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STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
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RECIP.NAME RECIPIENT AFFILIATION
TEDESCO,R.L. Assistant Director for Licensing

SUBJECT: Forwards responses to 810714 ltr re unresolved safety issues.Items 1-5 also apply to CESSAR docket.

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September 16, 1981
ANPP-18933-JMA/TFQ

Mr. R. L. Tedesco
Assistant Director for Licensing
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3
Docket Nos. STN-50-528/529/530
File: 81-056-026; G.1.10

Reference: Letter from R. L. Tedesco, NRC, to EEVBJr, dated July 14, 1981; Subject: Unresolved Safety Issues Information Request

Dear Mr. Tedesco:

Attached are responses to items 1, and 6 through 13, of the referenced letter for your use. Items 1 through 5 are also applicable to the CESSAR docket.

Please contact me if you have any further questions on these matters.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President
Nuclear Projects
ANPP Project Director

EEVBJr/TFQ/bj

Attachment

cc: J. Kerrigan (w/a)
P. Hourihan "
A. Gehr "

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1/1

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority so to do, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt

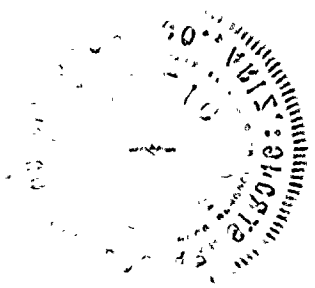
Edwin E. Van Brunt, Jr.

Sworn to before me this 23rd day of September, 1981.

Connie Lou Armstrong
Notary Public

My Commission expires:

June 24, 1983



UNRESOLVED SAFETY ISSUES - PVNGS

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UNRESOLVED SAFETY ISSUES - PVNGS

I Introduction

This status report responds to a request for information from Mr. Robert L. Tedesco to Mr. E. E. Van Brunt, Jr. dated July 14, 1981, regarding the following generic issues:

1. Water Hammer (A-1)
2. Steam Generator Tube Integrity (A-4).
3. ATWS (A-9)
4. Reactor Vessel Materials Toughness (A-11)
5. Steam Generator and Reactor Coolant Pump Support (A-12)
6. Systems Interaction (A-17)
7. Seismic Design Criteria (A-40)
8. Containment Emergency Sump Performance (A-43)
9. Station Blackout (A-44)
10. Shutdown Decay Heat Removal Requirements (A-45)
11. Seismic Qualification of Euipment in Operating Plants (A-46)
12. Safety Implications of Control Systems (A-47)
13. Hydrogen Control Measures and Effects of Hydrogen Burns on Safety Equipment (A-48)

This report identifies investigative programs conduced by Arizona Public Service Company (APS) and the interim measures, if any, considered to be appropriate for each issue. The report also identifies which issues do not specifically apply to PVNGS Units 1, 2, and 3 Docket Nos. STN 50-528, 529, and 530 but rather apply to CESSAR Docket No. STN 50-470.

II Investigative Programs/Interim Measures

1. Water Hammer (A-1)

APS is presently conducting an analysis of the potential for water-hammer in the Main and Auxiliary Feedwater System piping.

This analysis is considering NUREG-0582, specifically the concerns of valve closure times, potential for slug flow due to layout, and snubber design, as well as other design requirements of Section III of the ASME B&PV code.

This water hammer analysis is projected to be completed by January 1981. It is anticipated that the PVNGS main and auxiliary feedwater piping design will preclude any adverse effects of water hammer.

Reviews of the potential for water hammer within CESSAR scope components (e.g. steam generator) are applicable to the CESSAR docket.

2. Steam Generator Tube Integrity (A-4)

This issue is applicable to the CESSAR docket.

3. ATWS (A-9)

This issue is applicable to the CESSAR docket.

4. Reactor Vessel Materials Toughness (A-11)

This issue is applicable to the CESSAR docket.

5. Steam Generator and Reactor Coolant Pump Support (A-12)

This issue is applicable to the CESSAR docket.

6. Systems Interaction (A-17)

A.P.S. has conducted intensive interdiscipline reviews to ensure that plant systems do not interact in a manner detrimental to safety under structural failure or loss of ESF or non-ESF system integrity. The reviews are documented in an auditable form. A summary of the review process is provided in FSAR Section 3.6.1.2. These reviews included consideration of ESF train separation (spatially and by barriers), train independence, and protection of safety grade components from failures related to nonsafety grade components.

The design process at PVNGS has incorporated several different types of interdiscipline reviews directed towards identifying system interfaces and the potential for interactive effects. Multidiscipline reviews, including reviews by personnel knowledgeable of overall plant design and licensing criteria, have been conducted for the following design elements important to safety:

- Design Criteria
- C-E Interface Documents
- System Descriptions
- Piping and Instrumentation Diagrams
- Specifications
- Control Logics
- Elementary and Single-Line Diagrams
- Layout
- PSAR and FSAR
- Startup Test Procedures
- Operational Procedures
- Fire Protection Evaluation Report (FPER)

Additionally, the hazards analysis/separation reviews noted above and the ALARA reviews (refer to FSAR Appendix 12B) were conducted on a multidiscipline basis using the PVNGS three dimensional, scale model to assure that systems are properly segregated and protected. Currently, field walkdowns are being conducted to ensure that the as-built design conforms to the engineered design. This process will continue through startup testing. At the end of the design, review, and testing phases there will be significant assurance that PVNGS systems will not interact in an unsafe manner.

Additionally, the fire hazards analysis (refer to the FPER), cable and train (refer to the FPER) noted above and the ALARA reviews (refer to FSAR Appendix 12B) were conducted on a multidiscipline basis using the PVNGS three dimensional, scale model to assure that systems are properly segregated and protected. Currently, field walkdowns are being conducted to ensure that the as-built design conforms to the engineered design. This process will continue through startup testing. At the end of the design, review, and testing phases there will be significant assurance that PVNGS systems will not interact in an unsafe manner.

An additional review with C-E is being conducted concerning the interaction of high and moderate energy pipe breaks with nonsafety grade instrumentation in response to IE Bulletin 79-22. Current PVNGS plans in this area were discussed at the BOP Instrumentation and Control Systems Independent Design Review. This review will ensure that the potential interaction with equipment C-E assumed functional in accident analyses is prevented by separation (or equivalent design measures) or that the interaction is included in accident analyses. Either course will ensure that the requirements of 10CFR50 and 10CFR100 are met.

7. Seismic Design Criteria (A-40)

PVNGS seismic design has not changed since issuance of Construction Permits CPPR 141, 142, and 143. As noted in FSAR Section 2.5.2, the operating basis earthquake has a zero period ground level acceleration of 0.1g. The safe shutdown earthquake zero period ground level acceleration is 0.2g. Further reviews conducted in regard to PVNGS Units 4 and 5 (Docket Nos. STN 50-592 and 593) indicated that changes to seismic design were not required. No additional reviews beyond those completed and described in FSAR Section 2.5 are planned prior to the completion by the NRC of its actions noted in Task A-40.

8. Containment Emergency Sump Performance (A-43)

The design of the emergency recirculation sump screens is in compliance with the recommendations of Regulatory Guide 1.82 and assures that they will not become completely blocked by debris such as insulation. The screen is composed of three layers to preclude complete blockage. The first layer acts as a trash rack. It is stainless steel grating, 2 1/4" x 3/16" openings. The second layer is stainless steel wire cloth having one-half inch square openings. The third layer is the fine screen which is made of 0.09 inch opening stainless steel wire cloth. All sump screens are vertical and are placed on a three-inch high curb. The floor level in the sump vicinity slopes toward local floor drains.

The PVNGS design also incorporates vortex breakers and has successfully undergone 1:1 scale hydraulic testing in accordance with the recommendations of Regulatory Guide 1.79. This ensures that air entrainment, vortices, and excessive pressure drops do not occur. Additional details of the sump design were addressed in the Containment Systems Independent Design Review.

9. Station Blackout (A-44)

Each PVNGS unit design includes four independent sources of offsite preferred power (as well as two onsite sources of preferred power from the other PVNGS units), two redundant, independent ac ESF load groups with diesel generator supplied onsite power, four independent dc ESF load groups (powered by batteries or inverted from the diesel generator ac power), and four redundant, vital 120 V-ac instrument load groups (supplied by the diesel generator or inverted from dc).

The second layer is

Metal deposited on layered iron de-

The onsite diesel generators are designed and installed in accordance with NUREG/CR-0660 except for those items where compliance would be inconsistent with reliable diesel generator performance due to supplier mandated requirements (e.g., duration of prelube). A point-by-point comparison of PVNGS design with NUREG/CR-0660 is part of the record of the AC Power Independent Design Review.

This design provides substantial assurance that PVNGS will not undergo a station blackout. If one should occur, a steam turbine driven auxiliary feedwater pump can provide adequate feedwater for at least two hours. This would allow time to re-establish ac power. The controls for this pump and associated valves are powered by DC. Additional details regarding the reliability and sensitivity of the PVNGS design for this event are provided in FSAR Appendix 10B and the AC Power and Auxiliary Feedwater System Independent Design Reviews.

APS responded (Letter from E. E. Van Brunt, Jr. to D. G. Eisenhut, ANPP-17952, May 12, 1981) to an NRC request (Generic Letter 81-04, February 25, 1981) related to station blackout emergency procedures and training. In the response, APS committed to include station blackout events in the operator training and requalification programs. Procedures required to cope with station blackout will be available for onsite NRC review 60 days prior to fuel load.

10. Shutdown Decay Heat Removal Requirements (A-45)

PVNGS design includes redundant ESF auxiliary feedwater systems (AFS) and redundant ESF shutdown cooling systems with redundant ESF support systems to ensure adequate capability to remove decay heat. A third, non-ESF, auxiliary feedwater train is also provided. The motor-driven pump for this train can be manually loaded onto a diesel generator. The design of the AFS includes a steam turbine driven auxiliary feedwater pump that can provide adequate feedwater for at least two hours. For additional information regarding the reliability of decay heat removal, refer to the Auxiliary Feedwater Reliability Study in FSAR Appendix 10B.

11. Seismic Qualification of Equipment in Operating Plants (A-46)

PVNGS seismic qualification of equipment meets the requirements of Commission Order CLI-80-21, dated May 23, 1980 and is in conformance with Regulatory Guide 1.89, Revision 0, IEEE Standard 344-1975, and NUREG-0588. The PVNGS seismic level selected based on site investigation is 0.1g(OBE) and 0.2g(SSE); however, the seismic level used in design and qualification of structures and equipment is 0.13g(OBE) and 0.25g(SSE). Free-field spectra were developed consistent with Regulatory Guide 1.60. The damping values of Regulatory Guide 1.61 were used to develop in-structure seismic response data. Further information regarding this Task Action Plan item was discussed at the Equipment Qualification Independent Design Review.

12. Safety Implications of Control Systems (A-47)

PVNGS design includes two normal channels and four independent ESF channels of instrumentation. The separation of these systems and the susceptibility of the design to common failure were discussed at the BOP Instrumentation and Control System Independent Design Review (IDR). The IDR record specifically considered the concerns of IE Bulletins 79-22 and 79-27 and concluded that the present design provides adequate protection against single failures. Refer also to the response regarding system interaction (A-17). Cold shutdown can be reached with the loss of any single instrument distribution panel.

13. Hydrogen Control Measures and Effects of Hydrogen Burns on Safety Equipment (A-48)

The PVNGS containment has 2.6×10^6 cubic feet of net-free volume. In this regard, PVNGS design is similar to the Waterford containment design. It has a design pressure of 60 psig and can withstand 90 psig without exceeding stress limits. Two independent, redundant ESF trains of hydrogen monitors and portable recombiners are provided. Each train has separate, dedicated containment penetrations. A non-ESF filtered purge is available. Therefore, no near term mitigation measures are required by the interim rule on hydrogen control published in the Federal Register, October 2, 1980, or by NUREG-0737.