

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

PHILADELPHIA ELECTRIC COMPANY

(Limerick Generating Station,
Units 1 and 2)

}
}
}
}
}
} Docket Nos. 50-352
50-353

TESTIMONY OF MR. JOHN C. LEHR ON
CONTENTION V-16B CONCERNING QUALITY OF DELAWARE RIVER
WATER TRANSPORTED TO PROPOSED BRADSHAW RESERVOIR

Q1. Please state your name and position.

A1. My name is John C. Lehr. I am employed by the U.S. Nuclear Regulatory Commission, as Senior Environmental Engineer, in the Environmental Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation. A copy of my professional qualifications is attached.

Q2. What is the purpose of your testimony?

A2. The purpose of my testimony is to respond to a portion of Contention V-16b which states: "Seepage of water and toxics from Bradshaw Reservoir will cause a risk of groundwater contamination and hydraulic saturation." My testimony addresses the potential for presence of toxics in the water to be contained in Bradshaw Reservoir.

Q3. What is your understanding for the basis for this portion of the contention?

A3. It is my understanding that this portion of the contention is based on the allegation by Del-AWARE, Inc. that the Delaware River presently contains the toxics trichloroethylene (TCE), polychlorinated biphenyls (PCB's), manganese, pesticide and others. Further, that these substances would be transmitted to Bradshaw Reservoir and subsequently to the groundwater in the vicinity by seepage from the reservoir in amounts that may be harmful to people, animals and vegetation (Exhibit 1).

Q4. Has the applicant or any other agency characterized the water quality of the Delaware River in the vicinity of the proposed Point Pleasant Diversion?

A4. Yes. I am familiar with several studies that provide such characterizations. Those of the applicant, the DRBC and the U.S. Army Corps of Engineers are given below. Based on studies conducted from 1974 through 1978, the applicant in the ER-OL characterized the water quality of the Delaware River as "relatively good in that it is well buffered and does not contain excessively high concentrations of major cations and anions or ions considered essential plant nutrients." (ER-OL p. 2.4-7)

In the Delaware River Basin Comprehensive (Level B) Study (Ref 1), the Delaware River Basin Commission (DRBC) in May 1981 indicated that water quality is on an improving trend in most Delaware River basin streams. General water quality problems and issues were identified for the river above Trenton, New Jersey as follows: (1) occasionally high fecal coliform levels,

(2) occasionally low localized dissolved oxygen levels, and (3) high turbidity during storms. This report also mentions the presence of some of the pollutants on the U.S. Environmental Protection Agency List of Priority Pollutants in the surface and groundwaters of the basin. However, the quantities detected were characterized as "minute" in almost all cases.

In a more recent report, the DRBC characterized the water quality in the Delaware River between Easton, PA and Trenton, NJ as "Good" meaning "Minor or localized pollution problems. Water quality standards are not violated in most samples or in major sections of the river reach ...Wastewater discharges to the River reach generally meet applicable effluent requirements." (Ref 2). In addition, the DRBC cites in this report that this reach of the river meets the swimmable and fishable goals, as established under the Clean Water Act of 1977, for 1981 and is expected to meet these goals for 1983. The DRBC used their standards for fecal coliform bacteria levels, along with subjective considerations concerning the potential for toxic pollutants' presence to assess the attainment of the swimmable goal for this river reach. The specifically identified concerns for this reach in this study are: (1) occasionally high fecal coliform levels are a seasonally local problem; (2) phytoplankton has been found to be seasonally high in lower part of the river reach; and (3) summer dissolved oxygen concentration has been occasionally low at some locations.

In a report prepared for the U.S. Army Corps of Engineers (Ref 3), the quality of the Delaware River in the vicinity of Pt. Pleasant is described similarly to that given above. The report also notes that there have been

improvements in water quality over the period of 1971 to 1978, notably in levels of coliform bacteria counts and phenols.

Q5. Have you personally collected samples of the water in the vicinity of Pt. Pleasant or performed the analyses on such samples?

A5. No, I have not personally collected or analyzed the samples of Delaware River water from the vicinity of Point Pleasant.

Q6. Have you personally reviewed the available data and assessed the quality of the surface waters in the vicinity of Point Pleasant with respect to the applicable criteria?

A6. I have personally reviewed the available data, as well as the impact assessments and reports on the proposed Bradshaw Reservoir, as performed by the Delaware River Basin Commission (Refs 4,5), the Commonwealth of Pennsylvania Department of Environmental Resources (Ref 6), the U.S. Army Corps of Engineers (Ref 3), the Neshaminy Water Resources Authority (Ref 7) and the applicant, Philadelphia Electric Company (Ref 8).

Q7. To what extent have you relied on the reviews and impact assessments performed by agencies or individuals other than the U.S. Nuclear Regulatory Commission or yourself?

- A7. The responsibilities to assess and authorities to allow the withdrawal and transport of river water to the proposed Bradshaw Reservoir and the construction and operation of the reservoir lie with the Delaware River Basin Commission and the Commonwealth of Pennsylvania. These agencies have assessed the environmental impacts associated with these activities.

I am aware of the results of the reviews and impact assessments performed by these agencies and those listed in my response to the previous question. I am also aware of the data used as bases for these reviews and assessments. I have relied on these same data plus additional recent data as supplied to me by the applicant in response to my request for additional information #291.2 and the data available to date from the EPA STORET data base to assure myself that the assessments performed were adequate and reasonably based.

- Q8. What specific water quality data for the Delaware River have you reviewed?

- A8. I have reviewed water quality data for the Delaware River in the vicinity of the proposed Point Pleasant Diversion location. Data on water quality in this area are available from several sources. I have reviewed the data collected by the applicant, Philadelphia Electric Company, during the period 1975 through 1978 as presented in the Environmental Report, Operating License Stage, for the Limerick Generating Station Units 1 and 2 (ER-OL Table 2.4-16); the complete sample data collected by the applicant, including that

collected subsequent to the data presented in the ER-0L (i.e., data up to 6/82) (Ref 9), and data collected by the Commonwealth of Pennsylvania, as contained in the files of the EPA STORET data base (Ref 10).

Q9. What is the period of record, then, for the data you have reviewed?

A9. The applicant's data have been collected during the period of 1/30/75 through 6/10/82 and the data in the STORET files have been collected during the period of 7/22/76 through as late as 5/25/82. The periods of record for both the applicant's and the STORET data on the Delaware River are not the same for all water quality parameters sampled.

Q10. What water quality standards and usage criteria have you used in your review that are applicable to the Delaware River at Point Pleasant?

A10. The Commonwealth of Pennsylvania under Chapter 93 of the Rules and Regulations of the Department of Environmental Resources has assigned the maintenance and propagation of warm water fishes and the passage, maintenance and propagation of migratory fishes as protected uses of the Delaware River at this location. Both general and specific water quality criteria necessary to protect these uses have also been established by the Commonwealth for these waters. In addition, the Delaware River Basin Commission, under Article 3 of their Basin Regulations - Water Quality, has designated the following water uses to be protected: public water supply after reasonable treatment,

industrial water supply after reasonable treatment, agricultural water supply, maintenance of resident game fish and other aquatic life, spawning and nursery habitat for anadromous fish, passage for anadromous fish, wildlife, and recreation. Stream quality objectives have been assigned for this reach of the river to protect these uses.

Q11. Have you used any other water quality standards or water quality criteria in your review?

A11. Yes. Under the requirements of the Safe Drinking Water Act, the U.S. EPA has established National Interim Primary Drinking Water Regulations (40 CFR 141) and National Secondary Drinking Water Regulations (40 CFR 143). Although these regulations apply specifically to waters that have been processed in and delivered to a customer from a public water system and not raw, untreated waters like those to be transported to the proposed Bradshaw Reservoir, they do contain Maximum Contaminant Levels (MCL's) for several impurities of concern in potable water supply. The staff is aware that there are several individual drinking water wells in the vicinity of the proposed Bradshaw Reservoir location. Even though there is no statutory requirement for water in these wells to meet the criteria established under the Safe Drinking Water Act, in order to take a conservative approach I have compared the quality of the Delaware River water to the Maximum Contaminant Levels established under the Act.

Also, I have considered, where not considered specifically by PaDER and DRBC regulations, the appropriate U.S. EPA quality criteria for water and the criteria published by EPA pursuant to the Clean Water Act addressing the list of priority pollutants (45 Federal Register 231, November 28, 1980).

Q12. What are the results of your review of the water quality data on the Delaware River in the vicinity of Point Pleasant with regard to the applicable Pennsylvania and DRBC water quality standards and criteria?

A12. Review of the data with respect to the DRBC and Pennsylvania water quality standards indicates that, for those constituents with numerical criteria limitations, the mean constituent values found do not violate the criteria, except for fecal coliform bacteria counts. The water quality of the river with respect to these bacteria counts appears to be improving, as the bacteria counts appear to be decreasing over the period of record, 1978 to 1982. Infrequent violations of the numerical criteria of the DRBC and Pennsylvania are found to have occurred over the period of record when the maximum values of the constituents are considered. This is the case for limitations on pH (upper limit exceeded), total dissolved solids, ammonia, phosphates, cadmium, chromium, iron, cyanide and phenols. These data records are not consistently complete to the current sampling year (i.e., 1982, Not all constituents have been sampled for all years). However, based on the infrequent violations of the applicable numerical criteria, I believe that the data support the conclusions of the DRBC given above (see A4.) regarding the condition

of the river in this reach relative to applicable standards and designated uses.

Q13. What are the results of your review of the water quality data on the Delaware River in the vicinity of Point Pleasant with regard to the Maximum Contaminant Levels of the National Interim Primary Drinking Water Regulations and the National Secondary Drinking Water Regulations?

A13. Review of the data with respect to the MCL's established pursuant to the Safe Drinking Water Act indicates that six different constituents have been measured at levels in excess of the MCL's. These are pH, cadmium, chromium, iron, manganese and coliform bacteria. The MCL exceedances for pH, cadmium and chromium have been infrequent. The average values for these constituents have not been found to be in excess of the corresponding MCL. For the remaining constituents, the average values at both the proposed intake location and the upstream sampling location have been found to exceed the corresponding MCL as shown in the table which I have provided below. These measurements do not represent violations, because the provisions of the Act do not apply to the waters of the Delaware River, as would be withdrawn at Point Pleasant, nor would they apply to the Bradshaw Reservoir waters, both of which are untreated supply waters.

Constituent	Range ¹ of Mean Values, mg/l		Range ¹ of Max Values, mg/l		MCL mg/l
	Intake	Upstream	Intake	Upstream	
Total iron	0.36	0.41-0.48	2.06	2.97-3.00	0.30
Manganese	0.07-0.08	0.06-0.09	0.37-0.40	0.48	0.05
Coliform ₂ Bacteria ²	ND	6771	ND	154,000	1

1. Each sample for iron and manganese consists of 3 replicates.

2. Values shown are number of bacteria per 100 ml

ND No data

Q14. What is your conclusion regarding the significance of levels of total iron, manganese and coliform bacteria in these samples?

A14. Iron and manganese, at concentrations typically encountered in surface waters are not harmful to human health. Control of their concentrations in domestic and potable waters is desirable because of their adverse aesthetic effects of coloring of the water, staining of laundry and objectionable tastes in beverages.

Iron and manganese are constituents readily controlled to acceptable levels for domestic and potable water use during normal treatment of surface water supplies, through such processes as water softening, aeration, filtration, pH adjustment, sedimentation and also as a by-product of normally applied disinfectants (e.g., chlorine). In groundwater supplies, these impurities can be controlled to acceptable levels through the use of water softening treatment systems which are available for individual supply systems (i.e., individual dwelling treatment systems).

The proposed Bradshaw Reservoir will have an impervious liner installed which is designed to greatly reduce any water and water-borne contaminant seepage through the reservoir bottom (Exhibit 2). The form of the iron and manganese (i.e., particulate or dissolved) in the reservoir water will also influence the amount of these constituents that may leave the reservoir with any seepage, because particulate forms could reasonably be expected to be upheld within the reservoir by the liner.

Bacteria levels are periodically very high when compared to the MCL of the Safe Drinking Water Act and the PaDER and DRBC limitations. The movement of water-borne bacteria through the reservoir bottom will be hindered by the presence of the impervious liner and the buildup of any mat of organic materials, either on the reservoir bottom or within the soil. Other factors, such as soil and rock character, bacteria levels in the reservoir waters, growth media encountered in the soil, and rate of groundwater movement would affect the extent of travel, if any, of bacterial contaminants in the vicinity of the proposed Bradshaw Reservoir.

In any event, the applicant's data (Exhibit 2 - Response to staff request for additional information #E240.24) indicates that seepage is expected to flow to the northeast of the reservoir, where there are no existing wells (existing wells are located south of the reservoir) nor recharge areas to existing wells.

Based on the above, I conclude that the iron, manganese and coliform bacteria levels as measured in the Delaware River in the vicinity of

Point Pleasant do not pose a significant threat to nearby existing groundwater wells.

Q15. What are the results of your review of the water quality data on the Delaware River in the vicinity of Point Pleasant with regard to the toxic substances, as mentioned in connection with this contention?

A15. There are very limited sample data on the occurrence of the toxic substances mentioned in connection with this contention for the Delaware River in the vicinity of Point Pleasant(See A3).

Sampling and measurement of pesticides were performed for the NWRA on July 15, 1980 (for 2, 4,-D and Silvex) and on July 23, 1980 (for Lindane, Chlordane, Endrin, Heptachlor, Hepta-Epoxyde, Methoxychlor and Toxaphene). The results of these measurements from the Delaware River at Point Pleasant indicate that for all of these pesticides and herbicides, concentrations were below the limit of detection used by EHBA, Inc., 0.001 mg/l. Samples collected on August 20, 1978 for these same pesticides and herbicides were also reported by NWRA to be below the detection limits.

Measurements on Delaware River water from the vicinity of Point Pleasant have been made by the applicant, Philadelphia Electric Company, since March 1980 for trichloroethylene (TCE). Prior to March 1982, sampling was performed at one station. Beginning in

March 1982, sampling was expanded to several stations in the proposed Point Pleasant Diversion vicinity. TCE was detected sporadically at these locations beginning in March 1982. The range of concentrations found was 0-4.0 $\mu\text{g}/\text{l}$.

Q16. What are the established water quality criteria and Maximum Contaminant Levels, pursuant to the Clean Water Act and the Safe Drinking Water Act, respectively, for trichloroethylene?

A16. The U.S. Environmental Protection Agency indicates that for freshwater aquatic life, acute toxicity has been observed to occur at concentrations as low as 45,000 $\mu\text{g}/\text{l}$, but is expected to occur at lower concentrations among more sensitive species than those tested. No chronic toxicity data for freshwater biota is available. Adverse behavioral effects were noted at 21,900 $\mu\text{g}/\text{l}$. The human health criterion for maximum protection from potential carcinogenic effects from exposure to TCE through ingestion of contaminated water and contaminated aquatic organisms is recommended to be zero. EPA has estimated incremental cancer risk increases of 10^{-5} and 10^{-7} for consumption concentrations over a human lifetime of 27 $\mu\text{g}/\text{l}$ and 2.7 $\mu\text{g}/\text{l}$ (45 Federal Register 231, November 28, 1980), respectively.

To my knowledge, no Maximum Contaminant Level has been established for TCE in drinking water pursuant to the Safe Drinking Water Act.

Q17. Have you reviewed water quality data on the Delaware River in the vicinity of Point Pleasant with regard to PCB's?

A17. My review of the available data on the water quality of the Delaware River in the vicinity of Point Pleasant did not indicate any available concentration information for PCB's.

Q18. What are your conclusions with regard to the water quality of the Delaware River in the vicinity of the proposed Point Pleasant Diversion?

A18. Based on my review of the data collected by the applicant and others as mentioned previously in this testimony, I conclude that the water quality of the Delaware River in the vicinity of the proposed Point Pleasant Diversion is good, and that, with the exception of occasional elevations of bacteria levels, the observed concentrations of toxics and detrimental substances are very low. I concur with the water quality characterizations of this reach of the river as presented by the DRBC and the PaDER in their impact assessments of the Point Pleasant Diversion.

List of Exhibits

- Exhibit 1 - Del-Aware's Answers to NRC Staff's Discovery Requests; in the matter of Philadelphia Electric Company (Limerick Generating Station, Units 1 and 2); Docket Nos. 50-352-OL and 50-353-OL; August 23, 1982.
- Exhibit 2 - Applicant's Response to NRC Staff's Request for Additional Information #E240.24; Philadelphia Electric Company (Limerick Generating Station, Units 1 and 2); Docket Nos. 50-352 and 50-353; September 3, 1982.

List of References

- Reference 1 - The Delaware River Basin: The Final Report and Environmental Impact Statement of the Level B Study-May 1981; Delaware River Basin Commission; May 1, 1981.
- Reference 2 - Cleaning Up The Delaware River: A Status and Progress Report Prepared Under the Auspices of Section 305(b) of the Federal Clean Water Act; Delaware River Basin Commission; March 1982.
- Reference 3 - Environmental Assessment and Section 404 Analysis of Point Pleasant Diversion Project; Betz Converse Murdoch, Inc. for Dept. of the Army, Philadelphia District Corps of Engineers; January 1981.
- Reference 4 - Final Environmental Impact Statement: Point Pleasant Diversion Plan Bucks and Montgomery Counties, Pennsylvania; Delaware River Basin Commission; February 1973.
- Reference 5 - Final Environmental Assessment For The Neshaminy Water Supply System; Delaware River Basin Commission; August 1980.
- Reference 6 - Environmental Assessment Report And Findings Point Pleasant Water Supply Project; Commonwealth of Pennsylvania Department of Environmental Resources; August 1982.
- Reference 7 - Environmental Report On Neshaminy Water Supply System Neshaminy Water Resources Authority Bucks County; Neshaminy Water Resources Authority; February 1979.
- Reference 8 - Environmental Report Bradshaw Reservoir, Transmission Main, East Branch Perkiomen, And Perkiomen Creeks; Philadelphia Electric Company; July 1979.
- Reference 9 - Delaware River Water Quality Data; H. D. Honan, Philadelphia Electric Co.; Letter from H. D. Honan, PECO, to S. H. Lewis, Esq., USNRC; September 3, 1982.
- Reference 10 - STORET data from Delaware River at Lumberville, Pa.; Data storage and retrieval system maintained by U.S. Environmental Protection Agency; Data from Commonwealth of Pennsylvania.

PROFESSIONAL QUALIFICATIONS

JOHN C. LEHR

U.S. Nuclear Regulatory Commission

I am currently employed as Senior Environmental Engineer in the Office of Nuclear Reactor Regulation, Division of Engineering, in the Environmental Engineering Branch. I have the responsibility for the independent review and analysis of the proposed site, alternative sites, site selection methodology, station construction, and design and operation of those features of nuclear power plants as they may affect natural water resources, existing water quality and use, water quality and usage goals as established by the responsible agency and other impacts on the aquatic environment. In this capacity, I have prepared the abiotic aquatic impact sections for NRC environmental impact statements (EIS) on numerous construction permit and operating license applications. For operating license applications, I have provided the technical specifications in the area of water quality and chemical discharge limitations and monitoring requirements. I have provided the technical expertise in the NRC overview function of contractor prepared EIS's in the area of abiotic aquatic impact assessments, including the need for mitigative actions and establishment of coordination with state and regional EPA offices. In the above capacities, I have been responsible for the water quality related aspects of NRC licensing actions for over 70 applications. I have also been responsible for the water quality related sections of several NRC NEPA alternate site investigations of proposed nuclear power plants, including the Seabrook Units 1 and 2 plant. I have provided written testimony and served as an expert witness at NRC licensing hearings on a variety of subjects dealing with aquatic impacts relative to power plant siting, construction and operation.

I have acted as a consultant to other NRC branches and provide analyses of water quality problems through technical assistance requests, particularly to the Division of Operating Reactors on matters pertaining to assessment of chemical effluent impacts and changes in abiotic effluent limitations and water chemistry monitoring programs for operating plants.

I have served as the coordinator and principal investigator in an in-house study to determine actual releases of residual chlorine from operating nuclear power plants. In addition, I am the Division technical representative on several inter-office NRC Research Review Groups. As such, I am responsible for defining and coordinating research needs in the area of abiotic aquatic environmental concerns and for providing the technical guidance for on-going research programs in this area. Examples of research activities governed by these review groups are asbestos in cooling tower waters, residual chlorine and chlorination by-products in power plant discharges in fresh and marine waters and investigation of the occurrence of pathogenic organisms in power plant cooling waters.

I have been designated as the in-house technical originator responsible for development of Environmental Standard Review Plans addressing staff NEPA reviews of site water quality, plant water uses, plant chemical and sanitary wastes, water quality related impacts of plant operation, abiotic aquatic monitoring and chemical treatment system alternatives. In a related activity, I have participated as a member of the Standard Environmental Technical Specifications Task Group responsible for the abiotic aquatic monitoring sections of the McGuire Units 1 and 2 and the Three Mile Island Unit 2 ETS.

I have participated in technical conferences with and coordinated water quality related activities with the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and other Federal, State and local agencies regarding implementation of the National Environmental Policy Act, the Federal Water Pollution Control Act and its amendments, the Toxic Substances Act, the Safe Drinking Water Act and the memoranda of understanding between the NRC and EPA and COE.

I have also developed expertise and been designated as the responsible technical specialist in the areas of sound level prediction techniques for power plants and their transmission lines and techniques for estimation of community response to environmental sound levels, as influenced by power plant construction and operation. I have been responsible for sections of NRC environmental impact statements addressing these areas for several proposed and operating nuclear power plants. I have also provided written testimony and served as an expert witness at NRC licensing hearings for noise impacts related to nuclear power plant construction and operation.

I have a Bachelor of Science degree in Mechanical Engineering from Drexel Institute of Technology (1969) and a Master of Science degree in Environmental Engineering from Drexel University (1972) specializing in water associated problems in the environment. My academic background includes studies in water chemistry, domestic and industrial waste treatment, and water resources management.

From 1969 to 1972, I was employed as a mechanical engineer at the U.S. Army Frankford Arsenal, Philadelphia, Pennsylvania. I was assigned as Project Manager of materials handling, and pollution control efforts for the Small Caliber Ammunition Modernization Program. I participated in the development of solid and liquid waste management and noise control programs for metal parts manufacturing facilities.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Lehr
Exhibit 1

Before the Atomic Safety and Licensing Board

62 MAR 23 P2:

In the Matter of)
)
Philadelphia Electric Company) Docket No. 50-352-OL
) 50-353-OL
(Limerick Generating Station,)
Units 1 and 2))

emp

DEL-AWARE'S ANSWERS TO NRC STAFF'S DISCOVERY REQUESTS

Del-AWARE's Answers are complete based on present information, but will be supplemented as required and permitted under 10 C.F.R. 740(e), and/or if additional contentions are admitted by the Board.

Answers to General Interrogatories

G-1 (a) Del-AWARE intends to present the following expert witnesses with respect to Contention V-15:

Mr. Norman Torkelson (Residence: Box 22, Stockton, NJ; Business: Sundrive, Inc., Box 875 RD2, Stockton, NJ 08559), will testify regarding the water quality of the Delaware River--in the Point Pleasant area, the nature and extent of aquatic biota in that area, the likelihood of future water quality changes as a result of the project, and the projected impact on aquatic biota. The content of Mr. Torkelson's testimony is summarized, the basis thereof is stated, and his expertise is described, in his deposition taken by Applicant on August 12, 1982.*

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* Del-AWARE presently has no information available regarding the expertise of its witnesses other than as presented in their depositions.

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Pennsylvania Fish Commission, Box 556, Revere, PA 18453) will testify on behalf of the Fish Commission as to the effects on aquatic life of the change in hydraulics and hydrology and water quality described by Mr. Phillippe and Mr. Torkelson, respectively. To the extent known, Mr. Kaufman's and Mr. Emery's qualifications are stated in the transcript of their depositions by Applicant on August 12, 1982, which is incorporated herein by reference. The substance of the facts and opinions of these witnesses and the bases therefor, are also provided in the transcript of their depositions and are likewise incorporated herein by reference.

Mr. Joseph Miller (Business: U.S. Fish and Wildlife Service, Rosemont, NJ) and Mr. Rick McCoy (Business: U.S. Fish and Wildlife Service, State College, PA), will testify as to the past, present and future importance of Point Pleasant as a shad habitat and the reasons therefor, impacts of the changes in hydraulics and hydrology resulting from the intake, and the impact of the intake on the pool and on the American shad and shortnose sturgeon by virtue of this impact and the impact on dissolved oxygen on the Upper Estuary. See Motion to Compel, and Reply to Applicant's Answers. Mr. Miller and Mr. McCoy are professional biologists employed by the U.S. Fish and Wildlife Service. Mr. Miller is the director of the shad recovery program in the Delaware River. Mr. McCoy is a reviewer of projects affecting the Delaware River, including impacts on dissolved

oxygen and salinity. Mr. Miller's testimony will focus on the potential effect of the project on these and other species, and upon taking of them by anglers, and upon the use of the pool area as an active fishery with access for shore fishing. Mr. McCoy's testimony will focus on the reviews made by the U.S. Fish and Wildlife Service, the relationship between this project and the salinity program studies, analyses of DRBC program changes, and proposed projects which will cumulatively affect water quality, including dissolved oxygen, as a result of this project, and the impacts upon the fishery. Mr. Miller will also address this subject. The grounds for the opinions of these witnesses include their observations and analyses over a number of years, as well as the studies that they have undertaken. They are further provided in the Technical Appendix to the Shad Recovery Program for the Delaware River, and sources referenced therein.

Arthur Lupine (Business: U.S. Department of the Interior, Fish and Wildlife Service, Rosemont, NJ), may also be offered as a witness. Mr. Lupine has similarly conducted studies of the shad fishery in the Delaware River and has first hand knowledge of same, particularly as to shad.

Ezra Golub, Levittown, PA, a Registered Surveyor will testify on the surveyed location of the eddy and nursery and spawning pool in relationship to the intake.

All of the witnesses identified above will rely on the data produced by Neshaminy Water Resources Authority

("NWRA") and its consultants and supplied to the U.S. Army Corps of Engineers (the "Corps") in their letters of September 8 and 9, 1981, and January 22, 1982, and other papers submitted to DER. The witnesses will further rely on the biology study prepared by Paul L. Harmon entitled Biological Evaluation of the Point Pleasant Intake (1980) (hereinafter "Harmon Study"); the assessment of shortnose sturgeon prepared by Harold Brundage entitled Assessment of the Impacts of the Proposed Point Pleasant Pumping Station and Intake on the Shortnose Sturgeon, Acipenser brevirostrum (1982) (hereinafter "Brundage Study"); the letter from Paul L. Harmon to E.H. Bourguard dated July 28, 1981; the Environmental Assessments and Reports produced by NWRA, Philadelphia Electric Company ("PECo"), and DRBC Golub Survey, June, 1981, and various published documents relating to shad, sturgeon, intakes and their impacts, The DRBC Orders, Level B Study, Merrill Creek draft EIS, Draft Recommendations of the Parties to the U.S. Supreme Court and other documents provided to the parties at the depositions of the witnesses on August 12 and 13, 1982. In addition, Mr. Torkelson will rely on water quality data produced by EPA STORET, NJ DEP (D & R Canal studies), NWRA, PECo, and other parties, all of which has been previously provided or made available to the staff at the depositions, or is hereby made available.

Each witness will testify that the adverse effects to which their testimony relates would not ^{be} expected if the

Delaware River water allocation were withdrawn at Philadelphia.

(b) Del-AWARE intends to present the following expert witnesses with respect to Contention V-16a:

Samuel Landis, a professional archaeologist, (Residence: 221 Erie Avenue, Quakertown, PA 18951; Business: Bryn Mawr College, Bryn Mawr, PA), will testify as to the integrity of the Point Pleasant Historic District and the affect of constant maintenance dredging activity on that area. Mr. Landis's qualifications include the performance of contract archaeology work for Bryn Mawr College, Pennsylvania Historic and Museum Commission, U.S. National Park Service, and the National Audobon Society; supervision of field training for college archaeology students; and 18 years of archaeology experience in the Point Pleasant area. The substance of the facts and opinions to which he is expected to testify, and the summary of the grounds for each opinion have been stated in Applicant's deposition of Mr. Landis on August 18, 1982:

Mr. Jonathan Phillipe (address: see answer to Interrogatory G-1(a)) will testify as to the nature and extent of constant dredging and other activities required to cope with problems due to the intake, and the nature and extent of the effect of such intake and of such activities on the Point Pleasant Historic District, based on his studies and experience, and the anticipated adverse impacts of ice and debris on the intake.

(c) Del-AWARE intends to present the following expert witnesses with respect to Contention V-16b:

Mr. Norman Torkelson (see answer to Interrogatory G-1(a)), will testify as to the content of the Delaware River water.

Mr. John Phillipe (see answer to Interrogatory G-1(a)), will testify as to the likelihood of potential groundwater contamination and hydraulic saturation through alteration of the groundwater table, and the risks of ground and surface water contamination and hydraulic saturation due to instability of the slopes of Bradshaw Reservoir.

Edwin Beemer, a geologist, will testify regarding susceptibility of the soils to seepage and slope failure. His address, expertise and studies will be provided.

Both of these witnesses will rely on data produced by PECO, NWRA, and others, as mentioned above, regarding water quality, as well as information produced by PECO and its consultants concerning the characteristics of the soils and reservoir plans for Bradshaw Reservoir, and, to the extent known, the operating program for the reservoir.

G-2 To the extent they have been identified at this time, all documents described in Interrogatory G-2 have either been made available to the parties for copying through the witnesses or through Del-AWARE's counsel, and have been copied, or have been identified in Del-AWARE's answer to Interrogatory number G-1. Del-AWARE intends to

use portions of the depositions of PECO and Staff witnesses, and documents referred to therein. All of such documents which are intended to be used are available for Staff inspection and copying. Del-AWARE will use a letter dated June 17, 1982 from Johnson Screen Division to Robert J. Sugarman, and a letter from Paul Harmon to E.H. Bourquard dated July 29, 1981, and attachments.

Answers to Specific Interrogatories

S-1 The American shad and shortnose sturgeon will be deprived of a viable and important spawning and nursery area, and furthermore, to the extent that they are present in the eddy and pool, will be subject to substantial loss through impingement and entrainment on the intake structure, turbidity, current changes, and resuspension of solids. Del-AWARE understands the term "adverse impact" as used in this Interrogatory to have the same meaning as that given the term by Mr. Michael Masnick in his deposition by Del-AWARE on August 10, 1982, wherein he stated that his evaluation of such impacts will be based on the assumption that the relevant comparison is between the intake and no intake.

S-2 The physical and biological factors associated with the relocation of the intake that would result in the adverse impacts described in Del-AWARE's answer to Interrogatory S-1 include the turbulence to be caused by the operation of the intake; the changes in currents and patterns of flow attributable to the operation of the intake;

from the operation of the intake and pumphouse and maintenance of same will be inconsistent and incompatible with the historic character of the area and will diminish the effect sought to be achieved by the proposed listing of this area on the National Register of Historic Places, and the Landmark.

S-10 (a) All areas in the Village of Point Pleasant are sensitive to the noise identified in Del-AWARE's answer to Interrogatory S-9 for reasons described therein.

(b) Del-AWARE objects to this Interrogatory as it requires the creation of information.

(c) All areas of Point Pleasant enjoy the benefits of the Point Pleasant Historic District's characteristics.

S-11 The major documentation for this condition is EPA's Water Quality Report on the Lehigh River, which has already been supplied to the NRC Staff. Other data consists of water quality studies performed by various agencies in this reach of the Delaware River, identified in Del-AWARE's answer to Interrogatories G-1 and G-2.

S-12 Those toxics presently known to Del-AWARE include TCE's, PCB's, manganese, pesticide and others identified in the water quality data referred to in answer to Interrogatory S-11.

S-13 The bases for this assertion is provided by analyses of soils stability and soils characteristics, to be performed by Jon Phillipe, based on material provided by

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September 3, 1982

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division Of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Docket Nos: 50-352
50-353

Subject: Limerick Generating Station Units 1 and 2
Requests For Additional Information Relating
To Supplementary Cooling Water Supply

- Reference: (1) Letter, A. Schwencer to E. G. Bauer, Jr. dated
August 11, 1982: "Request For Additional
Information - Limerick EROL"
- (2) Letter, A. Schwencer to E. G. Bauer, Jr. dated
August 11, 1982: "Request for Additional
Information - Limerick (Point Pleasant-Noise)"

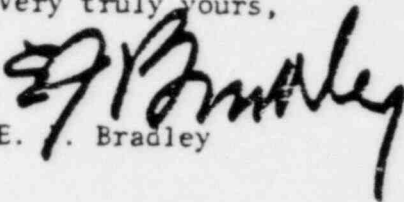
Dear Mr. Schwencer:

Enclosed herewith are our responses to the reference requests for additional information which relate to supplementary cooling water supply issues, as further specified in the enclosure. The enclosure also addresses questions provided to us by your staff at the August 18, 1982 Environmental Site Meeting in Pottstown, Pennsylvania.

Normally we would provide this information formally as an amendment to the Application. However, in order to accommodate your needs for the information as soon as possible, it is being provided in this fashion. If you wish, the material may be subsequently included in a revision to the EROL.

As our counsel has discussed with staff counsel, in the event members of your staff would like to meet with any individuals associated with the project to discuss these matters, we would be pleased to arrange a meeting to provide further explanations.

Very truly yours,



E. Bradley

HDH/pb/M-14

Enclosure

cc: See attached service list

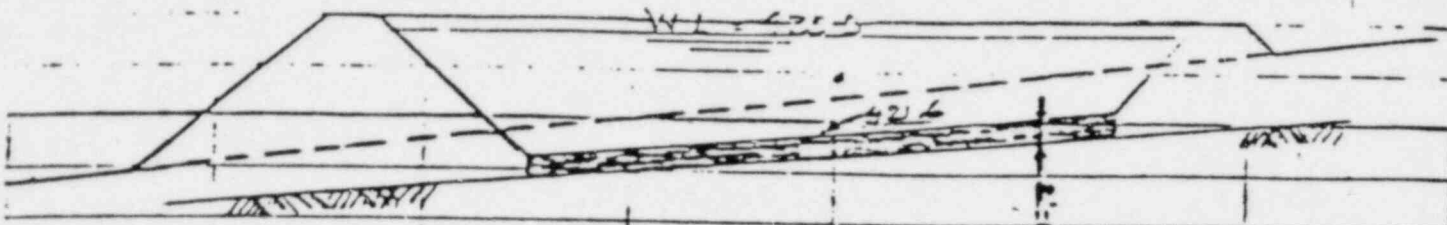
QUESTION E240.24

Please provide the following information regarding the Bradshaw Reservoir of the Point Pleasant Diversion Plan:

- a) A drawing(s) of the reservoir showing dimensions, water level, impervious liner, drains and filters.
- b) The thickness and permeability of the impervious liner on the bottom of the reservoir.
- c) Calculations of seepage through the reservoir and the path of the seepage (downstream or into ground).
- d) A drawing of the stratigraphy underneath the reservoir showing ambient water table elevation, potable aquifers, confining layers, and any other data pertinent to determining the potential for groundwater contamination from the reservoir.
- e) A map showing the location of groundwater users near Bradshaw Reservoir that could be affected by seepage from the reservoir.

RESPONSE

- a) Figure E240.24-1 shows a plan view of Bradshaw Reservoir. Figure E240.24-2 shows elevations of the dikes, the high and low water levels, and the location of the impervious liner. Details of the drains and filters are shown in Figure E240.24-3.
- b) The thickness of the impervious liner as shown in Figure E240.24-2 is to be a minimum of 2 feet. The maximum permeability of the liner material will be 5×10^{-6} cm/sec (0.014 fpd).
- c) Calculations of seepage through the reservoir bottom are shown in Exhibit E240.24-1, the calculated seepage rate is .67 cfs. The seepage will flow to the northeast of the reservoir and into the tributary of Geddes Run as shown in Figure E240.24-5.
- d) Figure E240.24-4 shows the stratigraphy below the reservoir. It should be noted that there are no confining beds or separate aquifers present. Figure E240.24-5 shows water table elevations.
- e) Figure E240.24-5 shows the location of groundwater users near Bradshaw Reservoir; however, since they are located south of the reservoir and the seepage will flow to the north, they will not be affected. It has been concluded that there will be no reversal of the direction of groundwater flow, and there will be no new recharge to existing wells in the area.



Normal High Water Level 435.0
 Aver Elev. Bot of Reservoir 421.6
 Aver. Head on Bottom 13.4 ft

Bottom Area = $825 \times 575 + 725 \times 200$
 $474,375 + 145,000$
 $619,375$ Say 620,000 sq. ft

Permeability Coefficient
 Natural Residual Soil 5×10^{-5} cm/sec
 Rolled & Consolidated 5×10^{-6} cm/sec
 - 0.014 fpd

$$Q = k i A$$

$$i = 13.4 \div 2 = 6.7 \text{ f./ft.}$$

$$= 0.014 \times 6.7 \times 620,000$$

$$= 58,156 \text{ cu. ft. / day}$$

$$= 436,170 \text{ gpd} = 0.67 \text{ cfs.}$$

Note This will be a conservative estimate as it assumes free flow under lining, with no back pressure. Pond on site with relatively constant level indicates very limited flow thru overburden or thru underlying weathered rock