

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/84-25, 50-529/84-19 and 50-530/84-12

Docket Nos. 50-528, 50-529 and 50-530

License Nos. CPPR-141, 142 and 143

Licensee: Arizona Public Service Company
P. O. Box 21666
Phoenix, Arizona 85036

Facility Name: Palo Verde Nuclear Generating Station - Units 1, 2 and 3

Inspection at: Palo Verde Construction Site, Wintersburg, Arizona

Inspection conducted: July 9-13, 1984

Inspectors:	<u>PP Narbut for</u>	<u>8/3/84</u>
	C. Clark, Reactor Inspector	Date Signed
	<u>PP Narbut for</u>	<u>8/3/84</u>
	R. C. Sorensen, Reactor Inspector	Date Signed
	<u>PP Narbut for</u>	<u>8/3/84</u>
	D. Hollenbach, Reactor Specialist	Date Signed
	<u>PP Narbut</u>	<u>8/3/84</u>
	P. P. Narbut, Reactor Inspector	Date Signed
Approved By:	<u>PP Narbut for</u>	<u>8/3/84</u>
	L. Miller, Jr., Chief Reactor Projects Section 2	Date Signed

Summary:

Inspection on July 9-13, 1984 (Report Nos. 50-528/84-25, 50-529/84-19 and 50-530/84-12)

Areas Inspected: Routine unannounced inspection by regional based inspectors of construction activities in Unit 3, with some examinations carried over into Units 1 and 2. In addition, operations activities and procedures involving Unit 1 were examined. The examined activities included seismic qualification of fire protection systems, safety-related components, fire protection audits, construction inspection of HVAC instrumentation, and implementation of Three Mile Island Lessons Learned actions. The inspection involved 160 inspector-hours onsite by four NRC inspectors.

Results: Two violations of NRC requirements and two deviations from a commitment to NRC were identified. Violations were identified regarding seismic qualification of the fire protection systems (paragraph 2a.(2)), and HVAC instrumentation installation (paragraph 5c.(3)(a)). Two deviations were identified regarding the seismic classification of the fire protection system and fire protection audits (paragraphs 4 and 3).

DETAILS

1. Persons Contacted

a. Arizona Public Service Company (APS)

R. Cramer, Quality Monitor
D. Bernier, Superintendent of Operations Support
L. Clyde, STA Supervisor
S. McKinney, Shift Supervisor
F. Riedel, Shift Supervisor
*J. Allen, Operations Engineering Manager
W. Montefour, Electrical Inspector
D. Hutton, Quality Assurance Engineer
T. Quan, Licensing
T. Quinn, Licensing Manager
*G. Volk, Engineering Manager
*E. Sterling,
*D. Karner, Assistant Vice President
*J. Bynum, Director of Nuclear Operations
*W. Quinn, Licensing Manager
*J. Smith, Compliance Engineer
*R. Kimmel, Transition Group
*R. Burgess, Engineering Supervisor
*V. Guthrie,
*L. Souza, Assistant Corporate Quality Assurance Manager
*C. N. Russo, Quality Audits/Monitoring Manager, QA
*S. Penick, Document Review Supervisor, QA
*W. Ide, Corporate Quality Assurance Manager
*G. Irick, Quality Systems Engineer
*D. Neal, Senior Fire Protection Engineer
*W. Jump, SPE Manager

b. Honeywell Inc. PVNGS

H. Barrett, Project Manager
B. Castellow, Project Engineer

c. Bechtel Power Corporation (Bechtel)

J. Black, Resident Engineer
D. Keith, Project Engineer
M. Patel, Civil, Structural Field Supervisor
S. Duo, Resident Engineer
A. Brown, Startup Supervisor
R. Bond, Startup Inspector
*S. Nickell, Project Superintendent
*D. Hawkinson, Project QA Manager
*H. Weber, Assistant Project Manager
*H. Foster, PQCE
*P. Huber, Project Quality Coordinator
*T. Horst, Project Field Engineer
*T. Mack, Assistant Project Manager
*W. Miller, Quality Coordinator

d. The Waldinger Corporation

- D. Wheeler, Quality Control Supervisor
- B. Strait, Project Engineer
- G. Clapper, Lead QA Engineer

*Denotes those attending exit meeting, July 13, 1984.

Note: In addition, various other engineering, craft and QC personnel were contacted.

2. Licensee Action on Previously Identified Items

a. (Open) Unresolved Item (50-528/84-10-01) Seismic Qualification of the Fire Protection Sprinkler System

This item was previously reported in Inspection Report 84-10. There were four concerns previously identified in this area and one new concern identified during this inspection. These will be discussed individually.

(1) The Horizontal Seismic Loading on Elcen C-clamps does not appear to have been considered

Previous Inspection

One of the hanger components used in the F.P. system is the type 231 Elcen C-clamp. The analysis of the Elcen C-clamp given in specification M65-200-1 dated October 20, 1980, only addresses the maximum vertical force allowed. There was no analysis on the ability of the clamp to withstand horizontal loads which would tend to pull the clamp off a beam.

This Inspection

On June 18, 1984, revision 2 of specification M650-200 was issued. This revision contains a report by Twining Laboratories regarding the type 231 Elcen C-clamp.

This report was presented to the inspector by the Bechtel Resident Engineer to resolve the C-clamp horizontal loading capacity question. It does not appear that the report's technical merit (to resolve the C-clamp questions) was considered prior to giving the information to the inspector. The report consists of test data showing the force required to slide a C-clamp configuration along a beam. The report did not resolve the inspectors questions for the reasons provided below:

- o The test data obtained was not compared to the loading expected in service nor were conclusions drawn as to the adequacy of the clamps for service.

- ° The test was performed with the C-clamp set screws torqued to either 60 in-lb or 125 in-lb depending on their size, either 3/8-in or 1/2-in respectively. No correlation was shown between the test torque settings and the "wrench tight" torquing requirement used during field installation.
- ° The hanger configuration used in the test consisted of an assembly of two C-clamps holding a U-Bolt to an I-Beam. A more typical field condition (and a more severe test) would appear to be a hanger configuration using only a single C-clamp.
- ° Loading tests were done only longitudinally along the beam and not transverse to the beam. Alternately a rationale for only performing longitudinal tests was not provided.

This item remains unresolved.

- (2) The Seismic Loading on Pipe supports acting as longitudinal loading restraints was not analyzed for adequacy

Previous inspection

The inspector had noted that the seismic analysis of the fire protection system pipe supports did not appear to include analysis for longitudinal (along-the-run) loading.

This inspection

The licensee was contacted to determine what information was available that would demonstrate that the fire protection supports had been analyzed for longitudinal (along-the-run) loading. The cognizant licensee engineer stated that no complete analysis had been found and that it appeared that the fire protection system supports had not been adequately analyzed for longitudinal loading.

The failure to perform design analysis of the fire protection system to ensure it can withstand the effects of a seismic event without damaging safety-related equipment is considered a violation of NRC regulations as follows:

Specification 13-MM-650, revision 4 dated March 10, 1982, "Fire Protection Sprinkler and Spray System," section D.5.7.2 states in part, "The piping, supports, anchors and restraints for all sprinkler systems located in safety-related areas shall be designed to withstand Seismic Category IX requirements...." Additionally, section DI.4.4 states in part "Seismic Category IX structures, systems, and components....must be designed to retain structural integrity during and after an SSE but do not have to retain operability for protection of the public. The basic requirement is prevention of structural

collapse and damage to equipment and structures required for protection of the public safety."

Additionally, Specification 13-MM-650 section D.5.7.9 states in part, "Contractor (Bechtel) shall review all calculations and designs of supports for these (safety-related) areas and make necessary modifications to meet Category IX requirements."

The calculations submitted by Viking for fire protection system piping (Bechtel Log No. 13-10407) were accepted on October 20, 1980, but the calculations do not provide an analysis that demonstrates the Fire Protection piping system has been designed to retain structural integrity during on SSE seismic event. The calculations do not demonstrate that longitudinal system and component loads have been considered or reviewed (Violation 50-528/84-25-01).

- (3) Not all hanger types in use in the field appear to be analyzed

Previous inspection

The inspector had identified that not all hanger types in field use had been analyzed in the calculations submitted by Viking to Bechtel.

This inspection

The inspector found additional hanger types that were not analyzed in the Viking calculations including miscellaneous combinations of angle iron welded to unistrut tray supports. The licensee had not completed their analysis of this item and it remains open.

- (4) The seismic analysis of the fire Protection system did not include all buildings containing safety-related hardware

Previous inspection

The inspector identified that the fire protection system seismic analysis did not include all buildings containing safety-related hardware.

This inspection

The inspector noted that the Fuel Building had been added to the Viking calculations. The inspector did not assess the adequacy of this action during this inspection. This item remains open.

- (5) FPSS Hangers attached to cable tray supports

During the review of the seismic qualification of the FPSS the inspector noted that some of the FPSS hangers are attached to unistrut supports for Q class cable trays.

The inspector was unable to confirm during the inspection that:

- ° the FPSS support, the attached miscellaneous steel, and the unistrut support had been seismically analyzed for the fire protection system, and
- ° the cable tray support analysis had been modified to reflect the added fire protection system loading. The inspector will examine these items in a future inspection (Unresolved item 50-528/84-25-02).

b. (Open) Follow-up Item (50-528/84-10-02) Installation of the F. P. Sprinkler System

Previous inspection

The licensee had identified extensive installation deficiencies in corrective action report CAR C83-169N.

The licensee's corrective action was to perform a 100% reinspection of seven completed FPSS systems in Unit 1. The inspector had noted that the reinspection was not being performed in accordance with the special procedure issued for the reinspection. No violation was given because at that point none of the inspections had been signed off as complete.

This inspection

The inspector noted that the reinspections appeared to be properly conducted. Nonconformance reports were generated to record the results of the inspections. The seven Nonconformance Reports (NCRs PA-8187, PJ-8260, PA-8273, PA-8372, PT-8400, and PT-8438) contain all the deficiencies identified in each system.

As a result of the reinspection CAR C83-169N (renumbered: CA-83-0042) has been expanded to require reinspection of all the FP systems in safety-related structures. The licensee has directed Bechtel to perform an independent verification of the rework done by the subcontractor (Viking). This aspect of follow-up item 50-528/84-10-02 is considered closed on the basis of the licensee's actions.

Note: During the previous inspection, the inspector had questioned whether the Nelson studs attached to structural steel beams by the contractor for FPSS supports met AWS D.1.1 inspection requirements. The licensee provided a statement by the subcontractor project manager that stated that he had verified the daily bend tests and examinations for "flash." The licensee was asked to finalize their position on the adequacy of the subcontractor verification. During this inspection the licensee was not prepared to present their position. This aspect of the follow-up item remains open.

3. Review of APS/Bechtel subcontractor overview

Previous inspections

The inspector had previously stated concerns regarding the adequacy of the licensee's overviews of subcontractor work (reference previous SALP reports and reports 50-528/84-10 and 84-15). The licensee had initiated corrective action request (CAR) C-84-20 dated January 13, 1984, to determine the degree and adequacy of subcontractor audits and surveillances.

This inspection

During this inspection, the licensee had not completed their study of subcontractor overview and were not prepared to define their position and/or actions.

In reviewing the CAR, however, the inspector noted that the subcontractor that installs spray on fireproofing (Ora B Hopper Inc) had not had the benefit of any QA audits or surveillance activity. Although, the activity is not subject to the QA provisions of 10 CFR 50 Appendix B, the adequacy of spray on fireproofing can affect safety-related structures in the event of a fire.

The licensee had committed to a limited QA program for fire protection activities in the submittal of their Fire Protection Evaluation Report.

The Fire Protection Evaluation Report (FPER), section III, item C.10 requires that QA "audits should be conducted and documented to verify compliance with the fire protection program including design and procurement documents; instructions; procedures and drawings; and inspection and test activities."

The failure to conduct QA audits of the spray-on fireproofing constitutes a deviation from the licensee's commitment in section III of the FPER. (Deviation Item Number 50-528/84-25-03).

4. Deviation from FSAR commitment (Fire Protection System Seismic Category)

Summary

During the review of the fire protection system seismic qualification described earlier in this report (paragraph 2.c.(2)), the inspector observed a discrepancy between the licensee FSAR commitments and the implemented design requirements of the fire protection hangers.

The licensee had committed to design fire protection supports to Seismic Category I but has designed them to Seismic Category IX requirements.

The difference between Seismic Category I design requirements and Category IX is that in an operating basis earthquake (OBE) the hardware must not permanently deform (for seismic I) but may deform (for seismic IX). Although, seismic IX requirements may eventually prove to

be acceptable, the current use of seismic IX design requirements represents a departure from FSAR commitments.

Details

Specification 13-MM-650 revision 4 section D.5.7.2 dated March 10, 1984 states in part, "The piping, supports, anchors, and restraints for all sprinkler systems located in safety-related areas shall be designed to withstand Seismic Category IX requirements..." The Project General Design Criterion Manual revision 12, dated September 24, 1982, section II.1.4.3.C states in part "Seismic Category IX structures and components shall be designed to experience no structural failure that might result in the malfunction of adjacent Seismic Category I structures or components when subjected to the vibratory motions of the SSE in combination with normal operating loads..."

Table 3.2.1 of the FSAR section 16, Fire Protection System, states in part "Supports and hangers for non-safety related systems are designed to Seismic Category I requirements when failure of the equipment or piping could adversely affect a safety-related system." The Project Design Criteria Manual, revision 12, dated September 24, 1982, section II.1.4.3.A states in part "Category I structures, systems, and components are those that are important to safety and designed to remain functional in the event of a safe shutdown earthquake (SSE)... In addition, Seismic Category I structures, systems, and components are designed to remain functional and within applicable stress and deformation limits when subjected to the vibratory motion of the operating basis earthquake (OBE) in combination with normal operating loads."

At the exit interview, the licensee stated a change to the FSAR will be submitted to state the fire protection hangers and supports to be designed in accordance with Seismic Category IX. The failure to design the fire protection hangers and support to Seismic Category I requirements is a deviation from the licensee's commitment in Table 3.2-1 of the FSAR (Deviation Item Number 50-528/84-25-04).

5. Inspection of Instrumentation and Controls for Heating, Ventilating, and Air Conditioning (HVAC) - Unit 3

a. Objective:

The inspector examined safety-related HVAC instrumentation and controls installed by Honeywell Inc. (onsite work under subcontracts to Waldinger Corporation) in Unit 3, to assess whether activities relative to safety-related quality Class 'Q' components were being accomplished in accordance with NRC requirements, SAR commitments and licensee procedures; and to determine whether there were inadequacies in completed work, partially completed work, or work activities in progress. Some additional non-safety related HVAC instruments/equipment installed onsite by Honeywell and quality class 'Q' instruments/equipment installed offsite by Honeywell suppliers (as assembled packages on components installed onsite by

Honeywell) were also examined for general workmanship of installations.

b. Technical Approach to Inspection:

- (1) Review and obtain applicable copies of Honeywell quality and work documents used at Palo Verde Nuclear Generating Station (PVNGS).
- (2) Obtain a list of safety-related (quality class 'Q') HVAC components installed by Honeywell and select components for examination.
- (3) Perform selective examinations of procedures and representative records, and interviews with Waldinger, Bechtel and Arizona Public Service (APS) personnel. The areas of examination were selected as representative of completed work and work in progress during the period of the inspection, the size of this sampling was controlled by the examination time required in each area and was not established to provide statistical inference as to the conclusions drawn. However, the extent and depth of the examinations are considered to be sufficient to support the inspector's evaluation of the licensee performance and identification of potential areas of deficiency.
- (4) Document findings.

c. Work Performed and Findings Identified:

- (1) There are approximately 164 HVAC quality class 'Q' instruments per unit as identified in a Honeywell list, and Honeywell only installs approximately 29 of these instruments onsite per unit. The remaining instruments are already mounted/supplied on other HVAC equipment by vendors as an instrument package with the individual piece of HVAC equipment. The inspector examined 11 of the 29 safety-related quality class 'Q' instruments installed onsite in Unit 3 by Honeywell and 4 each in Units 1 and 2.
- (2) The inspector examined the HVAC instruments/equipment identified below by building area and installer.

(a) Control Building

3-J-HJA-TIC-123 (Honeywell)
 3-J-HJA-TE-123 (Honeywell)
 3-J-HJB-TIC-124 (Honeywell)
 3-J-HJB-TE-124 (Honeywell)
 3-J-HJN-TIC-122 (Honeywell - Not Safety-related)
 3-J-HJN-TE-122 (Honeywell - Not safety-related)

(Battery Room)

3-J-HJA-PDSH-81 (Honeywell)

3-J-HJN-PDSH-89 High (Honeywell - not safety-related)
 3-J-HJN-PDSH-89 Low (Honeywell - not safety-related)
 3-J-HJN-PDSH-84 High (Honeywell - not safety-related)

(b) Diesel Generator Building

3-J-HDA-TSL-17 (Honeywell)
 3-J-HDA-TSH-29 (Honeywell)
 3-J-HDB-TSL-18 (Honeywell)
 3-J-HDB-TSH-30 (Honeywell)
 3-J-HDN-TSHL-25 (Honeywell - not safety-related)
 3-J-HDN-TSHL-26 (Honeywell - not safety-related)
 3-J-HDN-TSHL-2 (Honeywell - not safety-related)

(c) Fuel Building

3-J-HFA-TDT-73 (Honeywell)
 3-J-HFB-TDT-74 (Honeywell)

(d) Containment Building

13-J-HCN-TE-42A1 (Honeywell - not safety-related)
 13-J-HCN-TE-42Ea (Honeywell - not safety-related)

(3) Based on initial examination of Unit 3 control building HVAC instrumentation, similar instrumentation was examined in Units 1 and 2 for additional information and is reported below:

(a) Unit 3 instrument 3-J-HJA-TIC-123 had the following conditions noted, and identified as a violation of NRC requirements.

((1)) Lower right hand (facing front of enclosure) enclosure mounting unistrut nut (PC 18 on Dwg. No. HON-HJA-902 Rev. N) was incorrectly installed (cocked) on the unistrut, such that it did not have full thread engagement with mounting bolt or full load bearing surface contact with the unistrut.

((2)) The lockwashers associated with a 6-32 screw, nut and lockwasher assembly (PC 34 on Dwg. No. HON-ZZF-909-2 Rev. E and No. HON-ZZF-932-1 thru 9 Rev. D), to secure terminal strips (blocks) and fuse/switch base plate in the enclosure, were not installed in all applicable locations instead flat washers were installed in some locations.

The failure to perform safety-related instrumentation work to identified procedures and drawing requirements is an apparent violation of NRC requirements (violation 50-530/84-12-05).

Note: As a result of the NRC inspection, Honeywell DDR No. 0615 was written on July 11, 1984, and identified some of the items noted above as nonconforming.

- (b) Unit 2 instrument 2-J-HJA-TIC-123 had some of the same lockwasher identified in Unit 3 instrument (part of PC 34 6-32 screw, nut and lockwasher assemblies, on Dwg. No. HON-ZZF-902-2 Rev. E) missing.
- (c) Unit 2 instrument 2-J-HJB-TIC-124 was missing a "Scru-Tite" fitting (PC 56 on Dwg. No. HON-ZZF-902-2 Rev. E and Dwg. No. HON-ZZF-932-1), a seal ring (PC 49 on Dwgs. noted above), a ferrule compression type fitting that secures instrument probe 2-J-HJB-TE-124 in its assembly and a component identification tag for instrument probe 2-J-HJB-TE-124.

Note: As a result of the NRC inspection, APS startup work authorization (SWA) No. 9118 was written against some of these items on July 12, 1984.

- (d) Unit 1 instruments 1-J-HJA-TIC-123, 1-J-HJB-TIC-124 and 1-J-HJN-TIC-122 were missing "Scru-Tite" fittings (PC 56 on Dwg. No. HON-ZZF-902-2 Rev. E and Dwg. No. HON-ZZF-932-1) and the seal rings (PC 49 on Dwgs. noted above).
- (4) Examination of Unit 3 HVAC instrumentation in the diesel generator building revealed the following:
- (a) Instrument 3-J-HDA-TSL-17 was missing upper half of probe identification label plate (broken off) and instrument identification tag was not attached on left side (facing instrument) in accordance with Honeywell QSP8.1 Rev.0. (Licensee DDR No. 0616 was written July 11, 1984 to record this). There was no caution tag on instrument to identify that the conditions reported above had been documented by inspection before July 11, 1984. Honeywell/Waldinger notified the inspector that the above reported condition had been identified before (and documented on DER report No. 84-27 of April 25, 1984) and a yellow caution tag attached to the instrument, and that someone must have removed the caution tag.
- (5) Examination of Unit 3 HVAC instrumentation in the battery room of the control building, fuel building and containment building, initiated questions on the as sighted conditions of some instruments:
- (a) Instrument 3-J-HJA-PDSH-81 had a loose nut and washer in bottom of enclosure.

- (b) Miscellaneous instruments had electrical cable/conductors pulled through similar adjacent electrical hubs, and one would have a nylon insert sleeve installed to protect the conductor while another would not. APS representatives stated they would examine this condition, and that some of the cable/conductor wiring was installed by vendors offsite (to the vendors contract requirements, which may or may not require nylon insert sleeve (or similar device) installation) and the as installed electrical hub surface condition would also dictate whether a protective nylon insert sleeve was required on a hub for cable/conductor protection.

d. Conclusions

- (1) Instrument 3-J-HJA-TIC-123 in Unit 3, was improperly installed (Honeywell installation of the subject instrument was completed on May 3, 1984, and accepted by Honeywell QC on May 14, 1984 on installation data sheet (form No. HM-002)). It should be noted that at the time the inspector examined the subject instrument on July 11, 1984, it was wrapped in plastic to protect it, there were no external cables pulled to the instrument (Bechtel scope of work), and no Bechtel startup or APS calibration sticker attached to the outside of the instrument enclosure which might indicate the Honeywell work had been disturbed since its QC acceptance.
- (2) The above violation is an indication of current weakness in Honeywell quality inspection for initial installations of safety-related HVAC components and system. This is especially difficult to understand in view of the recent PVNGS management attention directed in this area since Bechtel deficiency evaluation reports (DERs) No. 82-81 (December 9, 1983) and No. 84-27 (April 25, 1984) were written against existing Honeywell HVAC component installations. Although, final corrective actions and reinspections required by the DER's of HVAC components/system in all units is still outstanding as of July 20, 1984, it would appear ongoing current work should be correctly performed.
- (3) No final conclusions will be presented on the remaining findings from examination of HVAC instruments installed by Honeywell in Units 1, 2 and 3, since these examples represent older work and DER report No. 84-27 of April 25, 1984 is open and inspections and an evaluation of Honeywell instrument installations in all units is ongoing.

6. Implementation of Three Mile Island Lessons Learned

The inspector reviewed the below listed items which represent a portion of a comprehensive and integrated plan to improve safety following the events at Three Mile Island, Unit 2 in March 1979. The item numbers correspond to Enclosure 2 of NUREG-0737.

I.A.1.3.1 Limit OvertimeNRC Position

Reference: NRC Generic Letter No. 82-12.

Enough plant operating personnel should be employed to maintain adequate shift coverage without routine heavy use of overtime. The objective is to have operating personnel work a normal 8-hour day, 40-hour week while the plant is operating. However, in the event that unforeseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance or major plant modifications, on a temporary basis, the following guidelines shall be followed:

- a. An individual should not be permitted to work more than 16 hours straight (excluding shift turnover time).
- b. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72-hours in any seven day period (all excluding shift turnover time).
- c. A break of at least eight hours should be allowed between work periods (including shift turnover time).
- d. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on shift.

Recognizing that very unusual circumstances may arise requiring deviation from the above guidelines, such deviation shall be authorized by the plant manager or his deputy, or higher levels of management. The paramount consideration in such authorization shall be that significant reductions in the effectiveness of operating personnel would be highly unlikely. Authorized deviations to the working hour guidelines shall be documented and available for NRC review.

In addition, procedures are encouraged that would allow licensed operators at the controls to be periodically relieved and assigned to other duties away from the control board during their tours of duty.

Licensee Commitment

Reference: PVNGS TMI-2 Lessons Learned Implementation Report

PVNGS administrative procedures shall, by fuel load, provide provisions limiting maximum hours worked by personnel performing a safety-related function to the guidelines of NRC Generic Letter No. 82-02:

- a. An individual should not be permitted to work more than 16 hours straight (excluding shift turnover time).

- b. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any seven day period (all excluding shift turnover time).
- c. A break of at least eight hours should be allowed between work periods (including shift turnover time).
- d. The use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Recognizing that very unusual circumstances may arise requiring deviation from the above guidelines, such deviation shall be authorized by the Manager of Nuclear Operations or his designee, or higher levels of management. The paramount consideration in such authorization shall be that significant reductions in the effectiveness of operating personnel would be highly unlikely.

In addition, procedures encourage licensed operators at the controls to be periodically relieved and assigned to other duties away from the control board during their tour of duty.

The personnel effected by this requirement will be senior reactor operators, reactor operators, radiation protection technicians, auxiliary operators, I&C technicians and key maintenance personnel.

Inspector Findings

References: (a) Procedure 40AC-9ZZ02, Conduct of Shift Operations
 (b) Procedure 10AC-OZZ07, Overtime Limitations (draft)
 (c) PVNGS Unit 1 Interim Technical Specifications

The inspector reviewed the above mentioned documents and interviewed on-shift licensee personnel.

The inspector verified that the requirements of NRC Generic Letter 82-12 have been incorporated into Procedure 10AC-OZZ07 entitled "Overtime Limitations." This procedure applies to plant personnel who perform safety-related functions, i.e., senior reactor operators, reactor operators, radiation protection technicians, auxiliary operators, I&C technicians, and maintenance personnel working on safety-related equipment. The procedure incorporates the words of NRC Generic Letter 82-12 virtually verbatim and meets the requirements stated above. Also, Procedure 40AC-9ZZ02 entitled "Conduct of Shift Operations" addresses the periodic relief of licensed operators away from the control board and assignment to other duties, if conditions permit. Thus, all of the licensee's commitments have been met.

One concern was identified however, namely, who may serve as designee for the Director of Nuclear Operations to authorize deviation from the overtime limitations. This was not clear from review of the subject procedure.

The licensee representative verbally committed to issuing a memo dictating who may serve as the designee for the Director of Nuclear Operations for authorizing deviations from the overtime limitations. The inspector found this resolution acceptable, however, the item will remain open until implementation can be personally verified. The inspector will follow this item during future inspections.

These requirements for overtime limitations have been incorporated into the Interim Technical Specifications in ¶6.2.3.

In addition, the inspector verified that the requirements of Generic Letter 82-12 as incorporated into 10AC-0ZZ07 have, in fact, been implemented in the conduct of shift operations by interviewing an on-shift shift supervisor. He indicated that the actual amount of overtime worked at present is approximately four hours per week and that this is primarily shift turnover. This is well within the applicable requirements.

I.A.1.3.2 Minimum Shift Crew

NRC Position

References: (a) NUREG-0737
(b) NRC Generic Letter No. 82-12

Licensees of operating plants and applicants for operating licenses shall include in their administrative procedures (required by license conditions) provisions governing required shift staffing and movement of key individuals about the plant. These provisions are required to assure that qualified plant personnel to man the operational shifts are readily available in the event of an abnormal or emergency situation.

For the one unit, one control room plant configuration that exists at Palo Verde, the minimum shift staffing required is: one shift supervisor (licensed senior reactor operator), one senior reactor operator, two reactor operators, and two auxiliary operators.

Licensee Commitment

Reference: PVNGS TMI-2 Lessons Learned Implementation Report

The minimum shift crew for a unit is discussed in FSAR Section 13.1.2.3 and FSAR Table 13.1-2 and meets the above requirements. PVNGS administrative procedures will, by fuel load, provide provisions governing required shift staffing.

Inspector Findings

References: (a) Procedure 40AC-9ZZ02, Conduct of Shift Operations
(b) PVNGS Part 1 Interim Technical Specifications
(c) PVNGS Final Safety Analysis Report, SECTION 13

The inspector reviewed the above documents to ensure compliance with the applicable requirements.

The inspector reviewed the FSAR, Section 13.1.2.3 for minimum shift staffing commitments and determined that they meet the requirements stated above. Procedure 40AC-9ZZ02 was also reviewed to ensure that the commitments as stated above in the PVNGS LLIR have been met. The procedure dictates minimum shift requirements of one shift supervisor (SRO), one senior reactor operator, (assigned as assistant shift supervisor) two reactor operators, two auxiliary operators and one shift technical advisor. It also addresses movement of key individuals about the plant, e.g. Control Room command function, required operators in the control room, restricted movement of auxiliary operators, and overall supervision of personnel movement by the Shift Supervisor. The inspector found that the provisions contained within the procedure for shift staffing meet the applicable requirements stated above.

In addition, the Interim Technical Specifications were reviewed and found to acceptably comply with the minimum shift staffing and movement of key personnel requirements. This is addressed in Section 6.2.2 of the Tech Specs.

In summary, no open items were identified concerning this TMI action requirement, and therefore, this item is considered closed.

I.C.2 Shift and Relief Turnover Procedures

NRC Position

References: (a) NRC Letter from D. B. Vassallo to All Pending Construction Permit Applicants, dated November 9, 1979.
 (b) NUREG-0578
 (c) NUREG-0694

The licensees shall review and revise as necessary the plant procedure for shift and relief turnover to assure the following:

1. A checklist shall be provided for the oncoming and offgoing control room operators and the oncoming shift supervisor to complete and sign. The following items, as a minimum, shall be included in the checklist.
 - a. Assurance that critical plant parameters are within allowable limits (parameters and allowable limits shall be listed on the checklist).
 - b. Assurance of the availability and proper alignment of all systems essential to the prevention and mitigation of operational transients and accidents by a check of the control console (what to check and criteria for acceptable status shall be included on the checklist).
 - c. Identification of systems and components that are in a degraded mode of operation permitted by the Technical Specifications. For such systems and components, the length of time in the degraded mode shall be compared with the Technical

Specifications action statement (this shall be recorded as a separate entry on the checklist).

2. Checklists or logs shall be provided for completion by the offgoing and ongoing auxiliary operators and technicians. Such checklists or logs shall include any equipment under maintenance or test that by themselves could degrade a system critical to the prevention and mitigation of operational transients and accidents or initiate an operational transient (what to check and criteria for acceptable status shall be included on the checklist).
3. A system shall be established to evaluate the effectiveness of the shift and relief turnover procedure (for example, periodic independent verification of system alignments).

Licensee Commitment

Reference: PVNGS TMI-2 Lessons Learned Implementation Report

PVNGS Operations will have detailed administrative procedures available 60 days prior to fuel load that meet the guidance of the November 9, 1979, NRC letter from D. B. Vassallo to all Pending Construction Permit Applicants for shift relief and turnovers to ensure that current plant conditions and system status is conveyed to the oncoming shift.

These procedures will include the use of checklists and logs to ensure that there is a proper turnover of command functions and current operating conditions. Turnover and relief will include a review of tagouts, abnormal conditions, jumpers/bypasses, surveillance testing, and conditions affecting Technical Specifications. Annunciator panels, CRT's, and key operating parameters will also be monitored to verify system status and equipment condition.

Inspector Findings

Reference: Procedure 40AC-9ZZ02, Conduct of Shift Operations

The inspector reviewed the above procedure to ascertain what requirements have been instituted at Palo Verde for shift turnover. The inspector also interviewed on-shift licensee personnel.

A check-off sheet has been instituted as part of the shift turnover procedure. The check-off sheet contains a list of 14 different items that must be reviewed by the on-coming shift supervisor, assistant shift supervisor, and both reactor operators. They must initial on the checksheet for each item reviewed. Included on the checksheet for operator review are such items as the Control Room Log, Tech Spec Component Condition Records, Control Board/Annunciator Panel Checks and Control Room Data Sheets. Included in the body of Procedure 40AC-9ZZ02 is an explanation of items contained on the checksheet which are not self explanatory.

However, there is no explanation of the meaning of the line items on the checksheet in the light of the requirements from the Vassallo letter of

November 9, 1979. Specifically, the procedures do not specify that the signature of completion of the checksheet indicates that: (1) critical plant parameters are within limits (2) availability and proper alignment of all safety systems, (3) identification of systems and components in a degraded mode permitted by Technical Specifications.

The inspector emphasized to the licensee representative the importance of ensuring that the operators are procedurally instructed as to why they review the line items on the checksheet. The procedure should explain the individual line items in more detail and specify exactly what the operator is signing for.

The licensee representative verbally committed to including the applicable requirements from the Vassallo letter in the body of Procedure 40AC-9ZZ02 as clarification for the operators. This TMI item will remain open pending follow-up by the inspector during future inspections.

The inspector verified that the checksheet is, in fact, utilized by the licensed operators coming on shift and that the operator interviewed appeared knowledgeable of its contents.

The inspector also verified that Procedure 40AC-9ZZ02 requires use of a checksheet for auxiliary operators as well. The inspector reviewed the checksheet for the auxiliary operators to ensure its compliance with applicable requirements. Again, the same concerns as exist with the licensed operator's checksheet was expressed to the licensee management at the exit interview. The licensee verbally committed to including in the body of 40AC-9ZZ02, the applicable requirement from the Vassallo letter to ensure that oncoming and offgoing auxiliary operators fully understand their responsibility. This TMI item will remain open pending follow-up by the inspector during future inspections.

In addition, the inspector was unable to determine implementation of the requirement to have a checksheet for Health Physics technicians and he requested to be informed if a checksheet was going to be included for maintenance personnel. These items will remain open pending further inspections.

Finally, a system has not been developed specifically geared toward evaluating the effectiveness of the shift and relief turnover procedure, as required by the Vassallo letter. This aspect of the TMI item was expressed to the licensee management and will remain open.

I.A.1.2 Shift Supervisor Responsibilities

NRC Position

References: (a) NRC Letter from D. B. Vassallo to All Pending Construction Permit Applicants, dated November 9, 1979
 (b) NUREG-0578
 (c) NUREG-0694

The administrative duties of the shift supervisor shall be reviewed by the senior officer of each utility responsible for plant operations.

Administrative functions that detract from or are subordinate to the management responsibility for assuring the safe operation of the plant shall be delegated to other operations personnel not on duty in the control room. Administrative duties should be reviewed annually by the Vice President for Operations.

Licensee Commitment

Reference: PVNGS TMI-2 Lessons Learned Implementation Report

The responsibility and authority of the shift supervisor is delineated in FSAR Section 13.1. The administrative duties of the shift supervisor will be defined in the PVNGS Station Manual and will be in accordance with the guidance in the November 9, 1979 letter from D. B. Vassallo to All Pending Construction Permit Applicants. Administrative functions which detract from or are subordinate to plant operational safety will be assigned to other personnel who do not direct operational functions.

Additionally, the PVNGS Operations organization includes a senior licensed assistant shift supervisor for each unit, in addition to the assigned shift supervisor who will perform many of the administrative functions which typically would have been performed by the shift supervisor.

The PVNGS Operations organization also includes personnel (including the licensed day shift supervisor for each unit) available during day shift on week days who function is to assume administrative functions that otherwise might detract from the shift organizations' ability to devote full attention to the operation of the plant.

Inspector Findings

Reference: Procedure 40AC-9ZZ02, Conduct of Shift Operations

The inspector reviewed the above procedure to determine what administrative duties have been assigned to the Shift Supervisor. Appendix B to the procedure specifically states what the Shift Supervisor's administrative responsibilities are. The inspector determined that every item listed in Appendix B was a necessary function of the shift supervisor and found the list of 10 items in Appendix B acceptable. The inspector also observed plant operations in the Control Room and noted that many of the administrative type duties were delegated to the assistant shift supervisor.

However, the inspector was unable to determine that the administrative duties of the Shift Supervisor are being reviewed on a periodic basis by any individual in upper management. The licensee management representative verbally committed to including this requirement in corporate procedures at the exit interview. This TMI item will remain open pending verification of implementation during a future inspection.

I.C.3. Shift Supervisor Responsibility

NRC Position

- References: (a) NRC Letter from D. B. Vassallo to All Pending
Construction Permit Applicants, dated November 9, 1979.
(b) NUREG-0578
(c) NUREG-0694

The highest level of corporate management of each licensee shall issue and periodically reissue a management directive that emphasizes the primary management responsibility of the shift supervisor for safe operation of the plant under all conditions on his shift and that clearly establishes his command duties.

Plant procedures shall be reviewed to assure that the duties, responsibilities, and authority of the shift supervisor and control room operators are properly defined to effect the establishment of a definite line of command and clear delineation of the command decision authority of the shift supervisor in the control room relative to other plant management personnel. Particular emphasis shall be placed on the following:

- a. The responsibility and authority of the shift supervisor shall be to maintain the broadest perspective of operational conditions affecting the safety of the plant as a matter of highest priority at all times when on duty in the control room. The idea shall be reinforced that the shift supervisor should not become totally involved in any single operation in times of emergency when multiple operations are required in the control room.
- b. The shift supervisor, until properly relieved, shall remain in the control room at all times during accident situations to direct the activities of control room operators. Persons authorized to relieve the shift supervisor shall be specified.
- c. If the shift supervisor is temporarily absent from the control room during routine operations, a lead control room operator shall be designated to assume the control room command function. These temporary duties, responsibilities, and authority shall be clearly specified.

Training programs for shift supervisors shall emphasize and reinforce the responsibility for safe operation and the management function the shift supervisor is to provide for assuring safety.

Licensee Commitment

Reference: PVNGS TMI-2 Lessons Learned Implementation Report

The duties and authorities of the shift supervisor will be defined to emphasize that he has primary onshift responsibility for safe operation of the plant.

The administrative duties and authority of the shift supervisor and his subordinates will be defined in the PVNGS Station Manual. Administrative

functions or duties which detract from the shift supervisor's control of the plant are discussed in the response to item I.A.1.2. Lines of command will be clearly established to enable the shift supervisor to fulfill the responsibility for safe operation of the plant.

The Vice President of Electric Operations shall issue a management directive, prior to PVNGS Unit 1 fuel load, that emphasizes the primary management responsibility of the shift supervisor for safe operation of the plant on his shift.

Inspector Findings

References: (a) Procedure 40AC-9ZZ02, Conduct of Shift Operations
 (b) PVNGS-EEVB-M84-12, Memo from E. E. Van Brunt, Jr., to All Shift Supervisors
 (c) EPIP-01, Emergency Organization

The inspector examined a copy of a memo, dated April 24, 1984, from the Vice President for Nuclear Production to all shift supervisors emphasizing their managerial responsibility for safe operation of the reactor plant. The memo clearly establishes the Shift Supervisor's command function. The inspector found that the memo acceptably meets the applicable requirement from the Vassallo letter.

The inspector reviewed Procedure 40AC-9ZZ02, Conduct of Shift Operations, and EPIP-01, Emergency Organization to ascertain compliance with the above requirements concerning shift supervisors' responsibilities. The inspector found that Procedure 40AC-9ZZ02 lists the specific duties of the Shift Supervisor and adequately establishes his command authority in the Control Room. It also assigns the duties of the other Control Room operators. The transfer of the Control Room command function has also been acceptably addressed. However, the inspector was unable to identify a statement from either procedure emphasizing the supervisory function of the Shift Supervisor and the need for him to refrain from involvement in any single operation during an emergency when multiple operations may be in progress.

The licensee representative indicated that this has been addressed in an alternate procedure and agreed to provide a copy to the resident inspectors for review. This TMI item will remain open until review of the alternate procedure is complete.

In addition, neither procedure reviewed addresses the requirement for the Shift Supervisor to remain in the Control Room during accidents to direct the control room operators. Further, the procedures did not specify who is authorized to relieve the Shift Supervisor during accident situations.

The licensee representative verbally committed to including these requirements within the body of Procedure 40AC-9ZZ02. This TMI item will remain open until follow-up by the inspector during subsequent inspections.

Finally, the inspector was unable to locate and review training programs for shift supervisors emphasizing their management function for safe

operation of the reactor plant. The licensee representative indicated that all shift supervisors have been trained in this respect and agreed to supply a course outline to the resident inspectors for verification that this requirement has been implemented. This TMI item will remain open until implementation can be verified by the inspector.

I.C.4. Control Room Access

NRC Position

References: (a) NRC Letter from D. B. Vassallo to All Pending Construction Permit Applicants, dated November 9, 1979
(b) NUREG-0578

The licensee shall make provisions for limiting access to the control room to those individuals responsible for the direct operation of the nuclear power plant (e.g., operations supervisor, shift supervisor, and control room operators), to technical advisors who may be requested or required to support the operation, and to predesignated NRC personnel. Provisions shall include the following:

1. Develop and implement an administrative procedure that establishes the authority and responsibility of the person in charge of the control room to limit access, and
2. Develop and implement procedures that establish a clear line of authority and responsibility in the control room in the event of an emergency. The line of succession for the person in charge of the control room shall be established and limited to persons possessing a current senior reactor operator's license. The plan shall clearly define the lines of communication and authority for plant management personnel not in direct command of operations, including those who report to stations outside of the control room.

Licensee Commitment

Reference: PVNGS TMI-2 Lessons Learned Implementation Report

Administrative procedures will limit access to the control room. The shift supervisor will have the responsibility and the authority to control access to those personnel who are required, or are requested, to support the operation of the plant. These procedures will establish clear lines of authority and communication during all plant conditions, including startups, normal, off-normal, and emergency conditions. These procedures will clearly establish the line of succession for the individual in charge of the control room. The line of authority and responsibility in the control room is discussed in our response to item I.C.3.

Inspector Findings

References: (a) Procedure 40AC-9ZZ02, Conduct of Shift Operations
(b) EPIP-01, Emergency Organization

The inspector reviewed the above procedures to determine if the requirements have been instituted. It was noted that one of the administrative duties assigned to the shift supervisor is to control access to the Control Room, per Appendix B of Procedure 40AC-9ZZ02. This procedure also limits Control Room access to those persons with official business and requires personnel to check with the Shift Supervisor prior to entering. The inspector found this procedure to acceptably limit and control Control Room access during normal operations.

Procedure EPIP-01, Emergency Organization, addresses the responsibilities and functions of various APS personnel, including upper management and shift supervisors, during implementation of the Emergency Plan. The inspector found that this procedure adequately describes who may be in charge of the Control Room (the shift supervisor or assistant shift supervisor, both SRO licensed). The procedure also assigns the responsibility of controlling the plant during an emergency and mitigating the consequences of an accident to the shift supervisor, and establishes the line of authority in the Control Room. Finally, this procedure does define the responsibilities, locations, and lines of communication of various licensee personnel, from technicians to the highest levels of management.

The inspector also observed control room operations and noticed that control room access appeared orderly and within the guidelines of Procedure 40AC-9ZZ02. There was not an excessive number of persons present in the Control Room.

In summary, the inspector identified no open items concerning this TMI action item and found that all the applicable requirements have been met. This item is considered closed.

7. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. Unresolved items disclosed during this inspection are discussed in paragraphs 2.a and 2.b.

8. Exit Interview

The inspectors met with the licensee management representatives denoted in paragraph 1 on July 13, 1984. The scope of the inspections and the inspector findings as noted in this report were discussed.