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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

PETITION TO INTERVENE AND REQUEST FOR PREPARATION OF SUPPLEMENTAL OR REVISED ENVIRONMENTAL IMPACT STATEMENT, HEARING AND OTHER RELIEF

West Valley Agricultural Protection Council, Inc. (West Valley), on its own behalf, on behalf of its members, and on behalf of others similarly situated, hereby:

(A) petitions for leave to intervene in the above-captioned licensing proceeding as a party of record;

(B) requests that the Nuclear Regulatory Commission (NRC) prepare a revised or supplemental Environmental Impact Statement analyzing the substantial new information submitted with this petition that salt drift from the cooling towers, spray ponds and evaporation ponds at the Palo Verde Nuclear Generating Station, Units 1, 2 and 3 (collectively PVNGS, separately PV1, PV2, or PV3) will cause major environmental damage to surrounding agricultural cropland;

(C) requests that the Atomic Safety and Licensing Board (ASLB) reopen the record on this licensing proceeding and hold a hearing on West Valley's contentions and claims that the

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cooling towers, spray ponds and evaporation ponds at PVNGS must be modified to reduce salt drift to a level that poses no threat to the agricultural crops growing on the surrounding land; and

(D) seeks the relief set forth in this petition.

Attached to this Petition are affidavits and reports documenting each of the petitioner's contentions and a memorandum of law in support of this petition.

## INTEREST OF WEST VALLEY

1. West Valley is a nonprofit corporation formed in 1982 by farmers in Maricopa County, Arizona, to take appropriate action to prevent or rectify harm to area agriculture from nonagricultural sources.

2. West Valley has 56 farmer members producing $96,000,000 of agricultural products per year and owning 85 percent of the farm land in the area occupied by West Valley members.

3. The PVNGS is located in Maricopa County, Arizona in an area whose agricultural cropland is among the richest in the nation. All West Valley members are located within the area likely to be affected by the salt deposition problem which is the subject of the Contentions in this petition.

4. The salt deposition problem which is the subject of the contentions in this petition threatens the agricultural productivity of all farms within the area occupied by West Valley

members, and thus the environmental effects of PVNGS directly threaten the financial livelihood of all West Valley members.

5. West Valley has a right under 10 C.F.R. Section 2.714 to be made a party to this proceeding.

BASIS FOR LATE FILING

6. West Valley has good cause for the untimely filing of their petition for leave to intervene, in that:

(a) the Environmental Impact Statements and Environmental Reports submitted in this licensing proceeding fail to mention any affects on agricultural crops from salt drift from the PVNGS;

(b) representatives of the operators of PVNGS at frequent meetings with West Valley members failed to mention possible affects on West Valley members' crops from salt drift from the PVNGS;

(c) because of these omissions, West Valley members had no grounds to believe that the salt drift from the PVNGS threatened their crops until after the final operating license hearing for the PVNGS held in the spring of 1982;

(d) because of these omissions, West Valley members had no available source of information that salt drift from the PVNGS posed a threat to their agricultural crops;

(e) because of these omissions, West Valley could not have known that the salt drift from the PVNGS threatened their crops without hiring their own experts to analyze this issue;

(f) West Valley first learned that salt drift from cooling towers can affect crops in newspaper articles written during the spring 1982 final operating license hearing;

(g) these newspaper articles only generally raised the issue of salt deposition and provided no factual basis for West Valley members to believe that the salt drift from the PVNGS might affect their crops;

(h) because of concern raised by these allegations, however, PVNGS area farmers formed West Valley and hired experts, whose reports are submitted with this petition, to review the affects of the salt deposition on their crops;

(i) immediately after West Valley received its experts' reports in mid-September 1982, it retained counsel to file this petition;

(j) West Valley intervened promptly, within the minimum time necessary to prepare its intervention papers, after it documented the omission in the Environmental Impact Statements and Environmental Reports regarding salt drift deposition.

8. As more fully stated in the contentions below, the salt drift deposition problem threatens the agricultural productivity of some of this nation's richest farmland and requires urgent consideration before any decision is made to grant an operating license for the PVNGS.

9. No means other than West Valley intervention in this petition can guarantee that PVNGS salt deposition will not destroy the productivity of some of this nation's richest farmland.

10. West Valley participation will materially assist the ASLB in developing a sound record since the ASLB record to date contains little or no evidence or analysis of the affects of PVNGS salt deposition on surrounding agricultural cropland and since West Valley is submitting substantial evidence on this issue with this petition.

11. No existing party to this proceeding has pursued the salt deposition issue, and no existing party has the legal or actual capacity to protect West Valley's interest in this proceeding.

12. As specified in the contentions, the PVNGS operator can solve the salt deposition problem with financially and technically feasible changes or additions to the PVNGS;

13. The minor delays that may be incidental to granting this petition will not prejudice any party, since:

(a) after the completion of the hearing on the final operating license, PVNGS notified the NRC on August 13 that it planned to delay operation of PV1 for approximately one year;

(b) the PVNGS operator does not plan to begin operation on PV1 for at least one year, on PV2 for at least two years and on PV3 for at least three years. It is technologically and financially feasible to implement solutions to the salt deposition problem within that time frame;

14. For the above reasons the final operating license hearing was premature and was held too far in advance of completion of the PVNGS to meet the requirements of 10 C.F.R. §50.57.

## CONTENTIONS

I. The salt deposition which will result from the operation of the PVNGS is inadequately assessed in the Environmental Reports (ER) and Environmental Impact Statements (EIS) and vastly understated.

A. The measurement of salt emitted from the cooling tower is unreliable and understated:

(i) a recent study has shown that the sampling method utilized by the vendor in determining the drift ratio of the recirculating water in the cooling towers ("drift ratio") can easily be in error by greater than 100 percent;

(ii) the ER, EIS and sampling methods utilized in determining the drift ratio fail to recognize wind effects within the fill and drift elimination system;

(iii) studies at the Chalk Point, Maryland, cooling towers frequently monitored tower salinity levels at twice those stated in the tower's design features;

(iv) the ER, EIS and sampling methods utilized in determining the drift ratio fail to measure water distribution canal drift losses; and

(v) the ER and EIS fail to state how or whether salt emissions will be monitored or how accurately this will be done.

B. The EIS and ER discuss drift related environmental effects only for cooling towers in an as built condition ignoring the effects of cooling tower deterioration over the life of the plant:

(i) the EIS and ER fail to demonstrate the existence of a program to maintain the cooling towers to avoid deterioration that would increase salt emissions;

(ii) the ER and EIS fail to discuss a monitoring program intended to detect an increase in drift-related environmental effects over the life of the plant;

(iii) studies at the Chalk Point, Maryland, power plant showed a sizable increase in salt desposition occurring after the plant had been in operation for six years; and

(iv) cooling tower deterioration problems which affect salt emissions include changes in the geometrics of cooling tower systems such as fill, inlet structures, water distribution, drift elimination and structural support.

C. The cooling tower drift model utilized at the PVNGS underpredicts salt deposition to off-site properties by a factor of ten or more:

(i) the drift and salt deposition capability of the model has not been compared to actual measurements;

(ii) the desert climate of the Palo Verde region is vastly different from other areas of the United States with the result that application of the model to the region cannot be expected to provide accurate results without some verifying experience;

(iii) the predictions for the PVNGS do not exhibit the usual salt deposition patterns;

(iv) the modeling procedure used for the PVNGS underpredicts salt deposition on the farms owned by West Valley members by:

(a) assuming drift droplets are released too high;

(b) failing to consider turbulent diffusion of drift droplets;

(c) limiting the size of drift droplets; and

(d) failing to consider the effect of plume trapping by elevated temperature inversions;

(v) the salt drift predictions for the PVNGS are low compared to another study of a similar tower;

(vi) a properly conducted salt drift analysis would show the PVNGS model to be unreliable by a factor of from ten to seventy and would consider the consequences of the model underpredicting salt deposition by those factors.

D. The EA and EIS fail to consider effects of changes in salt concentrations that are likely to occur over the life of PV:

(i) at times, the cooling water salinity of the PV towers will be higher than assumed in the model;

(ii) records from the Buckeye Irrigation Co. show some water samples taken from the Phoenix sewage effluent which will be utilized at the PVNGS contain twice the salt content listed in the ER and EIS;

(iii) the cooling water source is likely to change over the life of the plant (from Phoenix sewage effluent to groundwater or another water source) leading to much higher initial salt concentrations than shown in the model; and

(iv) the operator of PVNGS has applied for and received a permit to drill 49 new wells in connection with the operation of the PVNGS, indicating that it is prepared to shift from Phoenix sewage effluent to far more saline groundwater.

E. The ER and EIS fail to consider salt deposition from the evaporation ponds even though such salt deposition may equal or exceed the deposition from cooling towers:

(i) based on figures available to West Valley, the blow-off from 100 acres of evaporation ponds will average 23,000 lbs. of salt per day, far in excess of the 14,000 lbs./day the ER and EIS estimate will be emitted from the nine cooling towers;

(ii) the evaporation pond area at the PVNGS will eventually cover several hundred acres; and

(iii) the emissions from the evaporation ponds are from a low-level source that could cause significant off-site salt deposition

F. The ER and EIS fail to fully consider the impact of salt deposition from the spray ponds even though such deposition may exceed the deposition from the cooling towers:

(i) the anticipated drift rate from the spray ponds is as large as that estimated in the ER as the maximum for the three cooling towers serving each unit at the PVNGS;

(ii) the ER unrealistically expects refueling intervals for each tower to be one month per year when experience at most other similar stations has shown that a larger value would be more realistic;

(iii) the drift distributions from the spray ponds are unreliable and the vendors drift source term and drift transport models can be expected to be seriously in error, by as much as a factor of ten;

(iv) the ER and EIS fail to explain the basis for their spray pond drift estimates; and

(v) the spatial distribution of drift from spray ponds would be concentrated much nearer to the point of release than that from cooling towers.

G. The uncertainty in all measurements relied on in the ER and EIS mandates the preparation of a worst case drift analysis:

(i) the drift ratio measurements may be in error by a factor of more than 100 percent;

(ii) the drift ratio analysis fails to consider cooling tower deterioration over the life of PV;

(iii) the cooling tower drift model may be in error by a factor of ten to seventy or more;

(vi) the ER and EIS fail to consider evaporation pond salt drift which may exceed the drift from the cooling towers;

(v) the ER and EIS fail to measure the full impact of spray pond drift even though it may exceed the drift from the cooling towers and even though spray pond drift estimates may be in error by a factor of ten or more; and

(vi) the ER and EIS fail to consider likely changes in water availability over the life of the PVNGS.

H. A worst case analysis will show 10-100 times or more the salt drift deposition shown in the ER and EIS.

II. <u>The ER and EIS fail to evaluate the impact of salt on agricultural crops.</u>

(A) In other situations where cooling tower salt emissions might have had the potential to adversely affect surrounding croplands, other applicants have conducted careful assessments of the impact of the cooling towers on crops (e.g., Vienna and Chalk Point, Maryland). Despite the far greater risk of crop damage from salt in the dry climate surrounding the PVNGS, the applicant did not conduct such a study here.

(B) The agricultural land surrounding the plant is among the richest in the United States with farms owned by intervenors producing $96,000,000 per year. These farms constitute approximately 85% percent of the acreage given to cropland in the area in which intervenors are located.

(C) The ER and EIS discuss only the effect of salt on native vegetation already adapted to high saline land, not on commercially grown agricultural crops:

(D) the ER and EIS discuss only the environmental effect of adding additional salt to the soil, not the far more serious effect from deposition of the salt on the surface of the crops.

III. <u>The salt deposition from the PVNGS will reduce the productivity of agricultural lands owned by West Valley members.</u>

(A) Very low salt deposition rates in a dry environment such as that near the PVNGS may produce the same effects as higher salt deposition rates in more humid environments which are subject to rain events with higher frequency and greater intensity:

(i) the PVNGS region has a history of a large number of small rain events during the summer, rain events which frequently are of such low intensity that it is unlikely that they would remove salts accumulated on crop leaves;

(ii) the climatic conditions at the PVNGS will wet the leaves of crops in a manner that will dissolve much of the salt deposited on the leaves by the PVNGS, causing the movement and concentration of the salts along the leaf margins where general chlorosis and necrosis would likely occur; and

(iii) studies at Chalk Point, Maryland, showed much higher injury to crops during a drought year than had been observed during previous years, suggesting that the very dry environment at the PVNGS would create problems similar to those observed at Chalk Point during the drought;

(iv) the salt accumulation on leaves resulting from the operation of the PVNGS would cause plants to exhibit symptoms of general drought stress.

(B) The expected salt deposition levels in the area of PVNGS are likely to cause injury to cotton and other crops grown by West Valley members:

(i) recent studies have established that aerosol deposition of salts from cooling towers can harm agricultural crops:

(a) these studies have established that crops tolerant of saline soils may not exhibit the same level of tolerance to aerosol deposition of salts on leaves;

(b) these studies have established that aerosol salt deposition can harm a variety of crops at comparatively low levels, and at high enough deposition levels can harm virtually all crops; and

(c) these studies have established that a generating station much smaller and utilizing less saline water than the PVNGS caused extensive salt damage to native plants growing in similar climatic and soil conditions.

(ii) salt injury to cotton would: (a) cause a reduction in the number of bolls per plant, and thus a reduction in crop yields and (b) result in a reduction in leaf area caused by necrosis induced salt injury, reducing the photosynthetic capacity of the plant and reducing the plant's ability to assimulate cellulose fibers resulting in thin-walled, weak and poorly developed fibers of lower economic value than normal fibers;

(C) Salt deposition from the PVNGS will occur at levels sufficient to cause harm to surrounding agricultural crops:

(i) studies in the humid eastern United States established harm to certain plants at deposition levels of 2-4 lbs. per acre per week under climatic conditions where on the average of once a week a heavy rainfall washed all salt from the crops;

(ii) in the area surrounding the PVNGS, deposition levels of 2-4 lbs. per acre per week will occur near the plant and will be more damaging than similar levels in the eastern United States since there will not be sufficient rain to wash the salt from the crops each week; and

(iii) in areas further from the plant where weekly salt deposition rates are lower than 2-4 lbs./acre/weekly, the absence of rain will cause salts to accumulate on crops over a period of several weeks to levels sufficient to cause damage similar to that shown in areas with higher weekly salt deposition but with higher rainfall levels which remove that deposition.

IV. <u>The ER and EIS undervalue the cost of the water which will be used at the PVNGS.</u>

(A) The ER and EIS fail to evaluate properly the economic cost of the water used by the PVNGS since they base their calculations on the value listed in the water contract the PVNGS signed for Phoenix sewage effluent, not the actual value of the water to water users in the surrounding area over the life of the contract.

(B) The ER and EIS fail to consider the likely increases in the cost of water over the life of the PVNGS:

(i) they fail to consider that the sewage effluent contract with the City of Phoenix can be cancelled by the city under certain conditions and that the cost evaluation of water over the life of the plant must reflect that possibility; and

(ii) they fail to consider the steeply rising value of water likely in the future because of future water shortages in the Palo Verdes and broader central Arizona area.

(C) The ER and EIS fail to consider the increased cost of water to other area users resulting from the decrease in water availability caused by the PVNGS' operation.

V. <u>The ER and EIS fail to consider the full economic impact of the cooling towers on the area surrounding PVNGS.</u>

(A) The ER and EIS fail to include the value of agricultural crops which may be lost from salt damage caused by the operation of the PVNGS.

(B) The ER and EIS fail to consider the economic cost of the agricultural cropland which may be lost because area farmers cannot replace the water they currently use which, after operations begin at the PVNGS, the station will use.

(C) The ER and EIS fail to consider the loss to agricultural crop which will result from increased water usage needs (resulting from the use of more saline water) and pumping costs if local farmers have to substitute groundwater for the sewage effluent they are now using which PVNGS will use.

(D) The ER and EIS fail to consider the economic cost to the surrounding community of trying to remove, either

considered alone or in combination, salt deposition from agricultural crops.

VI. <u>The ER and EIS fail to consider technically and financially feasible alternatives that would reduce salt loss from the PVNGS cooling towers.</u>

(A) The water valuation relied on in the EIS as a ground for rejecting cooling tower alternatives vastly understates the value of the water used by PVNGS for the reasons set forth in Contentions IV and V.

(B) The PVNGS operator can modify the drift elimination bank to increase salt capture efficiency at the price of relatively modest increases in the required fan power and fan energy costs.

(C) The PVNGS operator can redesign the cooling towers to decrease water consumption and thus salt emissions by:

(i) increasing the fill volume;

(ii) reducing tower height;

(iii) increasing tower fan power; and

(iv) decreasing recirculating water temperature change and increasing the difference between the cold water temperature and wet bulb value.

(D) Dry cooling technology should be utilized at the PVNGS to supplement the existing wet cooling towers:

(i) dry cooling technology would impose virtually zero water demand upon the site and would have virtually no salt drift emissions;

(ii) dry cooling technology and wet/dry cooling technology have been in commercial use for more than twenty years;

(iii) the ER and EIS fail to consider the alternative of supplementary dry (base load) cooling, an approach which is far more attractive economically than the alternative of using dry cooling technology for complete power station cooling considered and rejected in the EIS;

(iv) the use of baseload dry cooling is economical in view of:

(a) the anticipated large increase in demand for and costs of water expected in the PVNGS region during the life of the contract;

(b) the anticipated agricultural losses which will result from excess salt deposition; and

(c) the other economic losses set forth in contention (IV) and (V).

(v) the use of dry assistance to the wet cooling tower would also have the benefit of reducing the wet cooling tower blowdown flow, with consequent proportional reductions in the required size of the blowdown evaporation ponds and thus salt erosion of these ponds; and

(vi) the applicant can retrofit the wet cooling towers with baseload dry cooling capability.

(E) The salt concentration in the cooling towers can be reduced to safer levels if desalinization capacity is added to the cooling tower arrangement:

(i) the most effective water flow desalinization arrangement is that of recirculating water flow sidestream treatment in which the blowdown flow is included in the sidestream flow. This flow minimizes the desalinization plant flow rate needed in order to accomplish a given level of salt removal; and

(ii) based upon estimates available to West Valley, the cost of maintaining the level of cycles of concentration at unity would be approximately 5 percent of the total cost of power from the PVNGS.

(F) The PVNGS has failed to conduct or develop a monitoring plan to establish both baseline and post operation data necessary to analyze the effect of PVNGS salt deposition on agricultural crops.

VII. <u>The EIS prepared by the NRC should be revised because it fails to analyze adequately the potential impact of salts on agricultural crops.</u>

(A) The EIS improperly fails to include a worst case analysis of potential salt drift as described in Contention I(G);

(B) The EIS improperly fails to include a worst case analysis of the effect of salt drift on agricultural crops as described in Contentions II and III;

(C) The EIS improperly fails to analyze the sensitivity of crops grown in the area of PVNGS to salt drift; and

(D) The EIS improperly and superficially values the water which will be used in the cooling towers, and thus fails to

consider economically feasible alternatives which would reduce salt emissions from the PVNGS.

VIII. <u>The NRC should prepare a supplemental EIS based on the substantial new evidence produced by West Valley that.</u>

(A) The cooling tower salt drift estimates in the ER and EIS are subject to error of from 10-100 percent or more and the salt deposition may exceed the amounts listed in the ER and EIS by those factors;

(B) The salt drift emissions rate likely to occur at the PVNGS has harmed many kinds of agricultural crops and there is need to study the potential harm to crops grown in the area of the PVNGS. These plants, including cotton, have characteristics which make it likely that they will be harmed by salt drift from PVNGS; and

(C) There are reasonable and economically feasible alternatives which the PVNGS can consider at this point in time which will decrease salt emissions from the PVNGS.

## Relief Sought

Wherefore, West Valley respectfully requests that the ASLB and the NRC:

A) grant its petition to Intervene pursuant to 10 C.F.R. §§2.714 and 2.715;

B) admit each of the contentions listed above;

C) prepare a revised or supplemental EIS analyzing the substantial new information submitted with this petition that

salt drift from the cooling towers, spray ponds and evaporation ponds at the PVNGS will cause major environmental damage to surrounding cropland;

D) reopen the record in this proceeding to take evidence on issues related to the contentions in the petition;

E) supplement the record in this proceeding by incorporating the experts reports submitted with this petition;

F) hold a hearing on the issues related to the contentions in the petition;

G) deny PVNGS' request for an extension of its construction permit for PV1 or make any such permit extension conditioned on solution to the salt deposition problems raised in the contentions in this petition;

H) revoke the construction permit for PV2 and PV3 or amend them to include a condition that the PVNGS operator must solve the salt deposition problems raised in the contentions in this petition are solved;

I) deny an operating license for PVNGS until the operator solves the salt deposition problems raised in the contentions in this petition, or condition any such license on a solution to these problems; and

J) grant such other and further relief as the NRC and the ASLB find necessary and appropriate.

Respectfully submitted,

Dated: Oct. 13, 1982

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Sworn to before me this
13th day of October, 1982.

Linda A. Wisko
Notary Public