

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket Nos.: 50-528; 50-529; 50-530  
License Nos.: NPF-41; NPF-51; NPF-74  
Report No.: 50-528/99-17; 50-529/99-17; 50-530/99-17  
Licensee: Arizona Public Service Company  
Facility: Palo Verde Nuclear Generating Station, Units 1, 2, and 3  
Location: 5951 S. Wintersburg Road  
Tonopah, Arizona  
Dates: August 30 through September 3, 1999  
Inspectors: M. Runyan, Senior Reactor Inspector  
Engineering and Maintenance Branch  
W. McNeill, Reactor Inspector  
Engineering and Maintenance Branch  
Approved By: Dr. Dale A. Powers, Chief,  
Engineering and Maintenance Branch  
Division of Reactor Safety

ATTACHMENT Supplemental Information

9910120220 991002  
PDR ADOCK 05000528  
G PDR



EXECUTIVE SUMMARY

Palo Verde Nuclear Generating Station, Units 1, 2, and 3  
NRC Inspection Report No. 50-528/99-17; 50-529/99-17; 50-530/99-17

Engineering

- The licensee had established and implemented an effective program for performing 10 CFR 50.59 safety evaluations. Safety evaluations reviewed were observed to be rigorous, comprehensive, and of high quality (Section E2.1).
- The licensee's policy on increase in consequences of an analyzed accident was not consistent with the requirements of 10 CFR 50.59. The licensee defined an increase in consequences to indicate that the calculated dose exceeds an applicable regulatory limit established in 10 CFR Part 100 or the General Design Criteria. The NRC considers an increase in consequences to constitute any increase in dose beyond that previously calculated and reported in the Updated Final Safety Analysis Report. Over the past 3 years, no violation examples existed (Section E2.1).
- A violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified for failure, during initial plant design and construction, to apply adequate design controls to ensure that cables associated with the station batteries and the emergency lighting batteries in each unit were separated in accordance with the requirements of Regulatory Guide 1.75. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as Condition Report/Disposition Request 99-100622 (Section E2.1).
- A violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified for failure to take prompt corrective action in response to the licensee's discovery of an electrical cable separation nonconformance associated with the station and emergency lighting batteries in Units 1 and 3. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as Condition Report/Disposition Request 99-100622 (Section E2.1).



## Report Details

### Summary of Plant Status

Units 1, 2, and 3 were in Mode 1 during the inspection.

### III. Engineering

#### **E2 Engineering Support of Facilities and Equipment**

##### **E2.1 10 CFR 50.59 Program and Implementation**

###### **a. Inspection Scope (37001)**

The inspectors reviewed the licensee's 10 CFR 50.59 safety evaluation program and its implementation. The review included an examination of procedures, screenings, safety evaluations, and the training and qualification records of personnel.

###### **b. Observations and Findings**

###### **10 CFR 50.59 Program**

The licensee's 10 CFR 50.59 program was described in Procedure 93DP-0LC07, "10 CFR 50.59 Screenings and Evaluations," Revision 2. The licensee reviewed changes to the plant as described in the Updated Final Safety Analysis Report (UFSAR), first for applicability to 10 CFR 50.59, then screened changes that did not require evaluations, and lastly performed safety evaluations, if necessary.

Section 3.2.1 of Procedure 93DP-0LC07 listed criteria for excluding changes from a 10 CFR 50.59 screening. This criteria included the presence of an existing evaluation or screening that adequately addresses the change, a change that merely restores conformance with the UFSAR, a change that was previously approved by the NRC, a change that was purely administrative or editorial in nature, a correction to UFSAR inconsistencies, or minor drawing corrections. The inspectors considered the exclusion criteria to be appropriate.

For those changes determined to be applicable to 10 CFR 50.59, Procedure 93DP-0LC07 listed criteria used to determine whether safety evaluations were necessary and, if so, listed questions to determine whether unreviewed safety questions existed. The inspectors considered this procedural guidance to be consistent with 10 CFR 50.59.



#### 10 CFR 50.59 Screenings

The inspectors reviewed 18 10 CFR 50.59 screenings where the licensee had concluded that safety evaluations were not required. In each case, the screening document adequately justified the decision to not perform a safety evaluation.

#### 10 CFR 50.59 Safety Evaluations

The inspectors reviewed 27 10 CFR 50.59 safety evaluations. The inspectors found each of these evaluations to be rigorous, comprehensive, and of high quality.

#### 10 CFR 50.59 Non-Applicability Reviews

The inspectors reviewed three safety-related changes that were determined by the licensee to not require a 10 CFR 50.59 screening or safety evaluation because they met a prescribed criterion for exclusion from the 10 CFR 50.59 process.

The inspectors identified a concern related to one of the non-applicability reviews. Deficiency Work Order 00828838, dated January 29, 1998, identified that a Class 1E cable of the station battery in Unit 2 was within 36 inches (horizontal) of the dc power cable jumper of the non-Class 1E emergency lighting battery, without the presence of a damage limiting barrier. This configuration was in conflict with the requirements of Regulatory Guide 1.75, to which the licensee was committed. Condition Report/Disposition Request (CRDR) 1-8-0013 was written on January 8, 1998, to document this condition, which was observed to exist in two battery rooms in each of the three units. Therefore, a total of six separation discrepancies existed. The nonconforming cable separation distances ranged from approximately 27 to 30 inches, versus the 36-inch requirement.

During the inspection, the licensee's representative speculated that the cable separation problem originated in 1992 and 1993 when new round cell batteries were installed in each unit. At the time of installation, the emergency lighting batteries were physically covered for protection, and, therefore, the associated cables were not noted to be located within the Regulatory Guide 1.75 minimum separation distance. Subsequent to the inspection, the licensee's representative informed the inspectors that a review of original specifications indicated that the discrepancy had existed since the time of initial plant licensing (Unit 1 - December 31, 1984, Unit 2 - December 9, 1985, and Unit 3 - March 25, 1987).

Criterion III of Appendix B, 10 CFR Part 50, "Design Control," states, in part, that measures shall be established to assure that applicable regulatory requirements for safety-related components are correctly translated into specifications, drawings, procedures, and instructions. The UFSAR committed to Regulatory Guide 1.75, which required that safety-related cables be separated by at least 36 inches horizontally. The licensee's failure, during initial plant design and construction, to assure that these regulatory requirements were correctly translated to drawings and specifications associated with the station and emergency lighting battery cables was identified as a violation of 10 CFR Part 50, Appendix B, Criterion III. This Severity Level IV violation is



being treated as a noncited violation (50-528; -529, -530/9917-01), consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as CRDR 99-100622.

Deficiency Work Order 00828838 and the Deficiency Work Orders 00828834, 00828835, 00828837, 00828839, and 00828840, addressing the five other separation discrepancies, were all dispositioned as not requiring a 10 CFR 50.59 screening or evaluation because the licensee intended to restore compliance to Regulatory Guide 1.75 during the next refueling outage on each unit (Unit 1- Spring 1998, Unit 3 - Fall 1998, and Unit 2 - Spring 1999). This work was to be accomplished in coordination with a replacement of the station batteries in each unit (installation of square cell batteries). An operability evaluation was not performed in response to CRDR 1-8-0013 or any of the deficiency work orders. However, CRDR 1-8-0013 included a statement that the "Regulatory Guide 1.75 separation requirements are not considered an equipment operability issue as detailed in CRDR 95-Q633. However, identified deficiencies should be resolved in a timely manner." Condition Report/Disposition Report 95-Q633 was noted by the inspectors to not contain an analytical assessment of operability, but rather referred to an NRC internal letter (Darrell G. Eisenhut to John A. Olshinski, December 20, 1983) that contained the following text:

"We do not believe that the physical separation barriers of R.G. 1.75 represent a first order of safety importance. More significant are those fire barriers of Appendix R which provide protection against an exposure fire affecting redundant safe shutdown capability and as such are included in the Technical Specifications. Therefore, we do not believe that physical separation barriers of R.G. 1.75 should be included in the Technical Specifications."

On this basis, the licensee concluded that [quoted from CRDR 95-Q633] "[t]herefore, it appears that the NRC does not consider nonconformances to Regulatory Guide 1.75 to be an 'operability' issue." The inspectors considered the above by itself to not necessarily constitute an adequate operability basis. However, the stationing of fire watches in these areas (which had been established previously for other reasons) provided justification for operability. Additionally, the inspectors did not consider the separation deficiencies to be a significant technical concern because of the existing separation (at least 27 inches) and the low probability of faults or fires propagating across this distance.

As of September 3, 1999, approximately 20 months after initial discovery of the problem, only two of the six separation problems had been corrected. This occurred during the Unit 2 refueling outage in Spring 1999, when the round cell station batteries were replaced. Because the battery replacement itself did not correct the separation problem, damage limiting barriers were erected in each of the Unit 2 battery rooms to restore Regulatory Guide 1.75 compliance. The separation problems in Units 1 and 3 were not corrected during the two refueling outages in 1998 because of vendor supply problems



that delayed by one operating cycle the battery replacement in these units. The licensee did not reconsider the corrective action plan for the Unit 1 and 3 separation deficiencies in response to the delay in replacing the batteries in these units. The licensee's representative stated that installation of the new batteries and correction of the separation issues would occur during the Fall 1999 refueling outage for Unit 1 and the Spring 2000 refueling outage for Unit 3.

The inspectors concluded that the licensee's actions in this instance were not in violation of 10 CFR 50.59 because Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1, does not require a safety evaluation for nonconforming conditions that the licensee intends to restore to compliance. However, within this allowance was an expectation that compliance will be restored at the next available opportunity. In this case, the licensee failed to re-evaluate the corrective action plan for the cable separation problems when the original corrective action schedule was delayed by one operating cycle. During the inspection and in response to the inspectors' finding, the licensee issued CRDR 99-100622, which was generated to review the corrective action issues and to perform a formal operability review of the separation issue. As noted above, the inspectors did not consider the nonconformances to constitute an immediate safety or operability concern.

Criterion XVI of Appendix B, 10 CFR Part 50, "Corrective Action," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. The licensee failed to correct in a prompt manner nonconformances associated with Regulatory Guide 1.75 separation criteria in Units 1 and 3. This failure was identified as a violation of 10 CFR Part 50, Appendix B, Criterion XVI. This Severity Level IV violation is being treated as a noncited violation (50-528; -530/9917-02), consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as CRDR 99-100622.

#### Consequences of an Accident

The inspectors noted that the licensee's definition of an increase in accident consequences endorsed Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Safety Evaluations," Revision 0, dated September 1997. This document identified that an increase in calculated dose resulting from a plant change would not be considered an increase in consequences under 10 CFR 50.59 unless the revised doses exceeded regulatory limits as defined in 10 CFR Part 100 or the General Design Criteria. The only exception was where the licensing document specifically addressed and credited the existing margin between the calculated and limiting doses. The licensee's policy on increase in consequences was not consistent with the NRC position, which establishes the existing dose calculations in the UFSAR as the basis for determining if an increase in consequences has occurred. Use of the licensee's policy could result in NRC enforcement action. The inspectors noted that during the time period reviewed within this inspection (3 years), a violation did not exist.



### Operator Response Times

The inspectors did not find in any procedure or lesson plan where the licensee had emphasized to reviewers the possibility of a 10 CFR 50.59 impact resulting from changes to environmental conditions (physical barriers, heat, oxygen, radiation, lighting, radiography, steam, etc.), as well as procedure changes that add operator actions to recovery efforts, or modifications that cause equipment response to be slower (such as, increasing motor-operated valve gear ratios). The concern was that assumed operator response times in the UFSAR may be affected by subtle changes of this nature.

One site-specific example that appeared relevant to this concern was a change within UFSAR, Section 9.5.3, to reflect that areas not routinely inhabited by personnel may not be equipped with emergency lighting (Safety Evaluation 97-00140). The licensee intended to use this UFSAR change to permit removal of batteries from emergency lighting fixtures in containment while the unit was in Modes 1 through 4. In cases where a containment entry was needed during or immediately following operation in these modes, portable lighting was to be used to provide necessary illumination, if offsite power sources supplying normal lighting is not available. The inspectors noted that the 10 CFR 50.59 evaluation did not address the impact that this change could have on assumed operator response times, noting that use of portable illumination would likely result in increased times to perform certain tasks. The inspectors questioned the licensee's representative whether any operator action times in the UFSAR were applicable to this case and were informed that there were no operator actions necessary for safe shutdown inside containment for any accident scenarios.

### Training and Qualifications

The inspectors assured, through a spot check of selected safety evaluations, that the preparers and reviewers of 10 CFR 50.59 evaluations and screenings were included on the licensee's list of qualified personnel. The inspectors reviewed two training documents (NGS03-02-RC-001-00, "50.59 Requalification (1998)," June 19, 1998, and NGT02-04-RC-001-008, "Engineering Support Personnel Training," September 23, 1998) and observed that they, with the exception of the definition of accident consequences (as discussed above), were consistent with the requirements of 10 CFR 50.59.

#### c. Conclusions

The licensee had established and implemented an effective program for 10 CFR 50.59 evaluations. The inspectors found the 10 CFR 50.59 evaluations to be rigorous, comprehensive, and of high quality.

The licensee's policy on increase in consequences of an analyzed accident was not consistent with the requirements of 10 CFR 50.59. The licensee defined an increase in consequences to indicate that the calculated dose exceeds an applicable regulatory limit.



established in 10 CFR Part 100 or the General Design Criteria. The NRC considers an increase in consequences to constitute any increase in dose beyond that previously calculated and reported in the UFSAR. Over the past 3 years, no violation existed.

A noncited violation was identified for failure, during initial plant design and construction, to apply adequate design controls to ensure that cables associated with the station batteries and the emergency lighting batteries in each unit were separated in accordance with the requirements of Regulatory Guide 1.75.

A noncited violation was identified for failure to take prompt corrective actions in response to the discovery of an electrical cable separation nonconformance associated with the station batteries in Units 1 and 3.

#### V. Management Meetings

##### **X1 Exit Meeting Summary**

An exit meeting was conducted on September 3, 1999. A supplemental exit meeting was conducted by telephone on September 28, 1999. The licensee's management acknowledged the findings of the inspection. The licensee's management stated that no proprietary information had been reviewed during the inspection.



ATTACHMENT

SUPPLEMENTAL INFORMATION  
PARTIAL LIST OF PERSONS CONTACTED

Licensee

A. Abbate, Engineer  
S. Bauer, Licensing Section Leader, Regulatory Affairs  
B. Blackmore, Engineer  
L. Bullington, Engineer  
D. Fan, Department Leader, Design Engineering  
M. Grissom, Senior Engineer, Regulatory Affairs  
W. Ido, Vice President, Nuclear Production  
D. Marks, Section Leader, Regulatory Affairs  
T. Mitchell, Maintenance Engineer  
D. Oaks, Inservice Testing Section Leader  
G. Overbeck, Senior Vice President, Nuclear Production  
P. Paramithas, Section Leader Instrument & Control Design  
R. Stroud, Senior Consultant, Regulatory Affairs  
M. Winsor, Director, Nuclear Engineering  
R. Younger, Department Leader, Nuclear Assurance

NRC

N. Salgado, Resident Inspector

INSPECTION PROCEDURES USED

37001      10 CFR 50.59 Safety Evaluation Program

ITEMS OPENED AND CLOSED

Opened

50-528; -529; -530/9917-01	NCV	Failure to Assure Regulatory Guide 1.75 Separation Distances for Battery Cables (Section E2.1)
50-528; -530/9917-02	NCV	Failure to Promptly Correct Electrical Cable Separation Problem (Section E2.1)

Closed

50-528; -529; -530/9917-01 NCV Failure to Assure Regulatory Guide 1.75 Separation Distances for Battery Cables (Section E2.1)

50-528; -530/9917-02 NCV Failure to Promptly Correct Electrical Cable Separation Problem (Section E2.1)

DOCUMENTS REVIEWED

Procedures

93DP-0LC07, "10 CFR 50.59 Screenings and Evaluations," Revision 2  
73DP-OZZ03, "System and Maintenance Engineering," Revision 9  
30DP-9WP02, "Work Document Development and Control," Revision 24

10 CFR 50.59 Reports

May 21, 1999 (January - December 1998)

Condition Report/Disposition Requests

95-Q633, December 8, 1995  
1-8-0013, January 8, 1998  
2-8-0074, March 25, 1998  
99-100622, September 2, 1999

Classroom Lectures

NGS03-02-RC-001-00, "50.59 Requalification (1998)," June 19, 1998  
NGT02-04-RC-001-008, "Engineering Support Personnel Training," September 23, 1998

Industry Documents

Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Safety Evaluations," September 1997

Safety Evaluations

95-00303, "Design Master Work Order 00715063," October 25, 1995  
97-00022, "Design Master Work Order 00766255," December 24, 1996  
97-00049, "Design Master Work Order 00768502," March 4, 1997



97-00140, "Design Master Work Order 00773802 and Safety Analysis Report Change Notice 3752," July 2, 1997

97-00238, "Revision to PVNGS UFSAR and Technical Specification Bases for RWT ESF Reserve Volume," July 8, 1998

97-00256, "Deletion of UFSAR Commitment to Automatic Differential Pressure Isolation of AS System HELB," November 26, 1997

97-00271, "WO 00825417," December 22, 1996

97-00273, "Safety Analysis Report Change Notice 3822," January 13, 1998

98-00008, "Deletion of Certain DG Valves From The IST Program. This Change Will Be Made By Revision 5 to 73DP-PXI01," February 3, 1998

98-00042, "Temporary Modification Implemented Via Procedure 31MT-9IA02," March 6, 1998

98-00050, "CRDR 9-8-0394," March 13, 1998

98-00068, "DFWOs 00830234, 00830235, 00830236, 008300237 - SG 11 and 12 Tube Plugging and Staking During U1R7," April 9, 1998

98-00076, "Temporary Modification 1-98-SH-009," April 22, 1998

98-00077, "DFWO 00837869," April 23, 1998

98-00082, "WO 00838582," May 5, 1998

98-00114, "Deletion of Special Test Exceptions From the TRM," July 15, 1998

98-00120, "Reduction in Action Requirements for Post Accident Monitoring System, TRM 3.3.105," July 15, 1998

98-00139, "Procedure Revision," October 2, 1998

98-00142, "CRDR 9-8-1283," August 28, 1998

98-00146, "WO 00852724," August 28, 1998

98-00155, "Evaluation of SDC Operation Requirements to Support Reduced Inventory Conditions for U3R7," September 17, 1998

98-00165, "Licensing Document Change Request 98-13012," September 24, 1998

98-00173, "WO 00849161," October 14, 1998

98-00176, "Work Order 00858695," no date noted



99-00063, "Configuration Calculation 13-MA-PC-992," April 28, 1999

99-00071, "Calculation 13-NC-CH-101, Revision 3," May 14, 1999

99-00083, "Calculation 13-MC-SI-215, Revision 3," July 14, 1999

Safety Evaluation Screenings

Work Order 00885570, June 11, 1999

Maintenance Engineering Evaluation MEE 02445, May 18, 1999

Procedure 40OP-9ZZ05, Revision 28, May 11, 1999

Procedure 81DP-0EE02, Revision 0, July 11, 1999

Work Order 00871666, April 30, 1999

Work Order 00853062, January 14, 1999

Work Order 00870204, April 16, 1999

Maintenance Engineering Evaluation MEE 02365.00, May 18, 1999

Calculation 13-NC-PC-200, Revision 2, May 26, 1999

Calculation 13-MC-CH-533, Revision 8, June 4, 1999

Calculation 13-MC-CH-537, Revision 5, June 4, 1999

Calculation 03-MC-CH-535, Revision 3, May 27, 1999

USAR Tables 9.5-11 and 9.5-12, July 16, 1999

Calculation 13-NC-SI-203, Revision 1, May 27, 1999

Calculation 13-MC-ZZ-217, Revision 2, July 9, 1999

Design Master Work Order 00851801, Revision 2, August 10, 1999

Calculation 13-JC-RC-206, Revision 4, May 13, 1999

Work Order 00878317, April 14, 1999

Non-Applicability Screenings

Deficiency Work Order 00713398, June 6, 1995

Deficiency Work Order 00828838, January 29, 1998

Deficiency Work Order 00874909, May 11, 1999

