

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKET

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of
ARIZONA PUBLIC SERVICE COMPANY, et al.

(Palo Verde Nuclear Generating
Station, Units 1, 2 and 3)

} Docket Nos. STN 50-528
} STN 50-529
} STN 50-530
}

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., Denver, 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, 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.

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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 competing for the same 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, the annual physical water supplies in a desert area vary 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 near Tulsa, Oklahoma, 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 contract water from the Oologah Reservoir as an assured supply of water when in fact there existed a likelihood that in certain years there would not be enough water to meet the contract.

6. I have listened to the testimony of Applicants' witnesses, Russell Hulse and Richard Juetten, and the testimony of many of the 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 some of the institutional constraints that may limit 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 possibly CAP water. However, Applicants have chosen to rely solely on effluent as a source. This primary right to use the effluent is based on Agreement 13904 to use 91st Avenue 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 gatewater 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 increased 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 Upper 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 500 mg/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 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. Applicant's effluent supply is obviously inadequate for the originally proposed five units if they were constructed in the 1980's.

The total effluent available from the 91st Avenue and 23rd Avenue treatment plants is 140 million gallons per day in 1986, according to Creeley and Hanson. This amount is less than the 300 cubic feet per second physically available to all other nuclear plants.

Furthermore, as the water system develops, municipalities may effect effluent trades with the Indians or others 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 of the same generating capacity.

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 likely have to pay at least twice as much as they are currently obligated to pay under Agreement No. 13904.

William L. Lorah
William L. Lorah

Sworn to and subscribed before me
this 19th day of May 1982.

Esther H. Piper
Notary Public

My Commission expires Jan. 9, 1983

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CERTIFICATE OF SERVICE

I hereby certify that copies of the executed Affidavit of William L. Lorah have been served upon the following persons by hand delivery or by mailing a copy, first class, postage prepaid this 21st day of May, 1982.

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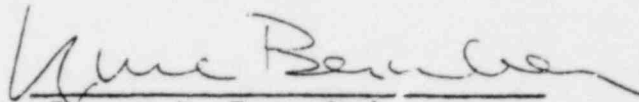
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** Hand - Delivered