NO. 88-22 (Revised)

A RESOLUTION to amend the Comprehensive Plan relating to criteria and operations formulae for emergency operations during a lower basin drought warning and drought.

WHEREAS, the Governors of the four Basin States and the Mayor of New York City have unanimously agreed to 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 No. 78-20; and

WHEREAS, Recommendation 4 of these Interstate Water Management Recommendations declares in pertinent part that:

"Criteria for defining a lower Basin[1/] drought warning and drought should be prepared and made part of the plan"; and

WHEREAS, the Commission, in June 1983 directed its Flow Management Technical Advisory Committee to develop alternative operating plans using the criteria in Recommendation 4 of the Interstate Water Management Recommendations; and

WHEREAS, the Delaware River Basin Commission's Flow Management Technical Advisory Committee has conducted a study and made recommendations to the Commission; and

WHEREAS, the Commission held a public hearing on March 23 and April 27, 1988 on this recommended plan and has reviewed and considered testimony from water users and other interested parties; now therefore

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1/ For the purposes of this resolution, the lower basin is defined as the drainage area of the Delaware River and Bay below the streamflow gaging station at Montague, N. J.

BE IT RESOLVED by the Delaware River Basin Commission:

I. The Comprehensive Plan and Article 2 of the Water Code of the Delaware River Basin are hereby amended by the addition of a new Section 2.5.6 to read as follows:

2.5.6 Coordinated Operation of Reservoirs During a Lower Basin Drought Warning and Drought.

A. **Banking and Use of Excess Release Quantity: New York City Reservoirs.** Prior to June 15 of each year and at any time the hydrologic conditions so warrant, the parties to the 1954 Supreme Court Decree, the Delaware River Basin Commission and the Delaware River Master will review existing conditions in the basin and shall determine whether or not to bank the "excess release quantity" provided pursuant to Section III, B.1.C of the Decree, as calculated for the seasonal period beginning June 15 and ending the following March 15, for possible use to help prevent lower basin "drought" or to provide lower basin "drought" assistance. Relevant factors to be considered include precipitation in the basin, climatic predictions, streamflows, ground water levels, soil moisture and other hydrologic data in making the determination with respect to the banking and use of the "excess release quantity." The "excess release quantity" shall be reserved and placed in an "excess release bank" if the parties to the 1954 Decree, Delaware River Basin Commission and the River Master determine that "drought" conditions in the lower basin are expected or threatening. If the "excess release quantity" is reserved and banked, the excess release provisions set forth in Section III.B.1.d of the Supreme Court Decree shall be deemed suspended for the balance of that water year beginning June 1 and ending May 31. The "excess release bank" shall be used, during that water year, to provide lower basin "drought" assistance releases to the Delaware River designed to assist in meeting the Trenton flow objective for lower basin "normal"

A. (continued)

conditions, or 3,000 cfs. Such lower basin "drought" assistance releases shall be made in quantities and at such times as determined by the Delaware River Basin Commission, and directed by the Delaware River Master. The lower basin "drought" assistance releases shall be made provided that the total combined storage available in the New York City Delaware River Basin reservoirs exceed the "drought warning" criteria set forth in Figure 1 of Section 2.5.3. The total lower basin releases made from the New York City Delaware Basin reservoirs during any water operations year under the provision of this section shall not exceed the total quantity available in the "excess release bank" available during that same period. If, while banking excess releases, augmented conservation releases from the New York City Delaware River Basin reservoirs are made that would have been credited towards the "excess release quantity" in the absence of banking, then that amount of augmented conservation release shall be deducted from the "excess release bank".

B. **Operations During Lower Basin "Normal" Conditions.** When basinwide conditions are "normal" and lower basin conditions are "normal" (as defined by Beltzville Reservoir storage above Elevation 615 m.s.l. and Blue Marsh Reservoir storage above Elevation 283 m.s.l.), the following provisions shall govern lower basin operations:

1. New Jersey Diversion - Diversions by the State of New Jersey during "normal" periods, shall be computed as provided in Section V.B. of the amended Decree of the U.S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954) and its total diversion without compensating releases shall not exceed 100 million gallons per day (mgd) as a monthly average, with the diversion on any day not to exceed 120 million gallons, and its total diversion without compensating releases shall not exceed an average of 100 mgd during any calendar year.

B. (continued)

2. Trenton Flow Objective - The minimum streamflow objective at the U.S.G.S gaging station located at Trenton, NJ, shall be 3,000 cfs.

3. Priority of Releases - Releases shall be made from storage to maintain the minimum Trenton streamflow objective of 3,000 cfs in such quantities and at such times as determined by the Delaware River Basin Commission, and, in the case of the New York City reservoirs, as directed by the Delaware River Master, in the following order of priority:

   (a) Releases from the "excess release bank" in the New York City Delaware Basin reservoirs, if available as provided under Section A of this plan.

   (b) Releases from Beltzville Reservoir from storage between elevations 628 and 615 m.s.l. (73.7% of storage remaining), and/or releases from Blue Marsh Reservoir from storage between elevations 290 and 283 m.s.l. (68.9% of storage remaining). Releases may be made from either or both reservoirs considering water quality needs in the Lehigh and Schuylkill Rivers.

C. **Operations During Lower Basin "Drought Warning" Conditions.** When the storage in Beltzville Reservoir falls below elevation 615 m.s.l. (73.7% of storage capacity) and the storage in Blue Marsh Reservoir falls below elevation 283 m.s.l. (68.9% of storage capacity) the Delaware River Basin Commission shall declare a "drought warning" condition in the lower basin, and the following operating provisions and actions shall automatically be placed in effect:

C. **(continued)**

1. New Jersey Diversion - The total diversion by the State of New Jersey during lower basin "drought warning" conditions in the lower basin shall be computed as a daily running average, commencing on the day such "drought warning" becomes effective. The total diversion by New Jersey shall not exceed a running average of 70 mgd with the diversion on any day not to exceed 120 million gallons per day. If the allowable diversion for any condition period following entry into "drought warning" operations is not fully used, the unused portion may not be credited or used during subsequent periods.

2. Trenton Flow Objective - During lower basin "drought warning" periods, the minimum streamflow objective at the U.S.G.S. gaging station located at Trenton, NJ, shall be established as set forth in Table 2 of Section 2.5.3, in accordance with the seven-day average location of the 250-mg/l isochlor (the "salt front") in the Delaware Estuary.

3. Priority of Releases - Releases shall be made from storage to maintain the minimum streamflow objectives set forth in Table 2 of Section 2.5.3, in such quantities and at such times as determined by the Delaware River Basin Commission, and in the case of the New York City Reservoirs, as directed by the Delaware River Master, in the following order of priority:

   (a) Releases from the "excess release bank" in the New York City Delaware River Basin Reservoirs, if available, as provided under Section A. Because the "excess release bank" will have been used under lower basin "normal" conditions, it would only be available in the second or a subsequent year of a

lower basin "drought" or lower basin "drought warning."

(b) Releases from Beltzville Reservoir from storage between elevations 615 to 590 m.s.l. (38% of storage remaining), and/or releases from Blue Marsh Reservoir from storage between elevations 283 and 273 m.s.l. (36.8% of storage remaining). Releases may be made from either or both reservoirs, considering water quality needs in the Lehigh and Schuylkill Rivers.

4. Reduction of Conservation Releases - In order to conserve storage, conservation releases from the listed lower basin reservoirs shall be modified as set forth in Table 4 of Section 2.5.5 commencing with the declaration of a lower basin "drought warning" condition.

5. Conservation Measures - The Delaware River Basin Commission and the lower basin states will implement and encourage concerted voluntary water conservation measures and programs during the lower basin "drought warning" condition.

6. Consultation by Decree Parties, the Delaware River Basin Commission, and Delaware River Master - Within 30 days following triggering of lower basin "drought warning" conditions, the Delaware River Basin Commission shall convene the authorized representatives of the States of Delaware, New Jersey and New York, Commonwealth of Pennsylvania, City of New York and the Delaware River Master to review current conditions and to consider and determine actions to be implemented in the event of lower

basin "drought" emergency conditions declared pursuant to Article 10.4 of the Compact.

7. Ending Lower Basin "Drought Warning" - When the storage levels in Beltzville and Blue Marsh Reservoirs simultaneously exceed their respective lower basin "drought warning" storage levels for 30 consecutive days, or when either of those reservoirs spills, the lower basin "drought warning" operation shall automatically terminate and "normal" operations shall be resumed, unless the Commission unanimously agrees otherwise.

D. **Operations During Lower Basin "Drought" Conditions.** When storage in Beltzville Reservoir falls below elevation 590 m.s.l. (38.0% of storage capacity) and storage in Blue Marsh Reservoir falls below elevation 273 m.s.l. (36.8% of capacity) and remains below such levels for three consecutive days, the Delaware River Basin Commission shall, pursuant to Article 10.4 of the Compact, declare a lower basin "drought" emergency condition in the lower basin and the following provisions shall automatically be placed in effect:

1. New Jersey Diversion - The total diversion by New Jersey during lower basin drought conditions shall not exceed a running average of 65 mgd, for the continuous period commencing on the first day following declaration of the lower basin "drought," with the diversion on any day not to exceed 120 mgd.

2. Trenton Flow Objective - During lower basin "drought" conditions, the minimum streamflow objective at the U.S.G.S. gaging station located at Trenton, NJ shall be established as set forth in Table 2 of Section 2.5.3 in accordance with the seven-day average location of the

D.2. **(continued)**

250 mgl isochlor (the "salt front") in the Delaware Estuary.

3. Reservoir Operations

(a) If not previously agreed to, within three days following the triggering of lower basin "drought" conditions, the parties to the 1954 Decree in consultation with the Delaware River Basin Commission, shall consider and unanimously select, and the Delaware River Basin Commission shall implement, one of the six lower basin "drought" reservoir operations plans set forth in Section E, or any other plan designed to meet then existing conditions. The parties may by unanimous agreement modify and adjust any such operations plan or plans as necessary and appropriate to reflect actual conditions and needs.

(b) The lower basin "drought" reservoir operations plans shall consider and include provision of staged releases, as appropriate, from the following storage:

(1) Beltzville Reservoir storage between elevations 590 and 537 m.s.l. (4.65 billion gallons).

(2) Blue Marsh Reservoir storage between elevations 273 and 261 m.s.l. (1.77 billion gallons).

(3) Lake Nockamixon storage between elevations 395 and 325.5 m.s.l. (12.97 billion gallons).

(4) Storage in Lake Wallenpaupack and Mongaup facilities (29.81 and 15.38 billion gallons

respectively), subject to the conditions set forth in subsection D3(e).

(5) Any water from storage in the New York City Delaware Basin Reservoirs in excess of 80 billion gallons above "drought warning" criteria as set forth in Figure 1 of Section 2.5.3, without compensation.

(6) Any water from storage in the New York City Delaware Basin Reservoirs between 65 billion gallons and 80 billion gallons above "drought warning" criteria as set forth in Figure 1 of Section 2.5.3, with compensation for the use of storage between 65 billion gallons and 80 billion gallons at the rate of 50% of actual releases made for lower basin "drought" assistance only if storage drops below the level of 65 billion gallons above "drought warning." Credits will be added to the lower basin Drought Assistance Releases Credit Bank as defined in Subsection D3(d)(2) and compensated for as provided in Subsection D3(d)(3).

(7) Up to 30 billion gallons from storage in the New York City Delaware Basin Reservoirs between 30 billion gallons and 65 billion gallons above "drought warning" criteria as set forth in Figure 1 of Section 2.5.3, subject to the conditions set forth in subsection D3(d).

(8) Available storage in Lake Hopatcong (1.9 to 4.3 billion gallons) subject to the considerations set forth in Subsection D3(f).

D.3. (continued)

(c) The Delaware River Basin Commission, in consultation with the parties to the 1954 Decree, shall consider requesting the temporary storage of water in Francis E. Walter and Prompton Reservoirs for future use.

(d) New York City Delaware Basin Reservoirs Operations. During a lower basin "drought" condition, an amount not to exceed 30 billion gallons of storage between 30 billion gallons and 65 billion gallons above the "drought warning" line in the New York City Delaware Basin Reservoirs may be considered for inclusion in the lower basin "drought" reservoir operations plan to provide lower basin "drought" assistance releases to the Delaware River (in addition to such releases as may be needed to meet the Montague flow objective), in order to assist in meeting the Trenton flow objectives, subject to the following conditions and limitations:

(1) Lower basin "drought" assistance releases may be made under this provision provided that the total combined storage available in the New York City Delaware Basin Reservoirs exceeds by 30 billion gallons the "drought warning" criteria set forth in Figure 1 of Section 2.5.3.

(2) The total quantity of supplemental releases made from the New York City Delaware River Basin reservoirs from storage between 30 billion gallons and 65 billion gallons above "drought warning" criteria in any water year shall be credited to the City in a lower basin "Drought Assistance Releases Credit Bank" at the rate of 100% of actual releases made.

D.3.(d) (continued)

(3) Except as provided in (iii) and (iv), credits accumulated in the lower basin "Drought Assistance Releases Credit Bank" shall be carried forward to the following water years, and compensated for as follows:

(i) Credits shall first be used to reduce the "excess release quantity" for the water year beginning the following June as provided under Section III.B.1.c of the 1954 Decree.

(ii) Any remaining credits shall be compensated by a proportionate reduction in the basic Montague flow objective provided under the 1954 Supreme Court Decree and Section 2.5.3. The amount and timing of such reductions shall be determined by the Delaware River Master, in consultation with the Commission and parties to the 1954 Decree. To the maximum extent possible and considering the hydrological condition of the New York City Delaware River Basin reservoirs and upper basin streamflows, such credits will be worked off on days when releases are required to meet Montague flow objectives, and Trenton flows exceed the applicable flow objective without augmentation from lower basin storage as ordered by the Delaware River Basin Commission.

(iii) Should any credits still remain at the end of the following water year, the

procedure as outlined in D3(d)(3)(i)and D3(d)(3)(ii) shall be repeated for subsequent years as necessary to totally deplete the lower basin "Drought Assistance Releases Credit Bank", except as provided in (iv).

(iv) In the event that any New York City Delaware Basin Reservoir refills and spills, all credits accumulated in the lower basin "Drought Assistance Releases Credit Bank" shall be cancelled.

(e) Power Reservoir Releases - During lower basin "drought" condition, the Delaware River Basin Commission may direct releases from storage in Lake Wallenpaupack and the Mongaup facilities according to D.3 (a) through (d). The Commission may delegate to the River Master responsibility for directing operation of the Lake Wallenpaupack and Mongaup facilities under the release schedules and drought management policies of the Commission. In order to conserve the waters of the basin, releases from Wallenpaupack and Mongaup shall be made only when water is needed to meet Trenton flow objectives.

(1) Releases from Lake Wallenpaupack may be directed as needed to meet Trenton flow objectives, provided that elevations do not drop below the elevations listed for the following month according to Table 2 of Section 2.5.5 of the Water Code.

D.3.(e) (continued)

(2) Releases from the Mongaup reservoir system may be directed, as needed to meet Trenton flow objectives, following an operations rule curve based upon maximum available storage of 15.38 billion gallons for the total system and providing for refilling the system during the worst hydrologic year of record, maintaining a minimum release and maintaining minimum operating levels. In the absence of an operations rule curve for the Mongaup system, releases shall be made from Mongaup facilities at a ratio of approximately 1 to 2 to the quantity of releases directed from Lake Wallenpaupack.

(3) If the Montague flow objective exceeds the sum of the New York City Delaware River Basin reservoir conservation releases plus uncontrolled flow at Montague by 350 cfs or more, then 350 cfs from the total Wallenpaupack and Mongaup directed releases shall be credited toward the Montague flow objective, and any additional releases required to meet the Montague flow objective shall be made from the New York City Delaware River Basin reservoirs.

(4) If the Montague flow objective exceeds the sum of New York City Delaware Basin reservoir conservation releases plus uncontrolled flow at Montague by less than 350 cfs, then an amount from the total Wallenpaupack and Mongaup directed releases, which is equal to the difference between the Montague flow objective and the sum of New York City conservation releases plus uncontrolled flow at Montague,

shall be credited toward the Montague flow objective, and no additional releases shall be required from the New York City Delaware Basin reservoirs to meet the Montague flow objective.

(f) In selecting the reservoir operations plan and release schedules to be implemented, the parties will consider the following factors:

(1) Lake Hopatcong is a privately-owned non-utility lake.

(2) The water in any reservoir or lake may not be available if under the provisions of a declaration of a drought emergency either within or outside of the basin by the Governor of New York, New Jersey, or Pennsylvania, such facility has been identified to provide supplies for essential health and safety purposes.

(3) There are flow constraints imposed by the outlet works.

(4) There are release limitations due to potential flooding conditions downstream.

(5) The season and seasonal hydrologic conditions.

(6) The status of storage and probability of refill or drawdown for each reservoir.

(7) The status of demands upon each reservoir.

D.3.(f) **(continued)**

(8) The impact of drought operations upon the authorized uses of each reservoir.

(9) The condition of other water supplies, storage or sources available to the owners and operators of each reservoir.

(10) The variable impact of observed and expected drought conditions in the drainage areas for each reservoir.

(11) Salinity intrusion in the Delaware Estuary.

(12) Releases shall be made from storage to maintain the minimum Trenton streamflow objectives set forth in Table 2, of Section 2.5.3, in such quantities and at such times as determined by the Delaware River Basin Commission, and, in the case of the New York City reservoirs, as directed by the Delaware River Master, in accordance with the schedules and priorities set forth in the operating plan selected or modified by the parties under this section.

E. **Operations Alternatives for Lower Basin "Drought" When Basinwide Conditions are "Normal."** When storage in Beltzville Reservoir falls below elevation 590 m.s.l. (38.0% of storage capacity) and storage in Blue Marsh Reservoir falls below elevation 273 m.s.l. (36.8% of capacity) and remains below such levels for three consecutive days, the Delaware River Basin Commission shall, pursuant to Article 10.4 of the Compact, declare a lower basin "drought" emergency condition in the lower basin and the following provisions shall automatically be placed in effect:

E. (continued)

1. New Jersey Diversion - The total diversion by New Jersey during lower basin "drought" conditions shall not exceed a running average of 65 mgd, for the continuous period commencing on the first day following declaration of the lower basin "drought", with the diversion on any day not to exceed 120 mgd.

2. Trenton Flow Objective - During lower basin "drought" conditions, the minimum streamflow objective at the U.S.G.S. gaging station located at Trenton, N.J. shall be established as set forth in Table 2 of Section 2.5.3 in accordance with the seven-day average location of the 250 mgl isochlor (the "salt front") in the Delaware Estuary.

3. Operations Alternatives - The alternatives for lower basin "drought" operations presented herein vary considerably and were specifically designed to be able to address the wide range of conditions which may occur. For example, if a lower basin "drought" triggers and the upper basin reservoirs are nearly full, then upper basin reservoirs may play a more significant role in helping to solve the lower basin crisis. On the other hand, if the lower basin is in a "drought" condition and the basin as a whole is about to enter a "drought warning" condition, then it would be appropriate to look to other sources such as power dams or recreation reservoirs for assistance. In that case, early mobilization of these additional sources would significantly reduce the severity of basinwide "drought" conditions should they occur. A schematic guide for selecting alternatives for lower basin "drought" operations is presented in Figure 1-a.

E.3. (continued)

(a) Factors which would indicate the most favorable conditions for each alternative are presented below in the column entitled Indications. The corresponding operations alternatives each present the order of priority* of augmented reservoir releases to maintain Trenton flow objectives and are located in the column entitled Operations.

(1) Alternative 1

Indications

Application of Alternative 1 is indicated if the general hydrologic condition of the upper basin is much better than the lower basin, based on various drought indicators, including precipitation, streamflow, ground water levels and reservoir storage. Under these conditions storage in the New York City Delaware River Basin reservoirs would be high (i.e., 65 bg above the "drought warning" line), with a low projected demand on the reservoirs. Storage in the New York City non-Delaware reservoirs would also be high.

Under these conditions, Alternative 1 calls for New York City Delaware storage to be used heavily because there would not be a significant risk of drawdown triggering a basinwide "drought" condition. This alternative would use water which would otherwise likely spill later during the water year.

Operations

1. Impound and use temporary storage in F.E. Walter and Prompton, if available.

2. Make additional releases from New York City Delaware Reservoir storage in excess of 80 bg above "drought warning" without compensation, and in excess of 65 bg above "drought warning" with 50% compensation if storage subsequently drops below 65 bg above "drought warning", to augment Delaware River flow.

3. Nockamixon from elev. 395 to elev. 385 (68.7%/4.1 bg)**.

4. Make 10 bg of additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow.

5. Make total of 5 bg release from Beltzville, Blue Marsh**** and Nockamixon, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 919 (1.9 bg) at a maximum release rate of 75 cfs.

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* To be followed after the "excess release bank" has been exhausted. Order of priority would be reversed for coming out of a drought condition.

** Loss of recreation below this level.

*** New York City would be credited this water against the following year's "excess release quantity" unless there is an intervening spill condition. In addition, these releases would only be made when New York City Delaware reservoir storage is more than 30 billion gallons above the "drought warning" curve. The maximum cumulative amount of these releases is 30 bg.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

Alternative 1

Operations

6. Make 10 bg of additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow.

7. Make total of 5 bg release from Beltzville, Blue Marsh**** and Nockamixon, at maximum total release rate of 200 cfs.

8. Make 10 bg of additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow.

9. Make releases from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from Mongaup storage****** subject to minimum operating levels.

10. Make releases from Beltzville, Blue Marsh**** and Nockamixon to elev. 537, 261 and 325.5 respectively at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 915.2 (2.4 bg) at a maximum release rate of 75 cfs.

*** New York City would be credited this water against the following year's "excess release quantity" unless there is an intervening spill condition. In addition, these releases would only be made when New York City Delaware reservoir storage is more than 30 billion gallons above the "drought warning" curve. The maximum cumulative amount of these releases is 30 bg.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

****** Releases will be made from Lake Wallenpaupack and the Mongaup Power Reservoir System simultaneously and approximately in a two to one ratio, respectively.

E.3.(a) (continued)

(2) Alternative 2

Indications

Use of Alternative 2 is indicated if the general condition in the upper basin is moderately favorable (i.e., storage at least 30 bg above "drought warning" and less than 65 bg above "drought warning"). This plan involves extra releases from the New York City reservoirs to assist lower basin conditions. In the event that the City reservoirs drop to less than 30 bg above "drought warning," then releases from the power dams would be used instead. Because such releases would tend to increase the risk of the basin entering "drought warning," this option should only be considered if it triggers after September 1, when the risk of drawing the basin into "drought warning" conditions is reduced. This would limit the amount of time water would be needed as well as increase the probability of refill before serious drawdown occurred.

Operations

1. Impound and use temporary storage in F.E. Walter and Prompton, if available.

2. Nockamixon from elev. 395 to elev. 385 (68.7%/4.1 bg)**.

3. Make 10 bg of additional releases from New York City Delaware reservoirs to augment Delaware River flow. To the extent New York City Delaware reservoirs are unavailable, make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

4. Make total of 5 bg release from Beltzville, Blue Marsh**** and Nockamixon at maximum total release rate of 200 cfs, and releases from Lake Hopatcong***** to elev. 919 (1.9 bg) at a maximum release rate of 75 cfs.

5. Make 10 bg of additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow. To

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** Loss of recreation below this level.

*** New York City would be credited this water against the following year's "excess release quantity" unless there is an intervening spill condition. In addition, these releases would only be made when New York City Delaware reservoir storage is more than 30 billion gallons above the "drought warning" curve. The maximum cumulative amount of these releases is 30 bg.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

****** Releases will be made from Lake Wallenpaupack and the Mongaup Power Reservoir System simultaneously and approximately in a two to one ratio, respectively.

Alternative 2

Operations

the extent New York City Delaware reservoirs are unavailable, make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

6. Make total of 5 bg release from Beltzville, Blue Marsh**** and Nockamixon, at maximum total release rate of 200 cfs.

7. Make 10 bg of additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow. To the extent New York City Delaware reservoirs are unavailable, make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

8. Make releases from Beltzville, Blue Marsh**** and Nockamixon, to elev. 537, 261 and 325.5 respectively, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 915.2 (2.4 bg) at a maximum release rate of 75 cfs.

*** New York City would be credited this water against the following year's "excess release quantity" unless there is an intervening spill condition. In addition, these releases would only be made when New York City Delaware reservoir storage is more than 30 billion gallons above the "drought warning" curve. The maximum cumulative amount of these releases is 30 bg.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

****** Releases will be made from Lake Wallenpaupack and the Mongaup Power Reservoir System simultaneously and approximately in a two to one ratio, respectively.

E.3.(a) (continued)

(3) Alternative 3

Indications

This alternative uses only lower basin reservoirs (i.e., located below Montague) and does not involve the use of New York City or upper basin power reservoirs. This alternative provides the least amount of storage with which to work. Two conditions combined would indicate that application of Alternative 3 is appropriate - (1) the New York City Delaware River Basin reservoirs are very close to entering a "drought warning" condition (i.e., storage in New York City Delaware reservoirs is less than 30 bg above the "drought warning" line when lower basin "drought" triggers) and the non-Delaware River Basin New York City supplies are low; and (2) the lower basin "drought" occurs very late in the season (i.e., after November 1). Under these seasonal conditions, the likelihood of the lower basin reservoirs emptying before the natural refill period is low, and the required releases most likely can be made from the limited remaining contents of the lower basin reservoirs.

Operations

1. Impound and use temporary storage in F.E. Walter and Prompton, if available.

2. Nockamixon from elev. 395 to elev. 385 (68.7%/4.1 bg)** and release from Lake Hopatcong to elev. 919 (1.9 bg) at a maximum release rate of 75 cfs.

3. Make releases from Beltzville, Blue Marsh**** and Nockamixon, to elev. 537, 261, and 325.5 respectively, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 915.2 (2.4 bg) at a maximum release rate of 75 cfs.

** Loss of recreation below this level.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

E.3.(a) (continued)

(4) Alternative 4

Indications

This alternative calls upon the upper basin power company reservoirs for assistance. This alternative would be indicated when the New York City Delaware River Basin reservoirs are less than 30 bg above the "drought warning" line and the lower basin triggers before November 1, thereby increasing the probable need for additional water. In this case, the basin would have a high probability of entering a "drought warning" condition, thus the City storage should be conserved.

Operations

1. Impound and use temporary storage in F.E. Walter and Prompton, if available.

2. Nockamixon from elev. 395 to elev. 385 (68.7%/4.1 bg)**.

3. Make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

4. Make total of 5 bg release from Beltzville, Blue Marsh**** and Nockamixon, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 919 (1.9 bg) at a maximum release rate of 75 cfs.

5. Make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

6. Make releases from Beltzville, Blue Marsh**** and Nockamixon, to elev. 537, 261 and 325.5 respectively, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 915.2 (2.4 bg) at a maximum release rate of 75 cfs.

** Loss of recreation below this level.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

****** Releases will be made from Lake Wallenpaupack and the Mongaup Power Reservoir System simultaneously and approximately in a two to one ratio, respectively.

(5) Alternative 5

Indications

This option proposes the early use of upper basin power company reservoirs followed much later by the use of New York City storage. If a lower basin "drought" triggered early in the year (i.e., before September 1) and City storage were only 30 to 65 bg above "drought warning" then there would be a distinct risk of the basin entering "drought warning" later and a strong chance that the lower basin reservoirs could be exhausted. This option, using upper basin power company storage to conserve lower basin and New York City storage for later use, addresses these possibilities.

Operations

1. Impound and use temporary storage in F.E. Walter and Prompton, if available.

2. Nockamixon from elev. 395 to elev. 385 (68.7%/4.1 bg)**.

3. Make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

4. Make releases from Beltzville, Blue Marsh**** and Nockamixon, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 919 (1.9 bg) at a maximum release rate of 75 cfs.

5. Make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

** Loss of recreation below this level.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

****** Releases will be made from Lake Wallenpaupack and the Mongaup Power Reservoir System simultaneously and approximately in a two to one ratio, respectively.

Alternative 5

Operations

6. Make total of 5 bg release from Beltzville, Blue Marsh**** and Nockamixon, at maximum total release rate of 200 cfs.

7. Make additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow.

8. Make releases from Beltzville, Blue Marsh**** and Nockamixon to elev. 537, 261 and 325.5 respectively, at maximum total release rate of 200 cfs, and release from Lake Hopatcong***** to elev. 915.2 (2.4 bg) at a maximum release rate of 75 cfs.

(6) Alternative 6

Indications

This option is similar to Alternative 2 except that New York City releases would be made concurrently with releases from lower basin storage on a 50-50 basis. The conditions under which it would be most appropriate would be similar to those for Alternative 2.

Operations

1. Impound and use temporary storage in F.E. Walter and Prompton, if available.

*** New York City would be credited this water against the following year's "excess release quantity" unless there is an intervening spill condition. In addition, these releases would only be made when New York City Delaware reservoir storage is more than 30 billion gallons above the "drought warning" curve. The maximum cumulative amount of these releases is 30 bg.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

***** Use of water from Lake Hopatcong is subject to the considerations set forth in Subsection D3(f).

Alternative 6

Operations

2. Nockamixon from elev. 395 to elev. 385 (68.7%/4.1 bg)**. Make additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow, equal to and simultaneous with releases from Nockamixon; to the extent New York City storage is unavailable, make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir System****** subject to minimum operating levels.

3. Make releases from Beltzville, Blue Marsh**** and Nockamixon to elev. 537, 261 and 325.5 respectively, at maximum total release rate of 200 cfs, and release from Lake Hopatcong to elev. 915.2 at a maximum release rate of 75 cfs. Make additional releases from New York City Delaware Reservoirs*** to augment Delaware River flow, equal to and simultaneous with releases from Beltzville, Blue Marsh, Nockamixon and Hopatcong; to the extent New York City storage is unavailable. Make releases for Trenton from Lake Wallenpaupack subject to the elevation schedule, and make proportional releases from the Mongaup Power Reservoir system****** subject to minimum operating levels.

** Loss of recreation below this level.

*** New York City would be credited this water against the following year's "excess release quantity" unless there is an intervening spill condition. In addition, these releases would only be made when New York City Delaware reservoir storage is more than 30 billion gallons above the "drought warning" curve. The maximum cumulative amount of these releases is 30 bg.

**** Sufficient storage would be retained to supply the needs of the Western Berks Water Authority, required conservation releases and water quality augmentation needs on the Schuylkill River.

****** Releases will be made from Lake Wallenpaupack and the Mongaup Power Reservoir System simultaneously and approximately in a two to one ratio, respectively.

E. (continued)

4. Reduction of Conservation Releases - In order to conserve storage, conservation releases from the listed lower basin reservoirs shall continue to be modified in accordance with Table 4 of Section 2.5.5 for the duration of a lower basin "drought" condition.

5. Conservation Measures - Upon the declaration of a lower basin "drought" emergency, the lower basin states shall adopt and implement within the basin drainage area below Montague comparable mandatory conservation measures, including restrictions on non-essential water uses, and shall implement other provisions of "drought" contingency plans designed to achieve a target of 15 percent reduction in depletive water use. The following water uses shall be deemed non-essential:

   (a) Serving of water to any patron of a restaurant, club or other eating place unless specifically requested by such patron.

   (b) The use of water for ornamental purposes.

   (c) The use of water for washing paved surfaces such as streets, sidewalks, outdoor plazas, driveways, garages, parking areas and patios.

   (d) The use of water for non-commercial washing or cleaning of vehicles except for the windshields and windows and except for emergency vehicles.

   (e) The use of water for watering of established lawns (i.e., those not newly seeded, sodded or fertilized).

(f) The use of water for watering or sprinkling any part of a golf course except for tees, greens, and aprons.

(g) The use of water for watering non-commercial outdoor gardens, landscaped areas, trees, shrubs and other outdoor plants except: water may be applied with a bucket, can or hand-held hose equipped with automatic shut-off valve.

6. Ending "Drought" - When the storage levels in Beltzville and Blue Marsh Reservoirs simultaneously exceed their respective lower basin "drought" storage levels for 30 consecutive days or either one of those reservoirs spills, the lower basin "drought" operation shall automatically terminate and either lower basin "drought warning" or normal operations shall be resumed in accordance with Section B or C, unless the Decree parties unanimously agree otherwise.

F. **Operations During Basinwide Drought Warning or Drought Following Lower Basin Drought Warning or Drought.**

1. Selection of Alternate Plans - If, following the triggering of a lower basin "drought" or lower basin "drought warning" under this plan, the combined storage in the New York City Delaware Basin Reservoirs declines to basinwide "drought warning" or "drought" conditions as defined in Section 2.5.3, the parties to the 1954 Decree shall select and agree to, and the Delaware River Basin Commission shall implement, the provisions of either Section F2 or F3 of this Plan. In the absence of unanimous agreement, the operating rules set forth in Section 2.5.3 shall govern. The parties may by unanimous agreement

modify and adjust either plan as necessary and appropriate to respond to actual conditions. In selecting between the alternative plans, and any modification thereto, the parties will consider the following factors:

(a) The extent and severity of drought conditions in various parts of the basin.

(b) The season, and seasonal variation of hydrologic conditions.

(c) The status of storage in all affected reservoirs, and the probability of refill or drawdown for each reservoir.

(d) The status of demands upon each reservoir.

(e) The lead time needed to effect conservation measures and to reduce demand.

(f) The prior availability of time and notice to provide for adequate warning and preparation for drought response actions.

(g) The need and ability to take expedited steps to conserve storage in the New York City and other basin reservoirs.

2. Combined Drought Operations Plan 1

(a) The schedules of phased reductions governing the maximum allowable rates of diversion of waters of the Delaware Basin by New York City, the minimum compensating releases to be made by the City of New

York Delaware Basin Reservoirs, and the streamflow objectives at the U.S.G.S. gaging station located at Montague, NJ, shall be as prescribed in Section 2.5.3.

(b) The operation of Lake Wallenpaupack and the Mongaup System Reservoirs shall be governed by the storage and release schedules prescribed in the operating plan for basinwide "drought" conditions. The Commission may delegate to the River Master responsibility for directing operation of the Lake Wallenpaupack and Mongaup facilities under the release schedules and drought management policies of the Commission.

(c) So long as lower basin "drought warning" or lower basin "drought" conditions prevail simultaneously with basinwide "drought warning" and "drought" conditions, the maximum allowable rates of diversion of Delaware Basin waters by New Jersey, the streamflow objectives at the U.S.G.S. gaging station located at Trenton, NJ, and the operation of storage in Beltzville Reservoir, Blue Marsh Reservoir, Lake Nockamixon, Lake Hopatcong, and any storage made available in the F.E. Walter and Prompton Reservoirs, shall be governed by the stricter of the provisions of Sections C and D of the Lower Delaware Basin Operating Plan, or the provisions of Section 2.5.3, which permit lesser New Jersey diversions and lower Trenton Flow Objectives.

3. Combined Drought Operations Plan 2

F.3 (continued)

(a) If during the period May 1 to November 30, the combined storage in the New York City Delaware River Basin Reservoirs is in the upper half of the "drought warning" condition identified in Figure 1 of Section 2.5.3, the maximum allowable rates of diversion of waters of the Delaware by New York City, the minimum compensating releases to be made by the New York City Delaware River Basin Reservoirs, and the streamflow objectives at the U.S.G.S. gaging station located at Montague, NJ, shall be as prescribed for lower half "drought warning" in Tables 1 and 2 of Section 2.5.3. If the combined storage in the New York City Delaware River Basin reservoirs subsequently enters the lower half of the "drought warning" condition identified in Figure 1 of Section 2.5.3, the maximum allowable rate of diversions of the Delaware Basin by New York City, the minimum compensating releases to be made by the New York City Delaware River Basin reservoirs, and the streamflow objectives at the U.S.G.S. gaging station located at Montague, NJ, shall be as prescribed for "drought" in Tables 1 and 2 of Section 2.5.3.

(b) If during the period December 1 to April 30, the combined storage in the New York City Delaware Basin Reservoirs falls within the "drought warning" levels identified in Figure 1 of Section 2.5.3, the maximum rates of New York City diversions, the minimum compensating releases made by the New York City Delaware River Basin Reservoirs, and the Montague streamflow objectives shall be as prescribed for the applicable "drought warning" upper and lower half

conditions set forth in Tables 1 and 2 of Section 2.5.3. Any subsequent triggering of basinwide "drought" conditions shall be governed by Figure 1 of Section 2.5.3.

(c) So long as lower basin "drought warning" or lower basin "drought" conditions prevail simultaneous with a basinwide "drought warning" condition, the maximum rate of diversion by New Jersey, the minimum streamflow objectives at Trenton, and the operation of available storage in Beltzville Reservoir, Blue Marsh Reservoir, Lake Nockamixon, Lake Hopatcong, and the F.E. Walter and Prompton Reservoirs shall be governed by the provisions of Sections C and D of the Lower Delaware Basin Drought Operating Plan.

(d) In the event that following the triggering of a lower basin "drought warning" or lower basin "drought," the combined storage in the New York City Delaware River Basin Reservoirs is in the "drought" levels identified in F.3.a. and b., whichever is applicable, the maximum rate of diversions by New York City and New Jersey, the minimum rates of compensating releases, and the minimum streamflow objectives at Montague, NJ and Trenton, NJ shall be those set forth in Tables 1 and 2 of Section 2.5.3. The operation of all basin reservoirs shall be as prescribed in the plans for basinwide drought reservoir operation.

(e) The operation of Lake Wallenpaupack and the Mongaup System Reservoirs shall be governed by the storage and release schedules prescribed in the operating plan for basinwide "drought" conditions. The

Commission may delegate to the River Master responsibility for directing operation of the Lake Wallenpaupack and Mongaup facilities under the release schedules and drought management policies of the Commission.

II. This operating plan will be reviewed by the Commission and the Parties periodically or when additional water storage projects become operational and revised as appropriate.

III. This amendment shall take effect upon approval by the Commission and the Parties to the U.S. Supreme Court Decree in New Jersey v. New York, 347 U.S. 995 (1954).

Russell C. Mt. Pleasant

Russell C. Mt. Pleasant, Acting Vice Chairman pro tem

Susan M. Weisman

Susan M. Weisman, Secretary

ADOPTED: September 28, 1988

FIGURE 1—OPERATION CURVES FOR CANNONSVILLE, PEPACTON AND NEVERSINK RESERVOIRS

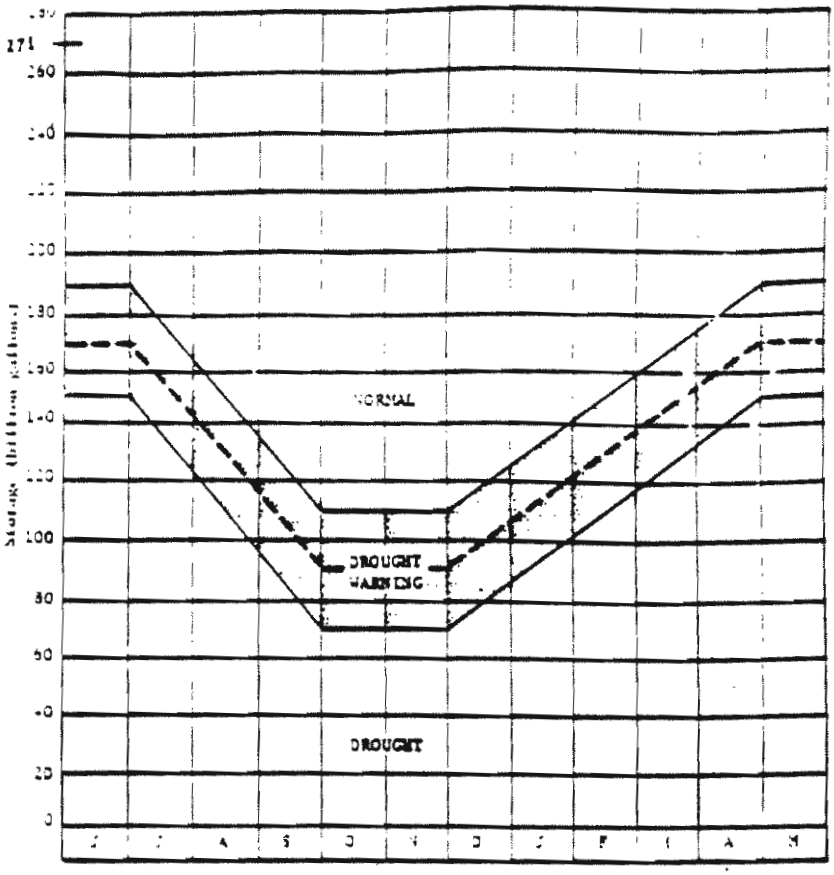


TABLE 1.—INTERSTATE OPERATION FORMULA FOR REDUCTIONS IN DIVERSIONS, RELEASES, AND FLOW OBJECTIVES DURING PERIODS OF DROUGHT

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)				

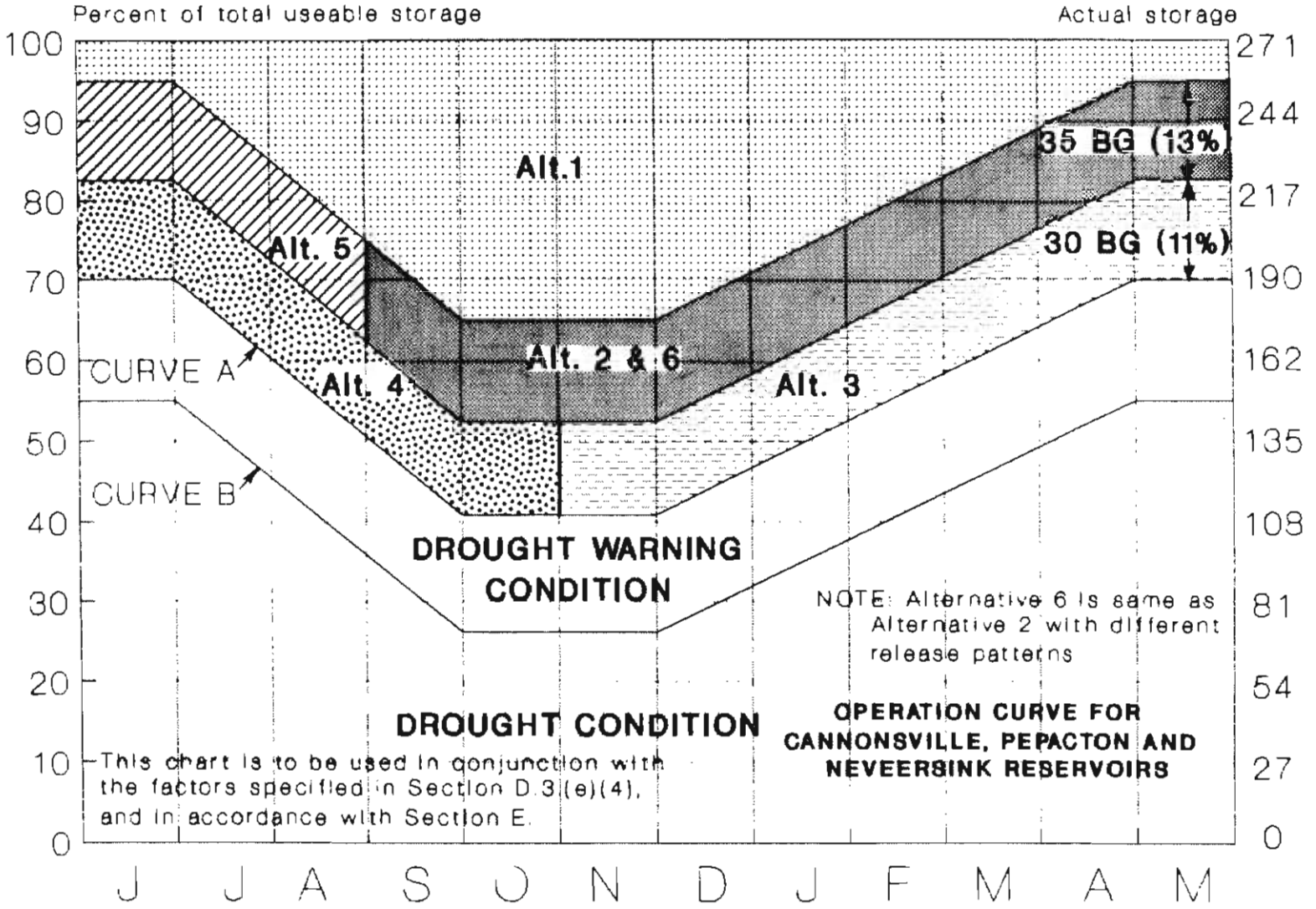
* Varies with time of year and location of salt front as shown on Table 2.

TABLE 2.—FLOW OBJECTIVES FOR SALINITY CONTROL DURING DROUGHT PERIODS

7-day average location of "Salt Front," River-mile*	Flow objective, cubic feet per second at: Montague, N.J. Dec-Apr.	May-Aug.	Sept-Nov.	Trenton, N.J. Dec-Apr.	May-Aug.	Sept-Nov.
Upstream of R.M. 92.5	1,600	1,650	1,650	2,700	2,900	2,900
Between R.M. 87.0 and R.M. 92.5	1,350	1,600	1,500	2,700	2,700	2,700
Between R.M. 82.9 and R.M. 87.0	1,350	1,600	1,500	2,500	2,500	2,500
Downstream of R.M. 82.9	1,100	1,100	1,100	2,500	2,500	2,500

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

Figure 1a. A GUIDE FOR SELECTING ALTERNATIVES FOR LOWER BASIN DROUGHT PLAN OPTIONS



Glossary of Terms

Banking of Excess Release Quantity - The temporary holding back of water releases from an excess release quantity set aside in the three Delaware Basin New York City Reservoirs under terms of the 1954 Supreme Court Decree to provide drought assistance to the lower basin.

Basinwide Drought Warning and Drought - Defined in Section 2.5.3 of the Water Code. For further information concerning basinwide drought warning and drought conditions, see Figure 1, Operation Curves for Cannonsville, Pepacton and Neversink Reservoirs; Table 1 for Interstate Operation Forumula and Table 2 for Flow Objectives.

Excess Release Quantity - Under terms of the 1954 Supreme Court Decree, it is a quantity of water equal to 83 percent of the amount by which the estimated consumption during such year is less than New York City's estimate of the continuous safe yield during such year of all its sources obtainable without pumping. The safe yield shall be estimated at not less than 1665 mgd.

Excess Release Requirement - Defined in 1954 U.S. Supreme Court Decree.

Lower Basin Area - The drainage area of the Delaware River and Bay below the streamflow gaging station at Montague, New Jersey.

Lower Basin "Drought Assistance Releases Credit Bank" is defined in Section D3(d)(2) of this resolution.

Lower Basin "Normal," "Drought Warning" and "Drought" are defined in Sections B., C. and D, respectively, of this resolution.

Upper Basin Area - The drainage area of the Delaware River in New York, Pennsylvania and New Jersey above the streamflow gaging station at Montague, New Jersey.

Consent to Action by

Delaware River Basin Commission

Consent of the parties to the U.S. Supreme Court Decree in New Jersey vs. New York, 347 U.S. 995 (1954) to the action of the Delaware River Basin Commission in adopting Resolution No. 88-22 (Revised) amending the Comprehensive Plan relating to criteria and operations formulae for emergency operations during a lower basin drought warning and drought is hereby given.

Michael S. Castanes
State of New Jersey

Russell C. Mt. Pleasant
State of New York

State of Delaware

James R. Grace
Commonwealth of Pennsylvania

City of New York