APS

10 CFR 50.12

Palo Verde Nuclear
Generating Station

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102-04540-CDM/SAB/JAP
March 2, 2001

U.S. Nuclear Regulatory Commission
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References: 1) Letter dated July 17, 1992, "Exemption from 10 CFR 50.46, 10 CFR Part 50, Appendix K, and 10 CFR 50.44," from C. M. Thompson, USNRC, to W. F. Conway, APS

2) Letter dated February 4, 1997, "Lead Fuel Assemblies – Exemption Request," from J. W. Clifford, USNRC, to J. M. Levine, APS

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530
Lead Fuel Assembly - Exemption Request Extension

Pursuant to Title 10 of the Code of Federal Regulations (10 CFR) 50.12(a), Arizona Public Service Company (APS), requests a temporary exemption from the requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K, for PVNGS Unit 3. This exemption will allow continued testing of a Lead Fuel Assembly (LFA) containing fuel rods fabricated with an advanced zirconium based cladding material. The advanced alloy is designated as Alloy A. This cladding material has been previously approved for limited use and testing at PVNGS (references 1 and 2). The requested exemption extension will allow the Unit 3 LFA to exceed the already approved (reference 2) three cycles of burnup to a fourth operating cycle (Unit 3, Cycle 10 – U3C10). Unit 3 Cycle 10 begins in November 2001.

The advanced alloy clad demonstration program is expected to provide performance information that may support the production of fuel rods that can provide improved performance margins and greater operational flexibility at higher fuel burnups. As discussed in Enclosure 1, this exemption is necessary in order to conduct representative testing of cladding material whose chemical composition falls outside the ASTM specification for Zircaloy-4. This testing is intended to: 1) provide data to support the

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development of these new and improved fuel cladding materials and 2) provide a basis for future regulation changes to allow full batch use of Alloy A. This exemption will permit the LFA program to characterize the behavior of a relatively large number of test rods with Alloy A cladding that have operated in pressurized water reactor (PWR) conditions at extended burnup.

The CFR specifies standards and acceptance criteria only for fuel rods clad with zircaloy or ZIRLO. APS requested and, as noted above, was granted an exemption in Reference 1 to use Alloy A in a limited number of pins starting in Cycle 4 and continuing through Cycle 6 in Unit 3. Based on the success of this advanced cladding, APS requested and was granted an exemption in Reference 2 to extend the burnup for a limited number of pins clad with Alloy A during Cycle 7. In this same letter, APS requested and was granted an exemption to use a full assembly of the Alloy A clad in Unit 3, for three operating cycles, starting in Cycle 7. Based on the results of physical examination and measurements that have confirmed the superior performance of Alloy A and NRC's prior approval for a limited number of pins, APS requests an exemption to extend the burnup into Cycle 10 for the full assembly of Alloy A fuel rods. APS believes that the standards of 10 CFR 50.12 are satisfied in this case. Special circumstances are present, pursuant to 10 CFR 50.12(a)(ii), to warrant granting the exemption request.

It is requested that this exemption request be reviewed and approved by August 1, 2001, in order to support fuel procurement and delivery for Unit 3 Cycle 10.

Enclosure 1 provides detailed justification for the proposed exemption. Enclosure 2 provides Westinghouse's technical evaluation of the historical performance of Alloy A in Unit 3 for both the Lead Test Rods (LTR), Cycles 4 through 7, and the Lead Fuel Assembly (LFA), cycles 7 through 9. The evaluation includes justification for the reinsertion of the LFA into Unit 3 operating cycle 10. Enclosure 2 contains information, which is proprietary to Westinghouse Inc. and for which an affidavit is provided. The affidavit (Enclosure 5) sets forth the basis on which the information may be withheld from public disclosure by the Commission and specifically addresses the considerations listed in 10 CFR 2.790(b)(1). Accordingly, it is requested that Enclosure 2 be withheld from public disclosure in accordance with 10 CFR 2.790(b)(1). A non-proprietary version of the safety analysis is provided as Enclosure 3 for your use in docketing this request for an exemption.

In response to our previous request for exemption (reference 2), you requested additional information. Enclosure 4 provides our response as it relates to the current exemption request.

No commitments are being made to the NRC by this letter.

Should you have any questions, please contact Scott A. Bauer at (623) 393- 5978.

Sincerely,

David Mauldin

CDM/SAB/JAP/kg

Enclosures

cc: E. W. Merschoff
J. N. Donohew
J. H. Moorman

ENCLOSURE 1

Request for Exemption from the Provisions of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50 Appendix K for Lead Fuel Assembly

REQUEST FOR EXEMPTION FROM THE PROVISIONS OF 10 CFR 50.46, AND 10 CFR 50, APPENDIX K FOR LEAD FUEL ASSEMBLIES

BACKGROUND

With the recent trends in the nuclear industry regarding increased fuel duty, higher discharge burnups and longer exposure cycles, the corrosion performance requirements for nuclear fuel cladding are becoming more demanding. Under these more demanding operating conditions, standard Zircaloy-4 cladding material may not be the optimum material to maintain fuel cladding integrity or provide the operational flexibility and performance margins needed in the future.

To meet these needs, Westinghouse has developed new cladding materials with improved corrosion resistance and dimensional stability. As part of this development program, several zirconium based cladding alloys were included in two lead fuel assemblies (LFA) which were inserted in the Palo Verde Unit 3 Batch F reload. A limited number of rods were included in the LFAs with these advanced zirconium based cladding materials. Those rods began irradiation in Cycle 4 and a select subset was eventually irradiated through Cycle 7. As the irradiation program progressed, Alloy A cladding emerged as the material with the greatest potential to provide the performance margins that are envisioned for the future. A limited number of Batch F rods with Alloy A cladding were ultimately irradiated for 4 cycles to discharged burnup of ~ 70 MWD/MTU. Poolside examinations conducted for those rods confirmed the alloys superior performance.

In response to the promising performance demonstrated by the limited number of Alloy A clad rods from the Batch F LFA, a second LFA was inserted in Palo Verde Unit 3 as part of Batch J. All 236 rods in that second LFA (assembly P3J408) were fabricated using Alloy A cladding. The irradiation of that LFA began in Cycle 7 and is continuing. The LFA is currently operating for a third cycle in Cycle 9. Interim inspections performed during refueling outages on the assembly and Alloy A clad rods reinforce the data originally generated by the rods from the Batch F LFA.

Westinghouse prepared report CEN-411 (V)-P to support initial testing of Alloy A at PVNGS. Subsequently, Westinghouse prepared and submitted Safety Analysis Report (SAR), CEN-429-P, to document the acceptable performance of Alloy A in the continuing test program and provided a basis for the continuation of testing in larger quantities and to higher burnups. Enclosure 2 is the latest Westinghouse report documenting the results of the data confirming the superior performance of Alloy A and justifying the continued irradiation of this clad material in Unit 3 Cycle 10 to higher burnups.

LFA P3J408 is planned for reinsertion in Palo Verde Unit 3, Cycle 10, beginning in November 2001. The LFA would be inserted for a fourth cycle to collect additional data on rod performance as well as fuel assembly performance. The burnup of this assembly is expected to exceed 60,000 MWD/MTU. Some of the rods with Alloy A cladding are expected to reach 72,000 MWD/MTU. Alloy A is an advanced zirconium-based alloy with a chemical composition other than that of conventional Zircaloy-4 or Zirlo, hence the need for an approved exemption.

Title 10 of the Code of Federal Regulations (10 CFR) 50.46(a)(1)(i) states, "Each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding must be provided with an emergency core cooling system (ECCS) that must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in paragraph (b) of this section. ECCS cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated." 10 CFR 50.46 continues on to delineate specifications for peak cladding temperature, maximum hydrogen generation, coolable geometry, and long-term cooling.

In addition, 10 CFR 50.44(a) states, "Each boiling or pressurized light-water nuclear power reactor fueled with oxide pellets within cylindrical zircaloy or ZIRLO cladding, must, as provided in paragraphs (b) through (d) of this section, include means for control of hydrogen gas that may be generated, following a postulated loss-of-coolant accident (LOCA)...." Since 10 CFR 50.46 and 50.44 specifically refer to fuel with zircaloy or ZIRLO cladding, the use of fuel clad with zirconium-based alloys that do not conform to either of these two designations requires an exemption from this section of the Code.

Finally, 10 CFR 50, Appendix K, paragraph I.A.5, states, "The rate of energy release, hydrogen generation, and cladding oxidation from the metal/water reaction shall be calculated using the Baker-Just equation." The Baker-Just equation presumes the use of zircaloy or ZIRLO cladding. The use of fuel with zirconium-based alloys that do not conform to either of these two designations require an exemption from this section of the Code.

10 CFR 50.12, SPECIFIC EXEMPTION

The standards set forth in 10 CFR 50.12 provide that the Commission may grant exemptions from the requirements of the regulations of this part for reasons consistent with the following:

- the exemption is authorized by law;
- the exemption will not present an undue risk to the public health and safety;
- the exemption is consistent with the common defense and security; and
- special circumstances are present.

This exemption is authorized by law. The remaining standards for the exemption are also satisfied, as described below.

The exemption will not present an undue risk to public health and safety. The previously issued reports generated by Westinghouse (CEN-411 (V)-P, Rev. 2-P and CEN-429-P, Rev. 00-P) demonstrate that the predicted chemical, mechanical, and material performance characteristics of Alloy A cladding are within that approved for zircaloy. A detailed analysis will be performed on assembly P3J408 prior to its reloading in the U3C10 core. This analysis will use cycle-specific conditions to confirm that the cladding would perform within the criteria approved for zircaloy under anticipated operational occurrences and postulated accidents. In addition, poolside inspection of assembly P3J408 will be performed prior to this assembly being reloaded for U3C10. The expected nominal fuel performance characteristics of the advanced zirconium-based clad test rods will be verified through analysis and inspection to be the same, if not superior to those expected for standard Zircaloy-4 fuel rods. The lead fuel assembly will be placed in a non-limiting core location, which does not experience the highest core power density throughout cycle 10. Therefore, the LFA will not present an undue risk to the public health and safety and is consistent with the common defense and security.

This request for an exemption involves special circumstances as set forth in 10 CFR 50.12(a)(2)(ii), which states that special circumstances are present whenever "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The underlying purpose of 10 CFR 50.44 is to ensure that there is an adequate means of controlling generated hydrogen. The hydrogen produced in a post-LOCA scenario comes from a metal-water reaction. The SARs previously mentioned (CEN-411 (V)-P and CEN-429-P) conclude that the use of the Baker-Just equation to determine the metal-water reaction rate is conservative for Alloy A cladding. Therefore, the amount of hydrogen generated by metal-water reaction in these materials will be within the design basis of Palo Verde Unit 3.

10 CFR 50.46 identifies acceptance criteria for ECCS system performance at nuclear power facilities. The effectiveness of the ECCS in Palo Verde Unit 3 will not be affected by the reinsertion of the LFA. Due to the similarities in the material properties of Alloy A to zircaloy as described in the reports CEN-411 (V)-P and CEN-429-P, and the location of the lead fuel assembly in a non-limiting location, it can be concluded that the ECCS performance in Palo Verde Unit 3 will not be adversely affected.

The intent of paragraph I.A.5 of Appendix K to 10 CFR Part 50 is to apply an equation for rates of energy release, hydrogen generation, and cladding oxidation from a metal-water reaction which conservatively bounds all post-LOCA scenarios. CEN-429-P verifies that, due to the similarities in the composition of the Alloy A cladding and zircaloy, the application of the Baker-Just equation will continue to conservatively bound all post-LOCA scenarios.

CONCLUSION

A strict interpretation of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K, would not allow the use of the advanced zirconium-based cladding on fuel rods in lead test assemblies since the cladding material does not fall within the strict definition of zircaloy or ZIRLO cladding. In order to support development of new cladding materials with improved corrosion resistance, an exemption from these requirements is requested. The reports referenced below show that the intent of the regulations would continue to be met, since the predicted chemical, mechanical, and material properties and performance expectation of the advanced cladding materials fall within the range of the properties for Zircaloy-4. Additionally, inspection results for fuel rods with Alloy A cladding further support these expectations. Therefore, application of these regulations is not necessary to meet the underlying purpose of the rule and special circumstances exist to justify the approval of an exemption from the subject requirements.

References:

1. CEN-411 (V)-P, Rev. 2-P, "Safety Evaluation Report for Use of Advanced Zirconium Based Cladding Materials in PVNGS Unit 3 Batch F Demonstration Assemblies," December 1991

2. CEN-429-P, Rev.–00-P, "Safety Analysis Report for Use of Advanced Zirconium Based Cladding Material in PVNGS Unit 3 Lead Fuel Assemblies," August 1996

3. Attachment to Westinghouse Inc. letter V-2001-014, "Performance of Alloy A Clad Rods and LFA in Palo Verde Unit 3," dated February 23, 2001 (Attachment A to M-PV3-FMDE-001, Rev. 00 – Proprietary Version & Attachment B to M-PV3-FMDE-001 – Non Proprietary Version)

ENCLOSURE 3

WESTINGHOUSE INC.
Attachment to letter V-2001-0014
Performance of Alloy A Clad Rods and LFA in Palo Verde Unit 3

(Non-Proprietary)

Performance of Alloy A Clad Rods and LFA in Palo Verde Unit 3

1.0 ALLOY A DEVELOPMENT PROGRAM

Since the late 1980's CENP and APS have cooperated in a development program to demonstrate the performance of advanced fuel rod cladding materials. The objective of the program has been to identify cladding alloys that offer improved corrosion resistance and dimensional stability relative to that of OPTIN™ (optimized Zircaloy-4), CENP's standard PWR cladding alloy. Alloy A, one of the zirconium alloys being evaluated, has demonstrated itself to be the best candidate by its in-reactor performance.

As part of the fuel rod clad alloy development program, Alloy A Lead Test Rods (LTRs) were introduced into Palo Verde Unit 3 in Cycle 4. The LTRs were fabricated as part of an otherwise standard, Batch F assembly. They were irradiated and examined during interim refueling outages following Cycles 4, 5, and 6 in the Batch F assembly. A limited number of Alloy A LTRs were then transplanted into a carrier assembly during the Palo Verde 3, EOC-6 outage for continued irradiation in Cycle 7. At the completion of Cycle 7 the transplanted rods were discharged (rod average burnups up to 69 MWd/kgU) and examined again.

Subsequent to the start of irradiation of the LTRs, a Lead Fuel Assembly (LFA) was fabricated as part of Batch J and loaded in Palo Verde Unit 3 at the beginning of Cycle 7. All 236 rods in the LFA were fabricated using Alloy A cladding. The LFA has operated in Cycles 7 and 8 and has been examined during the refueling outages. The LFA is currently in its third cycle of operation in Cycle 9 and will be examined at the end of the cycle. A fourth cycle of irradiation in Cycle 10 is planned for the LFA in which the lead rods are anticipated to reach average burnups of up to 72 MWd/kgU.

The following sections summarize the results of the examinations of the Alloy A LTRs and LFA after four and two cycles of operation, respectively. These results indicate that little risk is involved in the proposal to increase the maximum rod average burnup of Alloy A clad rods from 69 MWd/kgU for the LTRs, to 72 MWd/kgU for the lead rods of the Alloy A LFA by operation for a fourth cycle in Palo Verde Unit 3.

2.0 ALLOY A IN-REACTOR PERFORMANCE

The Alloy A LTRs were examined after each of their four cycles of operation in Palo Verde Unit 3 (Cycles 4, 5, 6 and 7). The Alloy A LFA was examined after each of its two cycles of operation (Cycles 7 and 8). The examination results are discussed in the following sections.

2.1 Alloy composition

Alloy A is a zirconium-based alloy similar to Zircaloy-4, the standard PWR cladding alloy. The CENP optimized version of Zircaloy-4 in current use is referred to as OPTIN. Reduction in the [ ]. Alloy A has reduced [ ] for increased corrosion resistance while mechanical strength has been maintained with the addition of [ ]. [ ] contents were also adjusted to optimize corrosion resistance.

The range of major alloying elements in Alloy A and OPTIN are identified in Table 2.1:

Table 2.1

Range of Major Alloying Elements in Alloy A and OPTIN

Alloy Designation	Sn%	Fe%	Cr%	Nb%	Zr
(					)
OPTIN	1.2-1.44	0.18-0.24	0.07-0.13	--	Balance

2.2 Visual Appearance

Visual examinations of the assembly carrying the Alloy A LTRs and the Alloy A LFA were performed after each cycle of operation. In addition, single rod examinations were performed on a limited number of Alloy A clad rods following each cycle of operation. The Alloy A clad rods appeared to be in excellent condition after each cycle and exhibited no unusual or unexpected features up to burnups of 69 MWd/kgU. Some small areas of tenacious crud and remnant ESAs (elliptical surface anomalies) were observed on some of the higher burnup LTRs in high power positions.

Spallation of the oxide was observed on the four rods with OPTIN cladding that operated for a 4th cycle with the Alloy A LTRs in Assembly P3F322. No spallation was observed on the LTRs with Alloy A cladding.

2.3 Corrosion

Oxide thickness measurements of Alloy A clad rods were performed after each cycle of operation of the LTRs and the LFA. A maximum, circumferentially averaged oxide thickness was calculated for each rod.

Figure 2.1 shows the Alloy A corrosion performance of the LTRs and LFA rods in Palo Verde Unit 3 relative to the best estimate corrosion curve for low-tin Zircaloy-4 cladding from Palo Verde 1 Batch D. The improvement in corrosion resistance of the Alloy A cladding is up to [ ] depending on burnup.

2.4 Fuel Rod Growth

Length measurements of Alloy A clad rods were performed after each cycle of operation of the LTRs and the LFA and rod growth was determined.

The rod growth measurements of the Alloy A clad rods are shown in Figure 2.2 as a function of rod average fast fluence and compared to the CENP rod growth model. The more dimensionally stable Alloy A clad rods grew [ ] than the average Zircaloy-4 clad rods depending on fast fluence exposure.

2.5 Cladding Creep

Profilometry measurements of Alloy A LTRs and an OPTIN clad rod were performed after two and four cycles of operation. Evaluation of the relative creep rates of Alloy A and OPTIN can only be performed by comparing the creepdown in the unsupported section of cladding in the plenum region, because the data after two and four cycles of operation in the active fuel region of the rod is confounded by contact with the pellets.

Comparative results of Alloy A and OPTIN clad rods after two and four cycles of operation indicate that the Alloy A creep rate is [ ] that of OPTIN. Diameter measurements from the plenum region of the 4-cycle Alloy A LTRs and OPTIN clad rod are shown in Figure 2.3.

3.0 LFA Grid Cage

Reinsertion of the Alloy A LFA will involve exposure of the assembly grid cage for a fourth cycle. Total exposure for four cycles will be about 50,000 EFPH. An indication that the LFA grid cage will perform adequately for a fourth cycle is provided by the results of a hot cell examination on grid cage C1G003 after five cycles of operation (47,200 EFPH) in Calvert Cliffs Unit 1. The results of the metallography and tensile testing demonstrated adequate remaining strength in the structure. Although the LFA grid cage will be exposed for a slightly longer time at a higher temperature than C1G003, it is anticipated that the slightly higher oxidation will not compromise the structural integrity of the grid cage.

4.0 Summary

Examination of the Batch F LTRs with Alloy A cladding after four cycles of operation (rod average burnups up to 69 MWd/kgU) and the Batch J LFA with Alloy A cladding after two cycles of operation (rod average burnups up to 45 MWd/kgU) have shown that the rods are in excellent condition. No apparent anomalies were observed that would indicate unacceptable performance. Examination results indicate that Alloy A cladding offers improvements of up to [ ] in corrosion resistance and [ ] for dimensional stability compared to OPTIN cladding. The creep rate of Alloy A is [ ] that of OPTIN.

Extension of the maximum rod average burnup for Alloy A clad rods from 69 to 72 MWd/kgU by operation for a fourth cycle of the Alloy A LFA in Palo Verde Unit 3 is expected to result in satisfactory performance. The performance of the assembly structure after four cycles of operation is also expected to be satisfactory. However, prior to reinsertion of the LFA for its fourth cycle, measurements will be performed at the EOC-9 outage to verify acceptable fuel rod performance, fuel rod shoulder gap, and guide tube length after three cycles. In addition, all necessary analyses and evaluations, such as in the areas of fuel performance, mechanical design, corrosion, and LOCA, will be performed to ensure that requirements for the fuel rods and assembly structurals will be projected to be met for the fourth cycle.

Figure 2.1

Corrosion Performance of Alloy A Clad Rods

Figure 2.2

Fuel Rod Growth of Alloy A Clad Rods

Figure 2.3

Plenum Creep of Alloy A Clad Rods
after Four Cycles of Operation

ENCLOSURE 4

PVNGS Unit 3 Cycle 10 Exemption Request Extension
Description of Test, Test Assembly, and Test Conditions

PVNGS Unit 3 Cycle 10 Exemption Request
Description of Test, Test Assembly, and Test Conditions

1. Is the test assembly in a rodded location?

Yes. The test assembly will be located under a single four-fingered part length – part strength Control Element Assembly (CEA) from group PL1 (part length group 1). This CEA is depicted in PVNGS UFSAR drawing 4.2-10, "Control Element Assembly Locations," (drawing attached) as the center CEA.

2. What is the exact location of the test assembly in the core?

The assembly, P3J408, will be located in the center of the core at box 121, PVNGS UFSAR drawing 4.3-6 (drawing attached).

3. What are the values of Fq and F delta H in the test rods?

The test assembly will be in a "non-limiting core location." A non-limiting location is defined by APS for this test assembly as being a location where power of the peak rod in the test assembly is 95% or less than the peak rod in the core.

Fq and F delta H are terms typically applied to Westinghouse fuel. Similar defining parameters for Combustion Engineering fuel include the following:

a. Fxy - 2d planar radial peak (Fq/Fz)
b. Fr - Integrated radial peak (F delta H)

The values for these parameters given below are for the time in Cycle 10 when the percentage of the peak rod is the highest.

	Peak rod in core	Alloy A P3J408	P3J408 % of peak rod
Fxy	1.393	0.835	60
Fr	1.379	0.811	59

4. What are the details of the long term test program?

The long term test program involves the continued testing of the Alloy A clad material. Testing of this material includes individual rod testing to higher burnups. The scope of the test program that is planned by Westinghouse includes determination of material properties and irradiation performance characteristics of Alloy A.

The broad categories of tasks in the long term plan include the following:

- Pre-irradiation testing and manufacturing development for fabricating cladding materials with potential for superior in-reactor performance.
- In-reactor testing of lead test rods.
- In-reactor testing of lead test assemblies.
- Poolside examinations to monitor performance.
- Hot cell examinations subsequent to discharge of fuel rods at selected burnup intervals.
- High-temperature material property tests for safety related analyses and evaluation.
- Topical report to NRC for approval of batch-wide application.

It should be noted that the test program is based on the premise that the cladding materials selected will continue to exhibit superior performance characteristics (e.g. improved corrosion resistance and/or dimensional stability) in comparison to the current standard cladding. The continued irradiation in cycle 10 will be discontinued if interim poolside examination results obtained after cycle 9 indicate unsatisfactory performance. Additionally, if the cladding alloy does not show expected performance advantages over standard cladding, further tests planned for these materials, such as the hot cell examinations and high-temperature material property tests, may not be performed.

5. What inspection parameters are included in hot cell testing?

The following points are typically included in performing hot cell exams.

- Visual inspection.
- Gamma scanning to determine local burnup of cladding and fuel sections used in subsequent tests.
- Rod puncture and gas collection to determine a number of parameters related to fuel behavior such as rod void volume, rod internal pressure, and fission gas release fraction.
- Metallographic examination to compare oxide thickness on the cladding determined in the poolside examination and hydride morphology.
- Quantitative analysis to determine hydrogen in the cladding for comparison to local oxide thickness to determine hydrogen absorption fraction.
- Cladding mechanical property testing to characterize ductility and strength.
- Fractography using optical/scanning microscopy.

6. What plans are there to perform drag testing, i.e. drop time testing?

As a result of NRC Bulletin 96-01, Control Rod Insertion Problems, Combustion Engineering (CE) evaluated its fuel assemblies to look for potential mechanisms which could prevent control rods from fully inserting during a reactor trip. The results from this evaluation were submitted by CE to the NRC on October 17, 1996 in report CE NPSD-

1049-P, Rev. 2 June 1996. Overall, the report found no mechanisms that would prevent control rods from fully inserting.

The evaluation performed in response to Bulletin 96-01 included a sample of these drop times. No significant increase in drop times for high burnup assemblies was noted in any of the data evaluated.

In-reactor testing of the test clad to date has not shown any behavior that would lead to an abnormal condition which would affect assembly guide tubes, control rod insertion capability, or have any effects on the other structural components of the assembly. The structural components of the lead test assembly, namely the guide tubes, spacer grids and the end fittings, are identical in design and material to the standard fuel being fabricated for Unit 3 Cycle 10. Consideration was given to perform additional testing as a result of the NRC's request for more information. However, based on the above points, APS does not believe that more frequent or detailed drop time testing for the lead test assemblies is necessary at this time.

Nevertheless, APS performs drop time surveillance testing for each of the 89 CEAs in the core following each refueling outage. For Cycle 10, the test assembly will be in a rodded location and hence, is subjected to normal drop time testing. The CEA above the LFA is a part length rod. Under certain conditions, which would prevent normal testing, alternate testing does not test part length rods since part length rods are not credited for shutdown margin.

7. What dimensional changes are involved with the test assembly?

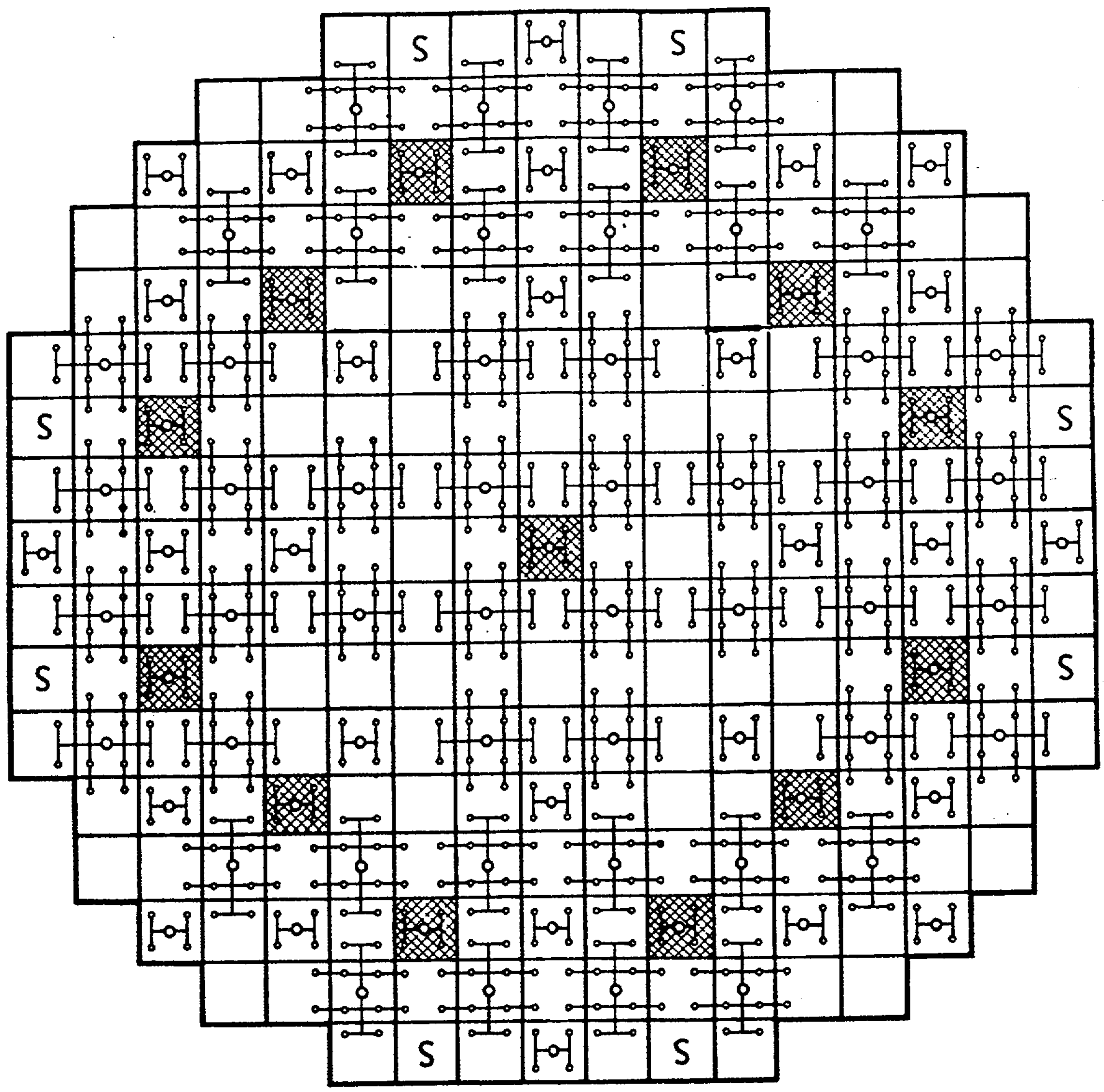
No dimensional changes will exist for structural components and test rods in assembly P3J408 as compared to the remainder of the fuel manufactured for Unit 3 Cycle 10. Rod endcaps in the Alloy A assembly will be fabricated from standard OPTIN material. Assembly grids, guide tubes, and top and bottom end fittings will be the same for the test assemblies as for the rest of the Unit 3 Cycle 10 fuel.

8. What are the end of cycle 9 poolside inspection parameters?

Inspections of test rods and assembly will be performed in the spent fuel pool following operating Cycle 9. The rods are typically examined for oxide thickness, axial fuel rod growth and/or shoulder gap, ovality, and cladding diameters over the length of the rods. Visual inspections are also performed to evaluate surface conditions and look for defects.

9. How long will the test assembly be in-core for testing?

The new assembly clad with Alloy A has been in Unit 3 for cycles 7, 8, and 9 and is planned to be re-inserted in cycle 10. The expected peak rod exposure (axially averaged) of this assembly during this cycle will not exceed 72,000 MWD/MTU.



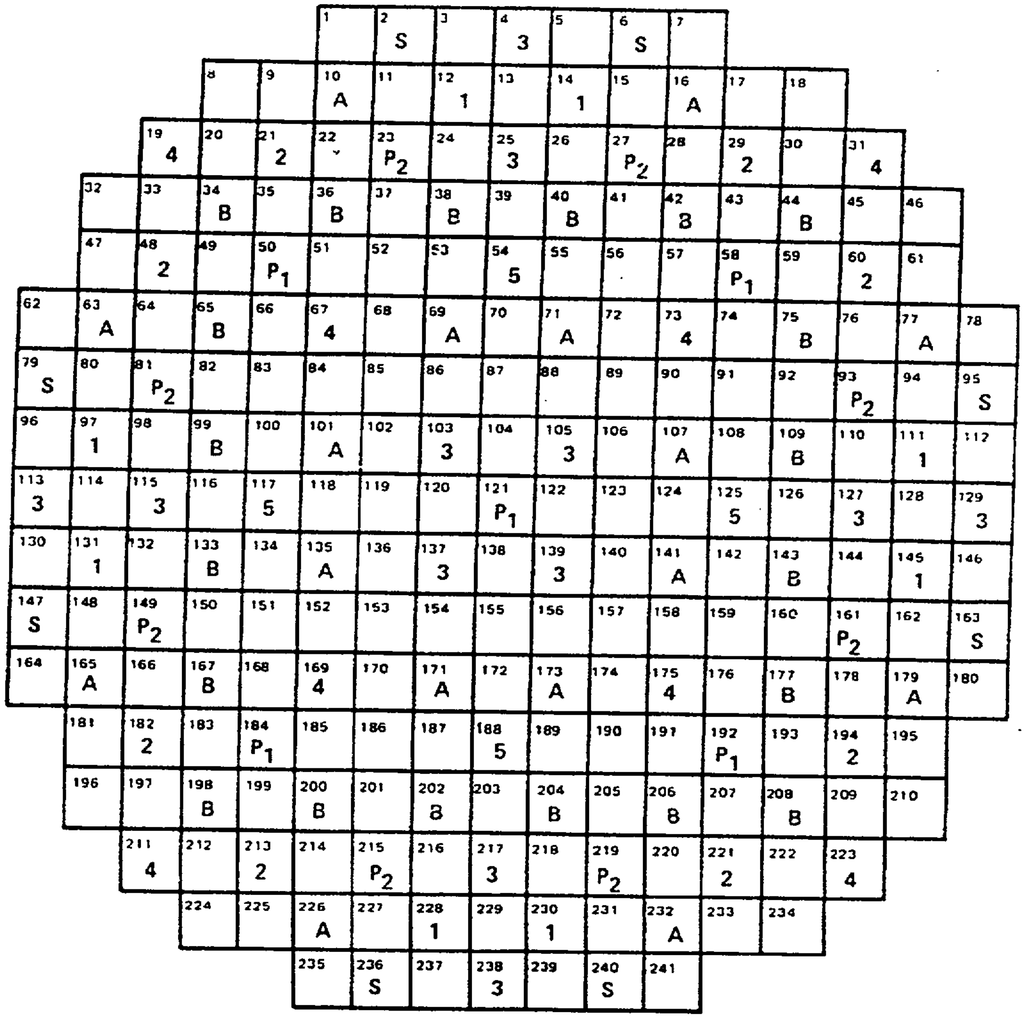
12 ELEMENT FULL LENGTH CEA's	48	
4 ELEMENT FULL LENGTH CEA's	28	
4 ELEMENT PART LENGTH CEA's	13	
TOTAL	89	CEA's
S DENOTES SPARE CEA LOCATIONS	8	

Palo Verde Nuclear Generating Station
Updated FSAR

CONTROL ELEMENT ASSEMBLY LOCATIONS

Figure 4.2-10

3 – THIRD REGULATING BANK
2 – FOURTH REGULATING BANK
1 – LAST REGULATING BANK
B – SHUTDOWN BANK B
A – SHUTDOWN BANK A
P_2 – PLR GROUP 2
P_1 – PLR GROUP 1
S – SPACE CEA LOCATIONS



PALO VERDE NUCLEAR GENERATING STATION

UPDATED FSAR

CEA BANK IDENTIFICATION

FIGURE 4.3-6

ENCLOSURE 5

WESTINGHOUSE INC.
Proprietary Affidavit for Unit 3 Lead Fuel Assembly - Exemption Request Extension

I, Philip W. Richardson, depose and say that I am the Licensing Project Manager of CE Nuclear Power LLC (CENP), duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and described below.

I am submitting this affidavit in conjunction with the application by Arizona Public Service Company and in conformance with the provisions of 10 CFR 2.790 of the Commission's regulations for withholding this information. I have personal knowledge of the criteria and procedures utilized by CENP in designating information as a trade secret, privileged, or as confidential commercial or financial information.

The information for which proprietary treatment is sought, and which document has been appropriately designated as proprietary, is contained in the following:

- *Attachment to letter V-2001-014, "Performance of Alloy A Clad Rods and LFA in Palo Verde Unit 3," dated February 23, 2001.*

Pursuant to the provisions of Section 2.790(b)(4) of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information included in the document listed above should be withheld from public disclosure.

i. The information sought to be withheld from public disclosure is owned and has been held in confidence by CENP. It consists of information concerning the design, development, and performance of Alloy A fuel cladding.

ii. The information consists of test data or other similar data concerning a process, method or component, the application of which results in substantial competitive advantage to CENP.

iii. The information is of a type customarily held in confidence by CENP and not customarily disclosed to the public.

iv. The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.790 with the understanding that it is to be received in confidence by the Commission.

v. The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements that provide for maintenance of the information in confidence.

vi. Public disclosure of the information is likely to cause substantial harm to the competitive position of CENP because:

   a. A similar product is manufactured and sold by major competitors of CENP.

   b. Development of this information by CENP required hundreds of thousands of dollars and thousands of manhours of effort. In order to acquire equivalent information, a competitor would need to invest considerable time, expense and inconvenience to design, develop, manufacture and test the subject fuel cladding.

   c. The information consists of technical data and details concerning the design, development, and performance of Alloy A as applied to lead test fuel rods, the application of which provides CENP a competitive economic advantage. The availability of such information to competitors would enable them to design their product to better compete with CENP, take marketing or other actions to improve their product's position or impair the position of CENP's product, and avoid developing similar technical analysis in support of their processes, methods or apparatus.

d. In pricing CENP's products and services, significant research, development, engineering, analytical, manufacturing, licensing, quality assurance and other costs and expenses must be included. The ability of CENP's competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

e. Use of the information by competitors in the international marketplace would increase their ability to market steam generator repair systems and services by reducing the costs associated with their technology development. In addition, disclosure would have an adverse economic impact on CENP's potential for obtaining or maintaining foreign licenses.

Philip W. Richardson
Licensing Project Manager

Sworn to before me this 22nd day of February 2001.

Joan C. Hastings
Notary Public

My Commission expires: JOAN C. HASTINGS
NOTARY PUBLIC
MY COMMISSION EXPIRES SEP. 30, 2002