

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION

Report Nos.: 50-528/87-37, 50-529/87-36, 50-530/87-38  
Docket Nos.: 50-528, 50-529, 50-530  
License Nos.: NPF-41, NPF-51, NPF-74  
Licensee: Arizona Nuclear Power Project  
P. O. Box 52034  
Phoenix, Arizona 85072-2034  
Facility Name: Palo Verde Nuclear Generating Station  
Inspection at: Arizona Nuclear Power Project  
Nuclear Engineering Division  
Phoenix, Arizona and  
Palo Verde Nuclear Generating Station  
Wintersburg, Arizona (Maricopa County)  
Inspection Conducted: November 2 through 6, 1987  
Inspector: *R. C. Wilson* 2/5/88  
R. C. Wilson, Special Projects  
Inspection Section (SPIS), VIB Date Signed

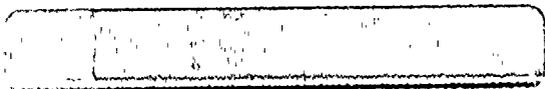
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## INSPECTION SUMMARY:

Inspection conducted November 2 through 6, 1987 (Inspection Report Nos. 50-528/87-37; 50-529/87-36; and 50-530/87-38).

Areas Inspected: Special, announced inspection to review Arizona Nuclear Power Project's (ANPP's) implementation of a program for establishing and maintaining the environmental qualification of electrical equipment (EQ) important to safety at Palo Verde Nuclear Generating Station in compliance with 10 CFR 50.49. The inspection also included evaluation of implementation of EQ corrective action commitments made by ANPP as a result of deficiencies identified in Safety Evaluation Reports (SERs).

Results: The inspectors determined that ANPP has implemented a program that meets the requirements of 10 CFR 50.49 at Palo Verde except for certain deficiencies identified in this inspection report (tabulated in Appendix A to this report). Five of the deficiencies are classified as Potential Enforcement/Unresolved Items; they will be referred to the NRC Region V Office for further action. None of these deficiencies impacted plant operation, and based on information reviewed during the inspection and subsequently provided in ANPP's November 20 submittal, all of the affected equipment is considered qualifiable for its service at Palo Verde. Five additional concerns are classified as Open Items, and a future NRC inspection will review ANPP's actions concerning them.

Following is the list of concerns:

### Potential Enforcement/Unresolved Items:

- (1) Limitorque operators - crimped connections in dual-voltage motor leads
- (2) Limitorque operators - grease relief valves and T-drains
- (3) Pressure transmitter conduit deterioration
- (4) Skinner solenoid valves - similarity
- (5) Masoneilan position transducer - qualification based only on summary test report

### Open Items:

- (1) Kaman high-range radiation monitor - incomplete transient error analysis
- (2) Veam-Litton connectors for core exit thermocouples - moisture seal degradation
- (3) Agastat relays - IN 82-04 still not addressed for two types of panels
- (4) Walkdown inspection of Unit 2 and 3 Limitorque operators
- (5) EQ training of site personnel



## DISCUSSION

### 1. PERSONS CONTACTED

See Appendix B.

### 2. PURPOSE

The purpose of this inspection was to review Arizona Nuclear Power Project's (ANPP's) implementation of a program to meet the requirements of 10 CFR 50.49 for its Palo Verde Nuclear Generating Station.

### 3. BACKGROUND

All three Palo Verde units are near-term operating license (NTOL) plants. Extensive descriptions of environmental qualification are contained in Section 3.11 and related appendices of the Palo Verde Final Safety Analysis Report (FSAR) and the System 80 CESSAR. NRR review of the environmental qualification of electrical equipment is documented in Supplements 5, 8, 9, 10, and 11 to the Operating License Safety Evaluation Report, NUREG-0857. ANPP committed to qualifying to the criteria of 10 CFR 50.49. At the time of the inspection, all equipment within the scope of 10 CFR 50.49 was required to be qualified.

### 4. FINDINGS

The NRC inspectors examined the licensee's program for establishing the environmental qualification of electric equipment within the scope of 10 CFR 50.49. The program was evaluated by examining the licensee's qualification documentation files, reviewing procedures for controlling the licensee's EQ efforts, verifying adequacy and accuracy of the licensee's 10 CFR 50.49 equipment list, and examining the licensee's program for maintaining the qualified status of the covered electrical equipment.

Based on the inspection findings, which are discussed in more detail below, the inspection team determined that although some deficiencies were identified, the licensee has implemented a program to meet the requirements of 10 CFR 50.49.

#### 4.1 Environmental Qualification Program and Procedures

##### 4.1.1 Overall EQ Program

During the entrance meeting, ANPP described the Palo Verde EQ program and EQ procedures. The program was examined by interviewing and speaking with ANPP representatives and by reviewing ANPP's procedures for controlling and maintaining the status of 10 CFR 50.49 equipment. ANPP's document PS 07.00, "Equipment Qualification Policy," defines and assigns responsibilities for the licensee's overall EQ program. The inspectors examined this publication and also examined the following procedures and instructions to evaluate the completeness of the program:

- PS 07.01, Revision 0, dated November 1, 1987, "Equipment Qualification Practice" (supersedes Procedure 7N428.01.00)
- 7I428.01.01, Revision 0, dated January 31, 1986, "Equipment Qualification List"

- 7I428.01.02, Revision 2, dated May 1, 1987, "Equipment Change Evaluation"
- 7I428.01.03, Revision 3A, dated October 12, 1987, "Review of Equipment Qualification Plans, Procedures and Reports"
- 7I428.01.04, Revision 1, dated October 9, 1987, "Equipment Qualification Information System (EQIS)"
- 7I428.01.05, Revision 0, dated October 6, 1987, "Equipment Qualification Experience Data"
- EQ-CM, Revision 0, dated October 3, 1986, "Equipment Qualification Criteria Manual"
- 1N202.02.00, Revision 2, dated April 8, 1987, "QA Organization and Responsibilities"
- 30AC-9ZZ01, Revision 11, dated November 1, 1987, "Work Control"
- 30AC-9ZZ02, Revision 4, dated November 1, 1987, "Preventive Maintenance"
- 8I718.00.01, Revision 1, dated March 5, 1987, "Nuclear Engineering Indoctrination and Training Program"

Review of the above documents indicated that ANPP's EQ program provides controls for the following required activities:

- Development and maintenance of an EQ master equipment list
- Review and approval of documentation to establish qualification
- Controlled procurement of spare parts and replacement equipment to ensure qualification before plant installation
- Plant modifications and their effect on qualified equipment
- Indoctrination of personnel who work on qualified equipment in EQ requirements and procedures
- Quality Assurance (QA) and Quality Control (QC) documentation of surveillance and inspection of the various functional aspects of the EQ program
- Periodic internal audits of the EQ program functions such as procurement, receipt/storage, maintenance/surveillance, documentation, training, and plant modifications.

The inspectors conclude, based on the above review, that ANPP's program provides adequate procedures and controls to ensure an EQ program that satisfies the

requirement of 10 CFR 50.49. No programmatic or implementation deficiencies were identified.

#### 4.1.2 EQ Master List

The licensee is required to maintain a list of equipment that must be qualified under 10 CFR 50.49. In the summer of 1981, the licensee developed a summary of equipment in harsh environments in response to requirements of NUREG-0588. This summary is considered the first formal version of the licensee's master list of equipment.

The Equipment Qualification List (EQL) was developed from various sources such as the FSAR, Class 1 equipment list, emergency operating procedures, piping and instrument drawings, electrical diagrams, Technical Specifications and Regulatory Guide 1.97 (Revision 3, Categories 1 and 2) using criteria defined in the EQ-CM. The EQL was transferred from hard copy to computer program REVELATION, and was published as Revision 0 on March 18, 1986. Revision 5, dated October 30, 1987, was the issue of the EQL available for review during this inspection.

Procedure 7I428.01.01 establishes responsibilities and procedures for content, control, distribution, and ongoing maintenance of the EQL to satisfy the requirements of 10 CFR 50.49 paragraph (d). The responsibility for establishing, implementing, and controlling the EQL is assigned to the equipment qualification lead engineer of the Electrical Engineering Group, Nuclear Engineering Department.

To test the completeness of the EQL, the inspector selected some 20 items of equipment required to mitigate the consequences of a loss-of-coolant accident and to bring the plant to safe shutdown conditions. In each case, ANPP either showed that the equipment was covered in the EQL or justified its omission. No deficiencies were identified. The inspector also examined documentation (Corrective Action Report No. CA 86-0087) of corrective actions taken to amend deficiencies found during an internal audit (No. 86-002) of the EQL during the first quarter of 1986. The corrective actions were adequate and timely. Based on these reviews, the licensee's EQL for Units 1, 2, and 3 is considered acceptable.

#### 4.1.3 EQ Training

The training program associated with the environmental qualification of electrical equipment was reviewed with the lead engineer of the Methods, Training and Compliance Group, the section responsible for EQ training at the ANPP corporate offices, and the senior technical instructor for electrical training at the plant.

The inspector examined instruction No. 8I718.00.01, listed in Section 4.1.1 above, which describes ANPP's training program. The inspector also examined lesson plans, outlines, and attendance records for the following seminars and training periods:

- (1) "Procurement of Replacement Nuclear Parts and Components," April 7-8, 1986 (2 days), by Technical Seminars, Inc. of Great Neck, N.Y., conducted at Deer Valley. All disciplines attended.



- (2) "E/Q and Maintenance of Safety-Related Equipment," June 25-29, 1984 (5 days), by Wyle Laboratories of Norco, CA, conducted at plant site for maintenance personnel and for the Nuclear Engineering Department.
- (3) "Nuclear Components Materials Overview - Non-Metallic/Consumable Materials" (4 hours), December 16, 1986, two 4-hour presentations by the Nuclear Engineering Department (CECo).
- (4) "EQ Upgrade Project Training," June 2-4, 1986, by Impell at the ANPP Deer Valley offices. Instruction on use of the EQ documentation upgrade program guidelines.
- (5) "Seismic Qualification of Equipment," September 7, 1987, conducted by Bechtel at Deer Valley.
- (6) Nuclear engineering orientation package (electrical) covers EQ program maintenance.
- (7) Periodic (weekly) training. Staff meetings to review changes to procedures/instructions.

The EQ training at the corporate offices appears to be thorough and well documented and is considered to be adequate. EQ training of electrical and instrumentation and control (I&C) maintenance personnel at the plant site appeared to be sketchy and undocumented. It is concluded that EQ training at the plant site is an area of weakness. This area will be reviewed in a future NRC inspection and is identified as Open Item 50-528/87-37-09; 50-529/87-36-09; 50-530/87-38-09.

#### 4.1.4 EQ Maintenance Program

The implementation of the EQ maintenance program was inspected to assess the licensee's capability for preserving the qualified status of electrical equipment covered by 10 CFR 50.49. The inspector examined in detail Procedures 30 AC-9ZZ01 and 30 AC-9ZZ02, which describe the methods for identifying, documenting and controlling maintenance and station work on systems and equipment. The inspectors also reviewed other maintenance records such as qualification maintenance requirement reports, work orders, computer schedules of required preventive maintenance on EQ equipment, and records for specific components inspected during the plant walkdown.

ANPP has listed all plant equipment in its computerized scheduling system, "Station Information Management System" (SIMS). This computerized data base program monitors, manages, and provides timely notification of required surveillances and preventive maintenance of plant equipment. The inspector reviewed the SIMS repetitive work task schedule of EQ items for November 6, 1987, and selected five task items which were examined in detail. The SIMS program appears to be adequate.

The inspector concluded that adequate controls of maintenance and surveillance of qualified equipment have been established to ensure preservation of qualified status.

#### 4.1.5 Quality Assurance Audits

Quality Assurance (QA) Department audits that applied to EQ were reviewed to determine the effectiveness of QA involvement in the EQ program. The licensee's Quality Audits and Monitoring group performed five audits which included reviews of EQ between January 1985 and February 1987. Audit areas included: design control, procedures, procurement, documentation and records, followup of EQ-related NRC information notices, and followup of previously identified concerns.

The inspector noted that many findings related to the EQ program in the earlier audits. These concerns were documented on Corrective Action Reports (CARs), which require audit followup, and issued to the responsible organizations. The most recent audit concluded that programs and controls for EQ were established. However, two CARs remained open to track the completion of various open items raised by earlier audits. The corrective actions were scheduled for completion by December 1, 1987.

From the review of the audits and their associated findings and corrective actions, the inspector concluded that the QA Department has been involved in ensuring conformance to the EQ program and that responses to the audit findings have resulted in improvements to the EQ program. No violations or deviations of NRC requirements were identified.

#### 4.1.6 Procurement

This area was reviewed to determine if procedures for the procurement of new, replacement, and spare equipment addressed EQ requirements and required qualification of the equipment to be established before use in the plant. Since all EQ equipment was originally qualified to 10 CFR 50.49 criteria, upgrading of replacement equipment is not a concern at Palo Verde. The inspector interviewed procurement supervisors and reviewed applicable procedures to verify that responsibilities and controls were established to implement the requirements of the EQ program. These controls included:

- (1) The establishment of quality requirements and procurement level by engineering for qualified equipment
- (2) Receipt inspections
- (3) Storage level and shelf life requirements
- (4) Installation requirements
- (5) The review and approval of quality-related procurement documents by a dedicated procurement quality organization

The inspector concluded that the licensee's procedures established adequate controls for procuring, receiving, storing, and issuing environmentally qualified new and replacement equipment and spare parts. No violations or deviations of NRC requirements were identified.

#### 4.1.7 IE Information Notices and Bulletins

The licensee has established a program for reviewing and controlling NRC information notices (INs) and bulletins (IEBs) and for tracking any action

required, including timely responses. This program is controlled by Procedure 5I406.01.03, "NRC Inspection and Enforcement Bulletin and Information Notice Program." The inspector reviewed the procedure and noted that it included: review of the IN/IEB for applicability, distribution to responsible departments, assignment of a due date for completion of review and corrective actions, and tracking of each IN/IEB to resolution.

The inspector discussed the status of actions on EQ-related INs with the responsible licensing engineer and reviewed packages for seven closed INs and two open INs. Specific component file reviews also included verification that applicable INs and IEBs were addressed. The inspector noted that documentation for the completed INs satisfied the requirements set forth in the licensee's procedure. Review of the open INs revealed the following:

IN 85-40 concerned deficiencies in EQ testing and certification processes; responsibility for review and evaluation was assigned to the QA Department. As part of the review, a QA audit was performed using the IN as guidance. Seven CARs were issued from the audit findings. All but one of the CARs had been closed at the time of this inspection; the IN remained open pending closure of the final CAR.

IN 82-04 concerned potential deficiencies of certain Agastat E-7000 series time-delay relays. Extended-performance QA tests determined that pneumatic diaphragms manufactured by one of two diaphragm suppliers exhibited bleed-out of a fluid substance as a function of time and temperature. Furthermore, the temperature required to initiate significant bleed-out was within the range of qualification testing required by IEEE Standards 323 and 344. This bleed-out could result in shorter time delays than those set on the relay dial. The inspector noted that Units 2 and 3 had been inspected for the subject relays and the IN was closed for those units. However, the inspection for the relays in Unit 1 was scheduled for the first refueling outage which was in process at the time of this NRC inspection. The inspector questioned the timeliness of addressing an IN issued in 1982 during a 1987 outage. Licensee personnel informed the inspector that the inspection had been done previously but was being redone because of documentation concerns. Review of the EQ program qualification packages for Harlo Auxiliary Relay Cabinets (13-EM-022) and General Electric Motor Control Centers (13-EM-018) indicated that credit was taken for the completion of Deficiency Evaluation Report (DER) 81-22 to close out the concerns expressed in IN 82-04. However, at the time of this inspection, the DER had not been closed for Unit 1 and the inspection for the subject relays had not been completed.

The inspector concluded that a program to address EQ-related INs and IEBs was in place and being implemented. However, the adequacy of the licensee's qualification files for Harlo Auxiliary Relay Cabinets and General Electric Motor Control Centers remains as an Open Item pending the determination of whether Unit 1 has any of the subject relays installed in the plant and the effects on equipment qualification since the issuance of IN 82-04 in March 1982. Agastat Relays constitute Open Item 50-528/87-37-08 for Unit 1 only.

#### 4.1.8 Cable Identification System

The NRC inspectors selected ten of the walkdown components as specimens for testing ANPP's ability to identify plant cables and demonstrate the existence

of qualification files for them. The NRC inspectors independently examined the cables during the walkdown to verify the licensee's documentation; information such as cable manufacturer, type, size, voltage, and plant identification number was obtained as available:

Using the existing plant system, ANPP personnel were able to trace each cable to the manufacturer, type, reel number, and EQ specification report. Results of the NRC walkdown were consistent with ANPP's information. The inspector reviewed ANPP's system including applicable procedures and concluded that the system adequately provides traceability of EQ cables. No violations or deviations from NRC requirements were identified.

#### 4.2 Documentation Files

The Palo Verde files are maintained at ANPP's Deer Creek engineering offices. Instruction No. 7I428.01.04 defines the overall Equipment Qualification Information System (EQIS). Specification Files and Supplier Document Files are maintained by the Nuclear Records Management (NRM) Department as permanent QA records. The EQ Data File (EQDF), maintained by the Nuclear Electrical Engineering (NEE) Department, provides the auditable binders that document the qualification of equipment. A separate EQDF subfile is prepared for each specification used to purchase qualified equipment. A subfile may cover multiple types of equipment and multiple tag numbers of each type. Conversely, the same type of equipment may be addressed by multiple subfiles if it was procured under more than one specification. Other elements of the EQIS include the EQL and EQ-CM described in Sections 4.1.2 and 4.1.1 above; and the Equipment Change Evaluation File and EQ Document Review File, which cover evaluations related to plant changes, nonconformance reports, operating experience, maintenance history, and other items that affect EQ.

Each EQDF subfile contains the following, as applicable:

- (1) Any Equipment Change Evaluation that impacts qualification information in the EQDF
- (2) A title page providing for revision identification and signoffs and summarizing the scope
- (3) A list of all EQ documents provided by the supplier for review
- (4) An original EQ Report Evaluation Summary (typically 5 pages plus several pages of notes) which documents NEE's independent review and acceptance of the report
- (5) A Qualification Data Summary and other checklists documenting preparer reviews
- (6) Copies of test reports and analyses contained in the NRM files, to enhance auditability
- (7) EQL Change Control Forms
- (8) Bechtel documents such as the original specifications and review checklists



(9) References

(10) Background information

The NRC inspectors examined files for 29 equipment items, where an item is defined as a specific type of electrical equipment, designated by manufacturer and model, which is representative of all identical equipment in a plant area exposed to the same environmental service conditions. The items were selected in advance by the inspection team and identified to the licensee during the entrance meeting.

The files were examined to verify the qualified status of equipment within the scope of 10 CFR 50.49. In addition to comparing plant service conditions with qualification test conditions and verifying the bases for these conditions, the inspectors selectively reviewed areas such as:

- (1) Required post-accident operating time compared to the duration of time the equipment has been demonstrated to be qualified
- (2) Similarity of tested equipment to that installed in the plant (e.g., insulation class, materials of components of the equipment, test configuration compared to installed configuration, and documentation of both)
- (3) Evaluation of adequacy of test conditions
- (4) Aging calculations for qualified life and replacement interval determination
- (5) Effects of decreases in insulation resistance on equipment performance
- (6) Adequacy of demonstrated accuracy
- (7) Evaluation of test anomalies
- (8) Applicability of EQ problems reported in IEBs and INs and their resolution

The files were readily auditable except for some awkwardness caused by inclusion of several component types in the same subfile. The files documented qualification of the equipment except as described below.

4.2.1 Limitorque Valve Operators with Dual-Voltage Motors, EQDF PE-5731A

Two dual-voltage Limitorque motorized valve operators were inspected during the plant walkdown: MOV CHB-HV-530 in the Unit 1 auxiliary building and a warehouse spare that could be used as a replacement in any of the three units. Both operators contained unidentifiable nylon-insulated, crimped connectors used to connect winding leads from the dual-voltage motors. NRC inspection report 99900100/87-01, dated August 12, 1987, reports that Limitorque cannot document that any specific vendor's crimped connectors were used in any specific dual-voltage qualification test, and that Limitorque did not employ configuration controls that ensure that the crimped connections are kept away from conducting materials.



Before the exit meeting, ANPP provided a detailed evaluation of this concern. The Palo Verde EQL lists 62 dual-voltage Limitorque operators per unit. All are outside containment, and none require qualification for steam service. Evidence was provided to show that the nylon crimp connectors can be qualified for at least six years at Palo Verde. [Justification for continued operation was also provided.] ANPP committed to replace all of these crimped connectors with qualified Raychem splices by the end of the six-year life, with the goal of replacing them during the next refueling outage of each unit. However, because the files as reviewed were deficient, the crimped connectors in dual-voltage Limitorque operators constitute Potential Enforcement/Unresolved Item 50-528/87-37-01; 50-529/87-36-01; 50-530/87-38-01.

#### 4.2.2 Limitorque Valve Operators Inside Containment, EQDFs EQ-MOV-1 and EQ-PE-5731

During the walkdown inspection, two Unit 1 in-containment Limitorque operators were found to have unqualified configurations. On MOV SIA-UV-673 a grease fitting was threaded into the end of the grease relief, disabling the relief function that is required for qualification. The fitting was removed before the exit meeting. On MOV SIB-UV-614 the motor T-drain was positioned about 30 degrees above the bottom of the horizontally mounted motor. This position is not consistent with type test specimens, and would not adequately drain moisture from the motor. ANPP committed to move the T-drain to a lower available position. The inspectors cautioned ANPP to consider the generic aspects of these concerns while resolving them. The Limitorque grease relief and T-drain constitute Potential Enforcement/Unresolved Item 50-528/87-37-02; 50-529/87-36-02; 50-530/87-38-02.

#### 4.2.3 Pressure Transmitter Conduit Deterioration, EQDF ICE-3535

During the walkdown inspection, the inspectors observed a split in the outer plastic sheath of Anaconda flex conduit for Rosemount pressurizer pressure transmitter RC-PT-103 inside the Unit 1 containment. Several other flex conduits had split sheaths; others had been taped. LOCA qualification of Rosemount 1154 transmitters requires that the cable entrance be sealed by the user. ANPP had a Conax entrance seal installed; however, the inspectors questioned whether water entering the split in the vertical run, top-entry flex conduit, and collecting above the seal would void its qualification.

ANPP was aware of the problem and had in effect a procedure to tape split conduit sheaths with Scotch 88 tape. Although this correction may be adequate to prevent moisture intrusion during normal operation, it is not LOCA-qualified. In a November 20, 1987 submittal, ANPP advised the inspectors that Conax has conducted submerged testing of the seal design, and ANPP hopes to justify the installation on the basis of the Conax test report. Although this concern reflects conduit sheath splitting, the transmitter is ultimately the environmentally qualified component whose performance could be degraded by an unqualified installation. Transmitter conduit sheath deterioration constitutes Potential Enforcement/Unresolved Item 50-528/87-37-03; 50-529/87-36-03; 50-530/87-38-03.



#### 4.2.4 Skinner Solenoid Valves, Similarity Deficiency, EQDF 13-MM-234A

Models V5H65560 and V5H65600 are installed in the plant whereas models V5H61100 and V5H61090 are covered by the type test report (Anchor Darling Valve Company Report E9023-QR-2 Revision A). The file did not contain sufficient information to substantiate the stated conclusion that the installed and tested valves differ only in pressure rating and voltage. A 10 CFR 50.49 similarity analysis of this type must be based on comparison of drawings, and of parts and material lists.

ANPP's November 20, 1987 submittal states that a detailed review of the two designs shows that only the coil and electrical housing differ, and that ANPP can adequately document similarity. The deficiency in the as-reviewed file constitutes Potential Enforcement/Unresolved Item 50-528/87-37-04; 50-529/87-36-04; 50-530/87-38-04.

#### 4.2.5 Masoneilan Position Transducers, EDQF 13-JM-312

The file for these valve position transducers contained a summary test report, and lacked a complete report or evidence that the complete report had been reviewed. ANPP's November 20, 1987 submittal states that full qualification reports were obtained from the vendor, reviewed, and found satisfactory; the full reports will be incorporated into the files. The deficiency in the as-reviewed file constitutes Potential Enforcement/Unresolved Item 50-528/87-37-05; 50-529/87-36-05; 50-530/87-38-05.

#### 4.2.6 Kaman High-Range Radiation Monitor, EQDP NM-997

Kaman Qualification Report 460036-002, Revision A, dated February 4, 1985, covers this equipment. Appendix K of the qualification report discusses a spurious transient current caused in the mineral-insulated, metal-sheathed triaxial cable by the LOCA increasing temperature transient. The peak magnitude of the spurious current in Kaman's testing was about 150 picoamperes. Methods for reducing the spurious current are mentioned, such as reducing the rate of temperature increase by enclosing the cable in conduit. Appendix K contains a suggestion that this concern should be addressed on a plant-specific basis.

Although ANPP's file did not specifically address the transient current concern, ANPP did adequately respond to the inspector's question concerning the cable installation at Palo Verde. The November 20, 1987 ANPP submittal provided additional information including a calculation showing that the maximum spurious current could result in containment radiation readings that are high by a factor of six for about 20 seconds early in a LOCA, and for less than five minutes during a main steam linebreak (MSLB). The submittal contained preliminary analysis indicating that such transient readings and the associated alarm are acceptable. FSAR Table 1.8-1 may be revised to reflect this condition.

This concern is considered to be an Unresolved Item pending completion of ANPP action and NRC review. The Kaman transient error constitutes Open Item 50-528/87-37-06; 50-529/87-36-06; 50-530/87-38-06.

#### 4.2.7 Veam-Litton Connectors for Core Exit Thermocouples, EQDF PE-5800

The Palo Verde core exit thermocouple system was supplied by Combustion Engineering (CE). In May 1987, CE submitted letters to the NRC and to affected licensees stating that the effect of LOCA moisture on cable connectors doubled the system error from the  $\pm 22^{\circ}\text{F}$  value given in the test report. ANPP reviewed the additional information and analysis provided by CE and concurred in CE's conclusion that the system still met all operational requirements. However, ANPP also commented to CE on the revised test report.

The CE qualification test report, U-PAK-543, recommends a periodic maintenance and surveillance program for the connectors. However, the ANPP file states that a maintenance and surveillance program is not required. Three maintenance and surveillance procedures--36ST-9ZZ09, 36MT-9RI06, and 36MT-RI09--partially address routine maintenance of the connectors.

This concern is considered to be an Open Item pending (1) file revision incorporating resolution of ANPP's comments to CE, (2) possible additional NRC review of the additional test results and analyses, and (3) ANPP resolution of the maintenance and surveillance recommendation. The Veam-Litton connectors constitute Open Item 50-528/87-37-07, 50-529/87-36-07, 50-530/87-38-07.

#### 4.3 Plant Physical Inspection

The NRC inspectors, with component accessibility input from licensee personnel, established a list of multiple samples of 15 types of components for physical inspection. Most components were inside containment in Unit 1, which was shut down; others were outside containment in Units 2 and 3. The inspectors examined characteristics such as mounting configuration, orientation, interfaces, cable seals and splices, model number, ambient environment, and physical condition. Information from the walkdown inspection contributed to the deficiencies described in Sections 4.2.1, 4.2.2, and 4.2.3, above, for Limitorque operators and cable conduit.

ANPP declined the inspectors' request to remove covers from selected Limitorque operators in Units 2 and 3 for the walkdown inspection, citing a policy that technical specification equipment would not be taken out of service during plant operation except to improve the equipment. Efforts to identify inspection candidates in shutdown trains or by other means were unsuccessful. The inspectors advised ANPP that Limitorque operators in Units 2 and 3 may be walked down in the future when available. This constitutes Open Item 50-529/87-36-08, 50-530/87-38-08.



APPENDIX A  
INSPECTION FINDINGS

<u>Item</u>	<u>Report Paragraph</u>	<u>Item Number</u>		
		<u>Unit 1 50-528/</u>	<u>Unit 2 50-529/</u>	<u>Unit 3 50-530/</u>
POTENTIAL ENFORCEMENT/UNRESOLVED ITEMS				
(1) Limitorque operators - crimped connections in dual-voltage motor leads	4.2.1	87-37-01	87-36-01	87-38-01
(2) Limitorque operators - grease relief valves and T-drains	4.2.2	87-37-02	87-36-02	87-38-02
(3) Pressure transmitter conduit deterioration	4.2.3	87-37-03	87-36-03	87-38-03
(4) Skinner solenoid valves - similarity	4.2.4	87-37-04	87-36-04	87-38-04
(5) Masoneilan position transducer - qualification based only on a summary test report	4.2.5	87-37-05	87-36-05	87-38-05
OPEN ITEMS				
(1) Kaman high-range radiation monitor - incomplete transient error analysis	4.2.6	87-37-06	87-36-06	87-38-06
(2) Veam-Litton connectors for core exit thermocouples - moisture seal degradation	4.2.7	87-37-07	87-36-07	87-38-07
(3) Agastat relays - IN 82-04 still not addressed for two types of panels		87-37-08	--	--
(4) Walkdown inspection of Unit 2 and 3 Limitorque operators	4.3	--	87-36-08	87-38-08
(5) EQ training of site personnel	4.1.3	87-37-09	87-36-09	87-38-09

APPENDIX B  
PERSONS CONTACTED

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\*Denotes those present at the exit meeting at the Palo Verde site on November 6, 1987.

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Mr. E. E. Van Brunt, Jr.

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