



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

3 JUL 1979

Project #D-NRC-K06003-AZ

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attention: Director,
Division of Site Safety and Environmental Analysis

Dear Sir:

The Environmental Protection Agency (EPA) has received and reviewed the draft environmental impact statement (DEIS) on THE PALO VERDE NUCLEAR GENERATING STATION UNITS 4 and 5.

EPA's comments on the DEIS have been classified as Category ER-2. Definitions of the categories are provided in the enclosure. The classifications and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

The enclosed detailed comments reflect serious concerns in the area of emergency response preparations, reactor operational experience, and availability of cooling water for five reactor units. Given these concerns on the need for systematic procedures for operational assessments and for acceptable emergency response preparations we recommend that the Nuclear Regulatory Commission (NRC) seriously consider withholding reactor licensing actions until these concerns are addressed.

The EPA appreciates the opportunity to comment on this draft environmental impact statement and requests (3) three copies of the final environmental impact statement when available.

If you have any questions regarding our comments, please contact Betty Jankus, EIS Coordinator, at (415) 556-6695.

Sincerely yours,

Sheila M. Prindiville

for Paul De Falco, Jr.
Regional Administrator

Enclosure

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EIS CATEGORY CODES

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information which was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

GENERAL COMMENTS

1. The EPA believes major improvements are needed in the review of reactor operating experience to assure that such experience is translated into improved safety designs and operating procedures. The reactor accident at the Three Mile Island 2 (TMI-2) reactor on March 28, 1979, has focused attention on the great need for a thorough re-examination of reactor safety. We are concerned about the effectiveness of the procedures by which reactor operating experience is translated into improved reactor designs or operational practices. We believe it incumbent on the NRC to carefully review its current procedures for identifying, assessing, and acting on potential accident scenarios as actual operating experience with reactors increases.
2. The EPA understands that the NRC is reviewing the current status of emergency response planning and that the U.S. Congress is now considering legislation regarding emergency response planning. As the result of those actions are reported, the EPA will make the NRC aware of its concerns. However, based on present conditions the EPA believes the NRC should seriously consider postponing any reactor licensing actions in any state unless emergency response planning preparations have been initiated in a manner satisfactory to the NRC.
3. The EPA recognizes that high-level waste management is currently under review with the issuance of a DEIS. The EPA assumes that the recent work of the Interagency Review Group on Nuclear Waste Management (IRG) will provide a strong and well-coordinated Federal program to solve the problem.
4. The EPA has examined the NRC's assessment of accidents and their potential risks. The assessments were developed by the NRC in the course of its engineering evaluation of reactor safety in the design of nuclear plants. Since these issues are common to all nuclear plants of a given type, the EPA understands the NRC's use of a generic approach to accident risk evaluation. Moreover, the NRC is expected to continue to ensure safety through siting, plant design and accident assessments in the licensing process on a case-by-case basis.

RADIOLOGICAL COMMENTS

I - SITE OPERATION

1. The period of time that the reactor could operate and/or be brought to a cold shutdown and maintained in the event of a complete loss of effluent supply from Phoenix is not readily apparent from the discussion in section 3.3 of the DEIS. We note that Units 4 and 5 have a 20 hectare (50-acre) storage reservoir, but seepage loss is expected to be 300 acre-feet/year, evaporative loss is 500 acre-feet/year, and condenser cooling tower loss is 12,300 gallons/minute per unit (six cooling towers for units 4 and 5). The FEIS should address itself to the time necessary to bring reactor units 1,2,3,4, and 5 to a cold shutdown mode and the amount and source of water necessary to accomplish and maintain this action.

2. Although the calculated exposures per unit (Table 5.8) indicate that five units could operate at the Palo Verde site and that the population exposures allowed by the Uranium Fuel Cycle Standard (UFC) would not be exceeded, EPA recommends that the actual site data from the operation of units 1,2, and 3 be used to determine the total site impact from five units. Analysis at that time should indicate any need for modifications to units 4 and 5 before operation. The data and information required from the applicant for this type of analysis should be addressed in the FEIS.
3. The mention of 10CFR20 in Section 5.4.3., paragraph one, is inappropriate and should be deleted. Section 5.4.3., paragraph two, states that UFC Standard (40CFR190), not 10CFR20 must be used to determine measureable radiological impact on man from the routine operation of all the units at the Palo Verde site.
5. In view of Three Mile Island-2 (TMI-2) and the addition of subscript "e" to Table 7.2 (page 7-3), EPA strongly urges that Table 7.2 be modified in the FEIS.

II - ENVIRONMENTAL MONITORING

The pre-operational and operational radiological environmental monitoring program (as described in Sections 6.1.5. and 6.2.2 of the DEIS and Section 6.2 of the FVNGS-1,2, & 3 ER) appears to be, in general, satisfactory with the following exceptions that should be addressed in the FEIS:

1. The environmental monitoring programs must be capable of providing data which can be used to calculate radiation exposures from all pathways in order to evaluate compliance with 40CFR190, not just compliance with Appendix I of 10CFR50.
2. The planned quarterly analysis of the Phoenix sewage treatment plant treated wastewater for tritium content is not adequate to determine possible additions to the tritium emissions from the plant. The treated wastewater supply at the site should be analyzed monthly for tritium in addition to the tritium analysis for locally-collected food samples.
3. The planned stack and liquid radiation monitoring equipment should be reassessed to allow detection of operational emission concentrations of nucleides as well as detection of estimated accident concentrations. The FEIS should include a description of the re-designed monitoring system.
4. No Thermoluminescent Dosimeter (TLD) stations are indicated for the visitors' center. EPA considers it most desirable to include TLD's at this location to monitor direct radiation where the public has access. In general, the numbers of present TLD stations should be addressed in the FEIS and additional stations should be considered.

III TRANSPORTATION

In its earlier reviews of the environmental impacts of transportation of radioactive material, the EPA agreed with the Atomic Energy Commission (AEC) that many aspects of this program could best be treated on a generic basis. The NRC has codified this generic approach (40 FR 1005) by adding a table to its regulations (10 CFR Part 51). That table summarizes the environmental

impacts resulting from the "routine" transportation of radioactive materials to and from light-water reactors. These regulations permit the use of the impact values listed in the table in lieu of assessing the transportation impact for individual reactor licensing actions if certain conditions are met. Palo Verde appears to meet these conditions, so the routine transportation impact values in the table are reasonable, and the generic approach appears adequate for this plant.

The impact values for routine transportation of radioactive materials mentioned above have been set at a level which covers 90 percent of the reactors currently operating or under construction. However, the basis for the impact, or risk, of transportation "accidents" (versus "routine" transportation) is not clearly defined. At present, the EPA, the DOE, and the NRC are each attempting to more fully assess the radiological impact of transportation risks. The EPA will then make known its views on any environmentally-unacceptable conditions related to transportation. On the basis of present information, it appears that there are no unique characteristics of the Palo Verde site which would precipitate greater accident risks than those of the "typical" site studied generically.

IV - FUEL CYCLE AND LONG TERM DOSE ASSESSMENTS

The EPA is responsible for establishing generally applicable environmental radiation protection standards to limit unnecessary radiation exposures and radioactive materials in the general environment resulting from normal operations that are part of the total uranium fuel cycle as well as those of the facilities. The EPA has concluded (in 40 CFR 190) that environmental radiation standards for nuclear power industry operations should take into account the total radiation dose to the population, the maximum individual dose, the risk of health effects attributable to these doses (including future risks arising from the release of long-lived radionuclides to the environment), and the effectiveness and costs of effluent control technology. The EPA's Uranium Fuel Cycle Standards are expressed in terms of dose limits to individual members of the general public and limits on quantities of certain long-lived radioactive materials released to the general environment.

A document entitled, "Environmental Survey of the Uranium Fuel Cycle" (WASH-1248) was issued by the AEC in conjunction with a regulation (10 CFR 50, Appendix D) for application in completing the cost-benefit analysis for individual light-water reactor environmental reviews (39 FR 14188). This document is used by the NRC in draft environmental statements to assess the incremental environmental impacts that can be attributed to fuel cycle components which support nuclear power plants. Recently, the NRC distributed an update of the WASH-1248 survey. We believe this to be a prudent step. In comments provided to the NRC on November 14, 1978 on this subject, we encouraged the NRC to express environmental impacts in terms of potential consequences to human health because radioactive materials and ionizing radiation are the most important factors affecting human health. We believe the presentation of environmental impact in terms of human health impact fosters a better understanding of the radiation protection afforded the public. Furthermore, human health impacts should be expressed in terms of both death and sickness.

A second major concern of EPA deals with the discharge and dispersal of long-lived radionuclides into the general environment. The EPA is encouraged to find some discussion of the long-term impacts in the DEIS. However, in the areas addressed in WASH-1248, there are several cases in which radioactive materials of long persistence are released into the environment. The resulting consequences may extend over many generations and constitute irreversible public health commitments. The long-term potential impact should also be considered in any assessment on health impact. The EPA has consistently found the NRC's estimates of population doses for the persistent radioactive materials to be inadequate. In particular, the NRC has generally limited their analysis to the population within 50 miles of a facility, or, in rare cases, to the U.S. population, and doses committed for a 50-year period by an annual release. These limitations produce incomplete estimates of environmental impacts and underestimate the impact in some cases, such as from releases of tritium, Krypton-85, Carbon -14, Technetium-99, and Iodine-129. The total impact of these persistent radionuclides should be assessed, qualifying such estimates as appropriate to reflect the large uncertainties. In this regard, we note that the Nuclear Energy Agency (NEA) is addressing this approach in making assessments and that NRC is represented in this effort.

Another major consideration in updating WASH-1248 is the health impact from Radon-222 from the uranium mining and milling industry. Estimates made by EPA, among others, indicate that Radon-222 contributes the greatest fraction of the total health impact from nuclear power generation. In preparing an updated WASH-1248, we believe the NRC should:

1. include the Radon-222 contribution from both the uranium mining and milling industries;
2. determine the health impact to larger populations, not only the local populations;
3. recognize the persistent nature of the Radon-222 precursors (Th-230 and Ra-226) by estimating the health impact for a period reflecting multi-generational times.

V - DECOMMISSIONING

The NRC has published a proposed rulemaking on Decommissioning Criteria for Nuclear Facilities in the Federal Register of March 13, 1978. The EPA comments dealing with the decommissioning issue were sent to the NRC on July 5, 1978.

In these comments, we stated that one of the most important issues in the decommissioning of nuclear facilities is the development of standards for radiation exposure limits for materials, facilities, and sites prior to release for unrestricted use. We have included the development of such standards among our planned projects. The work will require a thorough study to provide necessary information, including a cost-effectiveness analysis for various levels of decontamination.

The development of standards for decommissioning must, of course, include consideration of the many concurrent activities in radioactive waste management and radiological protection. The EPA has developed proposed Criteria for Radioactive Waste for management of all radioactive wastes

which will provide guidance for decommissioning standards. From the decommissioning view, probably the most important criterion is the one that limits the reliance on institutional controls (guards and fences) to a finite period of time. The EPA believes that the use of institutional controls to protect the public from retired nuclear facility sites until they can be decontaminated and decommissioned should have a time limit of a maximum of 100 years; a time limit of less than 50 years would be preferred. This also includes nuclear reactors shut down and mothballed or entombed for a period of time under protective storage. After the allowable institutional care period is over, the site will have to meet radioactive protection levels established for release for restricted use unless the site is still in use for active units. We believe the EPA's proposed criteria would be directly applicable to decommissioning of nuclear facilities and should be given serious consideration by the NRC.

The availability of adequate funds when the time to decommission arrives is also most important. It should be the NRC's responsibility to assure that such provisions are made. We recognize the great complexity of providing funds at the time of construction for use at the time of decommission 40 years later. However, if it can be determined for public utilities that the total cost of decommissioning in current dollars is a very small fraction of initial capital cost, a provision of escrow funding may not be necessary. Therefore, we urge the NRC to conduct the necessary studies and assessments to determine unequivocally the costs of decommissioning and to compare such costs to initial capital costs. It is only through a definitive analysis, and perhaps realistic demonstrations, that this issue can be successfully resolved.

HAZARDOUS WASTE COMMENTS

1. The DEIS indicates (Section 3.3) that 99 percent of the effluent from the Phoenix 91st Avenue Municipal Sewage Treatment Plant (MSTP) will be treated at the on-site PWSGS reclamation plant. The applicant should have a knowledge of events at the MSTP prior to on-site treatment of the effluent since accidental or unauthorized disposal of hazardous waste into the Phoenix sewage collection system could affect the operation of the MSTP. The responsibility for notification and the communications plan to be used should be detailed and documented in the FEIS.
2. "Other than radioactive" waste disposal is discussed in Section 3.7.3. However, there is no mention made regarding the impact of the Resource Conservation and Recovery Act (RCRA) on the 160-acre, on-site disposal site. These factors should be discussed in the FEIS.

SITE DESCRIPTION COMMENTS

1. Although the site is located in the vicinity of a large metropolitan area, there is no discussion in the DEIS regarding the surrounding air fields, whether private, commercial, or military. While there was information included in the ER, the FEIS should include a current evaluation of the present and future air corridors, including the possibility of a determination of an "exclusion area" to prohibit over-flights of the area.

WATER COMMENTS

The DEIS fails to fully explain many of the impacts on water resources, should provide more mitigation measures, and seems to have used questionable assumptions in determining the availability of effluent for cooling. EPA requests that the FEIS address the following comments:

1. Depletion: A major problem identified in the Areawide 208 Plan is the depletion of groundwater. Also of concern is the increasing use of energy required to pump the water, the attendant costs, and the deterioration of groundwater quality attributable to over-pumping. Though the DEIS notes the problem of depletion (Section 2.2.4, Paragraph 2; and Section 2.5.3, Paragraph 1), it fails to address the impacts of this proposal on the problems (e.g., Section 4.2.2, Para. 2; and Section 5.2.2, Para. 1). The FEIS should discuss the impact of using effluent which otherwise would be available for other uses, including the effects on depletion regionally and on groundwater quality. A discussion of mitigation should be added. This could include the requirement for the applicant to conserve water as fully as possible and to restrict diversion to the absolute minimum necessary to operate the power plant.

2. Effluent Impacts: Two issues need further analysis. One, how the NRC intends to assure that the large salt load accumulated at the power plant site will be prevented from polluting water supplies. The amount of salt should be described. The second issue has to do with discharges to the environment. Although the DEIS indicates that wastewaters will not be discharged to any existing natural waters (Sec. 5.2.2, Para. 4), the FEIS should include containment or other mitigation measures to be implemented in the event of a pipeline accident.

3. Effluent Available for Cooling: NRC has assumed that the 91st Avenue Sewage Treatment Plant will provide all the cooling water needed for five reactors, a demand estimated at 115,000 acre-feet per year in 1995 (Section 5.1.2., Para. 1, Para. 3). This assumption appears to be inaccurate and/or outdated for the following reasons:

a) EPA believes that the projected flow at the 91st Avenue Plant described in the 208 Plan developed by the Maricopa Association of Governments (MAG, June 1979) is well substantiated. That projection is 138,700 acre-feet per year in 1995. The 208 Plan estimates prior commitments in 1995 at 38,500 acre feet per year. On the basis of the 208 Plan, it appears that the actual flows available to PVNGS will be less than (i.e., 138,700 less 38,500 acre feet per year) the NRC's estimated total demand of 115,000 acre feet per year. Therefore, a potentially major problem exists within cooling reactors 4 and 5 (and perhaps #3) since the 115,000 acre-feet/year demand for the entire plant raises total commitments on an annual basis to 153,000 acre-feet/year in 1995 (pp. 5-18). In addition, the expected success of MAG's flow reduction program may further reduce the expected flow. Some interest has also been expressed in reducing the ultimate capacity of the 91st Avenue Plant by shifting up to 20,000 acre-feet/year to the plant at 23rd Avenue. Thus, it appears that the effluent available to the power plant may be substantially short of demand on an annual basis and even more so on a peak seasonal basis.

- b) Some loss of water between the treatment plant and the reactors and some loss due to poor quality precluding effluent usage will have to be deducted from the total amount available.
- c) The DEIS projects Biochemical Oxygen Demand (BOD) in the effluent at 20 to 25 mg/l (Sec. 2.5.2, Para. 2). There is a substantial doubt that the expectation will be met. The plant is only intended to produce an effluent with a BOD of 30 on a monthly average, which will soon be accomplished. However, the plant is only required to meet Class III reliability, the lowest class. While the EPA does not expect major problems it is likely that the power plant will receive some effluent of an unusable quality.
- d) In the comments to the EPA on the DEIS issued on a portion of the MAG 208 Plan, the Arizona Public Service Company (APSC) projected a peak monthly demand for Units 1-3 at 6,550 acre-feet. When extrapolated to five units, this estimate would be about 10,900 acre-feet/month. This greatly exceeds the projected 1990 flows (when Reactor #5 will go on the line) from the 91st Avenue Plant of 7,400 acre-feet/month average (projections which, as noted above, may be high). Based on the 208 Plan, even Reactor #4's peak flow demand could not be handled until circa 1997.
- e) Another factor which has not been addressed is that of agricultural demand which will peak in the summer - just when the PVNGS peak needs are also likely to occur. Since the Buckeye Irrigation District has a prior right to effluent, there may be less than the average amount of effluent available to PVNGS during the summer months.

Examining "a" through "e" indicates clearly that the 91st Ave. Treatment Plant will not be able to provide sufficient effluent to cool five reactors. The combined 23rd and 91st Ave. plants might provide sufficient annual flow to support five reactors, but even this would depend on the extent of sewage flow reductions in the Phoenix area and the amount of effluent arriving at PVNGS which is unusable. Additionally, it appears that peak demands could not be met if Buckeye Irrigation District elects to take more than average amounts of effluent during the period of peak PVNGS need. There is also the possibility that MacDonald farms may be entitled to much of the 23rd Avenue flow, a factor which NRC has not considered. The EPA strongly urges further coordination with MAG and a re-examination of supply/demand of effluent. The FEIS should be revised to reflect the increased impacts if the NRC proposes to license five reactors and require the use of effluent from 23rd Ave. It should also include a full analysis of cooling water demand and effluent availability. The analysis should take into account peak demand from all users, including PVNGS, expected losses of usable effluent and the possibility of further reductions in projected flows to the 91st and 23rd Ave. Treatment Plants. If, as appears to be the case, demand will exceed supply, the FEIS should indicate alternative sources of coolant and their related impacts.

EFFLUENT DIVERSION COMMENTS

The DEIS notes that diversion of effluent will lead to "degradation" of riparian habitat (page 1). There appear to be many omissions in describing the impacts. Additionally, no mitigation is discussed. The DEIS indicates a maximum 37 percent reduction in flow in "Segment B" and 9 percent in "Segment D." of the Salt and Gila Rivers (Sec. 5.5.1.2, Para. 6 & 9). These figures should be reanalysed, in light of the questions concerning the amount of available effluent, and the fact that almost all the flow shown in Table 2.13 would be eliminated. In addition to the above, the FEIS should address seasonal variations in flow and their impacts as well as the impact on wildlife and on other beneficial uses such as fishing and recreation. The impact of decreased availability should be assessed.