

RELATED CORRESPONDENCE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



In the Matter of)
)
ARIZONA PUBLIC SERVICE COMPANY)
ET AL.)
)
(Palo Verde Nuclear Generating)
Station, Units 4 and 5))

Docket Nos. STN 50-592
STN 50-593

March 6, 1979

COMMENTS OF THE PEOPLE
OF THE STATE OF CALIFORNIA AND THE
PUBLIC UTILITIES COMMISSION OF THE
STATE OF CALIFORNIA
REGARDING THE ADEQUACY OF THE UNITED
STATES NUCLEAR REGULATORY COMMISSION'S
DRAFT ENVIRONMENTAL STATEMENT

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The following are the comments of the California Public Utilities Commission staff concerning the Draft Environmental Statement (DES). As indicated by the detailed comments, staff has identified two general and pervasive failures of the DES to comply with the provisions of NEPA. The document does not consider the cumulative impacts of PVNGS 4&5 together with accompanying units 1-3 and as part of the general development of nuclear generating capacity. Further, analyses of controversial issues appear to uniformly select a single position for documentation without acknowledging the existence of substantial disagreement with the position selected. Staff suggests that these shortcomings can be partially corrected by systematic and thorough preparation of responses to the following detailed comments for inclusion in the Final Environmental Statement (FES).

Chapter 2

The Site chapter contains no sections on noise or visual quality. The FES should contain information on these aspects of the setting.

Section 2.1

Figure 2.3, page 2-4 indicates an area of 250 acres to be developed for evaporation ponds for units 4&5. Another 250 acres are identified for units 1, 2,&3, with an area of about 275 additional acres marked "Future Evaporation Ponds, Units 1,2&3". This description is not consistent with other published descriptions, which range from an 1100 acre lake covering almost the entire lower portion of the site and inundating the railroad spur, (Operational Monitoring Program Perched Groundwater Level, figure 2.4-203, Jan 12, 1979) to an approximately 250 acre irregular lake (published in the Feb 3, 1975 ER in Figure 2.1-2).

The planned development of the evaporation ponds is significant, and an attempt should be made to supply an accurate description. The volumes and areas of evaporation ponds expected to be needed and the expected cycle of evaporation rates throughout the year should be described. Discuss the potentials for improperly managed ponds to trigger outbreaks of avian botulism and for heavy salt concentrations to adversely affect migrating transient fauna.

The DES describes proposals for lining the ponds for units 4&5 to prevent contamination of groundwater by saline seepage, but indicates that no equivalent modification is anticipated for the ponds for units 1,2&3 (DES p.3-17 Sect 3.6.5). Explanation should be supplied for the proposed differential management of the evaporation ponds, the need for supplementary areas, the location of expansion areas for the pond for units 4&5, the restriction of membrane liners to the ponds for units 4&5, and the annual hydraulic regime.

The potential vulnerability of soil cement liners to fracturing when exposed to alternating wet and dry conditions in the presence of saturated salt solutions and the associated crystal formation should be considered. The potential for evaporation ponds to become concentrated salt deposits which remain as a threat to water quality unless removed, encapsulated, or permanently monitored should be discussed, including seepage monitoring able to

detect leakage before a massive slug of salt has been allowed to enter usable groundwater. Repeated assault by long-separated flash floods which could tear apart most kinds of mechanical barriers to dispersion of the salt deposits should be considered. The DES indicates a flash flood barrier along the northeast perimeter of the site, indicating that the entire site would eventually become vulnerable to exposure and distribution of any buried materials. Discussion should be provided on strategies and methods for long-term protection of usable water supplies against the salt deposits created by the evaporation ponds.

The discussion should include consideration of the concentrations and effects of industrial chemicals, anti-fouling chromates, and other persistent toxicants in the ponds and their dispersion in solution and as blown dusts during the high evaporation conditions predicted by NRC staff (p 3-18) including possible radioactive wastes from condensate demineralizer waste deposited in open evaporation ponds (fig 3.2, page 3-4).

Section 2.2.2

Descriptions of income distribution, minority populations, health services, recreational opportunities, and transportation availability should be included in this section to permit an adequate assessment of socioeconomic impacts.

Table 2.2

The table of Present and Projected Population around the PVNGS Site lists the 1977 population within 50 miles of the project site as 994,829. The 1980 population for the same area is estimated at 841,039, or 153,790 less. This projected population drop is inconsistent with information contained in Section 2.2.2.1 concerning growth estimates, as well as with Table 2.2 population estimates for the years 1990 to 2030. The text should explain the methodology used to arrive at these projections and provide some rationale for this projected population drop.

Section 2.2.3

While Section 2.2.3, Land Use, contains information on regional airports, it is deficient in that it lacks information on whether the project site is located beneath any commercial or military flight paths.

Section 2.2.4

The discussion of water use should include consideration of the significant problem suggested in Dec. 1978 Maricopa Association of Governments "208 Program" report, page 14-2,4

"Because of the depletion of groundwater resources, most of the study area has been classified by the Arizona Land Department as a "critical groundwater area." A "critical groundwater area" is defined as "any groundwater basin, or any designated subdivision thereof, not having sufficient groundwater to provide a reasonably safe supply for irrigation of the cultivated lands in the basin at the then current rates of withdrawal." Drilling of

irrigation wells for development of new farmland is prohibited in designated critical groundwater areas.

"The 1975 overdraft in the basin exceeded one million acre-feet/year (Arizona Water Commission, April 1978) but this amount is expected to be reduced by about 60 percent when Central Arizona Project water is brought into the area."

Section 2.3

Section 2.3, "Prehistoric and Historic Cultural Resources", is inadequate in its discussion of cultural resource sites within the project site and adjacent property and along the pipeline route. The text should include a general description of each identified site, and discuss whether each site represents (1) a specific location of sustained activity, (2) an archaeological specimen indicative of general use of the area, or (3) an area requiring more study before it can be classified. Those sites falling into the first category are subject to appropriate protection and environmental mitigation, while the second category may not in itself be deserving of special precautions to protect it.

Section 2.4

Section 2.4 should include descriptions of the suitability of the site for alternative uses, including the proposed project. In particular, Section 2.4.2.1 should be amended to include soil data at the site sufficient to permit an assessment of the effects of salt drift and massive salt deposits in evaporation ponds, seepage, and other adverse impacts. The section is inadequate because no discussion is included concerning local or regional subsidence and its relationship to groundwater use.

Section 2.4.3

While Section 2.4.3 on Seismicity states that no epicenters have been recorded by instruments within 50 miles of the PVNGS site, Larry Bard has stated that Dr. William Sauck, an Assistant Professor of Geology at Arizona State University, in the December 27, 1974 "Tucson Daily Citizen" cited two recent seismic events in New River, twenty miles north of Phoenix on an unidentified fault located in an area of broken rocks. On December 19, 1974, an earthquake occurred of 2.5 magnitude on the Richter scale; on December 23, 1974, a 3.0 (Richter) event occurred. The text should be amended to address the New River events.

Section 2.7.1.1

Section 2.7.1.1 on "Soils" is incomplete because it does not define or explain the soil classifications used in that section, it includes no discussion on soil permeability, and does not discuss the agricultural carrying capacity of the soils.

Section 2.7.1.5

Species population descriptions should be improved to permit reasonable analysis. For example, 1.5 rabbits per linear mile is not a population density measure. Animals or plants per square mile or other area measure should be used.

Section 3.6.2, Figure 3.3

Discussions of salt loading to ground from evaporation towers are not consistent in the Final Environmental Impact Statement for Units 1,2,&3 and the DES for Units 4&5. The FES for Units 1,2,&3 predicts a maximum on-site contour of 125 lb/acre/yr. (FES p 3-23) The corresponding maximum contour from the DES for Units 4&5 predicts only 20 lb/acre/yr. Some explanation should be provided of the origin and provenance of the figures used in the DES and their relationship to the quite different values published in the FES for Units 1,2,&3. The authority quoted for the much lower figures used in the DES is a letter dated November 9, 1978 from the applicant. There is no indication that NRC staff independently verified applicant's submission or reconciled it with the previously published studies.

Over the thirty year life of the project the 125 lb per year figure would supply each acre within the contour with 1.875 tons of deposited salt. Section 3.6.2 notes that present draft model predictions may differ by a factor of 10 from observed values.

If such a ten fold error is assumed, the values shown in figure 3.5 could be interpreted as leading to a value of as much as seven and one half tons of salt per acre within the 50 lb/acre/year contour, or three quarters of a ton per acre if the figures are taken at face value. Considering this potential range of concentrations, justification should be presented for the conclusion presented in Section 10.1.1.1 (Land) that salt deposit will have no biological effects.

Section 3.8.3

The discussion claims to provide information to fill gaps in previously published transmission line descriptions. The information provided should be expanded to include the ecology of the transmission line corridor, archaeological site and sensitivity distribution, the results of the ethnographic study of the corridor cited in section 3.8.3.4, and a summary of the findings and conclusions of the previous descriptions incorporated by reference.

Section 4.1.5

This section contains no information on increased traffic resulting from PVNGS 4&5 construction. The FES should be amended to include traffic-related impacts.

Section 4.3.1.3

A complete discussion of environmental impacts associated with the Palo Verde 4&5-Devers Line should be supplied. The SDG&E/APS proposed San Diego-Arizona 500 kv Transmission Project should be discussed as a full or partial alternative to the Palo Verde-Devers Line. Chapters 4 and 5 do not take into

account the visual impacts of the proposed transmission lines and the degree to which available mitigation measures can reduce visibility of the lines. For each proposed route, full discussion in the text or by incorporation should be provided of visual effects of each portion of the line throughout sensitive areas.

Section 4.4.1

The noise discussion contains no information on blasting-related impacts and should be amended in the final EIS.

Section 4.4.2.2

The discussion concerning radiation exposure to construction workers should be amended to include an explanation of how the 15 man-rem integrated dose to construction workers figure was reached.

Section 4.4.5

This section addresses the impacts of transmission lines on Native American cultural resources by referring to a partially applicable preexisting study. On-site inspection and detailed review should be provided for each proposed route.

Section 5.4

The DES should address the cumulative effect of the fourth and fifth reactor at the Palo Verde site. Specifically, the use of the single reference reactor (model 1000 MWe LWR) basis in calculating the Uranium Fuel Cycle Impacts avoids any discussion of the functional relationship between the number of operating reactors nation-wide and the cumulative environmental effects. Failure to address this point implies an assumption that a linear relationship exists; such an assumption has not been adequately supported. This section does not address the radiological impacts associated with PVNGS 4&5 routine operation as an increment to PVNGS 1,2&3 radiation exposure. The FES should be amended to include the cumulative radiological impacts of PVNGS 1-5 operation.

Section 5.5

The DES contains no discussion of odor associated with on-site use of 91st Avenue treatment plant sewage effluent. The FES should be amended to address this issue.

Section 5.5.1.1

The discussion of the reservoir liner is internally contradictory. At the top of page 5-16, the one-foot thick soil cement reservoir liner is predicted to be impervious to the point of preventing emergent vegetation, nesting habitat, and cover. At the bottom of the same page the staff predicts seepage through the same soil cement liner of 300 acre feet per year, enough to create an increase in vegetation immediately outside the berm.

The description of the reservoir is incomplete in that the reservoir area is given as 50 acres, but no associated capacity or depth range is given.

The reservoir description should be expanded to include the volume capacity required to allow for interruption of adequately treated make-up water. Failure of the city treatment plant, the on-site tertiary plant, and of both should be allowed for. The circumstances under which the failure of the city plant could cause failure of the on-site plant should be described. The method for determining the size of the safety margin created by the reservoir's constructed volume should be given.

Section 5.5.1.2

The U.S. Environmental Protection Agency Draft EIS on Point Source Metro Phoenix Alternatives for MAG 208 Water Quality Management Plan (MAG 208) (p. 4-75) states that "sale of most of the effluent from the 91st Avenue treatment plant to ANPP (Arizona Nuclear Power Project) will have a long range adverse effect on agriculture west of 91st Avenue by reducing the total supply of water potentially available for irrigation and groundwater recharge." Page 5-21 of the PVNGS 4&5 DES states that the Buckeye Irrigation District will not be adversely affected because the City of Phoenix has contracted to supply them with replacement water. Section 5.2.1, Page 5-2 suggests that development of the 48th Street treatment plant could reduce supplies to the 91st Avenue plant to a point which would affect wastewater allocation contracts. Similar concerns are raised in page 4-31 of the MAG 208 plan, which points out that either of the two northeast plants would reduce supplies to the 91st Avenue plant by an estimated 12% by the year 2000. It appears by no means certain that the 91st Avenue plant will be able to supply planned volumes of water. Detailed consideration of water availability, including the effects of drought and of successful water conservation programs, should accompany the apparently oversimplified presentation of the DES.

The DES provides a partial description of the overall water economy supply and use picture for the region. This discussion should be amended to indicate the quantities of water redirected by the cumulative needs of the project, and the entities and activities making up the associated loss. The discussion should also specifically detail cases in which the predicted wastewater flows prove insufficient to service total development of the project.

Discussion of effluent available for cooling must take into account the quantity of effluent delivered to the conveyance pipes in Phoenix, less losses and diversions. Losses include pipe leakage, evaporation in storage ponds and trickling filters, use in biomass, losses in transmittal and processing of sludge, loss in chemical gels, etc. Diversions include 38,500 acre feet per year (AF/y) for contractors with prior rights.

Section 3.3 predicts less than 500 AF/y evaporative losses, and 300 AF/y of reservoir seepage loss. This is internally inconsistent with Section 10.1.1.2 which states that reservoir evaporation would be less than 177 AF/y and seepage less than 200 AF/y. Quantities for pipe leakage or effluent processing should also be provided.

The amount of effluent expected by the DES to be available at the 91st Avenue treatment plant by Section 5.5.1.2 does not agree with the MAG 208 draft EIS. The 91st Avenue 1995 effluent production will total less than 137,000 AF/y according to the MAG 208 plan, while the DES states 145,000 AF/y will be diverted. MAG is currently studying plans to have a larger 23rd Avenue plant and a smaller 91st Avenue plant.

Seasonal variations of agricultural demands should be included in water availability calculations. The contracting parties with prior rights to effluent can be expected to take most of their water in four to six months of the year. Crops are not irrigated on a uniform or near uniform daily basis; the weekly or monthly demands for irrigation water need to be included in calculations of available effluent, along with the effect of the rainy season on effluent demand.

The effects of drought on the availability of effluent have not been considered. The DES does not state what alternative measures will be taken if a shortage of effluent exists. The DES should examine the worst-case shortage. If well water would be used as an alternative coolant, the effects on the local groundwater situation should be examined. The legality and justification of this action in a critical water basin, even on a short-term basis, should be examined.

Section 5.5.1.3

This section contains no discussion on the cumulative impacts of two 500 kv transmission lines operating in parallel (The Palo Verde 1,2,&3 Devers Line and the Palo Verde 4&5 Devers Line), nor is there any discussion of the health effects of two high voltage transmission lines operating in parallel. Reliability considerations are not discussed. Problems associated with obtaining all necessary permits from governmental agencies and Native American tribal organizations are not discussed. Transmission line losses are not included. The FES should be amended to include these issues.

Sections 5.5.2.1 and 5.5.2.2

The description of the effects of the intake of water from the 91st Avenue treatment plant is inadequate in that it does not document or quantify the expected effects on the flora and fauna of the Salt River, the groundwater recharge occurring through the bed of the river, or the agriculture downstream which uses the existing effluent for irrigation water. Over one hundred thousand acre feet per year will be diverted from the treatment plant effluent for total consumptive use in the five reactor units (page 3-3 DES). The implication that loss of this flow is insignificant is incorrect.

Section 5.8 : Table 5.15

The table describe. the environmental impacts associated with a "model 1000 MWe LWR"; it should discuss the differences between the model reactor and the proposed 1270 MWe PWR units. The document should calculate (i) the incremental effects of a 1270 MWe PWR, (ii) the incremental impacts of two

1270 MWe FWR units, and (iii) the cumulative effects of five 1270 MWe FWR units at the same site. The staff's statement that "its conclusions would not be altered if the analysis were to be based on the net electric power output of the proposed project" (DES p. 5-29 is undocumented and it does not indicate that the cumulative impacts from five operating units at a single site have been adequately considered.

Given the current moratorium on reprocessing, the spent fuel will have to be stored at either on-site or off-site facilities. There are no away-from-reactor storage facilities (AFRs) in existence at the present time, nor are there any packaging techniques available. The DES should discuss the environmental impacts associated with spent fuel storage in AFRs until such time that a packaging technique becomes available. While Table 5.15 addresses the environmental impact of on-site spent fuel storage, the possible environmental impact from the necessity to rerack and densify on-site spent fuel storage should also be addressed.

Section 5.8.1

The section states that "a temporary land commitment is a commitment for the life of the specific fuel-cycle plant, e.g., mill, enrichment plant, or succeeding plants. On abandonment or decommissioning, such land can be used for any purpose." There are no set procedures governing abandonment or decommissioning that would guarantee that such land can indeed be used for any purpose. The DES should explain the assumptions made in reaching this conclusion concerning the disposition of fuel-cycle plant facilities and the necessary commitment of additional land to allow this recovery.

The section provides an assertion that strip mining coal to fuel a 1000 MWe coal-fired plant disturbs about 81 hectares (ha) per year. The DES should state the grade of coal assumed for the calculation and identify how represented this grade is of the distribution of U.S. coal deposits.

Section 5.8.5

The calculation in the section on radioactive effluents, paragraph four, states "this dose is equivalent to 0.00002% of the natural background total body dose of about 3 billion man-rem to the U.S. population." The figure of 0.00002% is in error because it is obtained by dividing the total annual body dose of a model 1000-MWe LWR (which is 600 man-rem/year) by 3 billion man-rem (which is the total body dose to a stabilized U.S. population of 300 million from natural background, over 100 years). This error alone would increase the ratio by two orders of magnitude.

Other errors in deriving this figure:

- (1) The use of a model 1000 MWe LWR again ignores the fact that FVNGS 4&5 together will generate 2540 MWe, and that the Palo Verde site as a whole will be generating 6350 MWe. The cumulative effects on dose rates have been ignored.

- (2) The calculations are based on a stabilized U.S. population of 300 million, and the implication here is that the radioactive releases entailed in the mining and milling operations will be uniformly distributed to every individual in the U.S.A. The fact that it is the regional population who will receive this "involuntary environmental dose commitment" should be borne in mind in such calculations.
- (3) The annual average natural background individual dose commitment of 100 mrem is a national statistical figure; and as such gives no indication of the actual background radiation peoples in different regions receive. In order to make a valid comparison between natural background dose and "involuntary dose commitment", the dose commitment as a result of operating PVNGS 4&5 over 100 years should be divided by the regional population times the regional background dosage over 100 years.
- (4) The figure 100 man-rem in paragraph 4 line 3 should be 640 man-rem (500 man-rem from paragraph 1 line 12 and 140 man-rem from Table 5.17).

Section 5.8.6

The section does not address the implications of the fact that three out of six low level radioactive waste burial sites have been closed and a fourth is on a monthly quota system. It has not been adequately demonstrated that the remaining sites will be sufficient to accommodate the quantities of reactor waste continuously generated on a nation-wide basis. There is no mention of either the remaining capacity or estimated lifetime of the currently available waste storage capacity. The section also states that "high-level and transuranic wastes are to be buried at a Federal Repository, and no release to the environment is associated with such disposal." The DES neglects to support the NRC's confidence in a waste disposal technology which is not yet fully developed. Evidence should be furnished.

Section 5.8.9

In the section on the fuel cycle, it is stated that "the staff's analysis of the uranium fuel cycle did not depend on the selected fuel cycle (no recycle or uranium-only recycle), since the data provided in Table 5.15 include maximum recycle option impact for each element of the fuel cycle. Thus, the staff's conclusions as to acceptability of the environmental impacts of the fuel cycle are not affected by the specific fuel cycle selected." This statement's validity is dependent on the completeness of the analysis in Table 5.15, particularly the "maximum recycle option impact." Scrutiny of Table 5.15 reveals that off-site fuel storage, and possible spent fuel packaging and disposal have not been considered in the no-recycle option. As such it is not evident that the environmental impact analysis is independent of the specific fuel cycle selected. The assertion should not be retained unless evidence is supplied.

Section 6.1.4.1

Aquatic surveys were improperly omitted from the baseline. While the report acknowledges that the water supply for the plant will divert existing effluent discharges away from riparian vegetation, the effect of this alteration cannot be predicted from the cursory information included in the DES. On page 6-8 Staff Evaluation of Baseline Studies (Section 6.1.4.1) NRC staff analysis points out that baseline studies are inadequate to permit detection of salt accumulation effects. The information requested by NRC staff should be supplemented by annotations of the published salt tolerance of observed plant associations, where such information is available, to allow the FES to estimate the effects of salt deposit. Discussion on pages 5-14 and 5-15 should be expanded to cover all major species.

Chapter 7

The staff's assessment of environmental consequences from postulated accidents is inadequate for the following reasons:

1. The staff states that it uses standard accident assumptions, issued as a proposed amendment to Appendix D of 10 CFR Part 50 in its own evaluation of the environmental effects of postulated accidents. The amendment to Appendix D was developed as guidance for the applicant's use in preparing its environmental report. The staff should provide (1) the grounds for adoption of each standard assumption, (2) a justification for the use of each assumption in evaluating environmental consequence and (3) a description of how the staff proposes to assure the public that all nonstandard accident sequences have been adequately evaluated.
2. The DES fails to discuss the environmental implications of Class 9 accidents; accident sequences of this degree of severity should be discussed in the FES. The staff's assertion that "the probability of their occurrence is judged so small that their environmental risk is extremely low" is not supported by the evidence presented. Analysis should assess the existence of controversy among the technical experts over both the level of the estimated probabilities of occurrence and the severity of associated consequences for Class 9 accidents.

As a result of the March 28, 1979 accident at Three Mile Island Nuclear Station, Unit 2, classes of accidents now demonstrated to require analysis include those in which operator error compounds initial problems, limits the operation of safety devices, or fails to take action as directed by operating instructions.

The staff states that it did not use the WASH-1400 in its assessment of environmental risks. The FES should state what documents were used in its stead.

Section 8.1.2

The section states that only 2% of the Joint-Participant's generating capacity is nuclear. The staff does not discuss the fraction of total kilowatt-hours generated system-wide which nuclear plants will provide by the Palo Verde 4&5 timeframe.

Section 8.2

The DES does not adequately document its assessment of need for the proposed project. There is no statement of the criteria which the staff used in analyzing the Joint-Applicant's system requirements.

Section 8.2.2 states that "reserve margins of 15-20% of peak demand are used as bases for planning by the participants....failure to achieve such levels can adversely affect rights to and costs of emergency service." The staff includes no discussion of either the nature or the validity of the assumptions which underly the Joint-Participant's planning criteria, e.g., what reserve margin is required to maintain a loss of load probability (LOLP) of one day in 20 years, and one day in five years. There is no discussion of the costs and the benefits associated with the LOLP and other planning and reliability criteria proposed by the Joint-Applicants.

The staff has provided no discussion of the tradeoff between any savings associated with a larger plant's ability to generate power at a lower average cost (increasing returns to scale) and the increased cost which accompanies the large unit's greater requirements for system reserve. There is no discussion of any cost advantage which smaller units might offer in terms of greater flexibility in following the system demand growth.

Section 8.3

The section states that if the present downward trend of average annual growth rate persists, the growth forecasted by National Economic Research Associates could be too high. The staff neglects, however, to address the implications and likelihood of this lowered demand on the need for the plant.

Sections 9.1.1.1 to 9.1.2.7

In considering the costs and benefits of alternatives to the proposed project, the DES examines options to increase baseload capacity. Many of the alternatives involving the creation of new capacity, the more efficient use of electricity, the procurement of electricity from other producers, and the management of peak load demand are considered viable within limited timeframes, but are dismissed as being individually insufficient to meet project needs. There is no attempt to consider a combination of options as an alternative. Hence, the DES is inadequate in its analysis of available options.

The staff provides no discussion of the impacts of unit size or forced outage rate characteristics of the various alternatives on system reliability, reserve margin requirements, and costs. The staff provides no discussion of the planning and operating flexibility characteristics for each alternative nor the impact of these characteristics upon the cost, reliability and the environment. Such discussions should be included in the FES.

Section 9.1.2.7

The NRC staff and Advisory Committee on Reactor Safeguards made recommendations for changes in plant design, plant instrumentation, plant operation and maintenance procedures, operator training, and control room lay-out

in response to their examination of the 28 March 1979 accident at Three Mile Island Nuclear Station Unit 2 in NUREG-0560 and Interim Reports on Three Mile Island Nuclear Station Unit 2. Tables 9.1 and 9.2 should be recalculated for the FES to include the effects of (1) any additional capital investments, (2) delays in start-up time, (3) reductions in capacity factors, and (4) increases in operation and maintenance costs which may be caused by implementation of each recommendation.

Before the cost comparison presented in this section for the coal and nuclear options can be considered suitable for final publication or to serve as the basis for policy and planning decisions, the following issues must be addressed and concomitant problems must be corrected:

1.) Discount Rate -- The DES fails to mention this most important parameter at all and the sources cited give no serious discussion of it. The DES should state explicitly the point of view (social, ratepayer, utility, regulatory or other) from which the discount rate is developed and a detailed method and justification for the number used.

2.) Capital Costs -- The DES fails to compare its capital cost estimates to either historical data for nuclear and coal facilities which have been built or to the most recent published estimates of architect-engineer-constructor firms which are in the business of building such units. The sources cited by the DES also fail in this regard. This flaw, like that involving the discount rate used, is sufficient to render the nuclear-coal comparison and other economic assessments here unacceptable.

3.) Capacity Factors -- The DES and the sources on which it relies fail to present any discussion concerning the capacity factors which may reasonably be expected to characterize the nuclear and coal options and they present no justification for the values employed. The DES and its sources present no comparison of the capacity factors assumed to the historical data already recorded for nuclear and coal units now in operation.

4.) Fixed Charge Rates -- The DES fails to provide an independent basis for the fixed charge rates employed. Examination of the source relied upon by NRC Staff provides a breakdown for the fixed charge rates employed but it fails to recognize important differences in parameters for determining the fixed charge rates appropriate to nuclear and coal units. Moreover, the methodology which forms the basis for the fixed charge rates presented in the source cited fails to discuss the extent to which it is consistent with ratemaking practice.

5.) Fuel Costs for the Nuclear Unit -- The DES fails to provide an adequate basis for the nuclear fuel cost estimates used.

6.) Fuel Cost Outlook -- Beyond the question of the correct modelling of nuclear fuel cycle costs lies the matter of the outlook for the basic commodity and service price or cost assumptions on which the generating costs are calculated. The assumptions employed by the sources upon which the NRC Staff has relied are not justified in either the DES or the reference cited. The DES should at least provide discussion of this matter and compare the estimates used in the DES to recent published industry projections.

7.) Costs of Power Plant Decommissioning -- The DES fails to specify whether the cost estimates for the nuclear and coal alternatives include the costs of decommissioning the power plant. The source referenced by the NRC Staff does not state whether its numbers include these costs. In particular, to the extent that the fixed charge rates do not reflect these costs, it is questionable whether they were given appropriate treatment.

8.) Costs of Waste Disposal -- The DES fails to specify whether the cost estimates for the nuclear and coal alternatives include the "back-end" costs associated with each fuel type. The source referenced by the NRC Staff also does not state that it includes these waste disposal costs. If it does, it is not clear what assumptions were used concerning waste disposal methods and costs and what ratemaking treatment was accorded to them in computing the costs. The assessment is not adequate without resolution of all the details mentioned here and full justification of the treatment employed.

9.) Applicants' Ability to Finance -- The DES does not address the financial ability of the Applicants to construct, operate and decommission a nuclear power plant or any of the alternatives to it. It does not address the financial problems which might be posed for the Applicants by either delays in construction of the proposed project or by prolonged forced outages of one or both units once built. The DES does not present the financial structure of each applicant. It does not recognize the financial commitments already made by each to other projects. Nor does it recognize the financial options available to the Applicants for the proposed project or for alternatives and it does not show the effect combinations of these alternatives and these financing options will have on the utilities' financial make-up and financing parameters. Without addressing these issues, the document is not adequate for publication as a final assessment of the project.

Furthermore, the cost analyses apparently fail to recognize power and energy losses associated with transmitting the output of PVNGS 4&5 to the Applicants' service territories. Alternative generating sources located at various sites would have different transmission losses associated with them. The FES should address transmission losses explicitly in its cost-benefit analysis of alternatives.

Section 9.3.3

Two cooling system alternatives are rejected without presentation of adequate analysis. The rejection of dry mechanical-draft cooling systems should demonstrate that performance of existing systems or detailed engineering analysis leads to the stated conclusion of marginal performance. It is not apparent from the DES text that adequate comparisons of costs and benefits were considered in rejecting this system. Similarly, the rejection of wet-dry mechanical-draft cooling towers cites a 40% water use reduction (which is a benefit), a four-fold increase in land requirements (which is not a problem at the Palo Verde site), and a three-fold cost increase. It appears that increased cost was the sole significant reason for rejection of this tower type. However, it is not clear from the text whether the asserted cost increase is a one-time construction cost or a continuous operation and maintenance expense. Differential costs over the life of the plant for reduced

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water purchases, treatment requirements, pumping, handling, conveyance, and for increased agricultural availability of effluent should be presented.

Any consideration of the location of other industrial processes in conjunction with the PVNGS to permit consumptive use of the 4.6×10^{10} Btu/hr of waste heat to be discarded by units 1 through 5 should be explicitly presented in the DES.

Section 10.3.4.3

In its consideration of the availability of uranium resources, the DES looks at a number of steps in the uranium fuel cycle, including exploration, mining, and milling. The document should contain a discussion of the techniques employed by the Department of Energy (DOE) in developing its estimates of U.S. uranium resources, as well as test the reliability of these estimates against other prediction technique results. The assertion that "it is more likely that the total resources eventually will prove larger than present estimates than that they will be less," (p. 10-8) is not properly substantiated. The DES should document the claim that "expansion of (Nuclear fuel) production facilities can be accomplished when needed." (p. 10-8) A reference should be provided for the mentioned study which estimates "production levels of 60,000 tons U_2O_8 per year...with aggressive resource development and exploitation." (p. 10-8) Although foreign uranium could make up shortfalls in U.S. requirements, discussion should be provided of the political implications of sort of foreign dependence. Enrichment capacity should be discussed there should be some consideration given to current and possible policy alternatives regarding tails assay. Further, the analysis is insufficient in that there is no discussion of other steps in the fuel cycle which may limit the availability of fuel to a particular plant.

Although some price changes are considered in the shifts of uranium cost categories, there is a consistent failure to consider inflation in the discussion of investment in the uranium industry. Examples of this type of reporting are the figures on new mining and milling capacity spending on page 10-9; expenditures on uranium exploration activities in Figure 10.6, p. 10-15; total spending on exploration during the period 1966 to 1976, p. 10-16; and Department of Energy spending, p. 10-17. This is particularly misleading in Figure 10.6, where the exclusion of inflation considerations gives the appearance that exploration expenditures increased more rapidly from 1973 to 1977 than would be apparent if investment was given in adjusted dollars. All dollar figures should be stated in constant dollars, or should be identified as current dollars whenever cited. A uniform method for incorporating inflation in financial analysis should be provided, described, and used whenever appropriate in the analysis.

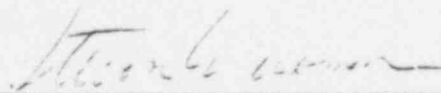
Appendix D.

The schedule proposed by the Applicant and used in Table D.1 of the DES by the NRC staff was not compared to any independent or internal assessments of required project lead time. The FES should explicitly mention other assessments of required lead-time, prepared by either the NRC or DOE, to allow for an adequate comparison with the proponent's estimate.

Summary and Conclusions

The California Public Utilities Commission and the State of California should be listed as commenting agencies.

Respectfully submitted,



Steven A. Weissman

Counsel for the People of the
State of California and the
Public Utilities Commission of
the State of California

June 25, 1979