cost is estimated to average about $14 million annually for municipal systems and $20 million annually for direct industrial withdrawals (1978 price levels).[8/] These costs do not include salinity-related costs to ground water users who depend on aquifers recharged in part by the estuary.

Recommendation 2.—Drought of Record

The Basin's water management system should be capable of providing and protecting reliable water supplies for essential uses during a drought equal in severity to the drought of record, which occurred in the period 1961-1967. The Commission should amend the Comprehensive Plan to include a specific management criterion that the drought of record will be used as the basis for determination and planning of dependable water supply.

Explanatory Notes

The 1960s drought is estimated to have a recurrence interval of several hundred years in the upper Basin and about 100 years for the lower Basin. A water supply system designed on the basis of a severe drought would offer a greater margin of safety than a system designed to meet a less severe drought. Where a reasonably long period of record is available (approximately 80 years in the Delaware River Basin), use of the drought of record is considered reasonable for determination and planning of dependable water supply.

Using the drought of record for planning purposes should not be understood to offer full protection. It is not uncommon for such events to be exceeded in severity by later, more extreme events. Prior to the 1960's the drought of record for the Delaware Basin was the 1929-33 drought (upon which the 1954 U. S. Supreme Court Decree was predicated). The severity of that event was exceeded to a substantial degree by the drought of the 1960s.

SECTION II

DIVERSIONS, RELEASES AND RESERVOIR MANAGEMENT DURING DROUGHT

Recommendation 3.—Drought Operation Formula

Pursuant to section 3.3 of the Compact, for purposes of management during a drought, the Commission should amend the Comprehensive Plan to include a schedule of phased reductions in diversions, releases, and flow objectives as set forth in Tables 1 and 2. The formula is based upon a differentiation between "normal," "drought warning" and "drought" conditions as

8/ "Delaware Estuary Salinity Intrusion Study," Appendix 1, Technical Studies, Department of the Army, Philadelphia District, Corps of Engineers, Draft-December 1981.

defined by the combined storage levels shown on the operation curves for Cannonsville, Neversink and Pepacton reservoirs (page six). The division of the drought warning zone into upper and lower halves is defined as a physically equal division, or 20 billion gallons in each zone.

TABLE 1

Interstate Operation Formula for Reductions
In Diversions, Releases, and Flow Objectives
During Periods of Drought

NYC Storage Condition	NYC Div mgd	NJ Div mgd	Montague Flow Objective cfs	Trenton Flow Objective cfs
Normal	800	100	1750	3000
Upper Half— Drought Warning	680	85	1655	2700
Lower Half— Drought Warning	560	70	1550	2700
Drought	520	65	1100-1650*	2500-2900*
Severe Drought (to be negotiated based on conditions)				

*Varies with time of year and location of salt front as shown on Table 2.

During drought conditions as defined by the operation curves shown on page six, the Montague and Trenton flow objectives should vary according to the location of the salt front (250 mg/l chloride isochlor 7-day average), in accordance with the following table:

TABLE 2

Flow Objectives for Salinity Control
During Drought Periods

Seven-day Average Location of "Salt Front," River-mile*	Flow Objective, Cubic Feet Per Second At: Montague, N.J.			Trenton, N.J.		
	Dec-Apr	May-Aug	Sept-Nov	Dec-Apr	May-Aug	Sept-Nov
Upstream of R.M. 92.5	1600	1650	1650	2700	2900	2900
Between R.M. 87.0 and R.M. 92.5	1350	1600	1500	2700	2700	2700
Between R.M. 82.9 and R.M. 87.0	1350	1600	1500	2500	2500	2500
Downstream of R.M. 82.9	1100	1100	1100	2500	2500	2500

*Measured in statute miles along the navigation channel from the mouth of Delaware Bay.

Diversions and releases under this drought operation formula should go into effect automatically whenever combined storage in the City reservoirs declines below the drought warning line and remains below that level for five consecutive days. When the combined storage (including the projected water runoff equivalent of actual snow and ice) reaches a level 15 billion gallons above the drought warning line, and remains above that level for five consecutive days, the drought operation formula should automatically terminate and normal operations provided for in the Decree should be resumed.

Whenever the drought operation formula goes into effect, it should be binding on all parties for not less than 180 days following the triggering of drought warning operations, unless terminated automatically by improved storage conditions, as noted above. During the 180-day period the parties will convene no less frequently than once each month to review current conditions, and they may extend, modify, or extend as modified the formula recommended here. If no unanimous agreement as to a continuing drought operation formula is reached within the 180-day period, all parties shall be released from the terms of the formula contained in this agreement and may pursue their rights and obligations under the Delaware River Basin Compact and the U. S. Supreme Court Decree.

The City of New York joins in recommendation 3 but does not by doing so accept any general responsibility under the doctrine of equitable apportionment or otherwise to vary releases from the City's reservoirs in accordance with the location of the salt front.

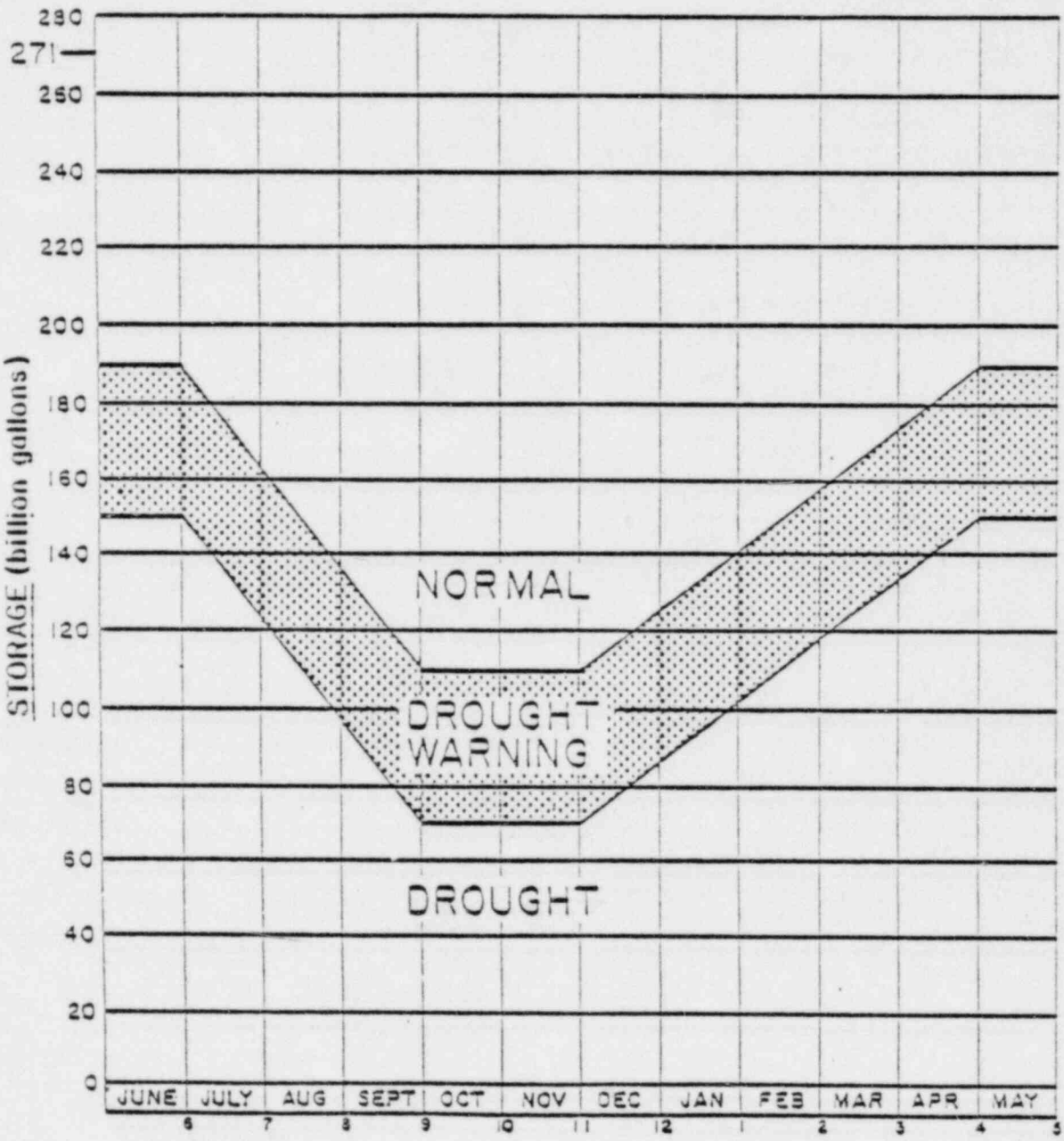
Explanatory Notes

The recommended drought operation formula was applied during the 1980-81 drought experience. The parties believe it represents a compromise between the needs of New York City and northeastern New Jersey for water supply, and the needs of the lower Basin to maintain minimum fresh-water flows in the river and into the estuary in order to protect water uses and quality in that region.

Termination of the drought operation formula as proposed in recommendation 3 involves a criterion (15 billion gallons for five days) different from that proposed for terminating a drought emergency in recommendation 10 (40 billion gallons for 30 days). In the former instance, the action required is largely automatic and can be executed quickly. It can be easily reversed if storage conditions worsen and dip into the drought warning. A larger margin of certainty is proposed in the latter instance because public conservation controls and drought awareness programs take time to organize and cannot be turned on and off quickly.

OPERATION CURVES FOR

CANNONSVILLE, PEPACTON AND NEVERSINK RESERVOIRS



Recommendation 4

The Commission should develop a plan for coordinated operation of other existing impoundments during drought periods to complement the operating formula for the New York City reservoirs, as outlined above, in order to maintain reliable supplies for essential uses, to conserve water, and to control salinity.

The plan should include operating criteria for the Beltzville, Blue Marsh, Walter, Prompton and Nockamixon projects, and the hydroelectric power reservoirs in the Basin of the Pennsylvania Power and Light Company and Orange and Rockland Utilities, Inc. Criteria for defining a lower Basin drought warning and drought should be prepared and made part of the plan. The plan should be completed by July 1, 1983, and made part of the Commission's Comprehensive Plan.

Explanatory Notes

During recent droughts special arrangements were made with the U. S. Army Corps of Engineers to provide water supply storage in the Walter and Prompton projects on a temporary emergency basis to help maintain lower Basin flow objectives. Arrangements were also made with electric utility companies to modify the operation of the Wallenpaupack and Mongaup power reservoirs in a manner calculated to increase releases during the low flow period, and provide sustained and dependable flows. This experience needs to be analyzed so that a more precise operating plan can be worked out in advance of the next drought emergency.

A series of reservoirs operated as an integrated system can produce a significantly greater net yield at downstream control points than if the same reservoirs are operated independently. Recommendation 4 seeks that objective as well as the general goal of emergency preparedness.

SECTION III

WATER STORAGE, WATER SUPPLY AND FLOW AUGMENTATION PROJECTS

Recommendation 5.—Walter, Prompton and Merrill Creek

It is recommended that the parties individually and collectively endorse and promote construction or modification of the following projects for water supply, and flow augmentation for salinity control according to the timetable specified:

— Enlargement of the Francis E. Walter reservoir in Luzerne County, Pennsylvania. Design studies are currently under way by the U.S. Army Corps of Engineers. Construction should be completed by 1990. Estimated additional yield: 290 cfs.* The Commission should amend its Comprehensive Plan by adding an updated description of the Francis E. Walter project. A proposed revised Comprehensive Plan description is made part of this report as Appendix A.

*This and the following yield figures are initial estimates and subject to change during engineering design. They are based on complete and uniform drawdown of increased storage over a 120-day period (115 days for Merrill Creek).

- Enlargement of the Prompton reservoir in Wayne County, Pennsylvania. Design studies should be initiated so that the project can be completed by 1995. Estimated additional yield: 130 cfs. Pursuant to section 3.3 of the Compact, the Commission should amend its Comprehensive Plan by adding an updated description of the Prompton project, including the following operating policy provision:

  (1) When New York City is releasing from its reservoirs by direction of the River Master to meet Montague flow objectives—

    (a) inflow to Prompton may be passed through the reservoir and released downstream with no change in the Montague flow objective, or stored in the reservoir with an equivalent reduction in the Montague flow objective; and

    (b) releases may be made from Prompton storage to meet Trenton flow requirements, and such releases will not be counted as part of the Montague objective.

  (2) When New York City is not releasing from its reservoirs to meet Montague flow objectives—

    (a) inflow at Prompton may be stored (except for minimum conservation releases); and

    (b) releases may be made from Prompton storage to meet Trenton flow requirements, and such releases will not be counted as part of the Montague objective.

  A proposed revised Comprehensive Plan description of the Prompton project is made part of this report as Appendix B.

- Construction of the Merrill Creek reservoir in Warren County, New Jersey, if determined to be practicable by feasibility and environmental studies, which are currently under way. Subject to the outcome of these studies, construction should be completed at the earliest possible date, which is estimated to be 1986. Estimated additional yield: 200 cfs. Subject to completion of the NEPA process, the Commission should amend its Comprehensive Plan by adding a description of the Merrill Creek project. A proposed Comprehensive Plan description is made part of this report as Appendix C.

Explanatory Notes

The foregoing yield figures are initial estimates and subject to change during engineering design. They are based on complete and uniform drawdown of increased storage over a 120-day period, 115 days for Merrill Creek) to supplement flows of the Delaware River at Trenton. This method of estimating results in combined yields about 10 to 15 percent higher than would actually be available from the three projects.

Experience of recent droughts has underscored the need for increased water storage, water supply and flow augmentation capacity in the Delaware Basin. The Basin is even now

in a deficit condition in terms of flows required to meet the year 2000 salinity control objective proposed in recommendation 1. Unless new augmentation facilities are provided, that deficit will worsen under the impact of new or expanded depletive use, both above and below Trenton. The conservation measures proposed in recommendations 10, 11 and 12 will be an important drought management tool and will partly offset increasing use, but will not suffice alone.

With recurrence today of a drought equal in severity to that of the 1960's, system operation of the Basin's existing impoundments could maintain a flow at Trenton of about 2500 cfs, including the effects of the proposed reduced diversions, flow objectives at Montague, and conservation recommended by the parties. Under the impact of increased depletive use, as projected in the Level B study, that capability will drop to slightly less than 2300 cfs by the year 2000 if no new flow augmentation or water suppy sources are developed before that date. These levels of capability contrast sharply against the estimated 2900 cfs that will be needed to meet the year 2000 salinity objective under projected conditions 18 years hence. Even with allowance for the approximations inherent in these numbers, the conclusion is inescapable that the existing water storage, water supply and flow augmentation facilities in the Basin are insufficient to cope with the impact of drought. Measured against the year 2000 salinity objective (150 mg/l of chloride at R.M. 98) the present shortfall is about 50 cfs. If depletive water uses increase as projected, and no new facilities are developed, this shortfall would increase to about 600 cfs by the year 2000, even with the imposition of rigorous water conservation measures.

Recommendation 6.--Cannonsville

> It is recommended that the State of New York enlarge the Cannonsville reservoir in Delaware County, New York, if determined to be practicable by feasibility and environmental studies. Subject to the outcome of these studies construction should be completed by 1990. The requirements of Section IIIB of the U. S. Supreme Court Decree of 1954 relating to excess releases should be waived as to the additional storage included in the Cannonsville modification project. Additional project yield should be used primarily to maintain conservation releases. Secondary purposes should be to support the Montague flow objectives and diversions to New York City within the limits of the 1954 U. S. Supreme Court Decree. The Commission should amend its Comprehensive Plan by adding an updated description of the Cannonsville project. A proposed revised Comprehensive Plan description is made part of this report as Appendix D.

Explanatory Notes.

Added storage in Cannonsville would increase the reliability of the New York City reservoirs during drought periods and enhance the capability of the reservoirs to meet the objectives specific in proposed recommendation 6. The project would not directly contribute to increased lower Basin flows since the Montague formula, and modified drought release requirements, would continue unchanged as the controlling measure of the City's downstream release obligations under the Supreme Court Decree. Additional storage would, however, delay somewhat the imposition of reduced diversions and flow objectives during drought periods.

Modification of Cannonsville was proposed in the report of the Temporary State Commission on the Water Supply Needs of Southeastern New York, December 1973, and recommended in the Level B Study. The reservoir level would be increased approximately eight feet by the addition of flashboards on the spillway. This would increase storage by approximately 13 billion gallons.

Recommendation 7.—New Jersey

It is recommended that New Jersey undertake a study to examine potential solutions to the Camden Metropolitan area water supply problems and the related overpumping of the Raritan-Magothy aquifer system. Alternatives to be explored should include the proposed conjunctive use of ground and surface water; pumping of ground water from the Cohansey Sands aquifer; and interconnection with and water transfer from the City of Philadelphia. This study should be completed and an alternative or some combination of alternatives should be selected by the end of 1985. The selected alternative(s) should be implemented by 1990.

Recommendation 8.—Alluvial Pumping

It is recommended that the Commission evaluate the recommendation of its ground water consultants that a field demonstration be made to gather further physical information about the effects of pumping from glacial alluvium to supplement flow augmentation capacity during drought periods. Possible development of such new sources of supply should be considered as a standby alternative, for use in emergency after the year 2000.

Explanatory Notes

Commission consultants have concluded that within the area of the Basin upstream of Phillipsburg, New Jersey, including tributary streams, a large potential exists for the use of ground water to augment low streamflows.9/ Such augmentation could be provided from unconsolidated or bedrock sources, either annually or as needed in response to drought emergencies.

Approximately 425 square miles of glacial outwash deposit are located in this upper Basin area having a combined available storage of about 645 billion gallons of ground water. The consultants concluded that it is most likely that only 10 to 15 percent of the available ground water storage could be practicably developed. However, the consultant also confirms the fact that very little is known about the hydrologic properties of the glacial deposits since little actual field data are available. The consultant recommends that the apparent feasibility of ground water augmentation from glacial deposits be confirmed by actual field measurements and a field demonstration project.

Recommendation 9.—Tocks Island

The parties are agreed that Tocks Island should be held in reserve status for development after the year 2000 if needed for water supply. The Commission should amend its Comprehensive Plan by adding an updated description of the Tocks Island project. A proposed revised Comprehensive Plan description is made part of this report as Appendix E.

Explanatory Notes

New projects, conservation controls and other recommendations of the parties are all drawn in reference to the period from the present to the end of this century. Calculations of increasing depletive use, and the amount of offsetting new storage that is required, do not extend beyond the year 2000. If the projections and assumptions on which these

9/"Special Ground Water Study of the Upper Delaware River Basin." A report prepared for the Delaware River Basin Commission by R. E. Wright Associates, Inc., May 1982.

recommendations are based are borne out in the experience of the next 18 years, the Basin would need additional storage capacity early in the next century beyond that which is now recommended by the parties.

The Delaware Water Gap National Recreation Area, authorized in 1965, surrounds the Tocks Island pool area. It was originally conceived as a reservoir-oriented recreation area. Planning and development of the area is currently proceeding on the basis of recreation without a reservoir.

The 37-mile section of the Delaware River mainstem that would be inundated by the Tocks Island reservoir pool was designated a component of the national wild and scenic river system in 1978. Policy of the National Wild and Scenic River Act (P. L. 90-542) is to preserve the free-flowing conditions of designated river components. However, designation does not foreclose all possibility of future development of a storage reservoir in the same river segment. The Act requires advance notification of the Secretary of the Interior, and that a report be submitted to the Congress specifying in what respect construction of a proposed project would conflict with the purpose of the Act. Nothing in the Act precludes Congressonal consideration of a project in a designated scenic river area.

SECTION IV

CONSERVATION

Recommendation 10.—Conservation Trigger

Storage conditions in the New York City Delaware Basin reservoirs should be the principal consideration of the Commission in declaring a basinwide drought emergency under the Compact, and the initiation of emergency conservation measures. The operation curves shown on page six should be the basis for such a declaration by the Commission based upon storage conditions. The Commission should include within its Comprehensive Plan a statement of general policy that a drought emergency will be declared for purposes of imposing mandatory in-Basin conservation measures whenever combined storage in the three reservoirs falls into the drought zone shown on the operation curves and remains in that zone for five consecutive days. The statement of policy should also provide that termination of a drought emergency will be considered by the Commission whenever combined storage in the three reservoirs reaches 40 billion gallons above the drought warning level and remains above that level for 30 consecutive days, and that the drought emergency will be terminated by the Commission whenever the combined storage remains above that level for 60 consecutive days unless the Commission unanimously agrees to extend the emergency.

This recommendation is not intended to extend, impair, or conflict with the Commission's authority under the Compact to declare or terminate a drought or water shortage emergency in the Basin, or sub-region thereof, in other instances as conditions may require.

Explanatory Notes

The intent of this proposed recommendation is to establish consensus in advance as to what constitutes drought conditions warranting emergency action. The criteria will be useful to water users and the general public, as well as to water management officials of the parties.

Combined storage of the three New York City reservoirs comprises about 90 percent of the total available storage in the Basin, and for that reason is accepted by the parties as a sound criterion for determining a basinwide drought emergency. The Commission may, as circumstances warrant, declare a drought emergency for sub-regions of the Basin based upon different criteria.

Authority to declare a drought or other water supply emergency is contained in Section 10.4 of the Compact. Under such declaration the Commission may control the amount of water withdrawn from surface or ground water sources for any purpose, and may regulate the operation of public and private reservoirs in the Basin. Section 3.3 of the Compact contains special provisions relating to diversions and releases under the Supreme Court Decree during a drought or catastrophe.

Recommendation 11.—Conservation Objective of 15 Percent

> **The Commission should include within its Comprehensive Plan a statement of general policy that conservation measures in the Basin designed for implementation during drought periods shall be based upon the objective of reducing overall depletive use of fresh water by 15 percent.**

Explanatory Notes

Conservation during drought periods requires extraordinary measures not justified under normal hydrologic conditions. Because of flow-salinity relationships in the estuary, and the importance of maintaining specified minimum fresh-water flows during drought, conservation of depletive use is of special importance in the Delaware Basin. It is the depletive uses of both surface and ground waters that impact quantitatively upon minimum flows and the capability to maintain them.

The policy objective of 15 percent reduction in depletive water use during drought derives from the Level B Study. The 15 percent represents an average of various levels of reduction among different classes of users. The range is from a high of 50 percent for golf course use, 25 percent for municipal use, 10 percent for agricultural use, down to no reduction in water used by livestock. A 15 percent reduction in depletive use as applied to levels of water use projected for the year 2000 would be equivalent to an augmentation of flow of approximately 280 cfs.

No estimate is available of the extent of depletive water use reduction achieved overall in the Basin during the 1980-81 drought. Diversion from the Basin (which can be considered depletive use) by New York City in the period June 1980--May 1981 was 14 percent less than the previous 12-month period.

In the Pennsylvania portion of the Basin it is estimated that public water suppliers were able to reduce depletive losses from a normal usage of 70 mgd to 20 mgd, two-thirds of which was realized within the Philadelphia Water Department and Philadelphia Suburban Water Company service areas. Self-supplied industries are estimated to have reduced depletive use by 10 percent (or 14 mgd) through in-plant conservation measures. About 90 percent of all self-supplied golf course use was curtailed, generating an estimated depletive use reduction of about 11 mgd.

During the February-to-November-1981 period overall water use in Philadelphia (depletive and non-depletive) was reduced by about nine percent. During the three summer months, the reduction was 13 percent. Many of the smaller communities in Pennsylvania, such as Hazelton, Schuylkill Haven, Kutztown, Walnutport and East Stroudsburg, achieved reductions in overall water use ranging up to 25 percent as a result of water rationing programs instituted during 1981.

Recommendation 12.—Contingency Plans

Each State should prepare drought contingency plans for phased implementation during periods of drought warning and drought. Such plans should be coordinated with action by the Commission in announcing a drought warning and in declaring a drought emergency under the Compact, and should be designed to achieve a target 15 percent reduction in depletive use at drought stage. Contingency plans should be completed no later than December 31, 1983, and should include:

- Identification of those restrictions on non-essential water uses, such as car washing, lawn watering, et cetera, that can be effectively and practically applied; and outline procedures for coordinated initiation and termination of public controls over such uses as drought conditions develop and subside.

- Contingency plans by large water users that provide for phased reduction of use as drought conditions worsen.

- Proposed or existing legal authority to establish emergency conservation programs with enforcement powers, including fines and penalties.

- Effective and timely public information services concerning the drought and the necessity for conservation by all classes of water users.

If adequate legal authority does not exist to implement contingency plans, including the foregoing features, the parties should seek such authority prior to December 31, 1985.

Explanatory Notes

Drought contingency plans are presently being prepared by Pennsylvania and Delaware and are expected to be completed in the near future. A contingency plan for New Jersey has been completed.10/

SECTION V

DEPLETIVE WATER USE BUDGET

Recommendation 13.—Water Use Budget

The Commission should develop a regulatory program to limit future depletive water use in such a way as to balance existing, new, or expanded depletive use with the availability of storage capacity required to meet salinity objectives. The principal features of such a program should be:

- The control area in which the regulatory program would operate would be that area of the basin downstream of the Montague gage and upstream of the Chesapeake and Delaware Canal.

10/ "New Jersey Drought Emergency Plan," June 1981.

- Water available for allocation to new or expanded depletive uses within the control area would be limited to that which is in excess of the flows needed to maintain the applicable salinity control objective during drought periods.

- Applications for new or expanded depletive water uses within the control area that would be in excess of the amount available for allocation would not be approved by the permitting agencies of the States or by the Commission unless new storage capacity is brought on line or existing uses are proportionately reduced by conservation or abandonment, or unless such new or expanded uses are offset by water imported from outside the Basin.

- Water available for allocation to new or expanded depletive uses would be allocated either among the States in proportion to the percentage of the control area within each State, or to the common pool for use without regard to political boundaries.

- If the Commission's regulatory program follows the State-by-State option, water available for allocation to a State would be increased (1) to reflect new storage capacity constructed and financed by that State, its agencies or subdivisions, or (2) to reflect that portion of new storage capacity constructed or financed by the Commission in accordance with agreements among the parties for each project.

- If the Commission's regulatory program follows the "common pool" option, allocations to the pool would be increased as new storage units are constructed and water becomes available for new or expanded uses in accordance with existing State and Commission permitting programs.

A depletive water use budget should be adopted and implemented by the Commission no later than 1985.

Explanatory Notes

The fundamental concept behind this proposal is that depletive use should not be allowed to continue to increase in the absence of offsetting storage capacity sufficient to sustain minimum streamflow objectives. There cannot be continued increases in depletive use without compensating releases from new storage unless the Basin is prepared to face the consequences of steadily decreasing streamflows. If the capacity does not exist, creation of new capacity, either through importation, reduction of existing uses, or construction of new impoundments or other flow augmentation sources, would be required under the proposed recommendation as a precondition of approval of any new depletive use. The Delaware Basin is reaching that point. Measured against the year 2000 salinity objective proposed in recommendation 1, waters of the Basin are already over-allocated.

Studies indicate that about 110 cfs would be available for allocation now under the interim salinity control objective proposed in recommendation 1. If depletive uses increase as projected, and no new flow augmentation facilities are brought on line, this allocation would be exhausted by 1987.

The area of the Basin above the Montague gage would be excluded since the U. S. Supreme Court Decree requires reservoir releases by the City of New York designed to meet the prescribed level of flow in the Delaware River at Montague.

Areas of the Basin below the Chesapeake and Delaware Canal are exluded because the concentration of sea salts in that area is so heavy that Bay waters cannot be utilized as a source of fresh water. Surface streams draining into the Bay contribute such minor flows that they have little impact upon salinity levels.

SECTION VI

CONSERVATION RELEASES FROM NEW YORK CITY RESERVOIRS

Recommendation 14.—Augmented Conservation Releases

The Commission should amend docket D-77-20, as necessary to authorize on a permanent basis the augmented conservation release schedules at the three reservoirs, as shown in Table 3. The revised docket, a draft of which is attached as Appendix F, should reflect the following conditions:

- An additional quantity of water up to 6000 cfs-days should be provided for the relief of thermal stress on aquatic life in the river downstream of the reservoirs and on the mainstem of the Delaware River, designed to prevent to the extent practicable, any water temperature higher than 75°F or daily average water temperature higher than 72°F in the designated downstream areas as determined from measurements at Callicoon, Harvard, Woodbourne, and Hale Eddy gaging sites during the period May 1 to October 31, inclusive. Releases for this purpose should be at the direction of the New York State Department of Environmental Conservation. In order to conserve available water in storage, no thermal stress releases should be made when the reservoirs are in drought warning or drought condition.

- Whenever combined water storage conditions in the three reservoirs decline to drought warning or drought levels, as shown on the operation curves (page six), the augmented conservation releases should be reduced to the basic rate in effect prior to 1977 for each reservoir except that larger volumes of water would be released during those periods when the River Master is directing releases to meet the Montague flow objectives. This reduction would be for the purpose of conserving available water in the reservoirs.

- Conservation releases should be returned to normal augmented levels when combined storage in the three reservoirs reaches 25 billion gallons above the drought warning level, as shown on the operation curves (page six), and remains at or above that level for 15 consecutive days.

- Increases in the augmented conservation release levels should be made only in accordance with the allowances provided for in the Stipulation of Discontinuance in The City of New York vs The State of New York Department of Environmental Conservation, Index No. 5840-80, and should be subject to approval by the Commission.

TABLE 3

Reservoir and Operative Dates	Basic Conservation Release	Augmented Conservation Release
Neversink		
4 / 1 - 4 / 7	5 cfs	45 cfs
4 / 8 - 10 / 31	15	45
11 / 1 - 3 / 31	5	25
Pepacton		
4 / 1 - 4 / 7	6	70
4 / 8 - 10 / 31	19	70
11 / 1 - 3 / 31	6	50
Cannonsville		
4 / 1 - 4 / 15	8	45
4 / 16 - 6 / 14	23	45
6 / 15 - 8 / 15	23	325
8 / 16 - 10 / 31	23	45
11 / 1 - 11 / 30	23	33
12 / 1 - 3 / 31	8	33

Explanatory Notes

Table 3 shows the programs of augmented conservation releases from the New York City Delaware Basin reservoirs that has been in effect since 1977 on an experimental basis. The purpose of the program is to augment low streamflows below the Cannonsville, Pepacton and Neversink reservoirs to protect and enhance the recreational use of waters affected by such releases. Research findings and comments from fishermen and recreationists indicate that the effect of the program has been beneficial and should be continued on a permanent basis.11/

The augmented conservation releases shown here are identical to the schedules contained in the Rules and Regulations of the New York State Department of Environmental Conservation (Part 671, Reservoir Release Regulations, Cannonsville, Pepacton and Neversink Reservoirs), adopted in November 1977 and amended in May 1980. The release levels have been consented to by the City of New York in reliance upon mutual commitments made by the State and City of New York (Stipulation of Discontinuance, City of New York vs New York State Department of Environmental Conservation, Index No. 5840-80).

11/ "Appraisal of Upper Basin Reservoir Systems, Drought Emergency Criteria and Conservation Measures," Task Group Report, Delaware River Basin Commission, March 1979; "Performance Report of New York Reservoir Releases Monitoring and Evaluation Programs—Delaware River—July 1978—December 1979," J. Douglas Sheppard, Bureau of Environmental Protection, New York Department of Environmental Conservation (undated).