

U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/84-28, 50-529/84-22

Docket Nos. 50-528, 50-529

License Nos. CPPR-141, 142

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

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

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: July 2 - August 11, 1984

Inspectors:

J. Miller  
R. Zimmerman, Senior Resident Inspector

9-11-84  
Date Signed

J. Miller  
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9-11-84  
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Approved by:

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9-11-84  
Date Signed

Summary:

Inspection on July 2 - August 11, 1984 (Report Nos. 50-528/84-28 and 50-529/84-22)

Areas Inspected: Routine, onsite, regular and backshift inspection by the three resident inspectors (565 hours). Areas inspected included: witnessing of preoperational testing activities; work order tracking system; staff training; test procedure review; Deficiency Evaluation Report followup, APS Quality Assurance/Quality Control program; followup of licensee action on previous inspection findings; disposition of Startup Field Reports; and plant tours.

Results: Of the nine areas inspected, one violation was identified in one area. (Failure to properly disposition an equipment malfunction documented on a Startup Field Report - paragraph 5).

## DETAILS

### 1. Persons Contacted

The below listed technical and supervisory personnel were among those contacted:

#### a. Arizona Public Service Company (APS)

J. Allen, Operations Manager  
R. Beecken, Startup Test Group Supervisor  
R. Bernier, Operations Supervisor  
J. R. Bynum, Director Nuclear Operations  
C. Churchman, Startup Test Group Supervisor  
S. Day, Unit 2 Startup Manager  
J. Dennis, Unit 1 Shift Supervisor  
W. Fernow, Plant Services Manager  
R. Gouge, Unit 1 Operations Supervisor  
J. Houchen, Transition Manager  
J. Kirby, Unit 1 Startup Manager  
D. Karner, Assistant Vice President, Nuclear Production  
R. Nelson, Maintenance Manager  
C. Russo, Quality Audits Manager  
E. E. Van Brunt Jr., Vice President, Nuclear Production  
J. Vorhees, Nuclear Safety Manager  
R. Younger, Unit 1 Operations Superintendent

#### b. Bechtel Corporation

C. Berg, Unit 1 General Superintendent  
R. Randels, Resident Engineering Group Supervisor

The inspector also talked with other licensee and contractor personnel during the course of the inspection.

### 2. Followup of Previously Identified Items

- a. (Closed) 528/82-36-01 (Inspector follow item): Ensure Plant Review Board (PRB) and Procedure Review Group (PRG) members are familiar with procedure review requirements such as proposed Technical Specification 6.8, Regulatory Guide 1.33, ANSI-N-8.7, 10 CFR 50.59, related PVNGS procedures, and other pertinent documents.

The licensee has developed a check list of items each member and alternate member of the PRB and PRG is required to read. The list includes: 10 CFR 50.59, Regulatory Guide 1.33, ANSI N18.7-1976, Technical Specification Section 6, and procedures pertaining to the organization of the PRB and to the review and approval of station procedures. The check list is maintained by the Training Department. The inspector verified the check lists are signed and maintained in the individual's training record.

- b. (Closed) 528/83-01-02 (Inspector follow item): Prepare a procedure to address training requirements for Duty Managers.

At the present time, the licensee has decided not to utilize a Duty Manager position, therefore, the training requirement procedure is not required.

- c. (Closed) 528/83-15-01 (Deviation): Delay in issuing procedure 70AC-OZZ02, "Review and Approval of Station Procedures". The licensee committed to implementing Revision 5 of 70AC-OZZ02 by April 15, 1983. However, procedures did not receive approval until May 5, 1983 with an effective date of May 6, 1983. This was due to the extent of comments made by the PRB that needed to be incorporated as a condition of approval.

The inspector verified that management issued a memorandum reminding all departments to assure commitments are met by timely preparation, technical review, and submission of material.

- d. (Closed) 528/83-15-07 (Inspector follow item): Review revised PRB implementing procedure.

The inspector verified that procedure 70AC-OZZ06, "Plant Review Board", issued July 20, 1984 did require the PRB to review changes to the Security and Emergency Plans; to review requirements identified in Section 6.5.1.6 items l, m, and n of the proposed Technical Specifications, and to define how the approved minutes of the monthly meetings will be distributed.

- e. (Closed) 528/83-26-01 (Inspector follow item): Lack of a procedure for the format, technical review, and approval of startup test procedures.

The inspector verified that the procedure 70AC-OZZ18, "Operations Test Conduct", requires that the Post-OL startup test procedures be written in accordance with 70AC-OZZ01 "Procedure Format, Content and Numbering", and that the technical review and approval of all safety related systems test procedures be in accordance with 70AC-OZZ18, "Operations Test Conduct", Appendix F.

- f. (Closed) 528/82-06-05 (Inspector follow item): Define scope of Operations Quality Assurance.

This matter is discussed in paragraph 10.

No violations were identified.

### 3. Review of Preoperational Test Activities

- a. Major preoperational test activities in progress in Unit 1 during the reporting period included hot pump demonstration testing, auxiliary feed water pump testing, chemical and volume control system testing, main steam isolation valve testing, steam bypass

system testing, piping expansion measurements and isolation valve response time testing.

- b. During the course of the inspection, tours of the following plant areas were conducted:
- Control Room, Units 1 and 2
  - Auxiliary Building, Units 1 and 2
  - Turbine Building, Units 1 and 2
  - Main Steam Support Structure, Units 1 and 2
  - Containment, Units 1 and 2
  - Yard Area and Perimeter, Unit 1
  - Control Building (Cable Spreading Rooms and Ventilation Support Systems), Unit 1
- c. The following areas were observed during the tours:
1. Control Room logs and records. Records were reviewed for completeness and accuracy to verify conformance with administrative procedure requirements.
  2. Equipment tagging. The turbine-driven auxiliary feedwater pump, for which tagging requests had been initiated, was observed on July 18, to verify that tags were in place and the equipment in the condition specified.
  3. Plant housekeeping. Plant conditions were observed for conformance with administrative procedures.
  4. Chemical analyses. Chemical analyses were reviewed on a sample basis and with minor exceptions were consistent with required specifications. Proper actions were verified to have been initiated to correct any out of tolerance chemistry.
- d. The inspector witnessed the performance of preoperational testing to verify that the procedures in use were properly approved and adequately detailed to assure satisfactory performance; test instrumentation required by the procedures were calibrated and in use; work was performed by qualified personnel; and results satisfied procedural acceptance criteria or were properly dispositioned.

The inspector witnessed the performance of portions of the following system testing activities:

- Reactor coolant pump operation, Unit 1
- Main steam isolation valve operation, Unit 1
- Mechanical vacuum pump operation, Unit 2
- Shut down cooling system valve operation, Unit 2
- Auxiliary feedwater pump operation, Unit 1
- Steam Generator level control calibration checks, Unit 1
- RCS flow rate test, Unit 1
- Excure safety channel drawers B and D calibration, Unit 1

- Atmospheric dump valve testing, Unit 1
- Main turbine governor operation, Unit 1

No violations were identified.

4. Review of 10 CFR 50.55(e) Reportable Items

During the reporting period, the inspector reviewed the items tabulated below which the licensee had identified to the NRC as having potential 10 CFR 50.55(e) reportability. The corrective actions taken or planned by the licensee were considered by the inspector to adequately resolve the items.

- a. DER 83-21: Low Pressure Safety Injection (LPSI) Pump B Operated in Violation of Procedures, Possibly Causing Damage. (Closed)

This event refers to the operation of the Unit 1 LPSI B pump with its suction valve closed on March 18, 1983. A second instance of pump operation with a closed suction valve involving the Unit 1 LPSI A pump occurred on May 19, 1983. These occurrences were reported in NRC inspection report 50-528/83-44. The initial event occurred early in the preoperational test program when the operating staff was becoming familiar with the operation of equipment. The event was attributed to failure to follow procedures. The requirement to follow procedures was re-emphasized to the operating staff with special staff meetings. The second event was attributed to the loss of AC power to the valve interlock circuitry and subsequent closure of the valve, was related to the system design requirements. Of the several modifications proposed, an alarm for low flow conditions is currently being pursued by APS and Combustion Engineering, to assist the operator.

The LPSI pumps were disassembled and inspected, after each event. No damage attributed to the valve closure was noted on the pumps. The pumps were operated intermittently subsequent to reassembly and on several occasions LPSI B pump tripped on motor overcurrent. This tripping problem was attributed to flexing of the motor shaft and is the subject of a separate DER.

- b. DER 83-76: Auxiliary Feedwater Steam Supply Valve Logic (Closed)

The design change to correct the initiating signal logic to the turbine driven auxiliary feedwater pump has been implemented. Testing of the change will be performed during the upcoming Integrated Safeguards test. A draft of the FSAR change was observed by the inspector. The licensee plans to submit the change to the FSAR in the near future.

- c. DER 83-88: QA Failure/Lack of Procedure and Program for Testing and Startup Activities (Closed).

The licensee's corrective efforts are discussed in detail in NRC Inspection Report 50-528/84-14, paragraph 3.

- d. DER 83-87: Valves SIA-V470 and SIB-V402 Found With The Handwheel Adaptor Nut Missing and Rising Stems Longer than the Operating Bridles (Closed).

The proper sized bridles have been installed on these valves. An initial inspection of these valves as well as other Unit 1 valves having Roto-Hammer operators for interference of the position indicator has also been made. The final testing of the two valves to confirm proper operation has been completed. The licensee's corrective actions includes the checking of valves having Roto-Hammer operators in Units 2 and 3. A generic test procedure has been developed for this activity.

- e. DER 83-64: Pressure Relief Valves Failed to Meet Prerequisite Tests (Closed).

This item was dispositioned by the licensee on May 24, 1984 by reporting that the problem of relief valves not passing the setpoint calibration check was due to foreign material in the test medium and to the use of test apparatus that did not have an accumulator.

The inspector found that this was the first safety related maintenance performed by the licensee's Mechanical Maintenance Department and the procedures and equipment needed to test the valves were not adequate. The device used to test the relief valves was designed to check leak rates on gate and globe valves and was not intended to test relief valve setpoints. The maintenance instruction for relief valve calibration in place at that time required a QC check of cleanliness and setpoints only prior to reinstallation of the valve into the system. The valves tested were not reinstalled, hence they were not inspected for cleanliness.

#### Corrective Actions

The inspector observed that a new Manager Maintenance who has commercial nuclear background and a PWR-SRO license has been employed to direct the licensee's maintenance program. A new procedure, 73ST-0ZZ01, "Relief and Safety Valve Testing", which requires that cleanliness be maintained throughout the testing and that an accumulator be used to test relief valves has been implemented. Two new test rigs were designed by engineering, to meet all ASME Code Standards, and built by the Maintenance Department. Currently all relief valves are being calibrated by the Maintenance Department using the new test rigs and the new procedure. A commercial test rig has also been ordered. The licensee has also changed the type of tamper indicator seals used on the relief valves. The original seals were a single strand of thin corrugated wire which was easily broken. If the seal broke, the valve was removed and sent to be retested and resealed. Since installation, approximately 15 to 20 seals wires have been broken. Interviews with maintenance personnel verified that the wires could be broken while moving the valve from one location to another or while working on the system and brushing against the valves. The new seal wires are constructed of four twisted strands of stainless

steel wires, and since installation (January 1984) no seals have been broken in the field.

The inspector witnessed the setpoints calibration of three relief valves and verified that the work was performed in accordance with approved procedures.

No violations were identified.

5. Inadequate Engineering Disposition of Containment Sump Recirculation Valve

Startup Field Report (SFR) ISI-723 documented the failure of containment sump recirculation valve 1JSIAUV673 to open remotely from the Unit 1 Control Room on July 5, 1984. Startup Work Authorization (SWA) 23339 was initiated and performed on July 6 to troubleshoot the valve electrically and identify the defective component. The limit switches and torque switches were inspected, with no obvious problems noted. The valve was then stroked electrically and it torqued out before opening past the valve seat. The valve was subsequently manually opened past the seat, and then electrically opened the remainder of its travel with no problems noted. The valve was electrically stroked open/closed four additional times with no observed difficulties. It was concluded that the valve had been manually over-torqued closed initially and no further electrical troubleshooting was necessary. On July 20, Resident Engineering, the department responsible for dispositioning SFRs, closed SFR ISI-723 as "not valid" based on the troubleshooting performed under SWA 23339 which concluded that the valve electrically operated satisfactorily.

On July 25, during a review of recent preoperational test problems with the sump recirculation valves, the inspector reviewed the above SFR and questioned cognizant personnel from the Startup and Resident Engineering departments on the justification for closing the SFR without providing corrective action to prevent recurrence, such as the installation/proper operation verification of a torque switch bypass and administrative procedure controls. The inspector stressed the safety significance of the inability of the valve to be opened electrically.

Startup and Resident Engineering personnel concluded that further evaluation was necessary and SFR ISI-761 was initiated to describe the potential problem for the valve to torque out when attempting to electrically open the valve after it has been manually closed. The licensee intends on performing a detailed valve testing program to determine why the existing torque switch bypass did not function as intended, and make any necessary modifications to the valve operator.

The inspector concluded that Resident Engineering failed to properly disposition SFR ISI-723 in that the SFR was incorrectly closed as "not valid" without: (1) adequately evaluating the safety significance of the failure of the valve to open, (2) fully determining the cause of the valve failure; and (3) taking appropriate corrective action to preclude repetition. This is contrary to 10 CFR 50, Appendix B, Criterion XVI; APS Operations Quality Assurance Criteria Manual, Criteria 16; and PVNGS

Procedure 90 GA-0ZZ19, Startup Field Report, and is considered a violation (84-28-01) (Severity Level IV).

The licensee brought to the inspector's attention that, although closed, SFR 1SI-723 would have been received by the onsite Principal Startup Engineer as well as Bechtel's offsite engineering office, emphasizing that had the inspector not questioned the SFR disposition, it may still have been questioned internally. The inspector acknowledged the licensee's comment.

6. Incorrect Valve Alignment During Plant Cooldown

On August 17, 1984 during the Unit 1 cooldown from the hot pump test, reactor pressure began decreasing for no apparent reason. Pressurizer level had also decreased from 30% to 15%. This condition had occurred at the time Containment Spray Pump B had been lined up in preparation for running the pump in parallel with the Low Pressure Safety Injection Pump B during plant cool down. The Control Operator responded to the pressure decrease by tripping the 3 Reactor Coolant Pumps which were running at the time. Reactor pressure at the time the pumps were tripped was approximately 320 psig. A check of the valve alignment disclosed that the Containment Spray Pump B recirculation line valve was open instead of closed. This valve position was contrary to the control room system status drawings which showed the valve closed and the requirements of paragraph 6.3.6 of operating procedure 41OP-1SI01 "Shutdown Cooling Initiation" (This procedure is specified in Operating Procedure 41OP-1ZZ10 "Hot Standby to Cold Shutdown" which in turn is specified in paragraph 8.13 of the hot test controlling procedure 90HF-1ZZ05 "PreCore Hot Pump Test Controlling Document"). 41OP-1SI01 required the valve to be closed prior to transferring pump suction from the Refueling Water Storage Tank to the Reactor Coolant System. Because the recirculation line valve was open, Reactor Coolant System water was transferred to the Refueling Water Storage Tank.

Another factor which contributed to the event was the lack of effective communication and coordination between the control room operators and supervisors during the operation of the Containment Spray Pump suction valves. These valves were authorized to be opened before time was allowed to refer to the appropriate operating procedures.

Failure to follow proper operating controls has resulted in several past operating problems. The more significant events are associated with the overfilling of one of the steam generators during previous preoperational testing, the loss of pressurizer level due to a misaligned valve during the previous hot functional testing, and the more recent event involving the boric acid makeup pump discussed in paragraph 9.

The licensee initiated a prompt investigation of the matter and will document the contributing causes and corrective actions in a report. This matter will remain unresolved until the licensee has completed this effort and the report is reviewed. (84-28-02)

No violations were identified.



## 7. Turbine Driven Auxiliary Feedwater Pump

Hot functional testing of the turbine driven feedwater pump was conducted during the recent testing phase. The turbine was tripping out on high speed even though a design change implemented during last years hot testing was to have corrected this problem. APS, along with the turbine vendor, governor vendor, and Bechtel did a considerable amount of trouble shooting. The efforts included rechecking the governor control settings, adjusting time delays on the steam supply valves, increasing the size of orifices in the steam bypass line, assuring the steam supply line was drained of condensate prior to the turbine start and evaluating the effect of the temperature of the steam line upstream of the turbine admission valve. Based on these investigative efforts it was concluded that the cause of the turbine tripping was due to the relatively cold temperature condition of the steam line downstream of the steam supply valve and to the lack of proper speed control adjustment. The cold steam line condition causes the small amount of bypass steam used to roll the turbine until the governor controls can take over to condense. The opening of the steam supply valves without governor control causes the turbine to overspeed. APS has implemented a design change which introduces the bypass steam at a point just upstream of the turbine admission valve. This eliminated the problems caused by the relatively long length of cold steam supply line. This corrective action coupled with an adjustment of the speed control mechanism has resulted in the turbine performing five consecutive cold starts.

The licensee is currently evaluating two other matters associated with the auxiliary feed water system. One involves the inoperability of one of the solenoid operated steam bypass valves. The vendor will assist in evaluating this problem.

The other matter is related to the consequences of having increased the feedwater circulation flow on both auxiliary feed water pumps. This change, which corrected a recirculation piping vibration problem at low flow rates, has decreased the auxiliary feedwater flow into the steam generators. APS as well as Combustion Engineering are evaluating this condition. The inspector will follow these open items (84-28-03).

No items of noncompliance were identified.

## 8. Control Room Alarm Response Procedures

During a routine, Unit 1 Control Room tour on July 11, the inspector had difficulty locating the appropriate alarm response procedure for a specific annunciator window associated with the operating Chemical and Volume Control System. Upon further review the inspector determined that a number of additional procedures covering alarm response actions for several entire alarm panels were not filed as expected, and thus not easily retrievable. Following discussions with members of the operating shift, they too were unable to readily find the alarm procedures in question. The procedures were located after several additional minutes. Administrative personnel responsible for filing the procedures had filed the procedures using a logical but unorthodox method. The procedures were subsequently refiled.

Based on the operators difficulty in locating the procedures, the inspector questioned whether the alarm response procedures were being effectively used during the ongoing hot demonstration test, realizing that the major systems still remain under Startup jurisdiction. The inspector discussed this issue with management representatives from both the site and corporate office. Based on discussions with several operators, the inspector questioned whether the input(s) to various annunciator alarms (including computer alarms) associated with systems in service were fully understood. The licensee representative acknowledged the inspector's comments and stated that it would be emphasized to Control Room personnel that alarm conditions associated with in-service systems should be understood and responded to in accordance with alarm response procedures. The inspector acknowledged that systems not yet turned over to Operations are in various stages of operational readiness and certain alarms may not yet be meaningful.

No violations were identified.

9. Startup/Operations Event Review

On July 17, during the initiation of boration/dilution testing at Unit 1 the boric acid makeup pumps tripped on low discharge pressure. Licensee investigation revealed that the suction and discharge valves for both pumps were closed. The licensee's detailed internal review concluded that contributing factors to the error involved poor communication of equipment status between Startup and Operations; poor communication within Operations, and a lack of awareness on the part of responsible Startup personnel to system conditions under their jurisdiction. Operations supervision issued an Operations Department Experience Report on July 20 which included details of the event and recommended corrective actions for both the Operations and Startup departments. Although Operations performed a timely, thorough review, the inspector expressed some concern over a delay of about two additional weeks before Operations and Startup supervision met on the problem to review the facts and formulate final corrective actions. The inspector stated that future event evaluations which involve more than one department should provide for a more cohesive approach to timely corrective action involving representatives of each affected discipline. The licensee representative acknowledged the inspector's comments. The thoroughness of the licensee's review of the event and corrective actions taken to prevent recurrence will be examined in conjunction with the item documented in paragraph 6.

10. Quality Assurance/Quality Control

The licensee has recently reorganized its Quality Assurance/Quality Control Organization. The main objective of the reorganization was to centralize certain functions common to construction, startup and operations, and increase effectiveness through improved consistency, continuity, and control of auditing, quality control and monitoring of project activities. The five main organizational units are Quality Systems Engineering, Procurement, Quality Audits/Monitoring, Quality Control and Non Nuclear Quality Assurance. The inspector confirmed that

the PVNGS project organization was consistent with the licensee's submittal to the NRC identifying the organizational changes.

The inspector's review of the QA monitoring, and auditing activities disclosed that check sheets were being used to implement procedural requirements. Reports of findings were written and distributed to responsible organizational units for corrective actions. The distribution of the reports also included APS corporate management. Problems are documented on Corrective Action Reports which require formal response and followup by responsible organizational units. Verification to confirm corrective actions have been taken is the responsibility of the QA organization.

Audit and monitoring activities have been identified and schedules have been developed for conducting reviews. Efforts are currently in progress to consolidate the individual activities to be monitored and audited on master matrices.

A review of certification and qualification records of five auditors and monitoring personnel confirmed that information on file was consistent with procedural requirements.

A separate unit having the responsibility for coordinating the training and certification needs of the QA/QC organization has been created. The person who directs these activities reports directly to the Corporate QA Manager. The primary responsibility is to develop and present training sessions to the QA/QC organization consistent with staff and program requirements. This unit also maintains a centralized file of staff certification and qualification records.

A program to trend QA/QC findings such as Corrective Action Report information, nonconformance reports and monitoring report information is being developed by the Quality Engineering group. The analysis of this type of information is intended to appraise APS management of the effectiveness of its program. An initial report has been issued; however, additional refinement of the data as well as expansion of the data base is planned.

No violations were identified.

#### 11. Emergency/Standby Power Supply System Test Procedure Review

A review of the emergency and standby power supply test procedures was conducted. The procedures were compared with the requirements of the FSAR, Technical Specifications, and Regulatory Guide 1.68. The procedures were also compared with administrative procedures 70AC-0ZZ01, "Procedure Format, Content, and Numbering", and 70AC-0ZZ02 "Procedure Review and Approval".

The procedures reviewed were:

- 93PE-1PK01 "125VDC Class IE Power System"
- 93PE-1PK02 "125VDC Class IE Station Battery Service Test"

- 93PE-1PN01 "Class IE Instrument AC Power"
- 93PE-1PB01 "4.16 KV Class IE Preoperational Procedure"
- 93PE-1PH01 "480V Class IE Preoperational Test Procedure"
- 93PE-1PE01 "Diesel Generator Electrical Tests"

The procedures were written and approved in accordance with the procedures in effect at the time of issuance. The procedures were technically adequate to perform the required functions and were consistent with regulatory requirements.

No violations were identified.

#### 12. Work Order Tracking System

The computer based system used to track work orders/work requests was reviewed. A work order was tracked from its inception to completion on the system with emphasis on the Shift Supervisor's ability to determine work in progress. With the computer system the Shift Supervisor has the ability to determine all work that has been approved for any system and all work which has been completed. No means of updating the work actually in progress is available on the computer. Maintenance personnel must inform the control room and Shift Supervisor before they start any work during a shift and at each change of the maintenance shift they must reinform the control room prior to resuming work. Interviews with the operators, supervisors, and management informed the inspector that the licensee feels that the maintenance control of work in progress is adequate for their needs and that the computer tracking system can handle the requirements of managing the maintenance in the plant after licensing.

No violations were identified.

#### 13. Staff Training

The training program was inspected to verify that procedures were in place to control the training of station personnel in the following areas:

- (a) Administrative controls
- (b) Radiological health and safety
- (c) Prenatal radiation exposure for females
- (d) Controlled access and security
- (e) Emergency plan
- (f) Industrial safety
- (g) Fire fighting
- (h) Quality assurance program

In addition to reviewing the procedures, the inspector reviewed training schedules, lesson plans and attendance sheets. Training records for reactor operators, auxiliary operators, maintenance technicians, technical staff, I&C technicians, radio chemistry technicians, radiation protection technicians, and principal staff members were reviewed to verify the implementation of the initial training program.

The inspector also attended classroom training sessions for reactor operators, auxiliary operators, maintenance technicians and technical staff. The instructors followed lesson plans and conformed to the requirements of the training procedures in effect at the time.

No violations were identified.

14. Exit Interivew

At periodic intervals during the course of the inspection, meetings were held with senior facility management to discuss the inspection, scope and findings. They acknowledged the violation cited in paragraph 5.