UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	:	Docket Nos. 50-352OL
PHILADELPHIA ELECTRIC COMPANY	:	50-353OL
(Limerick Generating Station,	:	
Units 1 and 2)	:	

MOTION TO SET ASIDE BASED ON NEW EVIDENCE

Pursuant to 10 C.F.R. §§2.730, 2.780 and Part 2, App. VI and VIII, Intervenor-Appellant Del-AWARE Unlimited, Inc. moves to set aside the Partial PID herein based on new evidence and circumstances, and avers as the basis thereof the following:

1. On June 18, 1984, the Pennsylvania Environmental Hearing Board rendered its decision, in which it found that the diversion of water into the East Branch of the Perkiomen Creek would cause substantial erosion therein. In so finding, the Environmental Hearing Board sustained the allegations of Contention V-16, which contention was rejected by the Board herein.

2. Recently in discovery in Bucks County Common Pleas Court, the applicant produced a memorandum dated December 12, 1973, disclosing clearly that its selection of the non-channelization option for the East Branch was based on an effort to avoid regulatory review by this Commission. That memorandum, reflecting a meeting of applicant's engineers and advisors, discloses that the applicant knowingly determined to accept erosion rather than channelize, because

channelization would involve impact which would require review by this Commission. A copy of the memorandum is attached as Exhibit "B". (See pg. 4.)

3. Had the Commission deferred the hearings until after the issuance of the FES, it would have been possible to have included the evidence herein that was presented before the EHB, as well as that presented before the Pennsylvania PUC. By requiring intervenors to litigate the issue prior to conclusion of necessary studies, the Board committed an error.

4. The EHB decision entails the construction by PECo of a sewage treatment plant to treat the diverted water prior to discharging it into the East Branch of the Perkiomen Creek. It is estimated that such construction will delay operation of the Diversion at least until the Fall of 1986.

5. Additional material discovered from PECo files have disclosed that Schuylkill river alternatives would suffice for one, but not two units at Limerick. This issue was considered by the Licensing Board, but rejected by it. The recent memorandum disclosed that the Applicant had been aware of the validity of intervenors' position since at least June, 1983. Copies of PECo memoranda are attached hereto as Exhibits "C" and "D".

6. Although the staff has taken the position that it has no interest in, and in not involved in the matter of the source of supplemental cooling water, this is directly

contradicted by an ex parte staff contact with PECo, obviously initiated by the staff. In that contact, in which the staff attepted to ascertain the impacts of the cancellation or delay of Point Pleasant, the staff indicated that it was making informal contact, and committed to discuss with PECo prior to making "formal" contact. (Informal notes of the informal contact attached as Exhibit "E".)

7. The staff action obviously reflected a improper contact with PECo, concealed from intervenors and the public, and contrary to the staff's public representations, and to 10 C.F.R. §27.80. It also constitutes an acknowledgement by the staff that the Commission is involved in the matter of PECo's source of supplemental cooling water.

8. The Pennsylvania Public Utility Commission has recently adopted a resolution instituting an investigation into the desirability of cancelling Unit 2 at Limerick. This Resolution, a copy of which is attached hereto as Exhibit "F", clearly show that the PUC's concern is no longer limited, as claimed previously by the staff, to the financial consequences of concelling Unit 2, but rather extends to the entire range of questions regarding the need for the power, the cost, and the effects of construction.

9. The Pennsylvania Public Utility Commission has indefinitely deferred approval of the Bradshall Reservoir Pump Station, a necessary component of the Point Pleasant Diversion. The Initial Decision by the Adminsitrative Law

Judge had recommended approval of only one pump, which created a situation where PECo could not properly operate the diversion, since DRBC order called for PECo to maintain the minimum flow in the Perkiomen in excess of the capability of one pump.

10. As a result of the foregoing, it is clear that PECo will not be able to operate Limerick Unit One in accordance with the representations in the Amended Application. Pursuant to this Commission's policies at 50 C.F.R. Part 2 Appendix A, it is therefore incumbent upon the Commission and its staff to make present preparation for subsitution of other alternatives, including the nonoperation alternative if necessary, in order to avoid regulatory delay if PECo should keep to its target date for commercial operation, in order to consider on a timely basis PECo's motion for a interim low power license, filed on May 9, 1984. Although PECo claims that it can operate unit one at low power without supplemental cooling water, such claim is based on the assumption that low power testing will occur only during the winter months; if it should continue into the summer of 1985 (assuming that PECo is successful in obtaning a license in the fall of 1984), PECo would be unable to operate at low power as purposed in the amended application.

11. The staff has estimated that it will require an effort of 6-12 months to review a substitute source of supplemental cooling water. The staff has not indicated

whether this estimate applies to temporary, permanent, or any substitutes. If it does not apply the temporary substitutes, the staff has not defined what "temporary" means, in terms of duration, or nature of substitute.

12. Under NEPA, this Commission is obliged to review reasonably foreseeable alternatives as well as the applicant proposed plan. E.g., Natural Resources Defense Council v. Morton, 458 F.2d 827 (D.C. Cir. 1972).

13. The Licensing Board has declined to take jurisdiction of these matters, but has, nevertheless, expressed in dictum its conclusion that these matter are not ripe or appropriate for hearing. Accordingly, either on the theory that jurisdiction lies in this Board, or that the Licensing Board has made a decision, the matter is properly before this Board at this time.

14. Construction of the Point Pleasant Diversion has come to a complete halt, and permits have been remanded to the Department of Environmental Resources. Friend of Branch Creek and a number of riparian landowners on the Perkiomen Creek have appealed the EHB decision to the Commonwealth Court, on the ground that no diversion at all should have been permitted into the East Branch. A copy of their petition for review is enclosed herewith (Exhibit "G").

15. Since the foregoing matter have very recently occurred or been disclosed, there can be nor question as to the timeliness of the foregoing Contentions.

16. No other party has previously demonstrated any deposition to litigate these Contentions, and the staff have steadfastly refused to face the reality of the situation, thereby making it clear that no other party will litigate these issues.

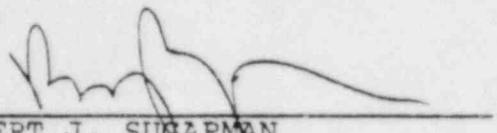
17. Litigation of these issues at the present time will substantially shorten these proceedings, since it will enable these Contentions and the question of alternatives sources of supplemental cooling water to be disposed of prior to the applicant bring this matter before the Commission, and thereby enabling the avoidance of regulatory delay.

18. The intervenor has previously demonstrated its superior capability to present this matter to the Commission.

WHEREFORE, intervenor moves and request that this Board set aside the PID as having been erreonous in law and fact, require that the Licensing Board proceed promptly to identify and evaluate likely alternatives to Point Pleasant, as well as any further evaluation of Point Pleasant that is consistent with this Board's determination, and find and determine that it would be contrary to the National Environmental Policy Act for this Commision to permit the operation of Limerick unless and until a substitute cooling

water source is identified, thereby obviating the need to impose the Point Pleasant facility.

Respectfully submitted,



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Of Counsel

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Dated: July 31, 1984
020

Intervenor request the Board's pardon for couching its previous communication as a letter. Such form of communication had routinely been employed by several of the parties in communications with the Board, and is common to many court in which counsel practices, including United States District Courts and U.S. Courts of Appeals. Counsel will adhere in the future to the Board's preference and rules. Likewise, counsel regrets not having observed that Mr. Edles had been substituted for Mr. Eilperin.

BC-10 7/10/83 0/21

ENVIRONMENTAL IMPACT STATEMENT OF PHILADELPHIA ELECTRIC ON THE LIMERICK NUCLEAR POWER PLANT

MEETING OF DECEMBER 12, 1972

Scope: This meeting was in connection with usage of the stream channel of the East Branch Perkiomen Creek to convey water pumped from the Delaware River to a point along the main stem of Perkiomen Creek where it will be picked up and transmitted to the Limerick Plant.

Attendance:

Philadelphia Electric Company:
- Mr. Dave Marano
- Mr. Lou Pyrih
- Mr. Haines Dickinson
- Mr. Edward Purdy

Ichthyological Associates:
- Edward C. Raney, Director
- Paul L. Harmon, Project Leader
- Mr. Robert Molzahn

E. H. Bourquard Associates, Inc.
- E. H. Bourquard
- Terry L. Fought

The meeting started with a discussion by E. H. Bourquard of the proposed channel improvement of the East Branch. This would consist of a 20-foot bottom width low flow channel starting where water is pumped into the East Branch from the Delaware River and extending 2500 feet downstream thereof (Later considerations were that this channel should extend at least to the Route 313 bridge, a total distance of about 8000 feet). The proposed channel would carry the 65 cfs maximum pumpage rate at a depth of 1.2 feet and the minimum pumpage rate provided in the DRBC water allocation of 18 cfs at a depth of 0.6 foot. We are reasonably certain that this proposed channel, with grassed banks, would conform to the requirements of the Impact Statement that there be no erosion; however, some maintenance would be required as a log or other flood debris could lodge in the channel and upset the regimen of

INFORMATION ONLY, FROM OLD FILES

EXHIBIT "B"

the stream. In explanation of the fact that the stream channel should be able to withstand erosion, E. H. Bourquard described a visit to the stream channel on November 10, 1972, when he and T. L. Fought inspected the upper reaches of the stream channel to note erosion from a flood which occurred on November 8th. This flood was roughly estimated to be approximately 400 cfs at Elephant Road Bridge and travelled down the stream channel at a depth of about 5 to 6 feet (4 to 5 feet above stream flow at time of visit). The only signs of erosion that were noted were along the outside bank of sharp bends where the water cut into the bank until it became an almost vertical face and continued to erode the unprotected surface, evidently for the duration of the flood flow. The other portions of the stream seemed to suffer only very minor erosion due to this flood. The existing vegetation and the soil forming the stream banks, which is plastic, appear to offer relatively high resistance to erosion. Also, the existing stream channel did not have much capacity for flood flows and when such flows occur the depth increases considerably and overbank flooding occurs. Pictures taken on November 10th, which showed the condition of the stream channel and the height of the November 8th flood, were passed around the group. Dave Marano stated that Dr. Raney had felt that no stream channel work of any type would be the best solution for the East Branch ecological problem and questioned why a channel should be installed. The existing stream channel can handle the peak pumping rate (65 cfs) at a depth of about 2 feet and, in general, should be within the banks of the stream which are approximately 3 to 6 feet high. Prints were passed around the group which showed computed flow lines for various discharges and the location of sections utilized in the flow line computations. Probably the only reason for the improved channel would be to firmly establish P. E.'s liability with regard to passage of the peak pumping rate; without such a channel, it is possible that P. E. might be blamed for any damage that was incurred as a result of a flood on the stream. It was pointed out that, at present, State laws pertaining to work on stream channels are primarily direct

at prevention of floods and do not necessarily take into account ecological matters. Also, the property owners along the stream channel are more likely to be concerned about flooding than the biota of the stream channel. Accordingly, P. E. might be considered liable for any difference in water level between the normal flow of the stream and the flow line of the 65 cfs peak pumping rate. Another item is the matter of stream crossings by property owners, such as farmers, who own land on both sides of the stream and are able, throughout most of the year, to ford the stream. With the passage of a 65 cfs flow, such fording would not be possible. P. E. will have to install some type of crossing where this situation exists. E. H. Bourquard stated that a general inspection of aerial photographs and property lines along the stream channel did not indicate very many places where a property owner worked across the stream channel; however, this must be checked in more detail later.

At this point, Dr. Raney reiterated his position that no channel work should be performed on the East Branch. He pointed out that stream channels are formed during times of flood and that during the rising stage of the flood most of the erosion takes place, whereas, on the following stage, the water becomes relatively clear except for colloidal materials. He felt that the existing channel, which had been formed by past flood flows, should not be materially affected by the peak pumping rate which is much less than the usual flood. In addition, channel work would destroy the ecology of that part of the stream and the resulting erosion from this work could be expected to deposit silt in the stream as far down as Sellersville. He was asked what measures might be taken to improve the ecology of the stream after channel improvement work had been installed. He stated that his observation of improved channels where definite attempts had been made to restore the ecology by small dams, groins, etc. had, even after a period of 15 years in some cases, not been very successful. He cited the Highway Department and other N. Y. State agencies' attempts to restore the ecology of improved channels as an example of what should not be done. Lou Pyrih pointed out that leaving the channel as is would probably expose

it to erosion with the increased flow over a long duration, as compared with the existing situation where high flows occur for short durations and very low flows are present at all other times. E. H. Bourquard was of the opinion, based upon observations of the West Branch of Codorus Creek, in York County, that the 65 cfs flow would erode a relatively stable channel into the existing stream bed below the point of discharge but that such erosion would be limited in amount and occur over a period of years. The flow of the West Branch of Codorus Creek is effectively controlled by a large dam on the main stream and by a diversion weir-pumping installation on the stream draining the remaining upstream watershed. Between these installations and Spring Grove, where the controlled flow is picked up, there is about seven miles of channel which, for the past 4-5 years has carried a relatively high and constant flow several times greater than the previous median flow of the stream. Inspection of this channel indicated that erosion of the existing East Branch channel would not create a sufficient volume of sediment to be damaging to the downstream channel. Also, it was pointed out that observations of the East Branch watershed and the tributary streams suggested that the major source of sediment carried by the East Branch is the tributary streams and sheet erosion of the watershed. This was somewhat confirmed by the results of total solids tests made on water samples taken during the June 23, 1972 flood on the East Branch. Going in a downstream direction from Elephant Road, where the total solids content, in milligrams per liter, was 208, to State Route 313 with a total solids content of 456, to Route 309 with content of 1196, to State Route 63 with a content of 1406, and finally at State Route 73 with a total solids content of 1568. Dr. Raney stated that any adverse effect of sediment resulting from erosion of the existing channel by the increased flow would be far less damaging to the ecological system of the stream than could be expected if an improved channel was installed. The group generally agreed that the ecological requirements of the stream channel outweigh the hydraulic, or flood factors, particularly with regard to obtaining approval of an application to construct the Limerick Plant. However, another consideration was the possible

CONCLUS

objections of the property owners to introduction of the increased flow without installing compensating stream improvement work. In Pennsylvania, the Commonwealth owns the stream bed and permission to discharge this flow into the East Branch must be obtained from DER. Consideration was given to contacting Vaden Butler, Chief of Dams and Encroachments, concerning the proposed usage of this stream channel; however, it was concluded that such should be delayed until after the Impact Statement is finalized. A draft copy of this Statement has already been furnished the Commonwealth and it is expected that Vaden has or will review the portion pertaining to the East Branch.

Following this was a discussion of the effects of chlorination of the water pumped from the Delaware River. John Carson's letter to DRBC concerning this matter states that "Present plans for diversion of water into the Perkiomen Creek, as part of the Point Pleasant Pumping Station project, do not include disinfection." The Environmental Impact Statement provided only that such disinfection not be harmful to the ecology of the stream. Chlorination had been initially considered in the Point Pleasant project as a means of inhibiting the growth of slime within the transmission mains. It is expected that Delaware River water will contain many varied types of micro-organisms and bacteria and some of these will probably be capable of attachment to the walls of the pipe line and continuing their growth. Also, the Health Department had indicated a need for chlorination because part of the water would go into the North Branch Reservoir where it is expected that swimming will be permitted. Dave Marano indicated that a solution might be to just chlorinate the water going into Neshaminy Creek by means of a chlorination station located near Bradshaw Reservoir. Also, numerous types of pipe were discussed as a possible means of reducing the ability of micro-organisms and bacteria to attach themselves to the walls, but it was generally concluded that the type of pipe would have little effect on the growth of these life forms. In view of the fact that chlorination creates such serious problems, it will probably be desirable to manually clean any such growths off of the walls of the pipe line as part of the project maintenance

work. Since John Carson's letter to DRBC stated that disinfection was not included as part of the project, at this time, P. E. can state that water to Perkiomen Creek will not be chlorinated.

The next item discussed was the discharge of the Delaware River water into Perkiomen Creek and its effect on the ecology of the stream. One item was the rapid increase or decrease in depth and velocity that would result from starting and stopping the pumps and Dr. Raney was questioned as to whether or not some operational procedure should be set up to slow down the variations in depth. Dr. Raney stated that aquatic life affected by the variation in depth would not benefit by a more gradual rate of variation. When asked about any harmful effect resulting from mixtures of Delaware River and East Branch water, Dr. Raney stated that nothing developed so far had indicated any adverse effects. In fact, Delaware River water appears to be a slightly better quality of water than that of the East Branch. The proposed impact energy dissipator to be installed at the outlet of the transmission main was discussed and it was pointed out that it would increase the DO content of the water. Dr. Raney asked if the actual pumping of the water would not increase the DO and it was agreed that there would be some increase solely as a result of the pumping. The question then arose as to whether or not it would be advisable to further increase the DO content by means of spray-aeration or other such methods. Dr. Raney said "No". The discussion then turned to the probable temperature of the water as it emerges from the impact basin. A rough estimate by Lou Pyrih and Haines Dickinson indicated that when pumping at the minimum rate (18 cfs), the water would be at about ground temperature, approximately 50°. This would have the effect of increasing stream water temperatures during the winter and decreasing stream water temperatures during the summer. Dr. Raney thought that this might convert the East Branch into a trout stream but that it also could have some harmful effects, particularly if there were sudden changes of temperature (5° or more). Consideration was given to installation of a small reservoir at the outlet of the transmission main

which could be used in the event of a power failure or pipe line break, to supply a limited quantity of water to the stream for the duration of the outage. Dr. Raney is to make a recommendation as to what minimum flow should be provided and, from this, the size of this storage basin can be determined. This storage basin could also have a temperature equalizing effect.

At this point, Lou Pyrih brought up the fact that the pipe lines must be designed for a Seismic II condition. He further stated that such requirements have not usually necessitated a greater strength pipe.

We are to furnish P.E. with a letter briefly summarizing our findings concerning the proposed East Branch channel improvement by December 22, 1972.

The necessity, or desirability, of a stream gaging station on the East Branch was discussed and it was concluded that such a station, particularly if utilized to obtain water quality data, would certainly be most helpful in future design work and in preparation of the additional environmental impact statements anticipated in connection with design of the Point Pleasant Pumping Facilities. Dave Marano indicated that they would take this up with management and attempt to secure approval of such a station, but that until such time as the availability of Delaware River water is confirmed (Tocks Island Reservoir), he did not expect an affirmative response.

Dr. Raney is to furnish us the minimum stream flow for ecological purposes after sudden shut-down of pumping; also, he is sending us some reports which include water quality and other data developed during the course of their study on the East Branch and the Schuylkill River.

P. E. will furnish us the results of the Beltz Laboratory studies of water quality of the Delaware River at Point Pleasant and of the Perkiomen Creek at Graterford, plus a draft of the Environmental Impact Statement pertinent to the East Branch and Delaware River pumping.

E. H. Bourquard
T. L. Fought

MECHANICAL ENGINEERING DIVISION
32-1 2301 Market Street

BC-36

MEMORANDUM

Subject: Limerick Make-Up Water Supply
Blue Marsh Reservoir

Blue Marsh Dam and Reservoir are located in Berks County, Pennsylvania, on Tulpehocken Creek, a tributary of the Schuylkill River. The dam is about 6 miles northwest of Reading, Pennsylvania, and by water is approximately 35 miles from the Limerick site.

The project was constructed by the Corps of Engineers to serve the multiple purposes of water supply, flood control, and recreation. The reservoir was filled during 1978, reaching full pond elevation in September. The COE has the responsibility for the operation and maintenance of the project; but because the Delaware River Basin Commission has contracted for the water supply features, it is the DRBC that allocates the stored water to downstream users for public water supply and industrial needs.

Available data and testimony at recent hearings confirm that the reservoir storage for water supply is 8,000 acre-feet and for flow augmentation to control water quality is 6,600 a-f, giving a total usable storage of 14,600 a-f. It was further developed that the only water available for Limerick would come from the water supply storage and that probably the DRBC would consider no more than 25% of that 8,000 a-f for PECO use.

Preliminary calculations indicate that the entire water supply (8,000 a-f) storage can barely meet the needs of one unit at Limerick under average conditions. The average consumptive need of one unit (27 cfs) for the average number of days each year that the Schuylkill River is not available because of low flow or high temperature (146 days) requires a storage of 7,884 a-f.

At present the only firm customer for water is the Western Berks Water Authority which has a need for 9 cfs through 1989.

In summary, Blue Marsh is an acceptable alternative water supply on a temporary basis for one unit because it is built and presently under-utilized. It is upriver from Limerick and would not require any new facilities to make it usable. It would have no known detrimental environmental impact and would be very cost effective. It would require DRBC approval of the allocation of water to Limerick, but it should be the quickest of all alternatives to implement.

Blue Marsh would not be capable of supporting two units at Limerick without major changes to the flow and/or temperature limitations on Schuylkill River withdrawals. Allocations of reservoir storage to other users would not be possible. It is unlikely that Blue Marsh could ever be considered for two units at Limerick based on testimony.

Prepared by: W. H. Dickinson
Mechanical Engineering Division
June 8, 1983

EXHIBIT "C"

WHD/dmc 7/1

JMP 6-1-83

LIMERICK MAKE-UP WATER STORAGE RESERVOIRS

	DELAWARE RIVER	SCHUYLKILL RIVER		
RESERVOIR	MERRILL CR.	BLUE MARSH (TULPEHOCKEN)		
RIVER FLOWS	TRENTON	POTTSTOWN		
YEARS OF RECORD	68	54		
MAX. INSTANT. - CFS	329 000	75 700		
MIN. " - "	1 180	87		
DAILY AVERAGE - "	11 750	1 907		
Q7-10		260		
DRBC - WITHDRAWAL LIMIT	3 000	500	500 & 15°C	(2)
LIMIT EXCEEDED, % OF TIME	87%	85%	60%	
	FLOW ONLY	FLOW ONLY	FLOW & TEMP.	
RIVER - UNAVAILABLE - AVE. DAYS PER YEAR - 2 UNITS (1)	47	55	146	
DAYS PER YEAR - YRS OF RECORD	42		44	
MAX. WORST YEAR	(1964) 130 (1)	(1965) 193 (2)	(1930) 283 (3)	
2ND " "	(1930) 126	(1966) 175	(1965) 243	
3TH " "	(1965) 107	(1981) 160	(1963) 242	
RESERVOIR SIZING - WORST DROUGHT - DAYS	115 (4)	193	283	
YIELD - CFS	200	27 (5)	27	
STORAGE - ACRE-FEET	46 000	10 422	15 262	
RESERVOIR CAPACITY - a-f				
DEAD OR INACTIVE	4 000	1 500		
WATER SUPPLY	46 000	8 000		
CONSERVATION RELEASE	—	6 600		
FLOOD STORAGE	2 800	33 000		
TOTAL VOLUME	52 800	49 100		
DRBC TESTIMONY - MAX. PROBABLE ALLOCATION ACRE-FEET		25% OF WATER SUPPLY 2 000		

(7) ON SCHUYLKILL RIVER 1 UNIT COULD OPERATE 7 TO 12 DAYS MORE
(6) DER - EA, AUG 1982
(5) SIZED FOR 1 UNIT AT LIMERICK
(4) DRBC STUDY OF FUTURE CONDITIONS
(3) DRBC LETTER (HANSLER) TO NRC OCT. 6, 1982
(2) TAMS - WATER SUPPLY RESERVOIR STUDY AUG 1976
(1) SOURCE - MERRILL CREEK ER - DEC 1977 - ADJUSTED DATA

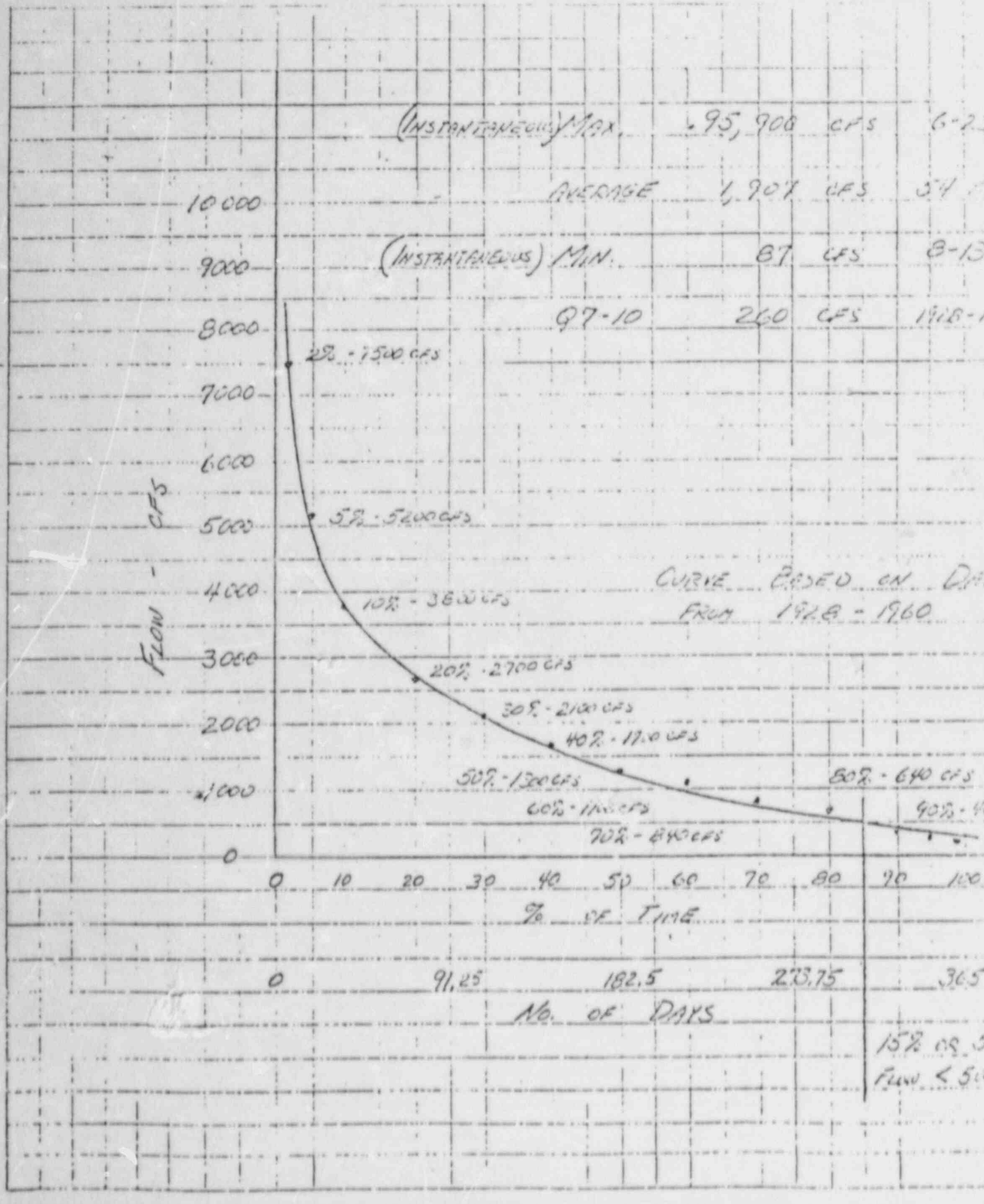
CALCULATION SHEET

PHILADELPHIA ELECTRIC CO.

NAME

LOCATION SCHUYLKILL RIVER - POTTSTOWN, PA. DATE

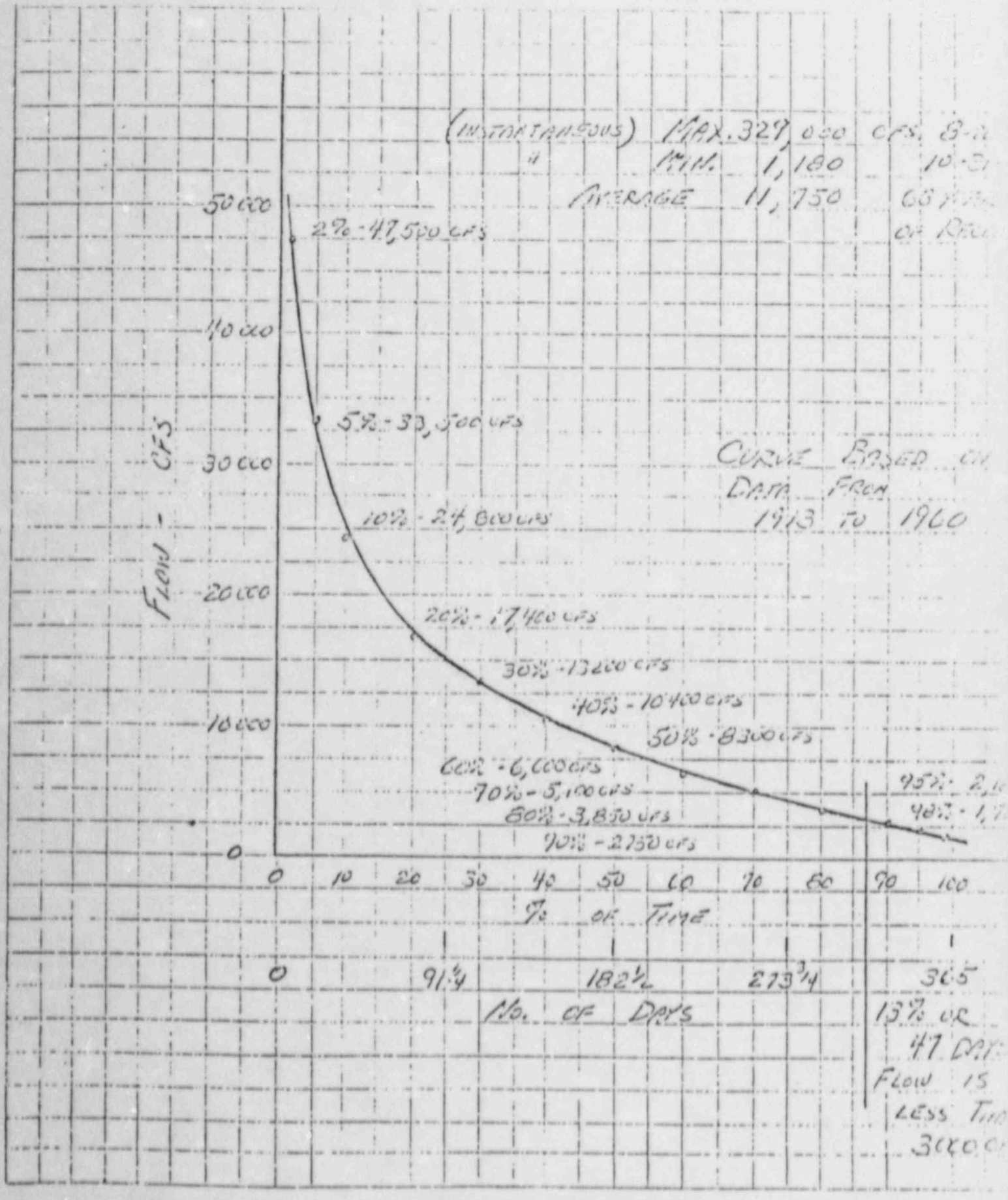
SUBJECT DAILY FLOW FREQUENCY JOB/CA NO



PHILADELPHIA ELECTRIC CO. NAME

LOCATION DELAWARE RIVER - TRENTON DATE SHEET NO.

SUBJECT JOB/CA NO.



Subject: Blue Marsh Reservoir

1. Limerick water need for 1 unit.

a) One unit consumptive rate average 27 cfs (17.5 MGD)
max. 33 cfs (21.3 MGD)

b) Days Schuylkill River water is not available (2 units)

1) TAMS report May 1973 states due to flow and Temperature water is unavailable on average 185 days/year. Worst year was 1930 when unavailable 283 days.

2) DER - EA Aug. 1982 (page 28) states water available 60% of the time (219 days). Unavailable 146 days.

3) Hunsa Letter (Oct. 6, 1982) to Judge Brenner and DER-EA Aug 1982 (page 29) show days water is unavailable based on flow criteria only for four critical years - Unavailable 1964 - 133 days
1965 - 193 days
1966 - 178 days
1981 - 160 days

It is stated in DER-EA that these days of unavailable water would be reduced by 7 to 12 days for 1 unit o

c) Water storage needed to compensate for Limerick use by 1 unit during days of unavailability from Schuylkill Based on average consumptive use and average days.

$$27 \text{ cfs} \times 2 \frac{\text{a-f/day}}{\text{cfs}} \times 146 \text{ days} = 7,884 \text{ a-f}$$

Based on max consumptive use and max days not considering the temperature criteria of 15°C.

$$33 \text{ cfs} \times 2 \frac{\text{a-f/day}}{\text{cfs}} \times 193 \text{ days} = 12,738 \text{ a-f}$$

Subject: Blue Mark Reservoir (continued)

2. Capacity of reservoir -

8,000 a-f for water supply
6,600 a-f for flow augmentation - water quality
14,600 a-f.

3. Witnesses for DER at hearings stated that the water supply (8,000 a-f.) was intended for multiple use, public water supply and industrial needs.

Witnesses feel the 8,000 a-f could marginally supply [illegible] it would be physically possible, if the entire water supply storage was allocated for this purpose. However, R. L. Herdell, DRBC Chief Engineer, feels that a maximum of only 20 to 25% (2,000 a-f.) can be allocated to Juniata.

4. Summarizing -

Blue Mark can just barely meet the needs of 1 [illegible] if all the water supply is available. It would not meet the needs if the maximum consumptive use is assumed to extend a maximum number of days when temperature and flow or flow alone limit the withdrawal.

TESTIMONY PAGES TO VSB 6/1/83

346, 347, 350, 352, 353, 898, 899, 900 IVIII D

945, 946, 947, 948, 949, 950, 953, 1019, 1050 6-1-83

Subject: Blue Marsh -

1. Storage required -

a) Merrill Creek was sized as follows: to provide as large a yield as possible for 115 days. The yield obtained is 200 cfs. (54 cfs for 7 months)

b) Number of days needed determined by TAMS study for years 1929 through 1970. (42 years) Actual flows were adjusted for current operating criteria under Supreme Court decree and existing or planned storage reservoirs.

Greatest number of days - 130 days in 1964
126 days in 1930
32½ days average for 42 years
0 days in 9 years

c) DRBC staff (H. Howbitt) concluded 115 days storage would provide protection for most severe drought of record - based on staffs extensive basin study.

(Source: Merrill Creek ER Dec. 1977 pg 1-3)

d) TAMS adjusted historic flows found longest period of shortage on Delaware River to be 155 days (1965). Two other years similar, 154 days 1930 and 153 days 1964 TAMS recommended sizing reservoir for 155 days.

(Source: Water Supply Reservoir TAMS Aug 1976 pg 1-

Subject: Blue Mountain (cont.)

1. Storage required -

a) Schuylkill River reservoir

TAMS (Aug 1976 study, page I-5) states longest period of shortage was 283 days - 1930, also were 4 years in 44 year period with shortages about 240 days.

TAMS states Sch. R. reservoir paying - 2 Jurisdictions

54 cfs × 2 cfs-days/a-f × 283 days = 30,564 a-f

Subject: Blue Marsh Reservoir

1. Dam located on Tulpehocken Creek (about 6 miles NW of

	Dam site		Reading	
DA - sq mi.	175		211	
Ave. flow - cfs	254	(15 yrs)	314	(30 yrs)
Max. - cfs	16,000	(1972)	17,000	(1972)
Min. - cfs	5.8	(1977)	23	(1964)
Min. - cfs (controlled release)	41	(1980)*	62	

* 1980 values are for that year and are examples of drou

Source: USGS Water Resources Data - Water Year 1980.

2. Q7-10 at dam site based on pre-dam records = 41

Source: Exhibits, COE, Testimony at DER hearing (5-6

COE structure in alternative folder.

3. Earth and rock fill dam rising about 100 ft. above creek.
Total capacity = 49,000 a-f. for water supply, flow augmenta
recreation and flood control.
Reservoir is about 1100 acres (water) and 9 miles long.

4. Volume available for flood control - 33,000 a-f above
water supply and recreation capability.

5. Storage allocations - 49,000
- 1,500 a-f inactive storage to elev. 24
- 14,500 a-f active water supply & recreation
- 33,000 a-f (short term) flood control

6. 14,500 a-f will provide 65 cfs yield.

7. Blue Marsh enlargement not feasible - site limitations due to

Subject: Blue Marsh

1. 2-24-69 Reviewed use of future Blue Marsh as source of water with DER (A. M. [illegible])

Dam on Tulpehocken Creek (Reading) 53,000 af. Cost $25,000,000. COE No firm allocations yet. DRBC controls project allocations at present.

2. 2-27-69 Met with DRBC Service date: 1974
Storage: 14,500 af Yield: 65 cfs Not allocated yet

3. 5-8-69 Met with DRBC. Wright said yield of 45-65 [illegible]
Questioned if water allocations could be made to 1 customer

4. 6-10-69 Met with DER. Holland said total yield = 65 [illegible]
Western Berks Co. Water Authority wants ≈ 11 cfs
Holland doubts reservoir could be expanded.

5. 7-24-69 Met with DRBC. Hewlett stated completion [illegible]
Also said total yield is virtually allotted to West. Berks Co. Water Auth. and Phila. Sub. Water Co.

Blue Marsh - 1976 yield 45 MGD.
Customer: Western Berks 1977 (year) need 10 MGD
1990 need 20 MGD
Phila Sub. Water 220 need 25 MGD ave, 60 MGD peak.

Capacity of Blue Marsh 53,000 af.

6. 9-18-69 Met with DRSC. Blue Mount could be possibly used for future plants but not to be used for Rumanek.

Testimony Before PUC Relating To
Blue Marsh Reservoir

1. Witness Page No. — Jonathon Phillippe, consulting engineer

158 — Blue Marsh benefits are: a) it is built, b) depends on natural filling, c) has fairly good yield. There are no pumps to fail so reliability is high, and there are no pumping power costs.

159 — Cost to DRBC was $30 m. including interest.
161 — Estimates PE could buy DR3C share for $20 to $25 m.
161 — Estimates PE costs for Merrill Creek, Point Pleasant, Bradshaw Perkiomen intake and all pipelines is $100 m.

164 — Water is stored and is available for municipal and industrial use.

165 — Blue Marsh has 8,000 a-f allocated to water supply 6,600 a-f allocated to low flow augmentation for water quality control.

166 — Yield is defined in terms of how much and how long.
167 — Natural stream flow gaged before dam was built showed flows greater than 41 cfs for 98% of time and greater than 65 cfs for 90% of time.
Limerick's need is less than 40 cfs.

185 — Any Schuylkill River alternative (Blue Marsh) would be better (than Point Pleasant).

195 — Removal of the temperature limitation on the Schuylkill River reduces PE need for supplemental water storage--and Blue Marsh could easily provide.

203 — DRBC must approve an allocation for use of Blue Marsh.

213 — Witness did not know whether PE sought DRBC approval to take Blue Marsh water.

218 — Witness feels PE should pursue use of Blue Marsh on either a long or short-term basis because DRBC pays charges for reservoir and is not now being paid by others.

220 — Witness feels environmental effects at other reservoir sites can be overcome since Blue Marsh had some very serious environmental impacts but was built.

226 — Repeats capacity data; see page 165. Feels PE can
227 — use water from the 8,000 cfs water supply storage
228 — except for a small portion already allocated to others.

Page No.

230 Witness believes PE needs 11,000 a-f for 2 units. A need of 37,000 a-f is suggested, but witness would have to do calculations to verify.

234 Witness would pursue City of Phila. alternative first and then the Blue Marsh option.

236 TAMS report states that 108 a-f/day (54 cfs) are required for 2 units. Safe yield of Blue Marsh
237 is about 40 cfs. Precise figure is 30.6 MGD or 47 cfs.

237 The 8,000 a-f in Blue Marsh would provide 54 a-f/day (27 cfs) for 1 unit operation for about 148 days.

240 Blue Marsh and gravity flow are a far safer source than pumping water over the mountain.

241 Safe yield of Blue Marsh is 47 cfs. Western Berks Water Authority requires 10 cfs leaving 37 cfs which is more than PE needs.

242 Witness agrees that the old gaged flow at Blue Marsh site of 41 cfs, 98% of the time, is in the Schuylkill and is in effect a flow-through.
243 This is not additional flow; and if there is a problem in the Schuylkill, the 41 cfs is already included in the insufficient quantity.

2. Witness R. Timothy Weston, DER and DRBC

347 Neither the DER or the DRBC have considered Blue Marsh as an alternative for 1 unit. PE has not requested the 1 unit option be evaluated.

348 Long-term storage capacity of 5 billion gallons or 14,600 a-f. Of that 3 billion gallons or 8,000 a-f are allocated to water supply and 2 billion gallons or 6,600 a-f to low flow augmentation for water quality control.

349 Witness does not know reservoir yield. There are various ways to evaluate yield. Referring to 1975 DRBC Water Plan (page II-44) a net yield of 31 MGD is stated. Western Berks Water Authority needs approximately 6 MGD, leaving 25 MGD.

350 Assuming PE needs a peak of 21 MGD for 1 unit, there is no physical reason that Blue Marsh could not provide PE with its maximum needs.

353 DRBC has at various times considered allocating all of its reservoir to PE, but Commission must consider policy of equitable apportionment. When Commission ordered electric utilities to construct their own reservoirs, Commission in effect determined they would not sell storage in Blue Marsh and Beltzville.

Page No.

353 PE had not submitted an application for Blue Marsh in
354 1977. Witness feels decision to have utilities build reservoir was a decision not to sell Blue Marsh.

354 DRBC discussed use of several reservoirs including Blue Marsh, Beltzville, and Trexler. Trexler was the only one considered for sale to utilities. When Congress deauthorized Trexler, Commission ordered utilities to build their own reservoir.

355 DRBC has not considered operating Blue Marsh for PE needs, while PE releases compensating flows at Merrill Creek. It is not known whether this scenario would satisfy the PE permit conditions.

360 DER did not consider Blue Marsh for 1 unit operation at the time of preparing DER's EA of August 1982.

373 Witness doesn't recall PE applying for the use of Blue Marsh.

373 Blue Marsh operations are fairly complicated. Used for water quality augmentation and Western Berks water supply. Also operated on "pool of water concept" to make up consumptive uses and repell salinity in Philadelphia area.

375 DRBC would very seriously consider the allocation of remaining capacity or yield to one user. It would not have additional water for other users. It would be a serious policy consideration.

3. Witness V. S. Boyer, PECo.

881 To pursue another source of water such as Blue Marsh or another Schuylkill Reservoir would result in a delay of several years. PE has not had occasion to explore the use of Blue Marsh and have not asked for the right.

882 Witness has no numbers on the cost to obtain the Blue Marsh water supply.

882 Witness wouldn't expect use of Blue Marsh to be granted,
883 and a review process would take several years. It would take an environmental impact statement because the assignment of the water to one user eliminates the availability of water for smaller users. Recreational uses would be effected.

884 The frequency of drawdown by PE would be greater than by the intended industrial use. The effects on recreation must be considered by the DRBC.

884 Witness has not asked PE Legal Department or any other branch to study the need for an EIS.

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898 The DRBC's EIS in 1973 stated two reasons for not considering Blue Marsh: a) Reservoir would not be ready in time and b) it is needed for population growth and industrial expansion. These reasons now
899 appear invalid so wouldn't it be prudent to reopen the question of Blue Marsh? Witness feels Dr. Goddard was against using a public supported water project
900 for one large consumptive user, and it eliminates the availability for others.

905 Witness has worked on water with DRBC for 15 years and doesn't recall an official request for the use of Blue Marsh. In turn, the Commission staff never proposed the use of Blue Marsh water.

4. Witness R. Timothy Weston (continued examination)

938 Has the DER determined whether the use by Limerick of Blue Marsh water would be contrary to public interest? Witness believes use would not receive DER or DRBC
939 support or approval. No formal application has been filed; so a final decision has not been made.

941 Witness states he has authority as governor's alternate to vote on an application by PE for the use of Blue
942 Marsh. Governor and witness have not discussed the subject of Blue Marsh.

944 Pennsylvania has no direct power, other than its vote on the DRBC, over the allocation of water in Blue Marsh (a federal reservoir). Witness briefly expressed to other Commissioners at the last DRBC meeting that the allocation of Blue Marsh for one use would not comport with good water management policy.

945 DRBC policy stating that Blue Marsh is for multiple users is recorded in the 1975 DRBC Water Management book, in the adoption of Blue Marsh in the Comprehensive Plan of 1962 and in subsequent resolutions. Resolution
948 60-14 cites the use of the storage for flow augmentation to satisfy needs in Pottstown/Reading area and in Philadelphia, multiple needs. A staff document, dated April 1975, called Water Management of Delaware River Basin, states Blue Marsh water supply has net yield
949 of 31 MCD (47 cfs) to meet needs in area, municipal and industrial needs. Will also meet minimum flow objectives and water quality control.

949 These documents are the total authority for the policy
950 that the Blue Marsh water supply is to meet multiple uses downstream rather than a single use.

953 Blue Marsh water is available for sale to consumptive users. It is being paid for by water users throughout the basin. It is not being sold to individual water users.

956 DRBC has taken a tougher look at water allocations since 1975-76 and is adopting a formal budget to limit allocations to actual on-line storage.

962 DER made an analysis assuming a reduced flow criteria and no temperature restrictions to determine the needs for Blue Marsh in the second worst year, 1960. Analysis led to witnesses' testimony.

967 PE needs 4,509 cfs-days to meet needs of second worst year of 167 days. (The next pages contains confusing calculations.) Now the needs of Limerick can be met with a 10% excess. These words by Mr. Sugarman are neither accepted or denied by witness.

969 Pennsylvania approved a reduction in conservation release from Blue Marsh from 41 cfs to 21 cfs during the drought of 1980/81.

5. Witness Robert L. Goodell, Chief Engineer - DRBC

1014 In response to Del Aware's petition to reopen DRBC's decision, the Commission reaffirmed its position that the (Point Pleasant) project would be necessary for
1016 either one or two units at Limerick and that alternatives cited by petitioners were less efficient, cost-effective or environmentally acceptable.
1017 Witness quoted this position as Commission's rejection of Blue Marsh for use to supply two units. He stated
1017 that Blue Marsh was not considered for use with one unit.

1018 DRBC Commissioners have not been polled with respect to the use of Blue Marsh for one unit.

1019 DRBC position is that Blue Marsh would not be adequate for 2 units and would be marginally adequate to support 1 unit. Hypothetical discussion follows in testimony as to whether docket decision would permit PECo. to withdraw water from Schuylkill during low flows even if they supplied a similar quantity of water upstream from their own reservoir.

1028 DRBC would not make a decision on the use of Blue Marsh unless an application was formally submitted.

1050 DRBC discussed use of Blue Marsh at time of preparing 1973 EIS. Blue Marsh could yield limited water supply but would not be ready in time and anticipated population
1051 growth and industrial expansion needs were expected.

1068 Prior to 1971 at meetings DRBC staff suggested to PECO that Blue Marsh would not be available for a Limerick water supply. Later discussed with entire Commission which upheld the staff position.

1071 Commissioners again considered Blue Marsh in 1982.

1072 Blue Marsh was endorsed for municipal and industrial use where high return flows could be expected.

1081 Witness feels between 20 and 25% of Blue Marsh could be allocated to PECO, but rest of storage must be available for other water quantity and quality demands.
1082 This represents 2,000 a-f out of 8,000 a-f. This allocation would be the extreme upper limit.

1082 Other demands on Blue Marsh are currently Western Berks Water Authority, replacement of other consumptive water uses and quality control.

1083 Blue Marsh was used between Sept. 1980 and Feb. 1981 for low flow augmentation to help the Delaware River
1090 meet salinity standards. It was also used for low flow augmentation in the Schuylkill River.

1095 Witness was not including the 6,600 a-f of low flow augmentation capacity when talking about allocating the Blue Marsh water supply.

1097 Western Berks Water Authority is projected as needing 17.6 cfs in year 2010. Contract of 1971 projected
1098 5.7 cfs in 1980, and actual use is only 4.8 cfs. These uses are allocated in Blue Marsh.

1098 DRBC requested a reduction in conservation releases from Blue Marsh during 1980 drought.
1099 41 cfs release lowered to 21 cfs for conservation and 9 cfs for Western Berks, or a revised total drought release of 30 cfs.

1116 Limerick's use of water is consumptive; and if Blue Marsh was dedicated to Limerick, the water could not be reused in the 38 miles to Philadelphia. The Limerick water would not be used to augment flows and improve downstream quality.

1117 Allocation of Blue Marsh to Limerick could impact current recreational use because drawdowns would be at a faster rate and would reduce the available pool acreage.

1120 Commission made a decision that dedication of all or any of Blue Marsh would not be looked on favorably.

6. Witness R. Timothy Weston (continued)

1151 Weston's 12/4/80 letter to Col Ton indicated State's willingness to reduce min. releases from 41 cfs to 21 cfs plus water for Western Berks. Fish agencies agreed for drought periods.

1152 A technical committee is working on reservoir operating plan.

1153 (Calculations of storage and releases are discussed
1162 but are so confusing no notes can be made.)

1163 The original 14,000 a-f (approx.) was for water quality, water supply, and recreation. If 8,000 a-f are for supply, the remaining 6,000 a-f (approx.) must be for quality and recreation. This storage was used during 1980/81 for quality control in Schuylkill and Delaware Rivers.

1165 Assignment of some of 6 000 a-f quality storage would require COE to complete a reformation study. Weston has been involved in 3 such studies. One lasted 3 years and was accepted. One study was rejected, and one is still in progress. If the quality storage is to be used for water supply, the DRBC would have to pay construction costs plus interest.

1171 Water projection for 1990 estimates 56.6 MGD additional
1172 needed. Equates to 88 cfs. This is consumptive use. The storage requirement for 167 days is about 14,600 cfs-days. This need is more than the existing storage. Adding Limerick's need of 32.5 cfs gives total need of 120 cfs. PECO need is about 26% of consumptive water use; and if Blue Marsh is made available, PECO should only be allotted about 26%.

1174 PE is the only user with ability to build a reservoir so DRBC may just say build your own reservoir.

1175 One unit at Limerick Ave. consumptive use for 167 days needs 4,509 cfs-days storage and peak need is 5,428 cfs-days. Blue Marsh inflow and storage minus present commitments is 5,000 cfs-day, and 26% is about 1,300 cfs-days. Blue Marsh is not adequate for 1 unit.

1192 Weston's recommendation to supply water in Schuylkill Basin would be to build a new reservoir.

1192 Before a new reservoir could be completed, DRBC has 3 options: 1) order river-follower operation of Limerick, 2) make temporary allocation from Blue Marsh and 3) reduce flow rates (criteria in river).

1193 The Commission action is difficult to predict. A temporary use of Blue Marsh would require a year to approve and another year for the environmental impact statement. The same time requirement would be needed to reduce Schuylkill minimum flow requirements.

1214 The COE makes Blue Marsh releases from storage and
1215 whether it is conservation storage, quality storage, or supply storage is - (testimony is confusing).

1229 Witness identifies alternatives for water supply. He later (page 1230) prioritizes them.

Page No.

1230 Witness lists alternatives in order of preference.

1) Project as proposed, based on environmental impacts and water management considerations.

2) Portion of water from Bradshaw and some from Blue Marsh.

1231 3) Flow adjustment on Schuylkill and Blue Marsh, ½ to¼ of its storage.

1232 4)&5) Red Creek or committing all of Blue Marsh.

6) Transfer of Philadelphia water.

WHD/dmc 1/1

MECHANICAL ENGINEERING DIVISION
N2-1 2301 Mrket Street

Testimony Before PUC Relating To
Blue Marsh Reservoir

1. Witness Jonathon Phillippe (continued)

Page	
1449 1453 1454	Reviewed Weston's testimony on water use in Schuylkill River and amplifies. Daily use per Weston is 716 MG/day of which 465 MG is once-through by utilities. 716 MGD is about 1000cfs which is about ½ of the average daily flow (Daily ave = 1821 cfs).
1454	Q7-10 is around 250 cfs and is sufficient to maintain water quality and the DO objective.
1454	Flow (530 cfs) and temperature (15°C) criteria are very arbitrary.
1457	Blue Marsh can support 1 unit marginally in worst drought year. But some witnesses say it should not be allocated to PECO only, and 20 to 25% would be maximum. Witness disagrees.
1458 1459 1461 1460 1461	Fish Commission and USF & WS desire as much flow as possible in stream. However, PFC set 15% of average daily flow as a minimum. 15% of average flow (1,821 cfs) is 273 cfs at Pottstown. A second minimum flow criteria is the Q7-10 which is approximately 250 cfs. In 1965 the 273 cfs would have not been met 20 days. Calculations follow to show that during 25 days of shortage Blue Marsh can supply the water and will even increase its storage by not releasing the total natural stream inflow.
1465	Weston has letter from Col. Ton saying conservation release can be reduced to 20 cfs.
1466 1468	Using 1,300 cfs-days (2600 a-f) from Blue Marsh for Limerick would mean a minimum flow criteria of about 300 cfs would have to be accepted. If DRBC allowed PE to use 50% of Blue Marsh storage, the minimum flow criteria would have to be between 330 and 350 cfs. If PE were allowed all Blue Marsh storage, the minimum river flow criteria could be 450 cfs.
1468	Proposal to lower Schuylkill flow criteria has not considered recreation impacts.

Page

1479 The temperature restriction which only applies to the Schuylkill withdrawals would have to be removed.

1480 River Modelling showed DO objective would be met with flow of 280 or 250 cfs and temperature of 82°F (76 or 28°C).

1526 "Water Supply & Water Quality Study, Blue Marsh Reservoir, June 1968" set temperature criteria according to DRBC, but witness does not find any support for temperature.

WHD/dmc 8/2

HYDRAULICAL ENGINEERING DIVISION
NE-1 230 Market Street

Testimony Before DER-Environmental Hearing Board
Blue Marsh Reservoir

Transcript Page No.	Witness - David K. Erickson, COE Chief, Reservoir Regulation
1541	Blue Marsh is under control of COE. Operated by COE.
1542	Filling started April 1979, officially filled Sept., 1979. Reservoir regulation manual (prel.) of Feb. 1980 has been updated. There are two storage levels-
1543	1) winter storage-14,600 a-f, conservation release 39.6 cfs. 2) summer storage = 19,000 a-f, " " 40.0 cfs. Storage difference is for recreation--the DRBC only has a contract for the 14,600 a-f.
1545	During drought of 1980/82, State and DRBC reduced min. release from 41 cfs to 21 cfs.
1546	Letter 12/4/80 Weston to Col. Ton, reduced conservation release during drought warning or drought conditions to 21 cfs. Water supply release for Western Berks shall be added resulting in a total of 30 cfs.
1550	COE physically operates the dam, but DRBC daily calls COE to request releases from their contracted storage. The final say on actual operation is the COE. Water supply storage belongs to DRBC.
1552	Minimum conservation release is set by State Water Plan. Considered the COE criteria. COE helped
1554	formulate min. release criteria during design period to meet federal requirements, fish and wildlife, aquatic and all agencies. Min. release criteria is a coordinated effort.
1554 (1563)	Min. summer release of 40 cfs was based on Q7-10 for Tulpehocken Creek before dam.
1556	Min. release is just that--the flow that must always be released. If DRBC requests a release for low flow augmentation, the same water can satisfy both requirements--the releases are not additive.
1557	COE is operating on a 41 cfs release regulation.
1559	Western Berks release is in addition to conservation
1560	release. Regulation Manual states 41 cfs for min. conservation release and 9 cfs for Western Berks. Western Berks intake is about 1 mile below the dam.

Transcript

1568	COE operates dam according to regulations manual. DRBC can request water from their storage, but COE can overrule. DRBC storage is 14,600 a-f and is stored above the conservation pool.
1569 1570	Reduction in conservation release came through DRBC with coordination of State. Reduction was to enable returning storage as fast as possible.
1571	Elevation 285 is top of winter, water supply pool. The top of the 14,600 a-f storage. Elevation 290 is top of summer or recreation pool. Summer pool maintained April 1 to October 1.
1572	Recreation facilities are designed for elevation 290.
1572	Western Berks required releases as planned. 9 cfs through 1989, 13 cfs for 1990 to 1999, 18 cfs for 2000 to 2009 and 27 cfs beyond 2010.
1573	Water is stored under flood conditions based on downstream gage readings to protect property.
1573	We would never release less than 41 cfs.
1574	If inflow was less than 41 cfs, COE would only store water to get pool to required normal level.
	NOTE: There seems to be some confusion for several pages as to when storage would occur at low flow.
1577	Augmentation flows (requests) come from DRBC.
1579	A study has been made to determine the impact on recreation of different pond elevations.
1581	Water supply comes before recreation because water supply is under contract with DRBC.
1582	DRBC provided future data for Western Berks needs and will request releases as required.
1585	Net yield is for worst drought of record. Net yield is 30.6 MGD.

WHD/dmc 5/1
6-5-83

EXHIBIT
BC-1
9-26-84 SR

MECHANICAL ENGINEERING DIVISION
N2-1 2301 Market Street

JAN 19 1984

FROM: J. L. Allen

TO: V. S. Boyer, Senior Vice President
Nuclear Power

SUBJECT: Blue Marsh Reservoir Regulation

In mid-December, you visited Blue Marsh Reservoir. Upon your return, you asked for information about Blue Marsh Reservoir elevations and storage capabilities. To answer your concerns, we borrowed The Corps of Engineers Reservoir Regulation Manual. The attached memorandum summarizes information contained in this manual. If you have any other questions, please call.

CBS/dmc 2/6

Attachments

EXHIBIT "D"

BC-37

MECHANICAL ENGINEERING DIVISION
N2-1 2301 Market Street

MEMORANDUM

Subject: Blue Marsh Reservoir Regulation

Blue Marsh Reservoir is the responsibility of the Corps of Engineers (COE). In Table 6-1, revised April, 1980, of the COE Reservoir Regulation Manual, an 'operating rule curve' is printed. This rule establishes that from October 16 thru March 31 Blue Marsh is maintained at Elevation 285.0 ft. sea level datum. The lake is filled to Elev. 290.0 ft. from April 1 thru April 15 and maintained at this elevation thru September 30. The reservoir is maintained 5 ft. higher, at 290.0, during the summer for recreational purposes. It is during this summer time period when most of the additional makeup water for Limerick Generating Station will be required due to low flow and/or high temperature restrictions of the Schuylkill River.

Blue Marsh Reservoir contains 8,000 acre-feet of water storage which can be allocated for industrial and municipal use. The average consumptive water need for one unit (27 cfs) at Limerick for the average number of days each year that the Schuylkill is not available because of low flow and/or high temperature (146 days) requires a storage of 7,884 acre-feet. Assuming that inflow is not available to supplement the Reservoir elevation, 7,884 acre-feet would lower Blue Marsh slightly less than 8 feet, from 290.0 ft. to approximately 282.0 ft. If the Schuylkill temperature restriction of 15°C (59°F) is removed, the Schuylkill would be available all but 55 days in an average year. This would lower the required storage at Blue Marsh for the average consumptive water need of one unit at Limerick to 2,970 acre-feet. Two thousand nine hundred seventy (2,970) acre-feet would lower the elevation of Blue Marsh from 290.0 ft. to between 287.0 ft. and 288.0 ft.

According to regulation, the COE attempts to maintain the pool elevation at or near the designated rule curve elevation while meeting all required release obligations. As the Delaware River Basin Commission (DRBC) has contracted for the water supply features of Blue Marsh, it is the DRBC which determines these release obligations. At present, only Western Berks Water Authority has a contractual agreement with the DRBC for a small allotment of water. In the past, their actual use has been even less than this allotment. Attached is a copy of Table 6-1 (Blue Marsh Lake - Schedule of Regulation), an Elevation, Area, and Capacity Table, and a Pool Elevation verses Area-Capacity Curve. These are copies from the COE Blue Marsh Lake Reservoir Regulation Manual.

Prepared by: C. B. Saidman
Mechanical Engineering Division
December 22, 1983

CBS/dmc 2/7
Attachments
Copy to: V. S. Boyer
L. C. Kistner/J. L. Allen
J. S. Kemper
D. Marano/W. E. Dickinson

BLUE MARSH LAKE
SCHEDULE OF REGULATION

Action Plan	Controlling Gaging Stations: Tulpehocken Creek Reading Gage (Stage in Ft.)	Schuylkill River Reading Gage (Stage in Ft.)	Schuylkill River Pottstown Gage (Stage in Ft.)	Blue Marsh Lake Pool Elevation (Ft. U.S.G.S.)
A*	below 7.0	below 10.5	below 10.0	261.0 to (285.0-290.0)***
B*	below 7.0	below 10.5	below 10.0	(285.0-290.0)*** to 307.0
C**	7.0 and above	10.5 and above	10.0 and above	261.0 to 307.0
D	Control Stations Not Considered			307.0 and above

* Stages at all control gages must be below indicated level.

** Stage need be exceeded at only one station.

*** Operating Rule Curve: 16 October thru 31 March - Elev. 285.0 ft. sld
1 April thru 15 April - Fill to Elev. 290.0 ft. sld
16 April thru 30 September - Elev. 290.0 ft. sld
1 October thru 15 October - Draw Down to Elev. 285.0 ft. sld

REGULATION PLAN

Schedule A - The regulation plan during this schedule is to always maintain the pool elevation at or near the designated rule curve elevation for that date while meeting required release obligations. The required release obligations are defined in the minimum release schedule. This schedule covers both direct withdrawal and stream withdrawal of water by the Western Berks Water Authority and downstream conservation release requirements. Additional increases in minimum release requirements due to low flow augmentation or water supply needs in the lower Schuylkill Basin in the future may be requested by the Delaware River Basin Commission. The water quality parameter guidelines for downstream releases are defined in the water quality release schedule. Water quality standards for water supply withdrawal directly from the project have not been defined by the Western Berks Water Authority. Regulation for water quality will be to prevent lake conditions from becoming anaerobic during times of warmest pool temperatures. Lake water quality monitoring will provide data on lake conditions. Under the initial water quality regulation plan, the primary objective is to keep the lake aerobic while meeting water quality objectives defined in the water quality release schedule if possible. Regulation to prevent anaerobic conditions in the lake will supercede meeting the water quality release schedule. All regulation under this schedule will be performed thru the water quality selective withdrawal system and the flood control system if necessary.

Schedule B - Attempt to maintain the pool elevation at or near the designated rule curve elevation for that date while meeting all required release obligations. In accomplishing the above, all criteria is defined in the maximum release schedule, the minimum release schedule and the water quality release schedule should be adhered to if possible. The Water Quality System should be used in making releases up to its maximum discharge capacity before using the Flood [illegible] system. When this situation arises, a combination of Water Quality and Flood Control System operation should be utilized in an attempt to maintain quality of releases. The initial filling criteria described in Exhibit E should be followed.

Schedule C - In this situation, key controlling stations should be continuously monitored and releases made under the criteria described in the maximum and minimum release schedules and the water quality release schedule. The initial filling criteria described in Exhibit E should be followed.

Schedule D - When the reservoir pool level exceeds spillway crest elevation of 307.0 ft. sld, the flood control system should be used exclusively. Inflow to the reservoir should be determined on an hourly basis. The flood control gates should be opened incrementally up to full open in an attempt to pass all inflow through the flood control system while trying to maintain the pool elevation at or below spillway crest. Once the outlet works capacity is exceeded and spillway flow occurs, the flood control gates should be maintained at the full open position (maximum outflow capacity) until the reservoir pool recedes to below spillway crest elevation. When the pool recedes to elevation 307.0 ft. sld and below, attempt to regulate outflow equal to inflow until maximum release schedule under Plan B can be followed to deplete the flood control storage.

MAXIMUM RELEASE SCHEDULE

Max Stage at Stream to be Monitored*		Maximum Allowable Releases**	
Schuylkill River at Reading Stage (Ft.)	Schuylkill River at Pottstown Stage (Ft.)	Tulpehocken Creek at Reading, Pa. (Red Bridge) Discharge (CFS)	Stage (Ft.)
Below 10.5	Below 10.0	5400	7.0
Between 10.5 and 11.0	Between 10.0 and 10.5	4000	5.6
Between 11.0 and 11.5	Between 10.5 and 11.0	2500	4.5
Between 11.5 and 12.0	Between 11.0 and 11.5	1000	3.0
Above 12.0	Above 11.5	***	***

* Stages must be exceeded at only one station.

** Adjust rated releases so that stage at Red Bridge gage does not exceed value shown. This flow includes uncontrolled flows from 36 square miles between the dam and the gage.

*** See minimum release schedule for required releases.

WATER QUALITY RELEASE SCHEDULE

All releases made for water supply, water quality and conservation purposes thru the water quality selective withdrawal system and possibly the flood control system under the initial water quality regulation plan are withdrawn from selected lake levels in an effort to keep the lake conditions aerobic. The guidelines presented are secondary targets under the water quality regulation plan.

Water Quality Guidelines

1. pH Range: 6.0 to 8.5

2. Dissolved Oxygen: 6.0 mg/l (Minimum Daily)

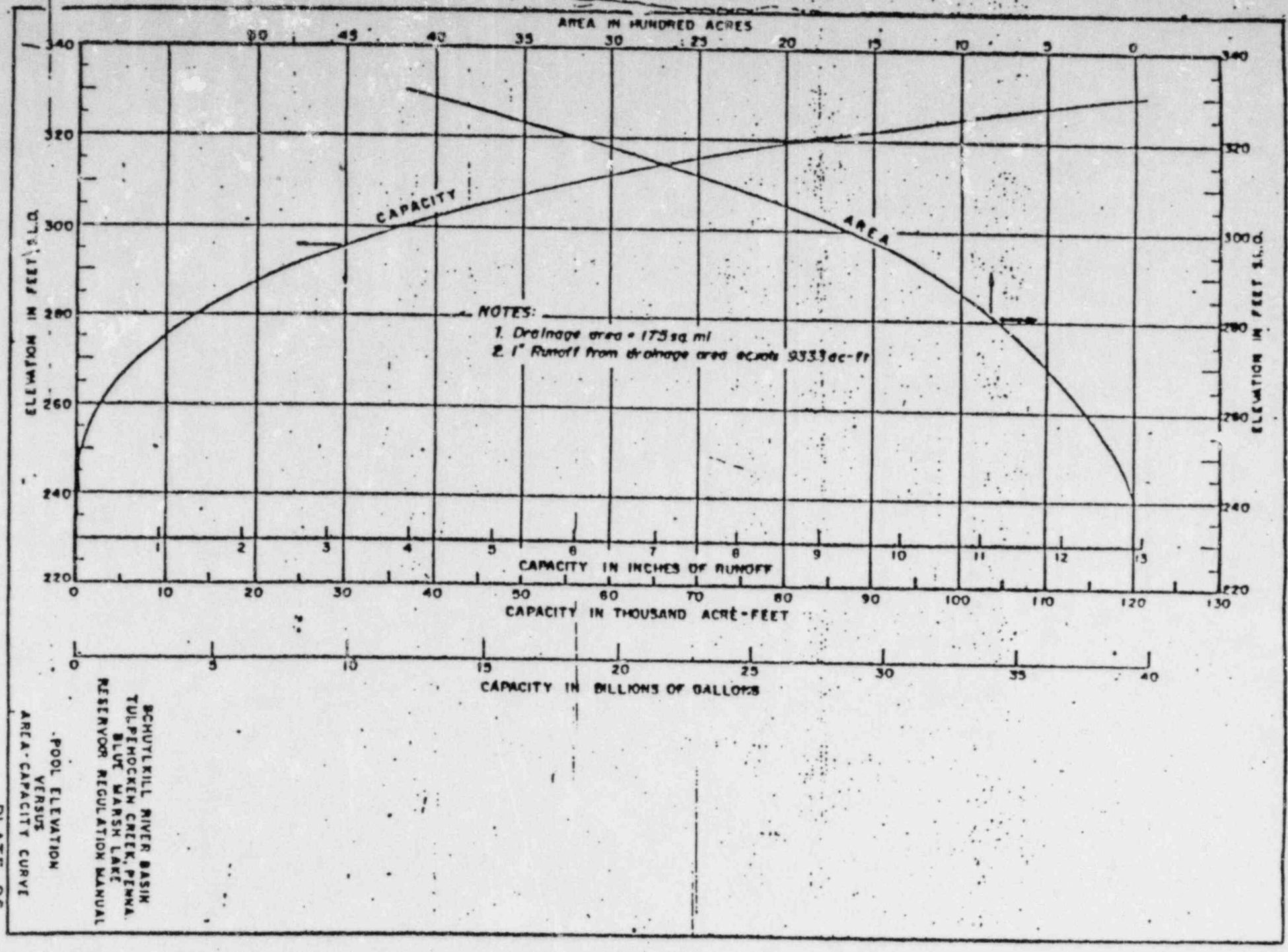
3. Temperature: During the period of Thermal Stratification (June through September) water releases should be maintained at temperatures between 52° and 55° F if possible. During other times of the year try to maintain release temperature not more than 5° F above the ambient temperature, but never exceed 87° F. Never change discharge temperature more than 2° F in any one half hour period.

MINIMUM RELEASE SCHEDULE
REQUIRED RELEASE

Year	Flows To Be Maintained At Key Stations			
	Tulpehocken Creek at Blue Marsh Dam site, Pa.			Tulpehocken Creek at Reading, Pa.
	W. Berks Water Auth. (CFS)	Conservation Release (CFS)	Total* (CFS)	Total (CFS)
I	Prior To Direct Water Supply Withdrawal From Project			
1970-1979	9	41	50	47
1980-1989	9	41	50	47
1990-1999	13	41	54	47
2000-2009	18	41	59	47
2010-	27	41	68	47
II	Direct Water Supply Withdrawal System Operational			
1970-1979	0	41	41	47
1980-1989	0	41	41	47
1990-1999	0	41	41	47
2000-2009	0	41	41	47
2010-	0	41	41	47

* Releases may increase as the Delaware River Basin Commission allows additional withdrawal of water in lower Schuylkill River basin. The Delaware River Basin Commission can also request additional releases for low flow augmentation.

Revised April



SCHUYLKILL RIVER BASIN
TULPEHOCKEN CREEK, PENNA.
BLUE MARSH LAKE
RESERVOIR REGULATION MANUAL

POOL ELEVATION
VERSUS
AREA-CAPACITY CURVE

PLATE 26

BLUE MARSH LAKE, PENNSYLVANIA

ELEVATION, AREA AND CAPACITY DATA

Elevation (ft/mld)	Surface Area (Acres)	Reservoir Capacity (Acre-feet)	(Day Second-feet)	(Inches Depth)	Million Gallons
234	0	0	0	0	0
235	3	1.5	0.76	0.00016	0.05
236	4	5	3	.0005	0.01
237	6	10	5	.0011	0.003
238	8	17	9	.002	0.005
239	11	27	13	.003	0.008
240	13	39	19	.004	0.01
241	17	54	27	.006	0.01
242	22	73	37	.008	0.02
243	29	99	50	.011	0.03
244	37	132	66	.014	0.04
245	47	174	87	.019	0.05
246	59	227	114	.024	0.07
247	72	292	147	.031	0.09
248	86	371	187	.04	0.12
249	102	465	234	.05	0.15
250	118	575	290	.06	0.18
251	138	703	354	.08	0.22
252	156	850	429	.09	0.27
253	174	1,015	512	.11	0.33
254	193	1,199	604	.13	0.39
255	216	1,403	707	.15	0.45
256	229	1,626	820	.17	0.52
257	248	1,864	940	.20	0.60
258	266	2,121	1,069	.23	0.69
259	284	2,396	1,208	.26	0.78
260	302	2,689	1,356	.29	0.87
261	323	3,002	1,514	.32	0.97
262	344	3,335	1,681	.36	1.08
263	365	3,670	1,850	.39	1.19
264	387	4,066	2,050	.44	1.32
265	409	4,464	2,251	.48	1.45
266	429	4,883	2,462	.52	1.59
267	450	5,322	2,683	.57	1.73
268	472	5,783	2,916	.62	1.88
269	493	6,266	3,159	.67	2.04
270	515	6,770	3,413	.73	2.20

BLUE MARSH LAKE, PENNSYLVANIA

ELEVATION, AREA AND CAPACITY TABLE

Elevation (Ft/mld)	Surface Area (Acres)	Reservoir Capacity (Acre-Feet)	(Day-Second-Feet)	(Inches Runoff)	
271	540	7,297	3,679	.70	2.
272	565	7,850	3,950	.84	2.
273	591	8,420	4,249	.90	2.
274	617	9,032	4,554	.97	2.
275	643	9,662	4,871	1.04	3.
276	671	10,319	5,203	1.11	3.
277	700	11,004	5,548	1.18	3.
278	730	11,719	5,906	1.26	3.
279	760	12,464	6,284	1.34	4.
280	791	13,240	6,675	1.42	4.
281	825	14,048	7,083	1.51	4.
282	859	14,890	7,507	1.60	4.
283	894	15,766	7,949	1.69	5.
284	928	16,677	8,408	1.79	5.
285	963	17,623	8,885	1.89	5.
286	1,000	18,605	9,380	1.99	6.
287	1,037	19,623	9,893	2.10	6.
288	1,073	20,678	10,425	2.22	6.
289	1,109	21,769	10,975	2.33	7.
290	1,147	22,897	11,544	2.45	7.
291	1,187	24,064	12,132	2.58	7.
292	1,229	25,272	12,741	2.71	8.
293	1,272	26,523	13,372	2.84	8.
294	1,315	27,816	14,024	2.98	9.
295	1,359	29,153	14,698	3.12	9.
296	1,416	30,541	15,398	3.27	9.
297	1,472	31,985	16,126	3.43	10.
298	1,528	33,485	16,882	3.59	10.
299	1,585	35,041	17,667	3.75	11.
300	1,643	36,655	18,480	3.93	11.
301	1,719	38,336	19,328	4.11	12.
302	1,795	40,093	20,214	4.30	13.
303	1,871	41,926	21,138	4.49	13.
304	1,948	43,836	22,101	4.70	14.
305	2,025	45,822	23,102	4.91	14.
306	2,092	47,881	24,140	5.13	15.
307	2,159	50,006	25,212	5.36	16.

ELEVATION, AREA AND CAPACITY TABLE

Elevation (Feet)	Surface Area (Acres)	Reservoir Capacity (Acre-Feet)	(Day-Second-Feet)	(Inches Runoff)	[illegible]
308	2,220	52,199	26,317	5.59	17.
309	2,293	54,450	27,456	5.83	17.
310	2,361	56,789	28,629	6.08	18.
311	2,437	59,184	29,839	6.34	19.
312	2,513	61,659	31,087	6.61	20.
313	2,590	64,211	32,373	6.88	20.
314	2,667	66,839	33,698	7.16	21.
315	2,745	69,545	35,063	7.45	22.
316	2,841	72,338	36,471	7.75	23.
317	2,938	75,228	37,928	8.06	24.
318	3,036	78,215	39,434	8.38	25.
319	3,134	81,300	40,989	8.71	26.
320	3,232	84,483	42,594	9.05	27.
321	3,321	87,750	44,245	9.40	28.
322	3,410	91,125	45,942	9.76	29.
323	3,499	94,579	47,684	10.13	30.
324	3,588	98,123	49,471	10.51	31.
325	3,677	101,755	51,302	10.90	33.
326	3,775	105,481	53,180	11.30	34.
327	3,873	109,305	55,108	11.71	35.
328	3,971	113,227	57,086	12.13	36.
329	4,069	117,247	59,112	12.56	38.
330	4,168	121,366	61,189	13.00	39.
331	4,267	125,584	63,426	13.45	40.
332	4,367	129,900	65,606	13.91	42.

Rep Wescott, NRC
called and asked several
questions about flaw in EC.
I sent him a copy of
Col Goodell's April 1, 1943
letter.

WHD
1-24-44

EXHIBIT "E"

7435

4/17/84 w/ NRC; re: Pt. Pleasant/H_2O etc.

PECo — NRC

WHD — Schoener — Lehr.

JTR — Mangdo

slow power test

— 1. Can you load fuel w/o make-up? JTR - no problem.

— 2. PUC - only 10 mgd thru EB until operating data shows no irreparable harm. ?

WHD: We appealed PUC decision (EXCEPTIONS) & so did Del-AWARE.

PUC has sidelined problem to a study committee of staff.

No date set for decision.

PUC is saying, if there is no PP, is there a "necessity for Bradshaw".

Our exceptions were 1) the 1 of 4 pumps to be installed. (4 are req'd for full LG capacity)

1 pump is not enough to provide req'd augmentation flow.

— 3. RE STOP WORK ORDER ON MERGENTIME. PECo WAS ABLE TO GET RELIEF TO FINISH IN WATER WORK IN DELAWARE. STATUS OF STOP ORDER & OF IN WATER WORK.

WHD: PECo didn't get relief. We're interested by stander.

NWRA claimed defective workmanship & invoked section of genl. conditions permitting this.

Mergentime filed suit saying alleged work was a subterfuge to shut down job.

Judge said he'd review but that [illegible] river work & canal work would be completed (@ urging of PADER & Fish Comm.).

River work now complete. Canal crossing now being finished (after flooding of canal xing & pumphouse

Lehr: Commonwealth was to maintain one of the locks?

WHD: Yes. Explained.

— 4. Not all of land easements for CTM have been obtained for Pt. Pleas. & Bradshaw?

WHD: True. 80-85% has been acquired.

Schoener: to Pt Pleas/Bradshaw all Mergentime

WHD: No. 1st Two M (of 22 mi. total) is Mera (up the hill). [illegible]

thereafter will be a separate contract.

Schwarz: Remainder of CTM let?

WHD: Work has stopped & NWRA isit pursuing.

5. Bradshaw?

WHD: It's all PECo's, PERMITS [illegible] rec'd from DRBC

Field work is waiting for PUC finding of necessity. Judge folture and have gotten a bldg permit.

6. Schedule estimate on Bradshaw?

WHD: Will reevaluate. Last evaluation was less than 10 months. (Bradshaw & pipeline to EB)

7. Schwarz: Driving obstacles removal from Mayentine, how long.

WHD: In Feb, they had 6 months to go.

Schwarz ⇒ would be done by Oct 1.

8. Sch. Bal of CTM

WHD: 4 months

9. Sch: Historical. How long has it taken to get easements?

WHD: NWRA was ready to condemn.

~~////~~

JR → This info not for $ community

DS → Had call on whether plant is licensable w/o offsite H₂O

DS has no info on plans w/o ~~[illegible]~~ offsite water.

May want to put on record that we can start up w/o water.

JR → We Don't want to put on record.

DS → has been asked by his mgt if we can start up w/o offsite water. Knowing that we have 2-4 mo that we can operate w/o offsite water.

Recent response to 2.206 report just delayed questions, saying premature speculation.

Although no discussion yet, DSB could ask.

10 DS/Lehr – Had ~~[illegible]~~ heard Del-AWARE has gotten PADER to evaluate relaxing H_2O qual. stds. for Schuylkill?

WFD: Lots of activity. There are 2 criteria which prevent use of river.
Flow & temp

Del-DW. was questing applicability of criteria.

" " has appealed to DEP to relax temp. criteria

DEP staff has restudied. Temp. was for water quality. Sewer plants have improved so temp. isn't as important. Staff found that even w/o temp, could do it on flow. Inspite of reviews w/ DEP Secy, criteria still stands.

Re: Blue Marsh(B)We were told years ago that we couldn't get it.

However BM would only be adequate for 1 unit in an average year.

11. AS: Best judgment, the threshold triggers and happen except very-ext.

WFD Yes. Week year we would have been prohibited 280+ days.

12. AS: If NRC was prepd to issue License w/ no guaranteed water, could you do it from an eng. pt. of view.

JR: No. No water, no run!

13. Lehr: Perk pipeline & pumphouse.

WFD: Pipeline in & hydro.

Pump sta. essentially complete. S/U testing of units

14. AS: Chas. We said we could go to meeting even from Schuylkill.

JR:

AS: Was informal. Will ask if we need formal.

JR: Have figures before you ask formal.

AS will do.

Public Meeting July 6, 1984

MOTION

RE: ORDER TO SHOW CAUSE WHY THE CONSTRUCTION OF LIMERICK UNIT II IS IN THE PUBLIC INTEREST

On October 10, 1980, this Commission entered an Order at docket number I-80100341 initiating an Investigation into the need for, and economy of, the Limerick Nuclear Generating Station of Philadelphia Electric Company (PECO). At the end of the Investigation, the Commission concluded that the simultaneous construction of Limerick Units I and II would not be in the public interest because of PECO's precarious financial condition and the effect that the continued construction of both units would have upon PECO's ability to provide safe and reliable service. PECO was given the option of either cancelling Unit II, or suspending Unit II until Unit I was completed; however, if PECO refused to suspend or cancel Unit II, the Commission would not approve any future securities issuances to raise capital for construction of Unit II. The Commission's Order was reversed by the Commonwealth Court but was upheld by the Supreme Court of Pennsylvania. Pennsylvania Public Utility Commission v. Philadelphia Electric Co., 501 Pa. 153, 460 A.2d 734 (1983). After the Supreme Court decision, PECO indicated that it intended to suspend Unit II until Unit I was completed, and then resume construction.

Recent developments have raised anew grave concerns regarding PECO's ability to provide adequate service at reasonable rates. PECO filed for a general rate increase on April 27, 1984, and has already announced its intention to file for another increase after Unit I

EXHIBIT "F"

4. Should the Commission reject any securities filings, or impose any other appropriate remedy, to guarantee the cancellation of Unit II?

5. If Unit II is cancelled, what, if any, percentage of the sunk costs should PECO be permitted to recover from its rate-payers?

6. If construction of Unit II is found to be in the public interest, should the Commission adopt an "Incentive/Penalty Plan" as an inducement to cost efficient and timely construction?

We believe that our duty to guarantee just and reasonable rates and to maintain adequate service require that the above issues be addressed by all affected parties and resolved by the Commission prior to April 1985, the date upon which construction of Unit II could resume; THEREFORE,

WE MOVE:

1. That the Philadelphia Electric Company be ordered to show cause why the completion of Limerick Nuclear Generating Station, Unit II, would be in the public interest.

2. That the Law Bureau prepare the necessary Order to Show Cause.

Bill Shane — 6/28/84 DATE

Frank Fisher — 6/28/84 DATE

Michael Johnson — 6/28/84 DATE

_____ — _____ DATE

_____ — _____ DATE

CERTIFICATE OF SERVICE

I hereby certify that I have served a copy of the foregoing MOTION TO REOPEN BASED ON NEW EVIDENCE by mailing a copy of the same to the following persons this 31st day of July, 1984.

Christine N. Kohl, Esq., Chairman
Administrative Judge
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gary Edles, Esquire
Administrative Judge
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Reginald L. Gotchy
Administrative Judge
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ann Hodgdon, Esquire
Benjamin H. Vogler, Esquire
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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1747 Pennsylvania Avenue
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Vice President & General Counsel
Philadelphia Electric Company
2301 Market Street
Philadelphia, PA 19101

Secretary
U.S. Nuclear Regulatory Commission
Attn.: Chief, Docketing & Service Branch
Washington, DC 20555

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