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May 14, 1982

Robert M. Lazo, Esq., Chairman
Administrative Judge
Atomic Safety and
Licensing Board
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555

Dr. Richard F. Cole
Administrative Judge
Atomic Safety and
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U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555

Dr. Dixon Callahan
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In the Matter of
Arizona Public Service Company et al.
(Palo Verde Nuclear Generating Station, Units 1, 2 and 3)
Dockets Nos. STN 50-528, STN 50-529 and STN 50-530

Dear Administrative Judges:

In accordance with this Board's Order of April 30, 1982, I am submitting, on behalf of Intervenor Patricia Lee Hourihan, the following list of witnesses, summary of the witnesses' testimony, and list of exhibits which may be introduced by Intervenor.

I have submitted an affidavit of Mr. Lorah, which outlines his testimony. I have carefully reviewed the affidavit with Mr. Lorah. Although it is not yet executed, I expect no significant changes, and will file the executed affidavit next week.

I have also submitted a Motion requesting that this Board reconsider its ruling that Intervenor may not introduce evidence or testimony about the Indians' claims to the effluent for which Applicants have contracted for use at Palo Verde. If this motion is granted, intervenor will present as her witness Mr. Philip Shea, whose testimony is outlined below. In order to have a complete record, I believe such a proffer of his testimony is necessary.

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The summary of the witnesses' testimony may be incomplete since Intervenor has not received certain requested documents from Applicants regarding the relationship between water quality and water quantity, and regarding the water requirements for the systems used to shut down the plant. When Intervenor receives these documents, I will submit a short summary of any testimony these witnesses will have regarding this new informaton.

Intervenor expects to introduce the following exhibits in connection with Mr. Lorah's testimony:

1. Arizona Department of Water Resources 1980-1981 Annual Report.
2. Reviewing Environmental Impact Statements - Power Plant Cooling Systems, Engineering Aspects, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, EPZ-660/2-73-016, October, 1973.
3. Some General Aspects of Fluctuations of Annual Runoff in the Upper Colorado River Basin, Vugica M. Yevdjovich, Engineering Research, Colorado State University, October, 1961, CER61VMY54.
4. An Environmental Analysis of the Central Arizona Project, U.S. Bureau of Reclamation, T.M. Powers, Economics Department of the University of Montana, 1978.
5. Potential Reuse Options for Wastewater Effluent and Residual Solids, June, 1977, U.S. Army Corps of Engineers, Los Angeles District, Phoenix Urban Study.
6. Phase I - Arizona Water Plan, Summary, Inventory of Resources and Uses, Arizona Water Commission, July, 1975.
7. Giusti, E.V., and E.L. Meyer, 1977. "Water Consumption by Nuclear Powerplants and Some Hydrological Implications," U.S. Geological Survey Circular 745 (U.S. Department of the Interior, Arlington, Va.)

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Intervenor also wishes to present Mr. Bill Stephens as her witness, pursuant to subpoena, or alternatively, to question Mr. Stephens if the Board calls him as its witness. Depending on Mr. Stephens and the Board's decision as to Intervenor's application for a subpoena, Intervenor may wish to call pursuant to subpoena, Mr. John Robert McCain, staff director of the Arizona Municipal Water Users Association. Mr. McCain works closely with Mr. Stephens and has attended most of the licensing hearing.

Intervenor expects that Mr. Stephens or Mr. McCain will testify to the following:

1. Agreement No. 13904 between the cities and Joint Applicants for provision of effluent to be used at Palo Verde;
2. Renegotiations about that Agreement; the cities' interpretation of section 21; the cities' prior invocation of section 21;
3. The long-range planning of the cities in the Salt River Valley for their needs for water and methods of satisfying those needs for water including their plans for developing water supplies;
4. The cities' present and short-term plans for building of treatment facilities and wastewater treatment facilities;
5. The cities' plans for selling effluent to the Indians and others, and the cities' long-range plans for deriving benefit from effluent;
6. The cities' expectations regarding CAP allocations and the dependability of CAP allocations.
7. Expansion of Mr. Stephens' limited appearance testimony, including his written submission.

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Intervenor will also present John Leshy, Professor of Law, Arizona State University. Mr. Leshy will testify to the following:

1. The Secretary of the Interior's legal responsibilities regarding reclamation waters, including Salt River Project waters and Central Arizona Project waters, and how these responsibilities might affect the CAP waters available to the cities within the Salt River Valley.

2. The present plans according to which the municipalities may trade their effluent with the Indians for the Indians' CAP allocations, and how that may affect the effluent available to the municipalities and the sources of water available to satisfy the needs of the municipalities.

3. Mr. Leshy may testify on the waters expected to be available to the municipalities through the Central Arizona Project.

4. Mr. Leshy, at this time, expects to rely only on legislation, legislative history, and exhibits already introduced by Joint Applicants.

Intervenor will present the testimony of Mr. William Paul Robinson, Executive Director and Environmental Analyst with the Southwest Research and Information Center in Albuquerque, N.M. Mr. Robinson, who holds a master's degree from the University of New Mexico in architecture with an emphasis on environmental design, has been engaged in environmental consulting work for over seven years and has testified in numerous administrative proceedings. He will testify regarding the following matters:

1. The adequacy of water reclamation demonstration plant and circulating water test facility pilot programs to verify and replicate operating conditions at the Palo Verde Nuclear Generating Station (PVNGS).

2. Analysis of several critical parameters to determine water quality relationships to water quantity requirements. These parameters include flow volumes, system geometry, time of operation, coolant flow velocity, coolant temperature, and coolant chemistry.

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3. Analysis of these factors to determine whether the Joint Applicants have proven that the "15 cycles of concentration" design for the circulating condenser cooling system can be attained with consistency in the context of operating conditions over the operating life of PVNGS.

4. Mr. Robinson's professional opinion is that the short duration of demonstration plant tests and discrepancies in key chemical parameter data have produced information not directly comparable to anticipated WRS operational conditions and estimated concentrations of key chemical constituents. Consequently, it is believed that PVNGS may not be able to operate consistently at the design "15 cycles of concentration and may require more water than Joint Applicants have calculated.

Intervenor expects to introduce the following exhibits in connection with Mr. Robinson's testimony:

1. Atkinson, D.L., 1979. "Controlling and Predicting Cooling Tower Water Quality." Industrial Water Engineering, May/June, pp. 37-40.
2. Baker, R.J., 1977. "The Measurement of Chlorine Compound," in Biofouling Control Procedures-Technology and Ecological Effects, ed.: L.D. Jensen (Pub.: Marcel Dekker, Inc., New York, N.Y.), pp. 39-42.
3. Bechtel Power Corp., "Water Reclamation Studies for the Arizona Public Service Company, Palo Verde Nuclear Generating Station Units 1, 2 and 3," Job Number 10407 (Norwalk, Ca.)
4. Coane, W.V. (Bechtel Power Corp.), 1973-1974. Multiple Letters of Transmittal to Edwin E. Van Brunt, Jr. (Director, Arizona Nuclear Power Project) of Demonstration Plant Study Weekly Status Reports, nos. 1-60 (written by C.L. Weddle and D.A. Salmond), from July 31, 1973 through September 25, 1974.
5. Coane, W.V. (Bechtel Power Corp.), 1975. Letter (B/ANPP-E-1974) to Edwin E. Van Brunt, Jr., (Director, Arizona Nuclear Power Project) Feb. 25 (with enclosures 1-4).

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6. Cole, S.A., 1977. "Chlorination for the Control of Biofouling in Thermal Power Plant Cooling Water System," in Biofouling Control Procedures-Technology and Ecological Effects, ed.: L.D. Jensen (pub.: Marcel Dekker, Inc., New York, N.Y.) pp. 29-38.
7. Controls for Environmental Pollution, Inc., 1976-1981. "Water Quality Analyses on the Effluent Sewage Water," Progress Reports for Arizona Public Service Company, Arizona Nuclear Power Project, 91st Avenue Sewage Plant Study for 1976, 1977, 1978, 1979, and 1980. Four volumes dated September 13, 1976; June 1, 1977; October 1, 1979; and June 1, 1981.
8. Draley, J.E., 1977. "Biofouling Control in Cooling Towers and Closed Cycle Systems," in Biofouling Control Procedures-Technology and Ecological Effects, ed.: L.D. Jensen (pub.: Marcel Dekker, Inc., New York, N.Y.) pp. 23-28
9. Electric Power Research Institute, 1976. "Report of a Workshop on the Impact of Thermal Power Plant Cooling Systems on Aquatic Environments," EPRI SR-38-Special Report, vols. I and II, April.
10. Electric Power Research Institute, 1979. "Summary of Equilibrium and Process Model Data Acquisition-Treatment of Recirculated Cooling Water, Resource Document 1," EPRI FP-1251, Project 1261-1, Interim Report, September.
11. Electric Power Research Institute, 1980. Condenser Biofouling Control-Symposium Proceeding, eds: J.F. Garey, et al., EPRI CS-1450 (pub.: Ann Arbor Science, Ann Arbor, Mi.)
12. Goldstein, D.J.: Wui, I.W.: and Hicks, R.E., 1979. "Reuse of Treated Municipal Wastewater as Makeup to Circulating Cooling Systems," Industrial Water Engineering, July/August, pp. 20-29.

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13. Kluesdner, J.; Heist, J.; and Van Note, R.H. (Hydro and Community Facilities, Bechtel, Inc.) 1975. "A Demonstration of Wastewater Treatment for Reuse in Cooling Towers at 15 Cycles of Concentration." Presented at American Institute of Chemical Engineers Water Reuse Conference (Chicago, Ill.), May 4-8.
14. Lee, G.F., 1979. "Persistence of Chlorine in Cooling Water from Electric Generating Station," Journal of the Environmental Engineering Division, American Society of Civil Engineers, vol. 105, no. EE4, August, pp. 757-773.
15. Nester, G.J. and Cappeline, G.A., 1979. "Water Related Problem of Evaporative Cooling System and Control Methods," Industrial Water Engineering, May/June pp. 14-25.
16. Rogers, A.C., and Weddle, C.L., 1977. "The Reuse of Reclaimed Wastewater in Nuclear Power Plant Cooling Towers," American Nuclear Society Transaction, vol. 27, p. 851.
17. U.S. Environmental Protection Agency, 1973. "Reviewing Environmental Impact Statements-Power Plant Cooling Systems, Engineering Aspects," EPA-660/2-73-016 (National Environmental Research Center, Corvallis, Or.), October.
18. U.S. Environmental Protection Agency, 1979. "Wet/Dry Cooling and Cooling Tower Blowdown Disposal in Synthetic Fuel and Steam-Electric Power Plants," EPA-600/7-79-085 (Office of Energy, Mineral and Industry, Washington, D.C.), March.
19. Zeitoun, I.H.; Gulvac, J.A., and Rochow, J.J. (Consumers Power Company), 1980. "Power Plant Water Intake Assessment," Environmental Science and Technology (pub.: American Chemical Society), vol. 14, no. 4, April, pp. 398-402.

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Intervenor also intends to present testimony from Mr. E. K. Swanson, or another employee delegated by Dr. Ronald Miller, Chief of the Bureau of Water Quality Control, Arizona Department of Health Services. Mr. Swanson is the Manager of the Ambient Water Quality Unit, Bureau of Water Quality Control, Division of Environmental Health Services, Arizona Department of Health Services. He will testify about the following:

- 1) Contamination of wells and groundwater in the Salt River Valley and the sources of that contamination. He will focus on contamination by DBCP, TCE, and other associated volatile organics.
- 2) The probability that this contamination will continue in the future and the effects that may have on the quantity and quality of groundwater available to the municipalities.

Mr. Swanson will use the following documents in his testimony:

1. Dibromochloropropane (DBCP) Well Supply Program for Maricopa County Arizona (June 11, 1979), Timothy D. Love, Bureau of Water Quality Control, Division of Environmental Health Services, Arizona Department of Health Services, December 10, 1979.
2. Arizona Department of Health Services Reports on Trichloroethylene.
3. Bureau of Waste Control Reports on Contaminated Groundwater in the Vicinity of Landfills.

Intervenor would also like to question Mr. E. E. Van Brunt, Jr., as an adverse witness about the sources of water examined and the sources of water to be used for operation and shut down of Palo Verde.

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Intervenor may use the following letters in examining Mr. Van Brunt:

1. October 26, 1977, Letter to E. E. Van Brunt.
2. April 18, 1977, E. E. Van Brunt Letter to H. W. Worthington, U. S. Army Corps of Engineers.
3. November 14, 1977, Letter of Leonard C. Halpenny to Arthur C. Gehr.
4. November 11, 1977, Oral Presentation of E. E. Van Brunt.
5. June 20, 1978, Letter from H. W. Worthington to E. E. Van Brunt.
6. July 12, 1978, Letter from E. E. Van Brunt to H. W. Worthington.
7. July 20, 1978, Letter from H. W. Worthington to E. E. Van Brunt.
8. August 10, 1978, Letter of E. E. Van Brunt to H. W. Worthington.

If the Board permits Mr. Philip Shea to testify, Intervenor would present his testimony on the following matters:

1. The legality of the Applicants' contract for effluent under the federal reclamation laws.
2. The governmental interest that has not yet been asserted to ensure that federal reclamation waters are allocated to the benefit of lands within project boundaries.
3. The need for the NRC to consult with the Secretary of the Interior on the legality of the Applicants' contract for effluent and the legality of carrying effluent outside Salt River Project boundaries.

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Intervenor also informs the Commission that Mr. Shea intends to add all Joint Applicants as defendants in the suit he has brought on behalf of the Pima-Maricopa Indian Community against the Secretary of the Interior.

Respectfully submitted,

Lynne Bernabei

Counsel for Intervenor

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May 14, 1982

RELATED CORRESPONDENCE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

In the Matter of)	
ARIZONA PUBLIC SERVICE COMPANY, et al.)	Docket Nos. STN 50-528
)	STN 50-529
(Palo Verde Nuclear Generating)	STN 50-530
Station, Units 1, 2 and 3))	
)	

AFFIDAVIT OF WILLIAM L. LORAH

I, William L. Lorah, being duly sworn, do depose and say:

1. I am a water resources engineer and vice-president for Wright Water Engineers, Inc., Glenwood Springs, Colorado.

2. I received a Bachelor of Sciences Degree in civil engineering from the University of Colorado (1962) and a Masters Degree in civil engineering and hydrology from Colorado State University (1966). I am licensed as a professional engineer in the states of Colorado, Wyoming, Oklahoma and New Mexico. I have testified as an expert on water resources about 100 times in the Colorado courts. My clients have included the Adolph Coors Company, Arco, Atlantic Richfield, Exxon, Amax, Urangesellschaft, National Iranian Exploration and Producing Company, Colorado Westmoreland Coal Company, Rio Blanco Oil Shale Project, and Utah International.

I have published several articles on water resources, including "Constraints on Water Development by the Appropriation Doctrine," presented to the Arizona section of the American Water Resources Association, Tucson, Arizona, 1974.

3. My work consists primarily of developing water resources for industry and municipalities. In addition, I am involved with basic hydrologic analysis of river basins.

In developing a water supply for an industrial or municipal use there are two major areas of analysis. The first is the physical water supply which is dependent on the vagaries of nature and requires a probabilistic or statistical approach to determine the critical period or dry period minimum physical supply. The second area of analysis relates to the institutional constraints of diverting and using the water that is physically available. These institutional constraints include such items as the analysis of other vested water rights appurtenant to the water supply (decreed and undecreed), interstate compacts, federal water claims different than the state water rights (Indian and federal reserve rights), administration of water diversions, and other practical, political and institutional realities. It is important to keep in mind that water resource development is an evolutionary process and basic criteria and assumptions are continuously changing as new physical facts are determined and political and institutional pressures occur.

Because of the vagaries of nature and changing institutional constraints, it is necessary to develop a conservative and redundant water supply for projects which require a guaranteed reliable water supply.

4. In areas of short water supply such as the Phoenix area, it is even more important to make conservative estimates of available water because of the competition for the limited resource. Moreover, physical water supplies vary in a desert area more than they do in a more humid climate.

In determining the reliability of a physical water supply it is necessary to take a probabilistic approach when the water supply is dependent on natural precipitation. Further, it is typical of major water users to develop their own reservoir storage in addition to direct flow sources.

5. In determining the water available for any large project I always examine the institutional and legal restrictions on the water which may exist. For example, in determining the availability of water for the Black Fox nuclear plant I reviewed the water resource plan designed by the Public Service Company of Oklahoma for its proposed Black Fox station. In reviewing its plan I determined that the company had not taken into account an interstate compact, the Kansas-Oklahoma Arkansas River Basin Compact. The Compact allowed Kansas to dry up the Verdigris River at the state line. The Public Service Company of Oklahoma relied upon water from the River as an assured supply of water when in fact there existed a likelihood that in certain years none of this water would be available.

6. I have listened to the testimony of Applicants' witnesses Russell Hulse and Richard Juetten and the testimony of all persons making limited appearances before the Licensing Board, including Bill Stephens and Philip Shea. I have read transcripts of testimony of Wesley Steiner, John Schaper, Robert Steytler and William Bingham. I have reviewed all documents introduced into evidence in this proceeding, and all documents which Intervenor intends to introduce. I have also read and studied all parts of the Applicants' FSAR and ER relevant to water quality or water quantity.

7. Through a review of the above testimony and materials, I have analyzed the physical supply of water available to Applicants for use at Palo Verde, and the institutional constraints that may be applied to the diversion and use of this supply. It is my professional opinion that Applicants have not demonstrated that they have an assured full water supply for Palo Verde.

8. There are, in my opinion, several possible raw water supplies available to Applicants for use at Palo Verde, including municipal effluent, groundwater and CAP water. However, Applicants have chosen to rely solely on effluent as a source, and on Agreement 13904 to use that effluent. This Agreement is currently in the process of renegotiation. Because of the institutional uncertainties associated with the contract, it would be prudent to develop a supplemental or redundant physical and "legal" water supply.

9. Section 21 of the contract allows the municipalities to reduce the amount of effluent sold to Applicants in the event of a critical need of the cities for that water. A requirement imposed on the cities that they sell effluent to the Indians could create such a critical need for the cities, which would reduce the amount of water available for Palo Verde.

Moreover, the future configuration of the cities' future water supply and wastewater treatment facilities is not certain. For example, some of the existing wells have been contaminated and shut down. In addition, during a dry year, Phoenix may not be able to accumulate groundwater credits. Phoenix' well drilling program also may be limited by the policy of the Department of Water Resources to deny permits for wells which deliver water to off-service areas, or those areas in which a distribution system has not yet been established.

These occurrences could also contribute to the cities' invocation of section 21 of the contract.

10. I would also consider in any analysis of the water available under the contract the possibility that the majority of effluent could be deemed to be Salt River Project reclamation water and therefore not available for use outside the Project's area.

11. I believe that many uncertainties exist about the availability of Central Arizona Project water for use by the municipalities within the Salt River Valley by 1985 and the future. These uncertainties include the effects of interstate compacts concerning the use of Colorado River Water and the licensing use by the upper Basin states of Colorado River water; the fact that the physical distribution system to carry CAP water is not yet completed; and the Secretary of the Interior's responsibility to the Indians and others who have contracted for CAP water.

The amount of water available to the Central Arizona Project is dependent upon the erratic virgin water supply of the Colorado River system, and numerous unresolved legal questions, including the Arizona v. California suit and the recent Special Masters' report.

A rational approach to relying upon Central Arizona Project water would be to determine the probabilistic amount of water that would be available in any given year. Mr. Steiner testified about an average supply of water available from the CAP but not a firm reliable supply in a series of drought years, or under adverse conditions, such as the Uper Basin's utilization of their full allotment of Colorado River water.

12. The quantity of water needed for Palo Verde depends on the quality of water available. The proposed cooling system relies on two complex water treatment plants to attain a water quality that is acceptable for the proposed cooling system. Therefore, the quantity of water needed for the system is dependent in part, on the quality of effluent at the 91st Avenue wastewater treatment plant.

The quality of effluent at the 91st Avenue treatment plant is dependent, in turn, on the source of water for the municipalities that use the 91st Avenue plant. The municipalities receive most of their raw water, 70 percent, from surface supplies and about 30 percent from groundwater supplies.

The quality of surface water available to the municipalities has a TDS (total dissolved solids) level that is less than 500mg/l, milligrams per liter. Well water is of a lesser quality. In the future, as the municipal systems expand it is reasonable to assume that the raw water quality will drop as additional groundwater is added to the system, and as CAP (Central Arizona Project) water is brought into the Phoenix area.

When the quality of raw water supply drops, the quality of the effluent will also drop, thus requiring additional cooling waters for Palo Verde.

13. It is my professional opinion that use of effluent for production of electricity at the Palo Verde plants is not a wise use of that water in a water short area. Wise management of water resources is especially important in the Phoenix area because water resources are limited and competition for those resources is high.

All other nuclear plants in the country are located near a

physical supply of water that would provide at least 300 cubic feet per second of water to them. Sewage effluent is not a natural flow, but an artificial source of water dependent on institutions such as municipalities and numerous and elaborate water supply schemes. Applicants' effluent supply is obviously inadequate for the originally proposed five units.

The total effluent available from the 91st Avenue and 23rd Avenue treatment plants is 140 million gallons per day, according to Greeley and Hanson. This amount is less than the 300 cubic feet per second available to all other plants.

Furthermore, as the water system develops, municipalities may effect effluent trades with the Indians for potable water and build subregional plants, which would decrease the amount of effluent available from these two plants for use at Palo Verde.

14. The water requirements for generating electricity by nuclear power are much higher than for other methods of generating electrical power. For instance, the total water requirements for cooling a fossil fuel electrical generation plant is approximately 40 percent of the water requirements for a nuclear-generating plant.

The price pursuant to Agreement No. 13904 for which Applicants are obtaining effluent is artificially low. If Applicants were forced to obtain another source of water for use as cooling water at Palo Verde, they would have to pay at least twice as much as they are currently obligated to pay under Agreement No. 13904.

William L. Lorah

Sworn to and subscribed before me
this day of 1982.

Notary Public

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
ARIZONA PUBLIC SERVICE COMPANY, et al.)	Docket Nos. STN 50-528
(Palo Verde Nuclear Generating)	STN 50-529
Station, Units 1, 2 and 3))	STN 50-530
)	

CERTIFICATE OF SERVICE

I hereby certify that copies of Intervenor's Motion for Re-consideration, Affidavit of William L. Lorah, and Intervenor's Letter regarding Witnesses and Exhibits, have been served upon the following persons by hand delivery or by mailing a copy, first class, postage prepaid, this 14th day of May, 1982.

Docketing and Service Section
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Washington, D.C. 20555

Atomic Safety and Licensing Appeal Board Panel
U.S. Nuclear Regulatory Commission
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