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SUBJECT: Application for amends to Licenses NPF-41 & NPF-51, modifying CEA symmetry test program to allow alternative test program to be perfomed that reduces test time & reduces waste water generation. Fee paid.

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July 1, 1987
161-00330-JGH/LJM

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1 and 2
Docket Nos. STN 50-528 (License NPF-41)
STN 50-529 (License NPF-51)
Technical Specification Change
File: 87-F-005-419.05; 87-056-026

Dear Sir:

This letter is provided to request an amendment to the PVNGS Unit 1 and 2 Technical Specifications Section 6.8.1(o); CEA Symmetry Test Program implementation. The request consists of the following proposed change.

The CEA Symmetry Test Program Note states, "The licensee shall perform a CEA symmetry test program in conformance with the program discussed in Section 4.2.2 of the PVNGS SER dated November 11, 1981." The proposed change would modify the statement to read "The licensee shall perform, after each reload, either a CEA symmetry test or worth measurements of all full-length CEA groups to address Section 4.2.2 of the PVNGS SER dated November 11, 1981."

The alternate test program provides information technically equivalent to that obtained from the standard program which was performed on Units 1 and 2. The alternate test program reduces test time and significantly reduces waste water generation by reducing the amount of boration and dilution of the Reactor Coolant System.

Enclosed within this amendment request are:

A. Description of Amendment Request
B. Purpose of the Technical Specification
C. Need for the Technical Specification Amendment
D. Basis for No Significant Hazards Consideration
E. Safety Analysis of the Proposed Change Request
F. Environmental Impact Consideration Determination
G. Marked-up Technical Specification Page

Pursuant to 10 CFR 50.91(b)(1), and by copy of this letter and attachment, we have notified the Arizona Radiation Regulatory Agency of this request for a Technical Specification change. In accordance with 10 CFR 170.12(c), the License Amendment application fee of $150 has been forwarded to the USNRC License Fee Management Coordinator.

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If you have any questions, please call R. A. Bernier at (602) 371-4295.

Very truly yours,

J. G. Haynes/SNG

J. G. Haynes
Vice President
Nuclear Production

JGH/LJM/ls
Attachment

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ATTACHMENT

A. DESCRIPTION OF AMENDMENT REQUEST

Technical Specification 6.8.1(o) requires that a Control Element Assembly (CEA) Symmetry Test Program be implemented for each reload. The accompanying note identifies where a description of the program can be found (PVNGS SER, dated November 11, 1981). At present, the program consists of the CEA Symmetry Test only. The proposed amendment renames the program to CEA Reactivity Integrity Program and expands the note to include, in the program, the option to perform worth measurements of all full-length CEA groups in place of the CEA Symmetry Test.

B. PURPOSE OF THE TECHNICAL SPECIFICATION

Section 6.8.1.(o) requires that a CEA Symmetry Test Program be implemented in conformance with the program in Section 4.2.2 of the PVNGS SER dated November 11, 1981. This requirement is the result of a concern about potential loss of control material from the control assemblies during operation and is based, in part, on observations of loss of boron from BWR control blades and from burnable poison rods through clad perforations. In the case of the burnable poison rods, the presence of perforations was attributed to primary hydriding of the Zircaloy clad material. Through the licensing process, utilities having a CE NSSS who are seeking an operating license have been required to address the issue of potential loss of control rod worth and identify a means to verify that such a condition does not develop and go undetected.

The CEA Symmetry Test was originally developed as a measure technique to demonstrate, at low power levels, that no loading or fabrication errors had occurred. Such errors would affect the neutron flux where feedback effects would be minimal. The CEA Symmetry Test identified unexpected asymmetries in the core by comparing relative worths of mechanisms which could lead to these control rods having unequal worths, and the CEA Symmetry Test alone does not differentiate between these mechanisms. While the primary purpose of the test is to provide assurance that a misloading of a fuel assembly in the core has not occurred, by its nature, the test would also provide an indication of unequal worths of symmetric control rods as might exist if control material had been lost from one of the rods. Because such a test existed and was to be performed prior to each cycle, it was offered as a means of verifying that no "identifiable" loss of control material had occurred since the beginning of the previous cycle.

C. NEED FOR THE TECHNICAL SPECIFICATION AMENDMENT

Through work performed by CE for the CE Owner's Group, an alternate CEA Symmetry Test Program has been developed whereby the CEA Symmetry Test, as a means of verifying no loss to control rod worth, and CEA Group Worth Measurement Test are replaced by a CEA Exchange Test described in CEN-319. To assure that the original intent of the CEA Symmetry Test is met, verifying that no fuel assembly misloading has occurred, a Flux Symmetry Test, using the incore neutron detector system, will be performed. The program allows the required measurements to be performed in less time, thereby reducing the duration of when the plant is operated with off-normal control rod configuration of design values. Since the worth of all full-length control rod groups, including the shutdown groups, is measured at the beginning of each cycle when the Exchange Test is performed, the intent of T.S. 6.8.1.(o) is still met. This alternate test program conforms to ANSI/ANS - 19.6.1-1985, "Reload Startup Physics Tests for Pressurized Water Reactors."

D. BASIS FOR NO SIGNIFICANT HAZARDS CONSIDERATION

1. The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) Involve a significant reduction in a margin of safety.

A discussion of these standards, as they relate to the amendment request, follows:

Standard 1--Involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated. The concern, being addressed by the subject Technical Specification, is the potential for control material to be lost from CEAs through perforations in the CEA cladding and for such loss to go undetected. Such an undetected loss could result in a reduction in the available CEA shutdown worth and violate assumptions made in the Safety Analysis regarding such. The program, which has previously been accepted by the NRC to address this concern, utilizes a CEA Symmetry Test which is performed at the beginning of each cycle of operation to assess the relative worths of the individual CEAs. The question to be addressed is whether the proposed alternate method (measurement of worths of all full-length CEA groups) will be as adequate as the CEA Symmetry Test in assuring that the Safety Analysis assumptions regarding available CEA Shutdown worth will not be violated.

The CEA Symmetry Test was developed (prior to identification of the potential loss of control material concern) as a measurement technique to demonstrate, at low power levels, that no loading or fabrication errors had occurred. It accomplishes this by determining the relative worths of symmetrically located CEAs when individually inserted into the core. There are, however, several mechanisms which could lead to these CEAs having unequal worths, including: (1) flux asymmetries caused by a misloading of fuel assemblies, (2) flux asymmetries caused by loss of control material from burnable poison rods, or (3) differences in characteristics of individual CEAs. The CEA Symmetry Test alone does not differentiate between these mechanisms.

Since the CEA Symmetry Test already existed and was planned to be performed at the beginning of each cycle of operation, it was identified as an acceptable means of monitoring for loss of control materials. At that time, the only CEA group worth measurements planned for each cycle were for the regulating CEA groups; there were no plans to measure the worth of the shutdown groups. Hence, group worth measurements alone would

not have identified loss of control material from shutdown group CEAs. Methodologies have subsequently been developed to facilitate measurement of the worths of all CEA groups every cycle.

For an actual loss of control material to occur, the CEA cladding must first be breached. The control material must then be dissolved into reactor coolant which has entered the CEA through the clad breach and be washed out of the CEA. These events have a very low probability of occurrence during the design lifetime of the CEAs, although the probability of such an occurrence increases with the length of time CEAs remain in service. Operating history of CEAs, throughout their design life at other CE plants, has been excellent; there are no known documented cases of clad failure, much less loss of control material.

To quote from the PVNGS SER section 4.2.2, "...CEA control materials in their physical states of application are relatively inert,... it would take months or years for a significant loss of B4C to occur...The rods held in safety banks, however, would not normally have their reactivity worth routinely assessed because they would not normally be used." Regarding the CEA Symmetry Test, the SER states that the test is "sensitive enough to detect the loss of substantial reactivity from any single element of a standard five - element CEA."

Finally, the staff concludes that the issue is adequately addressed based upon the facts that (a) the CEA design should preclude failure, (b) even if clad failure should occur, extended periods of time (months to years) would be required for significant reactivity loss to occur, and (c) reactivity checks will be performed after each refueling to verify CEA worths.

As stated previously, the CEA Symmetry Test assesses the worth of individual CEAs relative to other symmetrically located CEAs. Based upon established criteria, an individual CEA would have to be worth 20% to 25% less than its symmetric counter part to exceed acceptance limits. For a 4-finger CEA, this would be roughly equivalent to the loss of a full finger. For a 12-finger CEA, the worth equivalent of several fingers would have to be lost. Hence, it is possible that an isolated failure incident (one finger) would not be detected by the CEA Symmetry Test.

The alternate surveillance method consists of measuring the reactivity worth of all full-length CEA groups and comparing them to design predictions. CEA problems, leading to loss of control material and affecting only a few fingers throughout the core, might not be identified by this method but more widespread problems would be more likely to be identified.

Clad failures leading to loss of control material can be separated into two general categories: those of an isolate nature and those of a generic nature. The first category would include failures resulting from some isolated flaw (manufacturing defect, handling damage, etc.) and would affect single CEA fingers. Such failures would not be widespread, and any potential loss of control material would be limited to the damaged

individual fingers, of which there are 740 in the PVNGS core design. In the remote event that several failures of this category occurred, it is unlikely that more than one would be in any CEA. The second category of postulated CEA failures would be those of a generic nature, perhaps the result of an inherent design problem in either the CEAs or the reactor internals. This type of failure would be expected to be more widespread than the previous category; it could affect a large number of CEA fingers in an equally large number of CEAs. The probability of any failure during the design lifetime of a CEA is considered to be extremely small and, hence, the probability of multiple failures occurring are even smaller.

Of the two methods of monitoring for loss of control materials, both are performed only at the beginning of a new cycle of operation. Hence, neither method assures that some control material loss will not occur during the current cycle of operation, only that an identifiable loss has not occurred since the start of the previous cycle for the first category of postulated failures (isolated event); a few fingers (randomly located) at most might be affected. Unless an individual CEA contained more than one failed finger and unless substantial worth (almost all) had been lost from those fingers, it is possible that the CEA Symmetry Test would not identify the loss. Failures of this type would likely go undetected by either method; however, their impact on available shutdown worth would probably be insignificant.

For the second category of postulated failure (generic), the number of affected CEAs would be larger and more widespread. This category of failure would be more likely to significantly impact shutdown margin. Very small losses of control material, since they would be distributed through the core rather than localized, might still go undetected by either method of surveillance. However, loss of control material on a larger scale would be apparent in CEA groups, worths measured at the beginning of the cycle and might be identified by a CEA Symmetry Test.

Hence, (1) neither surveillance method guarantees identification of clad problems which have led to loss of control material, (2) isolated problems will possibly not be identified, but also will not significantly impact available shutdown margin, and (3) failures which significantly impact available shutdown margin would be widespread in nature, and the proposed alternate surveillance method would be at least as effective as the CEA Symmetry Test in identifying them. Therefore, the proposed alternate surveillance methods will be no less adequate than the CEA Symmetry Test in identifying events of loss of CEA control material which could significantly degrade available shutdown margin. As indicated previously, three facts were cited by the NRC in the PVNGS SER to conclude that the subject issue had been adequately addressed. None of these three statements are invalidated by the proposed change to the Technical Specifications.

Standard 2--Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated. As described in Section Standard 1, the alternate surveillance method (the CEA Group Exchange Test) measures the worth of entire groups whereas the CEA Symmetry Test measures individual CEAs. By allowing the performance of the Exchange Test, the plant would experience less off-normal control rod configurations of design values, thus reducing the possibility of any kind of accident occurring.

Standard 3--Involve a significant reduction in a margin of safety.

The requested amendment does not involve a significant reduction in a margin of safety because the proposed change does not affect the design basis of the plant. The subject Technical Specification is associated with concern for a potential loss of available shutdown worth. The mechanism for such loss is a loss of CEA clad integrity accompanied by a subsequent loss of control material. Based upon the facts that (1) the operating history of the CEA design throughout their design lifetime has been excellent at other plants, (2) the probability of a breach of CEA clad integrity is very small throughout their design lifetime, and (3) the mechanism by which control material would be lost subsequent to a loss of integrity is acknowledged to occur slowly, the possibility of such an occurrence is small. Furthermore, the worths of all full-length CEA groups will be measured and compared to design predictions as part of the test program. Hence, the proposed change does not involve a significant reduction in the margin of safety.

2. The proposed change matches one of the examples given in 51 FR 7751 of amendments that do not involve a significant hazards consideration.

   Example ix, other; The description of the Low Power Physics Test Program as described in the FSAR is being changed to allow use of an alternate test program during subsequent cycles.

E. SAFETY ANALYSIS OF THE PROPOSED CHANGE REQUEST

The proposed Technical Specification change will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR. No modifications are being made to equipment important to safety. The concerns described in Section 4.2.2 of the SER, which is the basis for the present requirement, are associated primarily with subsequent operating cycles after which time the CEAs will have been exposed to operating conditions for some duration. The proposed alternate surveillance method would be at least as effective as the CEA Symmetry Test in identifying significant reactivity loss and would be performed at the same interval as the Symmetry Test thus insuring that surveillance of the effectiveness of the CEAs remains on the same par for either of the test methods used. Therefore, the proposed change will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

The proposed Technical Specification change will not create the possibility for an accident or malfunction of equipment of a different type than any evaluated previously in the FSAR. As described in Section D, the alternate surveillance method (the CEA Group Exchange Test) measures the worth of entire groups where as the CEA Symmetry Test measures individual CEAs. By allowing the performance of the Exchange Test, the plant would experience less off-normal control rod configurations of design values, thus reducing the possibilities of any kind of accident occurring.

The proposed Technical Specification change will not reduce the margin of safety, as defined in the basis for any Technical Specification, because adequate shutdown worth will be confirmed during the test program through performance of control rod group's worth measurements (all full-length groups). Because the possibility of a breach of CEA clad integrity with an attendant loss of control material is considered small and shutdown margin is verified to be sufficient for maintaining the plant within the Safety Analysis at the beginning of each cycle, a reduction in the margin of safety, as defined in the basis for the Technical Specifications, will not occur.

F. ENVIRONMENTAL IMPACT CONSIDERATION DETERMINATION

The proposed change request does not involve an unreviewed environmental question because operation of PVNGS Units 1 and 2 in accordance with this change would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement (FES) as modified by the staff's testimony to the Atomic Safety and Licensing Board, Supplements to the FES, Environmental Impact Appraisals, or in any decisions of the Atomic Safety Licensing Board; or

2. Result in a significant change in effluents or power levels; or

3. Result in matters not previously reviewed in the licensing basis for PVNGS which may have a significant environmental impact.

G. MARKED-UP TECHNICAL SPECIFICATION

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