February 24, 2000

Mr. Gregg R. Overbeck
Senior Vice President, Nuclear
Arizona Public Service Company
P. O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION - ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT RELATED TO REQUEST FOR AMENDMENTS ON SPENT FUEL STORAGE CAPACITY (TAC NOS. MA5685, MA5686, AND MA5687)

Dear Mr. Overbeck:

Enclosed is a copy of the "Environmental Assessment and Finding of No Significant Impact" related to your application for amendments dated June 8, 1999, as supplemented by letters dated July 20 and November 24, 1999. The proposed amendments would change the Technical Specifications for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3, to increase the spent fuel storage capacity by crediting soluble boron and decay time in the safety analysis for the spent fuel pool storage racks. The proposed amendments would also change the maximum radially averaged fuel enrichment from 4.3 weight percent to 4.8 weight percent.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

/***RA***/

Mel B. Fields, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,
and STN 50-530

Enclosure: Environmental Assessment

cc w/encl: See next page

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UNITED STATES NUCLEAR REGULATORY COMMISSION

ARIZONA PUBLIC SERVICE COMPANY

DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U. S. Nuclear Regulatory Commission (NRC) is considering issuance of an amendment to Facility Operating Licenses Nos. NPF-41, NPF-51, and NPF-74, issued to the Arizona Public Service Company (the licensee), for operation of the Palo Verde Nuclear Generating Station (Palo Verde), Units 1, 2, and 3, located in Maricopa County, Arizona.

ENVIRONMENTAL ASSESSMENT

Identification of Proposed Action:

The proposed action would increase the number of fuel assemblies that can be stored in the Palo Verde spent fuel pools (SFPs) from 1034 fuel assemblies per SFP (1033 fuel assemblies for the Unit 2 SFP) to 1205 fuel assemblies per SFP. The increase in storage capacity is based on taking credit for fuel assembly burnup, for soluble boron, and for fuel assembly configuration in the SFP. In addition, the proposed action would increase the maximum radially averaged fuel enrichment from 4.3 weight percent to 4.8 weight percent.

The proposed action is in accordance with the licensee's application for amendments dated June 8, 1999, as supplemented by letters dated July 20 and November 24, 1999.

The Need for the Proposed Action:

The licensee is planning on implementing dry cask storage in the second half of 2002. Since all three Palo Verde SFPs will lose the capacity to fully offload the core prior to that time, the licensee needs to increase the maximum number of fuel assemblies that can be stored in the SFPs. The higher enrichment limit is needed to provide flexibility in future core designs.

Environmental Impacts of the Proposed Action:

Thermal Impact

The change in temperature of the SFP water was evaluated for the potential increase in reactivity. The current design basis for the SFP cooling system is based on the proposed increased capacity of the SFP, so no significant increase in SFP temperature is expected. In addition, because the reactivity coefficient in the SFP is negative, a temperature increase will result in a decrease in reactivity. Since increasing the capacity of the SFPs would increase the maximum heat load, the pool temperature would tend to be higher, not lower, after the proposed action was implemented. Therefore, the thermal impact of the proposed action would tend to increase the ability of the SFP system to maintain criticality parameters within the design bases of the plants.

The increased heat loads that result from increasing the SFP capacity would cause the total heat load rejected to the environment to increase. The maximum increase in heat rejection to the environment is less than 0.1 percent of the total heat load rejected to the environment by an operating Palo Verde unit, and is not considered a significant impact to the environment.

Radioactive Waste Treatment

The Palo Verde units use waste treatment systems designed to collect and process gaseous, liquid, and solid waste that might contain radioactive material. These radioactive waste treatment systems were evaluated in the Final Environmental Statement (FES) dated

February 1982 (NUREG-0841). The proposed increase in the capacity of the SFPs and the proposed increase in the enrichment limit will not involve any change in the waste treatment systems described in the FES.

Gaseous Radioactive Wastes

The storage of additional and higher enriched spent fuel assemblies in the pools is not expected to affect the releases of radioactive gases from the SPFs. Gaseous fission products such as krypton-85 and iodine-131 are produced by the fuel in the core during reactor operation. A small percentage of these fission gases is released to the reactor coolant from the small number of fuel assemblies that are expected to develop leaks during reactor operation. During refueling operations, some of these fission products enter the pools and are subsequently released into the air. Since the frequency of refueling (and, therefore, the number of freshly offloaded spent fuel assemblies stored in the pools at any one time) will not increase, there would be no increase in the amounts of these types of fission products released to the atmosphere as a result of the increased pool fuel storage capacity.

The increased heat load on the pools from the storage of additional spent fuel assemblies would potentially result in an increase in the pools' evaporation rate. However, this increased evaporation rate is not expected to result in an increase in the amount of gaseous tritium released from the pool. The overall release of radioactive gases from Palo Verde would remain a small fraction of the limits of 10 CFR 20.1301.

Solid Radioactive Wastes

Spent resins are generated by the processing of SFP water through the pools' purification system. These spent resins are disposed of as solid radioactive waste. Resin replacement is determined primarily by the requirement for water clarity and is normally done

approximately once per year. No significant increase in the volume of solid radioactive waste is expected with the expanded storage capacity.

Liquid Radioactive Wastes

The release of radioactive liquids would not be affected directly as a result of increasing the capacity of the SFPs. The SFP ion exchanger resins remove soluble radioactive materials from the pool water. When the resins are replaced, the small amount of resin sluice water that is released is processed by the radwaste systems. Resin replacement is determined primarily by the requirement for water clarity and is normally done approximately once per year. The increase in the amount of radioactive liquid released to the environment as a result of increasing the capacity of the SFPs is expected to be negligible.

Occupational Dose Consideration

There are no physical modifications needed to increase the capacity of the Palo Verde SFPs, so no increase in occupational doses will result from this proposed action. The existing procedures for normal activities associated with handling fuel assemblies limit the radiological exposure for plant workers, and these limits are not affected by the higher enrichment limits or increased SFP capacity.

Accident Considerations

The licensee evaluated three events related to the proposed action to verify that the previous accident analyses as incorporated in the plants' design bases remain bounding. They are a fuel handling accident, a fuel misloading event, and a boron dilution event.

The design-basis fuel handling accident is the dropping of a single fuel assembly during fuel handling. Increasing the SPF capacity and increasing the enrichment limit does not affect the method of handling spent fuel or the design of the fuel handling equipment. The fuel assembly design (clad material and structural components) is not affected by this change. The

equilibrium source term used in the fuel handling accident analysis is based on rated core thermal power and an infinite cycle, and therefore is independent of fuel assembly enrichment. Therefore, the radiological consequences of the fuel handling accident remains unchanged.

The effect of a single misloaded spent fuel assembly on the SFP maximum effective multiplication factor has been analyzed and shown to remain within the design limit for this parameter ($\leq$0.95). Therefore, the radiological consequences of a misloaded fuel assembly remains unchanged.

Analyses were conducted to evaluate the possibility of unacceptable dilution of the soluble boron in the SFPs due to operational events or accidents. The analyses verified that the SFP maximum effective multiplication factor remained $\leq$0.95 for all credible accident scenarios. Therefore, the proposed action will not result in a criticality event and no increases in radiological consequences will occur as a result of a boron dilution event.

The NRC has reviewed the above analyses conducted by the licensee and concludes that increases in the enrichment limit and in the capacity of the SFPs at Palo Verde will not be accompanied by an associated increase in the radiological consequences of fuel-handling accidents. The potential offsite doses will not be increased over the values given in the updated Final Safety Analysis Report.

Environmental Impact Conclusions

The proposed action will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential nonradiological impacts, the proposed action does not involve any historic sites. It does not affect nonradiological plant effluents and has no other

environmental impacts. Therefore, there are no significant nonradiological environmental impacts associated with the proposed action.

Accordingly, the NRC concludes that there are no significant environmental impacts associated with this action.

Alternatives to the Proposed Action:

Shipping Fuel to a Permanent Federal Fuel Storage/Disposal Facility

Shipment of spent fuel to a high-level radioactive storage facility is an alternative to increasing the onsite spent fuel storage capacity. However, the U.S. Department of Energy's (DOE's) high-level radioactive waste repository is not expected to begin receiving spent fuel until approximately 2010, at the earliest. To date, no location has been identified and an interim Federal storage facility has yet to be identified in advance of a decision on a permanent repository. Therefore, shipping the spent fuel to the DOE repository is not considered a viable alternative to increased onsite fuel storage capacity at this time.

Shipping Fuel to a Reprocessing Facility

Reprocessing of spent fuel from Palo Verde is not a viable alternative since there are no operating commercial reprocessing facilities in the United States. Therefore, spent fuel would have to be shipped to an overseas facility for reprocessing. However, this approach has never been used and it would require approval by the Department of State as well as other entities. Additionally, the cost of spent fuel reprocessing is not offset by the salvage value of the residual uranium; reprocessing represents an added cost.

Shipping the Fuel Offsite to Another Utility

The shipment of fuel to another utility would provide short-term relief from the fuel storage problems at Palo Verde. The Nuclear Waste Policy Act of 1982, Subtitle B Section 131(a)(1), however, clearly places the responsibility for the interim storage of spent fuel with

each owner or operator of a nuclear plant. The SFPs at the other reactor sites were designed with capacity to accommodate spent fuel from those particular sites. Therefore, transferring spent fuel from Palo Verde to other sites would create storage capacity problems at those locations.

Alternatives Creating Additional Storage Capacity

Alternative technologies that would create additional storage capacity include rod consolidation, dry cask storage, modular vault dry storage, and constructing a new pool. Rod consolidation involves disassembling the spent fuel assemblies and storing the fuel rods from two or more assemblies into a stainless steel canister that can be stored in the spent fuel racks. Industry experience with rod consolidation is currently limited, primarily due to concerns for potential gap activity release due to rod breakage, the potential for increased fuel cladding corrosion due to some of the protective oxide layer being scraped off, and because the prolonged consolidation activity could interfere with ongoing plant operations. Dry cask storage is a method of transferring spent fuel, after storage in the pool for several years, to high capacity casks with passive heat dissipation features. The licensee is planning on implementing dry cask storage at the Palo Verde site, but the SFPs will lose the capacity to fully offload the core prior to the time dry cask storage will be available. Vault storage consists of storing spent fuel in shielded stainless steel cylinders in a horizontal configuration in a reinforced concrete vault. The concrete vault provides missile and earthquake protection and radiation shielding. Concerns for vault dry storage include security, land consumption, eventual decommissioning of the new vault, and high cost. The alternative of constructing and licensing new SFPs is not practical for Palo Verde because such an effort would require about 10 years to complete and would not be available in the time frame needed.

The alternative technologies that could create additional storage capacity involve additional fuel handling with an attendant opportunity for a fuel handling accident, involve higher cumulative dose to workers affecting the fuel transfers, require additional security measures that are significantly more expensive, and would not result in a significant improvement in environmental impacts compared to the proposed action to increase the capacity of the current SFPs.

Reduction of Spent Fuel Generation

Generally, improved usage of the fuel and/or operation at a reduced power level would be an alternative that would decrease the amount of fuel being stored in the SFPs and, thus, increase the amount of time before the maximum storage capacities of the SFPs are reached. However, operating the plant at a reduced power level would not make effective use of available resources, and would cause unnecessary economic hardship on the licensee and its customers. Therefore, reducing the amount of spent fuel generated by increasing burnup further or reducing power is not considered a practical alternative.

The No-Action Alternative

The NRC staff also considered denial of the proposed action (i.e., the “no-action” alternative). Denial of the application would result in no significant change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for Palo Verde, Units 1, 2, and 3.

Agencies and Persons Contacted:

In accordance with its stated policy, on January 27, 2000, the staff consulted with the Arizona State official, Mr. Audbry Godwin of the Arizona Radiation Protection Agency, regarding the environmental impact of the proposed action. The State official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letters dated June 8, July 20, and November 24, 1999, which are available for public inspection at the Commission's Public Document Room, Gelman Building, 2120 L Street, NW., Washington DC. Publicly available records will be accessible electronically from the ADAMS Public Library component on the NRC Web site, http:\\www.nrc.gov (the Electronic Reading Room).

Dated at Rockville, Maryland, this 24thday of February 2000.

FOR THE NUCLEAR REGULATORY COMMISSION

/***RA***/

Mel B. Fields, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation