UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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May 30, 2007

Randall K. Edington
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SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, 3 - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000528/2007011; 05000529/2007011; AND 05000530/2007011

Dear Mr. Edington:

On May 25, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Palo Verde Nuclear Generating Station, Units 1, 2, and 3. The enclosed report documents the inspection results, which were discussed on March 23, 2007, with Mr. R. Bement, Vice President, Nuclear Operations, and other members of your staff. On May 25, 2007, an exit teleconference was held with Mr. R. Randels, Director, Design Engineering.

This inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

Based on the results of this inspection, the NRC identified four findings that were determined to be more than minor; three of the findings were determined to be violations of NRC requirements. These findings were evaluated under the risk significance determination process as having very low safety significance (Green). The violations are being treated as noncited violations, consistent with Section VI.A of the Enforcement Policy. If you contest the violations or significance of these noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 facility.

On February 20, 2007, the NRC held a public meeting with members of your staff to discuss the progress of your component design basis review program. During that meeting, your staff discussed the scope of several component reviews that had been performed and documented.

During this inspection the NRC independently selected several components that had been reviewed by your staff and noted numerous issues that had not been identified by your staff. For example, your staff's review of components associated with the station blackout generators did not identify numerous issues, some of which are documented in this report, that should have been identified as part of your independent component design bases review. Based on our sample review, it is evident that your initial effort in conducting component reviews has not been fully effective. We understand that you are implementing actions to improve the component design basis reviews. The NRC will conduct additional inspections at a later date to assess the effectiveness of your actions.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

William B. Jones, Chief
Engineering Branch 1
Division of Reactor Safety

Dockets: 50-528, 50-529, 50-530
Licenses: NPF-41, NPF-51, NPF-74

Enclosures:
Inspection Report 05000528/2007011;
05000529/2007011; and 05000530/2007011
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	50-528, 50-529, 50-530
Licenses:	NPF-41, NPF-51, NPF-74
Report No.:	05000528/2007011; 05000529/2007011; 05000530/2007011
Licensee:	Arizona Public Service Company
Facility:	Palo Verde Nuclear Generating Station, Units 1, 2, and 3
Location:	5951 S. Wintersburg Road Tonopah, Arizona
Dates:	February 19 through May 25, 2007
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Approved By:	William B. Jones Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000528/2007011; 05000529/2007011; 05000530/2007011; 2/19/07 - 5/25/07; Palo Verde Nuclear Generating Station, Units 1, 2, and 3: baseline inspection; NRC Inspection Procedure 71111.21, *Component Design Basis Inspection*.

The report covered a 5-week period of inspection by six region-based inspectors and two contractors. Three noncited violations and one finding (all Green) were identified. The significance of most findings is indicated by its color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC - Identified Findings

Cornerstone: Mitigating Systems

Green. The team identified a finding involving the implementation of Regulatory Guide 1.155, *Station Blackout,* Appendix A, for the demonstration of the station backout generator design and system readiness requirements. Specifically, established preventive maintenance tasks did not demonstrate that the coping requirements for the station blackout generator would be met for the approved increase from the 4-hour to 16-hour coping duration that, at the time this finding was identified, would become effective the following month. The licensee has entered this finding into their corrective action program as Palo Verde Action Request PVAR 2982699.

The finding is greater than minor because it would become a more significant safety concern if left uncorrected following the implementation of the 16-hour coping duration. The finding affected the mitigating systems cornerstone attributes to ensure the availability of the station blackout generators to respond to initiating events necessary to prevent undesirable consequences. Using the NRC Inspection Manual Chapter 0609, *Significance Determination Process*, Phase 1 Worksheet, the team determined that this finding had very low safety significance because there was not a loss of system function and it did not involve an external event. The cause of the finding was related to the crosscutting element of decision making associated with human performance for the failure to adequately evaluate the design and system readiness requirements for the station blackout generators for the approved license amendment that, at the time the finding was identified, would, increase the coping period to 16-hours. (Section 1R21b.1.)

Green. The team identified a noncited violation of very low safety significance for the failure to implement the design control requirements of Regulatory Guide 1.155, *Station Blackout,* Appendix A, Criterion 1, Design Control and Procurement Control, to 10 CFR 50.63, *Loss of All Alternating Current*. Specifically, approved Design Change DMWO 2827452 did not account for key station blackout generator performance parameters that included fuel and lubricating oil consumption rates and required station

blackout battery capacity for an increase in the station blackout coping period from 4 to16-hours.

The finding is greater than minor because it would become a more significant safety concern if left uncorrected in that the critical performance parameters for ensuring the station blackout generators would meet the 16-hour coping requirement were not established. The finding affected the mitigating systems cornerstone attributes to ensure the availability of the station blackout generators to respond to initiating events necessary to prevent undesirable consequences. Using the NRC Inspection Manual Chapter 0609, *Significance Determination Process*, Phase 1 Worksheet, the team determined that this finding had very low safety significance because there was not a loss of system function and it did not involve an external event. The cause of the finding was related to the crosscutting element of decision making associated with human performance for the failure to evaluate the key performance parameters for the station blackout generators for the approved license amendment that increased the coping period to 16-hours. (Section 1R21b.2.)

Green. The team identified a noncited violation of very low safety significance of 10 CFR Part 50, Appendix B, Criterion III, *Design Control*. Specifically, the design calculation that determined the minimum containment flood level following a loss-of-coolant accident was not based on the most limiting reactor coolant system break location. The calculated containment flood level was used to verify the adequacy of the available net positive suction head for the emergency core cooling pumps that would take suction from the containment sump during the recirculation phase of a postulated loss-of-coolant accident. The licensee has entered this issue into their corrective action program as Palo Verde Action Request PVAR 2981257.

This finding is greater than minor because this issue required accident analysis calculations to be re-performed to assure the accident requirements were met. The finding affected the mitigating systems cornerstone as related to the availability, reliability, and capability of the emergency core cooling system for post-loss-of-cooling accident. In accordance with Inspection Manual Chapter 0609, *Significance Determination Process*, Appendix A, *Significance Determination of Reactor Inspection Findings for At-Power Situations*, the team conducted a Phase 1 screening and determined the finding was of very low safety significance because it did not represent an actual loss of safety function. This deficiency would not have resulted in the emergency core cooling pumps becoming inoperable under the most limiting postulated accident conditions. This finding has cross-cutting aspects associated with corrective action of the problem identification and resolution area to ensure that issues potentially impacting nuclear safety are promptly identified, fully evaluated and that actions are taken to address safety issues in a timely manner. (Section 1R21b.3.)

Green. The team identified a noncited violation of very low safety significance of 10 CFR Part 50, Criterion XVI, Corrective Actions, for the failure to identify and correct significant conditions adverse to quality involving Target Rock valve failures. The licensee has entered this issue into their corrective action program as Palo Verde Nuclear Generating Station Action Requests PVAR 2984832 and 2985372.

The failure to identify and correct the cause(s) of turbine-driven auxiliary feedwater pump Target Rock solenoid-operated valves was a performance deficiency. This issue is more than minor because it is associated separately with the mitigating systems cornerstone and on one occasion affected the containment barrier integrity cornerstone. This finding has cross-cutting aspects associated with corrective action of the problem identification and resolution area to ensure that issues potentially impacting nuclear safety are promptly identified, fully evaluated and that actions are taken to address safety issues in a timely manner. (Section 1R21b.4.)

B. Licensee-Identified Findings

Violations of very low safety significance, which were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

1. REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and an important design feature may be altered or disabled during a modification. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance.

In addition to performing the baseline inspection, the team reviewed actions taken by the licensee in response to previously identified significant issues associated with engineering performance.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than two or Birnbaum value greater than 1E-6.

a. Inspection Scope

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed independent calculations to verify the appropriateness of the licensee engineers' conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience information to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios associated with the selected components, as well as observing simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions due to modification, or margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded, conditions; NRC resident inspector

input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins.

The inspection procedure requires a review of 15-20 risk-significant and low design margin components, 3 to 5 relatively high-risk operator actions, and 4 to 6 operating experience issues. The sample selection for this inspection was 20 components, 6 operator actions, and 5 operating experience items.

The components selected for review were:

- 13.8kV Bus E-NAN-S03, Breaker S03AB
- 4.16kV Bus E-PBA-S03, protective relaying
- Containment spray pump
- Emergency Battery B
- Emergency core cooling system relief valves
- Essential cooling water pump
- Essential chilled water pump
- High pressure safety injection bypass Valves SI-698/699
- Low pressure safety inject suction Valve SI-651
- Main steam isolation and atmospheric dump valve accumulators
- Motor-driven auxiliary feedwater pumps
- Refueling water storage tank level and temperature
- Shutdown cooling heat exchanger
- Spray pond level
- Start-up transformer
- Station blackout generator - electrical
- Station blackout generator - mechanical
- Turbine-driven auxiliary feedwater pump casing drains
- Turbine-driven auxiliary feedwater pump steam admission bypass valves
- Turbine-driven auxiliary feedwater pump steam traps

The selected operator actions were:

- Failure of spray pond pump to start/align auxiliary feedwater pump to refueling makeup water tank

- Failure of station blackout generator to start

- Align auxiliary feedwater pump n suction manually

- Failure of containment spray pump

- Feed with condensate pumps with a failure to depressurize

The operating experience issues were:

- Air-operated valves
- Barton transmitters
- Buried cables
- Very low sulfur diesel fuel
- DC-powered motor-operated valves

b. Findings

b.1. Demonstration of Conformance to Design and System Requirements for the Alternate ac Power Sources Required for Station Blackout Coping Capability

Introduction. The team identified a finding of very low safety significance (Green) for not effectively demonstrating the station blackout generator conformance with design and system requirements, for the pending increase in the station blackout coping duration, as provided by Regulatory Guide 1.155, *Station Blackout*, Appendix A, *Quality Assurance Guidance and Non-Safety Systems and Equipment*.

Description. Regulatory Guide 1.155, *Station Blackout*, Section C.3.3.5, states, in part, that the alternate ac power source should have sufficient capacity to operate the systems necessary for coping with a station blackout for the time required to bring and maintain the plant in safe shutdown. Regulatory Guide 1.155, Section 3.5, *Quality Assurance and Specification Guidance for Station Blackout Equipment That Is Not Safety-Related,* states that the subject guidance is provided in Appendices A, *Quality Assurance Guidance for Non-Safety Systems and Equipment*; and B, *Guidance Regarding System and Station Equipment Specifications*, of the Regulatory Guide. In response to 10 CFR 50.63, *Loss of All Alternating Current Power*, as stated in Arizona Public Service's letter to USNRC, No. 102-05370-CDM/TNW/RAB, dated October 28, 2005, *Revised Station Blackout (Station blackout) Evaluation*, the licensee adopted Regulatory Guide 1.155, Sections 3.3.5 and 3.5, and Appendix A, as the manner by which they would meet the requirements of 10 CFR 50.63. This includes Appendix A, Criterion 5, *Testing and Test Control*, which contains requirements for a test program to ensure that testing is performed to demonstrate conformance with design and system requirements.

On October 31, 2006, the NRC approved Amendment 157 to the Palo Verde Nuclear Generating Station operating license. This amendment changed the coping requirement for a station blackout event from 4 hours to 16 hours, and allowed 6 months for the required modifications to be completed before compliance was required. This change affected the design and system readiness requirements of the station blackout system and components.

When the Station blackout generators were initially installed, the required coping capability was 4 hours. Pre-operational testing demonstrated the capability of the station blackout generators to supply the design loads for the 4-hour duration. Subsequent periodic testing has consisted of operating the generators for approximately

1 hour per month and up to 3 hours during each refueling outage (approximately 16 hours per year).

The team found that the maintenance program established by licensee personnel did not consistently meet the vendor's requirements/recommendations. For example, many maintenance activities specified in the Palo Verde Nuclear Generating Station *PM* [preventive maintenance] *Program Basis* were on a biannual frequency. An exception were the lubricating oil filters which were scheduled for replacement on an 18-month frequency. Licensee personnel established this frequency on the basis of the infrequent operation of the station blackout generators. The vendor, however, identified the filter replacement as a "mandatory" requirement at a frequency of 6 months, "regardless of operating hours."

The air filters for the starting air diesel were scheduled for cleaning/replacement on a 6-month frequency. However, as observed by the team, the 6-month frequency for the cleaning/replacement of air filters was inadequate. The filters for Train A were replaced on March 7, 2007, after the team noted that they were clogged with dirt and debris. The Train B filters were scheduled for replacement on, or about, April 24, 2007; however, the team also noted that these air filters were partially clogged.

Another deficiency the team identified that could affect the capability of the station blackout generators to run for 16 hours (a design requirement) was the existence of delamination of the internal coating in the fuel oil storage tank. While licensee personnel had noted this condition, there was no established preventive maintenance task. The licensee had elected to perform maintenance on the fuel oil filters on an "as required" basis. Similar concerns were noted for preventive maintenance tasks associated with the testing and inspecting the fuel oil storage tank emergency vent valves, the combination pressure relief/vacuum breaker valves, and fuel oil.

Analysis. The team determined that the ineffective demonstration of conformance with design and system readiness requirements through effective preventive maintenance was a performance deficiency.

While the testing and maintenance program established to demonstrate the conformance with design and system readiness requirements to meet the 4-hour coping requirement was minimal, the ability of the station blackout system to perform its design functions was demonstrated. However, the established testing and maintenance program had not been identified as requiring modification to demonstrate conformance with the design and system readiness requirements to cope for 16 hours. As a result, the team found that the existing program would not effectively demonstrate conformance to design and system readiness requirements.

The finding is greater than minor because it affects the mitigating systems cornerstone attributes of design control, equipment performance, procedure quality, and human performance, which affect the cornerstone objective to ensure the availability of systems that respond to initiating events necessary to prevent undesirable consequences. Using the NRC Inspection Manual Chapter 0609, *Significance Determination Process*, Phase 1 Worksheet, the team determined that this finding had very low safety significance

(Green) because there was no loss of system function and it did not involve an external event. The licensee has entered this into the corrective action program as Palo Verde Action Request PVAR 2982699.

The cause of the finding was related to the crosscutting element of decision making associated with human performance for the failure to adequately evaluate the design and system readiness requirements for the station blackout generators for the approved license amendment that increased the coping period to 16-hours.

Enforcement. No violation of regulatory requirements was identified. This issue is identified as FIN 05000528, -529, -530/2007011-001, *Ineffective Demonstration of Conformance to Design for the Alternate ac Power Sources.*

b.2. Inadequate Control of Design Information for the Station Blackout System

Introduction. A noncited violation of very low safety significance (Green) was identified for the failure to include design-related guidelines used in complying with 10CFR50.63 in design documents.

Description. The current station blackout coping requirement of 4 hours was increased to 16 hours after License Amendment 157 was approved (October 31, 2006). In order to implement the amendment, the Design Change DMWO 2827452 must be implemented.

During the review of Design Change DMWO 2827452, the team found that licensee engineers did not account for key performance parameters. The performance section of the vendor technical manual addresses fuel and lubricating oil consumption as key parameters to be monitored to demonstrate the capability of the station blackout generators to perform their design requirements (i.e., provide an alternate ac power source for the required coping time).

The team also found that licensee engineers had not performed battery sizing calculations to determine the required battery capacity for the station blackout batteries. To complicate matters, the team found that the battery testing procedures were inadequate to provide an accurate indication of the health of the batteries. In addition, the licensee engineers' review of key structures and components was not adequate to identify or properly classify components (e.g., fuel oil storage tank vent and relief valves) which impact station blackout system operation.

Although the station blackout system was identified as requiring an augmented quality program, the team found that licensee personnel did not implement such a program with respect to design control. The licensee has entered these issues into their corrective action program as Palo Verde Action Requests PVARs 2980758, 2982699, and 2985197.

Analysis. The NRC issued Regulatory Guide 1.155, *Station Blackout*, as an acceptable method for meeting the requirements of 10 CFR 50.63. The Licensee adopted the methodology described in the regulatory guide to comply with 10 CFR 50.63. The team

determined that the failure to control the design information for the station blackout system is a performance deficiency; is more than minor because it is associated with the mitigating system cornerstone attributes of design control, procedure quality, human performance, and equipment performance; and it affected the cornerstone objective to ensure the availability of systems that respond to initiating events necessary to prevent undesirable consequences.

Quality assurance, as defined in Regulatory Guide 1.155, Appendix A, requires a quality program for equipment which is used to meet the requirements of 10 CFR 50.63 and not explicitly covered by existing quality assurance requirements. Criterion 1, *Design Control and Procurement Document Control*, of Appendix A to Regulatory Guide 1.155 states that "[m]easures should be established to ensure that all design related guidelines used in complying with §50.63 are included in design and procurement documents, and that deviation therefrom are controlled."

The cause of the finding was related to the crosscutting element of decision making associated with human performance for the failure to evaluate the key performance parameters for the station blackout generators for the approved license amendment that increased the coping period to 16-hours. Since no actual loss-of-safety function of the station blackout system has occurred as a result of the inadequate design control, the team determined that this finding was of very low safety significance (Green) in Phase 1 of the significance determination process.

Enforcement. Criterion 1, *Design Control and Procurement Document Control*, of Appendix A to Regulatory Guide 1.155 states that "[m]easures should be established to ensure that all design related guidelines used in complying with §50.63 are included in design and procurement documents, and that deviation therefrom are controlled."

Contrary to the above, as of March 15, 2007, the measures established to ensure that all the design-related guidelines for the station blackout system were not adequate in that key design parameters were not included in the design documentation used to demonstrate compliance with 10 CFR 50.63 and Regulatory Guide 1.155. Because the finding is of very low safety significance (Green) and has been entered into the licensee's corrective action program, this violation is being treated as a noncited violation, consistent with Section VI.A.1 of the Enforcement Policy: NCV 05000528, -529, -530/2007011-002, *Inadequate Control of Design Information for the SBO System.*

b.3. Non-conservative Containment Sump Level Analysis

Introduction. The team identified a noncited violation of 10 CFR 50, Appendix B, Criterion III, *Design Control*, of very low safety significance for containment flood level during certain loss-of-coolant accidents. Specifically, the design calculation that determined the minimum containment flood level following a loss-of-coolant accident was not based on the most limiting reactor coolant system break location. The calculated containment flood level was used to verify the adequacy of the available net positive suction head for the emergency core cooling pumps that would take suction from the containment sump during the recirculation phase of a postulated loss-of-coolant accident.

Description. The team reviewed design Calculation 13-MC-SI-017, *Safety Injection System Interface Requirements*, Revision 6. In part, this calculation determined the minimum water level that would be available in the containment during the recirculation phase of a postulated loss-of-coolant accident. This calculated water level was used to verify that the emergency core cooling pumps taking suction from the containment sump would have adequate net positive suction head under the most limiting conditions. The team noted that this calculation included a portion of the reactor coolant system inventory in the volume of water that would be available in the containment. The available volume of reactor coolant was based on an assumed break location at, or below, the centerline of the cold leg injection nozzles. The team questioned if this assumed break location was bounding, and if a reactor coolant system break at a higher elevation would result in a lower containment water level during the recirculation phase of a postulated loss-of-coolant accident.

In response to this concern, licensee engineers initiated Palo Verde Action Request PVAR 2981257 on March 12, 2007. The engineers also issued a prompt operability determination on March 15, 2007. The engineers concluded that there was a reasonable expectation of operability for all the emergency core cooling pumps. They evaluated the potential reduction in emergency core cooling pump net positive suction head margin that would result from this non-conservative analysis input. The design calculations indicated that the limiting emergency core cooling pump net positive suction head margin was 3.8 feet. If the water volume associated with all reactor coolant system spillage was eliminated from Calculation 13-MC-SI-017, the calculated net positive suction head margin would be reduced by less than 1.4 feet. In addition, the engineers evaluated the containment sump screen performance based on a lower water level and concluded that the emergency core cooling system performance would not be adversely affected. The team reviewed the prompt operability determination during the inspection.

Analysis. The failure to properly implement design controls was a performance deficiency. Specifically, design Calculation 13-MC-SI-017 included a non-conservative input value, which affected the available emergency core cooling pump net positive suction head margin under postulated accident conditions. The team determined this finding to be greater than minor because accident analysis calculations were required to be re-performed to assure the accident analysis requirements were met. The finding affected the mitigating systems cornerstone as related to the availability, reliability, and capability of the emergency core cooling system.

In accordance with Inspection Manual Chapter 0609, *Significance Determination Process*, Appendix A, *Significance Determination of Reactor Inspection Findings for At-Power Situations*, the team conducted a Phase 1 screening and determined the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss-of-operability in accordance with Part 9900, Technical Guidance, *Operability Determination Process for Operability and Functional Assessment*. Based on the licensee's evaluation, this deficiency would not have resulted in the emergency core cooling pumps becoming inoperable under the most limiting postulated accident conditions. Licensee personnel entered this into the corrective action program as Palo Verde Action Request PVAR 2981257.

This finding has crosscutting aspects associated with corrective action of the problem identification and resolution area to ensure that issues potentially impacting nuclear safety are promptly identified, fully evaluated and that actions are taken to address safety issues in a timely manner.

Enforcement: Criterion III, *Design Control*, of Appendix B to 10 CFR Part 50 requires, in part, that measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations. These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, as of March 15, 2007, the design control measures taken were not adequate to verify that Calculation 13-MC-SI-017, Revision 6, did not include a non-conservative input value which affected the available emergency core cooling pump net positive suction head margin under postulated accident conditions. Because this violation is of very low safety significance and has been entered into the licensee's corrective action program as Palo Verde Action Request PVAR 2981257, this violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000528, -529, -530/2007011-003, *Non-conservative Containment Sump Level Analysis*.

b.4. Inadequate Corrective Actions for Target Rock Solenoid-Operated Valves

Introduction. The team identified a 10 CFR 50, Appendix B, Criterion XVI, noncited violation of very low safety significance (Green) for the failure to promptly identify and correct significant conditions adverse to quality for failures of Target Rock solenoid-operated valves.

Description. During the review of the auxiliary feedwater pumps, the team noted repetitive failures of Target Rock solenoid-valves for the steam admission valves to the turbine-driven pumps. The team also noted Target Rock solenoid-operated valve failures associated with the safety injection tanks and the turbine-driven auxiliary feedwater pump high pressure drain traps.

Repetitive failures of the turbine-driven auxiliary feedwater pump steam admission bypass valves have been a long-standing equipment reliability issue and valve failures have resulted in increased unavailability of the turbine-driven pumps. Corrective actions taken have addressed the symptoms of the failures but have not been effective in addressing the underlying cause. For example, licensee engineers determined, in 2002, that the Target Rock solenoid-valves coils should be replaced every other refueling outage because of accelerated aging from being in a hot environment. Another cause was associated with the tolerances of the solenoid piston ring. A potential contributor was evaluated as the manufacturing tolerance for the piston ring may be too large for the valve applications. Licensee engineers had determined, through maintenance

activities, that by reducing the ring thickness, that the piston ring did not stick and cause blow-by. The blow-by has been postulated as the cause of the heat-related accelerated aging.

The valves in question are bolted bonnet, dual pilot assisted, 125Vdc, stainless steel solenoid-operated valves manufactured by Curtis-Wright Flow Control©. In the applications associated with the turbine-driven auxiliary feedwater pump steam admission bypass line and the safety injection tank system, the valves are normally closed and fail closed on loss-of-power. In the turbine-driven auxiliary feedwater pump high pressure drain system, the valves are normally open and fail closed.

The steam admission bypass valves have two safety functions. One is to provide containment isolation; the other to provide initial steam flow to the auxiliary feedwater turbine-driven pump to warm the steam lines and bring the skid mounted hydraulic control valves and lubrication subsystem to normal operating conditions prior to the larger steam admission valve opening. There are two valves in parallel, each with a steam supply from a different steam generator, in each pump's steam admission line.

Over a period dating as far back as 15 years and continuing in current performance, there have been multiple examples of failures and off-normal operation of these steam admission valves for each turbine-driven auxiliary feedwater pump, as well as of similar or identical Target Rock valves in other systems. In most cases, the failures were attributed to one of a small set of known apparent failure causes. A review over the last 2 years of the six steam admission valves onsite, 10 occurrences of valve problems were identified. There were 7 instances of the valves stroking within surveillance acceptance criteria but outside reference values. In a separate occurrence, 1 valve failure resulted in a turbine-driven auxiliary feedwater pump overspeed; and 2 valve failures caused failed surveillance tests, one of which led to a unit shutdown when the valve could not be repaired within its 7-day technical specification allowed action time. Many of the failures involved sticking piston rings with associated blow-by.

Failure of the Target Rock solenoid-operated valves have resulted in significant conditions adverse to quality. However, the licensee has not conducted root cause evaluations for the failures and initiated corrective actions to prevent recurrence. The team noted that a root cause Charter investigation, dated April 26, 2006, was to investigate the cause(s) for unacceptable delays experienced relative to the maintenance and retest of the failed valve, resulting in a unit shutdown. The charter did direct the root cause investigation team "to determine the cause(s) associated with the failure of Valve 2JSGAUV138A, as well as the delays that were experienced in resolving the condition in a controlled and timely manner." However, the root cause investigation team focused on the reasons why maintenance personnel were unable to repair the valve within 7 days, not on the cause of the valve failure or possible corrective actions to prevent recurrence. The root cause investigation did note the historical problems with these valves as the second contributing cause and the failure to replace the coil in accordance with the recommended preventive maintenance frequency as the third contributing cause. Similarly, each time a turbine-driven auxiliary feedwater pump steam admission bypass valve would fail during a surveillance, an apparent cause evaluation would attribute the failure to defects in the Target Rock design.

Analysis. The team found that the failure to identify and correct significant condition(s) adverse to quality, involving the Target Rock solenoid-operated valves was a performance deficiency. The finding was more than minor because it is associated with the mitigating systems cornerstone attribute of equipment performance and it affected the cornerstone objective to ensure the availability of systems that respond to initiating events to prevent undesirable consequences. In one instance, the turbine-driven auxiliary feedwater pump Target Rock solenoid-valve failure affected the containment barrier cornerstone. This finding has cross-cutting aspects associated with corrective action of the problem identification and resolution area to ensure that issues potentially impacting nuclear safety are promptly identified, fully evaluated and that actions are taken to address safety issues in a timely manner. Since there was no actual loss of safety function of the pump, the team determined that this finding was of very low safety significance (Green) in Phase 1 of the significance determination process. For the one instance that involved the containment barrier cornerstone, none of the attributes identified in the Manual Chapter 0609, Significance Determination Process, Appendix A, for the containment barrier were affected, and the issue screened as very low safety significance.

Enforcement. Criterion XVI, *Corrective Actions*, of Appendix B to 10 CFR Part 50 state, in part, that "[m]easures shall be established to assure that conditions adverse to quality . . . are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition."

Contrary to the above, the the licensee did not promptly identify and correct significant conditions adverse to quality for failures of Target Rock solenoid-operated valves to assure that the cause of the failures were determined and corrective action taken to prevent recurrence. For example, the cause analyses performed for the auxiliary feedwater pump Target Rock solenoid-valve failures, that resulted in a turbine overspeed on one occurrence and a plant shutdown as required by the Technical Specifications, on a separate occurrence, did not promptly identify and provide actions to prevent recurrence. Because the finding is of very low safety significance (Green) and has been entered into the licensee's corrective action program as Palo Verde Action Requests PVARs 2984832 and 2985372, this violation is being treated as a noncited violation, consistent with Section VI.A.1 of the Enforcement Policy: NCV 05000528, -529, -530/2007011-004, *Inadequate Corrective Actions for Target Rock Solenoid-Operated Valves.*

b.5. Problem Identification and Resolution

Assessment of Corrective Action Program

Inspection Scope

The team reviewed calculations, drawings, procedures, and other design information for the components, operator actions, and operating experience items identified above. Many of those items had also been reviewed by licensee personnel during the

performance of a component design basis review undertaken by the licensee in response to previously identified issues associated with engineering performance at the site.

The team performed these reviews as part of the inspection procedure, as well as to gain an insight into the effectiveness of the licensee's review program and ability to identify conditions adverse to quality. In addition to reviewing the documents, the team performed walkdowns of the selected items and interviewed cognizant plant personnel.

Assessment

The team found that the licensee's component design basis review activities were not completely effective in identifying conditions adverse to quality. The team identified several examples of conditions adverse to quality associated with the same components that had also been reviewed by the licensee. (Of these examples, 4 were more than minor and resulted in the noncited violations and findings discussed above.)

Based on the team's interviews with licensee personnel and a review of the component design basis review reports, the team was concerned with the thoroughness of the reviews and their understanding of which conditions should be addressed as conditions adverse to quality. Many of the minor violation examples identified by the team had aspects of problem identification deficiencies that were associated with design control and procedural adequacy/implementation.

The team was also concerned with an apparent lack of understanding by license personnel of the marginal review program. Following identification of the issues by the team, licensee personnel promptly initiated appropriate corrective action documents. Also, as stated above, those examples that were determined to be more than minor were entered into the corrective action programs as Palo Verde Action Requests in accordance with station procedures.

4. OTHER ACTIVITIES

4OA5 Other Activities

(Closed) URI 05000528, -529, -530/2005002-04: Potentially Nonconservative Setpoints

NRC Inspection Report 05000528, -529, 530/2005002 documented an unresolved item regarding potentially nonconservative setpoints for safety-related instruments. This item was left unresolved pending review of the licensee's evaluation of these setpoints to determine if there was sufficient margin when all uncertainties were accounted for. The licensee was able to demonstrate that there was sufficient margin in the calculations to demonstrate that the setpoints were conservative. Based on these results, the team identified no performance deficiencies or violations of NRC requirements. This unresolved item is closed.

4OA6 Meetings, Including Exit

On March 23, 2007, the team leader presented the inspection results to Mr. R. Bement, Vice President, Nuclear Operations, and other members of the staff who acknowledged the findings. The team leader confirmed that, while proprietary information was provided and examined during this inspection, no proprietary information is included in this report.

On May 3, 2007, the team leader presented information related to the classification of findings to Mr. R. Bement, Vice President, Nuclear Operations, and other members of the staff who acknowledged the findings.

On May 25, 2007, the team leader presented additional information related to the classification of findings to an exit teleconference was held with Mr. R. Randels, Director, Design Engineering, and other members of the staff who acknowledged the findings.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by licensee personnel and are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as noncited violations.

- 10 CFR Part 50.55(a)(g)(4), *Codes and Standards*, states, in part, that ". . . components which are classified as American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 must meet the requirements . . . set forth in Section XI of editions of the ASME Boiler and Pressure Vessel Code." Contrary to this, the licensee identified on January 25, 2007, that required ASME Section XI Inservice Inspections on non-corrosion resistant bolting that was covered by insulation had never been performed. Technical Specifications Surveillance Requirement 3.4.103.1 also requires that these inspections be performed in every 10-year inspection interval per the Code. The affected bolting occurs on valve body-to-bonnet connections and bolted flanges in approximately 50 locations per unit in the safety injection and shutdown cooling systems. This finding is greater than minor because, if left uncorrected, it would lead to a more serious safety concern. Using the Manual Chapter 0609, Phase 1 worksheet, the finding is determined to have very low safety significance (Green) because there was no actual loss of safety function to any component, train, or system. The licensee is currently inspecting the bolted connections and replacing the bolts with corrosion-resistant material. This violation was documented in Palo Verde Action Request PVAR 296298.

- 10 CFR 50.63(a)(1) requires that a licensed nuclear power plant must be able to withstand and recover from an station blackout event. To meet this requirement, Section 8.3.1.1.10 of the Palo Verde Nuclear Generating Station Updated Final Safety Analysis Report (UFSAR) states that the alternate ac power system is capable of energizing the required loads within one hour of the onset of an

station blackout. The UFSAR also states that a study was performed to demonstrate that Palo Verde Nuclear Generating Station is capable of coping with a station blackout for that initial one-hour period. Contrary to this requirement, the licensee determined, as the result of five tests, that it took from 61 minutes 30 seconds to 67 minutes 30 seconds to energize the required loads. This issue is documented in the licensee's corrective action program as Palo Verde Action Request PVAR 2970059. This finding is of very low safety significance because testing has demonstrated that, even at the most limiting time of 67 minutes, 30 seconds, Palo Verde Nuclear Generating Station could withstand an station blackout.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

G. Andrews, Director, Performance Improvement
R. Bement, Vice President, Nuclear Operations
B. Bolf, Senior Engineer, NSSS System Engineer
M. Brutcher, Section Leader, Design Engineering
R. Buzard, Senior Consultant, Regulatory Affairs
D. Carnes, Director, Nuclear Assurance
C. Churchman, Director, Plant Engineering
G. D'Aunoy, Senior Engineer, PRA Engineering
D. Fan, Department Leader, Special Projects
D. Hautala, Senior Engineer, Regulatory Affairs
J. Hesser, Vice President, Engineering
M. Karbassian, Department Leader, Design Engineering
M. Perito, Plant Manager, Nuclear Operations
R. Randels, Director, Design Engineering
M. Salazar, Section Leader, Maintenance
G. Sowers, Section Leader, PRA Engineering
B. Thiele, Site Manager, Component Design Basis Review
A. Turner, Administrative Assistant, Component Design Basis Review
T. Weber, Section Leader, Regulatory Affairs
J. Wood, Department Leader, Nuclear Training

NRC personnel

T. Brown, Resident Inspector, Diablo Canyon Nuclear Power Plant
J. Melfi, Resident Inspector, Palo Verde Nuclear Generating Station Nuclear
G. Warnick, Senior Resident Inspector, Palo Verde Nuclear Generating Station

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000528, -529, -530/2007011-01	FIN	Ineffective Demonstration of Conformance to Design for the Alternate ac Power Sources (Section 1R21b.1.).
05000528, -529, -530/2007011-02	NCV	Inadequate Control of Design Information for the Station Blackout System (Section 1R21b.2.).

Opened and Closed

05000528, -529, -530/2007011-03	NCV	Non-conservative Containment Sump Level Analysis (Section 1R21b.3.).
05000528, -529, -530/2007011-04	NCV	Ineffective Maintenance on Target Rock Solenoid-Operated Valves (Section 1R21b.4.).

Closed

05000528, -529, -530/2005002-04	URI	Potentially Nonconservative Setpoints (Section 4OA5).

LIST OF DOCUMENTS REVIEWED

Calculations:

NUMBER	TITLE	REVISION
02-EC-MA-0221	AC Distribution	12
02-EC-PB-0200	AC Overcurrent Protection: Class 1E	8
02-EC-PK-0207	DC Battery Sizing and Minimum Voltage Calculation	6
13-EC-NA-0221	Non-Class 1E 13.8 kV Switchgear Protection	1
13-EC-PB-0204	AC Equipment Protection (4.16KV and 480V): Class 1E	4
13-EC-PH-0100	A.C. Power feeder, voltage drop and cable size verification	12
13-ES-A15	Station Blackout Coping Study	1
13-JC-AF-0205	Turbine Driven AF Pump Control Settings	4
13-JC-CH-0206	Refueling Water Tank Level Instruments (CHA-L-200 and CHBL-201) Setpoint and Uncertainty Calculation	7
13-JC-CT-0200	Setpoints and Total Loop Uncertainty for High/Low Condensate Tank Levels (Loops CTALLOOPOO35 and CTBLLOOP0036)	9

Calculations:

NUMBER	TITLE	REVISION
13-JC-DF-0202	Diesel Fuel Oil Storage Tank Level Instrument Uncertainty Calculation	6
13-JC-DF-0203	Diesel Fuel Oil Storage Tank Level Instrument Setpoint and Uncertainty Calculation	4
13-JC-DF-0204	Diesel Fuel Oil Storage Tank Level Indication Conversion Calculation	2
13-JC-DG-0201	Diesel Fuel Oil Day Tank Level Instruments(DGN-L-5/6, -1/2, -343/344) Uncertainty Calculation	3
13-JC-DG-0203	Emergency Diesel Generator (DG) and Diesel Fuel Oil (DF) Systems Instrumentation Uncertainty Calculation	7
13-JC-RC-0202	RCS Hot & Cold Leg Temperature Instrument RCx-T-0112x & Rcx-T-0122x) Uncertainty Calculation	8
13-JC-RC-0204	Pressurizer Level Instrument (RCA-L-110X & RCB-L-110Y) Setpoint and Uncertainty Calculation	6
13-JC-SI-0218	Containment Spray Header Water Level Loop Setpoint and Uncertainty	3
13-JC-ZZ-0201	MOV thrust, Torque and Actuator Sizing Calculation	10
13-MC-AF-0209	Turbine Driven AF Pump Warming Line Sizing Calculation	4
13-MC-AF-0210	Turbine Driven AF Pump Response Time	1
13-MC-AF-0309	AF Hydraulic Calculation for Q-Trains	7
13-MC-CT-0205	Condensate Storage Tank	0, 1, 2, 3, 4
13-MC-CT-0307	Condensate Storage Tank Minimum Level Setpoint	2, 3, 4
13-MC-DF-0302	Diesel Fuel Oil Excess Flow Check Valve and Instrument Tubing Leakage Rate	1

Calculations:

NUMBER	TITLE	REVISION
13-MC-DF-0305	Calculation of Diesel Generator Fuel Oil Piping Flows, Pressures, and Temperatures	0
13-MC-DF-0306	As Built Calculation for Sizing the Diesel Fuel Storage and Day Tanks	7
13-MC-EC-0200	EC System Hydraulic Calculation	5
13-MC-EC-0252	EC System Water Requirements and Chiller Sizing	8
13-MC-HA-0802	Auxiliary Building Turbine Driven AFW Pump Room - Temperature Transient Blackout	2
13-MC-SG-0211	AOV Thrust and Actuator Sizing Calculation-CCI Drag Valves	2
13-MC-SG-0314	Nitrogen Tank Pressure Requirements for ADVs	6
13-MC-SG-0405	ADV Nitrogen Tank Temperature Adjusted Pressures	2
13-MC-SI-0017	Safety Injection System Interface Requirements	6
13-MC-SI-0018	Containment Spray System Interface Requirements Calculation	7
13-MC-SI-0021	HPSI Orifice Two-Stage Design	1
13-MC-SI-0220	Containment Spray System Hydraulic analysis and pump full flow and miniflow surveillance test requirements.	3
13-MC-SI-0222	HPSI Hot Leg Injection MOVs- Maximum Diff. Pressure	2
13-MC-SP-0306	MINET Hydraulic Analysis of SP System	4
13-MC-SP-0307	SP/EW System Thermal Performance Design Basis Analysis	7
13-MC-ZZ-0216	Air Operated Valve Bench Set Calculation	6
13-MC-ZZ-0217	Gate Valve Open Thrust Required During Potential Pressure Locking Conditions	4

Calculations:

NUMBER	TITLE	REVISION
13-MC-ZZ-2219	Piston AOV Thrust and Actuator Sizing Calculations	4
13-NC-SI-0202	Containment Spray Initiation Times	3
13-NC-SP-0006	Volume of Water in Essential Spray Pond	2
13-NC-SP-0202	Loops L-27 & L-28 Essential Spray Pond Level Uncertainty and Setpoint Calculation	4
13-NC-SP-0206	Ultimate Heat Sink Design Reverification	4
13-NC-ZC-0232	Effects of Containment Spray Setpoint on Containment Peak Pressure Analysis	9
73DP-9ZZ14	Surveillance Testing	14
A0-MA-GT-944	Gas Turbine Fuel Oil Temperature	0
A0-MC-FS-0201	GTG fuel usage during 16 hour blackout: Process Levels-Setpoints-Supply line losses and vent sizing	1
A0-MC-FS-0500	Fuel Oil System-Station Blackout Piping	1
AO-EC-NA-0422	Phase and Ground Overcurrent Relay/Breaker Selections and Settings for Station Blackout System Protection Devices	1
S-06-0331	Maintenance of Atmospheric Dump Valve Rupture Disc	0

Corrective Action Documents:

CRAI 0077197	CRAI 2886161	CRAI 2945501
CRAI 0117961	CRAI 2913077	CRAI 2945507
CRAI 2570696	CRAI 2913844	CRAI 2969114
CRAI 2862270	CRAI 2921186	CRAI 2969115
CRAI 2862295	CRAI 2921217	CRAI 2970984
CRAI 2862298	CRAI 2930022	CRAI 2970991
CRAI 2862303	CRAI 2932459	CRDR 0077194
CRAI 2880505	CRAI 2935818	CRDR 0101883
CRAI 2880515	CRAI 2938079	CRDR 0116569
CRAI 2884612	CRAI 2938116	CRDR 0117203

CRDR 0117666
CRDR 0220394
CRDR 0950242
CRDR 0950297
CRDR 1000043
CRDR 2250970
CRDR 2325514
CRDR 2407009
CRDR 2412347
CRDR 2425950
CRDR 2428211
CRDR 2505473
CRDR 2533249
CRDR 2534537
CRDR 2548716
CRDR 2556817
CRDR 2559098
CRDR 2564721
CRDR 2584124
CRDR 2612302
CRDR 2669828
CRDR 2720228
CRDR 2759239
CRDR 2759581
CRDR 2761657
CRDR 2784074
CRDR 2784303
CRDR 2790508
CRDR 2791162
CRDR 2792214
CRDR 2812118
CRDR 2818836
CRDR 2822409
CRDR 2825638
CRDR 2825644
CRDR 2825647
CRDR 2827845
CRDR 2839237
CRDR 2840390
CRDR 2841701
CRDR 2867216
CRDR 2869959
CRDR 2870352
CRDR 2872073
CRDR 2872154
CRDR 2875982
CRDR 2881083
CRDR 2883283
CRDR 2883327
CRDR 2886558
CRDR 2897810
CRDR 2898586
CRDR 2898613
CRDR 2902154
CRDR 2905638
CRDR 2906728
CRDR 2908954
CRDR 2909725
CRDR 2913728
CRDR 2916323
CRDR 2921844
CRDR 2928626
CRDR 2932120
CRDR 2932177
CRDR 2934345
CRDR 2935232
CRDR 2936216
CRDR 2936461
CRDR 2938366
CRDR 2945347
CRDR 2952147
CRDR 2958450
CRDR 2970059
CRDR 2971188
CRDR 2971202
CRDR 2971616
CRDR 2976608
CRDR 2981485
CRDR 6694222
EER 89-DG-116
EER 90-AF-011
EER 93W-FS-2545
PVAR 0117960
PVAR 00804911
PVAR 2952316
PVAR 2962981
PVAR 2968754
PVAR 2975783
PVAR 2975917
PVAR 2976608
PVAR 2976688
PVAR 2977447
PVAR 2977456
PVAR 2978124
PVAR 2978127
PVAR 2978156
PVAR 2978191
PVAR 2978448
PVAR 2979101
PVAR 2979140
PVAR 2979453
PVAR 2979643
PVAR 2979915
PVAR 2980300
PVAR 2980651
PVAR 2980677
PVAR 2980726
PVAR 2980758
PVAR 2980772
PVAR 2980805
PVAR 2981017
PVAR 2981226
PVAR 2981234
PVAR 2981257
PVAR 2981891
PVAR 2982023
PVAR 2982134
PVAR 2982193
PVAR 2982244
PVAR 2982699
PVAR 2982716
PVAR 2982775
PVAR 2982823
PVAR 2982828
PVAR 2982829
PVAR 2983146
PVAR 2983315
PVAR 2983319
PVAR 2983778
PVAR 2984000
PVAR 2984054
PVAR 2984055
PVAR 2984140
PVAR 2984313
PVAR 2984315
PVAR 2984322
PVAR 2984328
PVAR 2984367
PVAR 2984400
PVAR 2984434
PVAR 2984743
PVAR 2984745
PVAR 2984832
PVAR 2984872

PVAR 2984912	PVAR 2985167	PVAR 2985372
PVAR 2985156	PVAR 2985197	
PVAR 2985161	PVAR 2985242	

Design Basis Manuals:

TITLE	REVISION
Auxiliary Feedwater	16
Diesel Generator, Class 1E Standby Generation, Fuel Oil Storage and Transfer System	16
Diesel Generator and Class 1E Generation System	1
Essential Cooling Water System	18
Essential Spray Pond System	15
Station Blackout Gas Turbine Generation System	7
Class 1E 4.16 KV Power System	7
Class 1E 125 VDC Power System	11

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C05-1050	1115	January 5, 2005
C05-1051	1315	January 7, 2005
C05-1062	0840	January 12, 2005
C05-1076	0820	January 25, 2005
C05-1107	1310	February 8, 2005
C05-1112	0850	February 10, 2005
C05-1113	1035	February 10, 2005
C05-1114	0835	February 11, 2005

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C05-1143	0845	February 24, 2005
C05-1171	0810	March 10, 2005
C05-1184	1105	January 25, 2006
C05-1211	0755	March 19, 2005
C05-1216	0840	March 24, 2005
C05-1219	11:05	March 29, 2005
C05-1220	0750	February 8, 2006
C05-1270	8:35	April 7, 2005
C05-1272	13:20	April 11, 2005
C05-1273	15:40	April 11, 2005
C05-1274	21:10	April 11, 2005
C05-1275	22:50	April 11, 2005
C05-1276	0025	April 12, 2005
C05-1277	0835	April 12, 2005
C05-1278	1150	April 12, 2005
C05-1279	14:25	April 12, 2005
C05-1280	20:15	April 12, 2005
C05-1281	21:25	April 12, 2005
C05-1282	0025	April 13, 2005
C05-1293	1520	April 18, 2005

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C05-1294	1345	April 18, 2005
C05-1300	0840	April 21, 2005
C05-1301	1225	April 21, 2005
C05-1304	1130	April 24, 2005
C05-1305	1335	April 24, 2005
C05-1306	2020	April 24, 2005
C05-1307	2235	April 24, 2005
C05-1308	0105	April 25, 2005
C05-1309	0800	April 25, 2005
C05-1310	1000	April 25, 2005
C05-1311	1240	April 25, 2005
C05-1312	2020	April 25, 2005
C05-1313	2350	April 25, 2005
C05-1314	0155	April 26, 2005
C05-1329	2235	April 26, 2005
C05-1334	1030	May 3, 2005
C05-1345	1235	May 8, 2005
C05-1346	1410	May 9, 2005
C05-1423	0830	May 26, 2005
C05-1430	0855	May 25, 2005

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C05-1448	0825	June 2, 2005
C05-1468	0850	June 16, 2005
C05-1540	0845	June 30, 2005
C05-1541	0830	June 30, 2005
C05-1580	0830	July 20, 2005
C05-1584	0820	July 26, 2005
C05-1600	0845	July 28, 2005
C05-1616	1040	August 10, 2005
C05-1619	1245	August 11, 2005
C05-1620	1325	August 11, 2005
C05-1639	0840	August 25, 2005
C05-1642	1000	August 26, 2005
C05-1669	0830	September 8, 2005
C05-1670	1045	September 9, 2005
C05-1695	0835	September 23, 2005
C05-1749	1125	October 6, 2005
C05-1761	1320	October 13, 2005
C05-1795	0845	October 28, 2005
C05-1806	0845	November 3, 2005
C05-1808	1120	November 6, 2005

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C05-1809	0835	November 7, 2005
C05-1810	1130	November 7, 2005
C05-1824	0915	November 17, 2005
C05-1835	0945	November 18, 2005
C05-1836	0815	November 18, 2005
C05-1838	0800	November 21, 2005
C05-1839	0920	November 21, 2005
C05-1840	1540	November 21, 2005
C05-1881	0855	December 13, 2005
C05-1885	0925	December 15, 2005
C05-1916	0850	December 28, 2005
C05-1925	0800	December 29, 2005
C06-1160	0830	January 11, 2006
C06-1185	0840	January 26, 2006
C06-1188	1125	January 27, 2006
C06-1222	1325	February 9, 2006
C06-1277	0820	February 23, 2006
C06-1326	0830	March 9, 2006
C06-1351	0835	March 22, 2006
C06-1423	0740	April 12, 2006

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C06-1424	0945	April 12, 2006
C06-1425	1150	April 12, 2006
C06-1426	1325	April 12, 2006
C06-1427	1535	April 12, 2006
C06-1428	1957	April 12, 2006
C06-1429	2150	April 12, 2006
C06-1430	0805	April 13, 2006
C06-1431	0930	April 13, 2006
C06-1432	1130	April 13, 2006
C06-1435	1330	April 14, 2006
C06-1436	2035	April 14, 2006
C06-1460	1035	April 20, 2006
C06-1474	0840	April 23, 2006
C06-1475	1020	April 23, 2006
C06-1476	1315	April 23, 2006
C06-1477	0810	April 24, 2006
C06-1478	0945	April 24, 2006
C06-1479	1125	April 24, 2006
C06-1480	1345	April 24, 2006
C06-1481	1545	April 24, 2006

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C06-1482	0910	April 25, 2006
C06-1483	1055	April 25, 2006
C06-1484	1255	April 25, 2006
C06-1499	1515	April 26, 2006
C06-1502	0930	May 1, 2006
C06-1522	0855	May 5, 2006
C06-1523	0825	May 4, 2006
C06-1528	1020	May 5, 2006
C06-1531	1020	May 6, 2006
C06-1537	1015	May 10, 2006
C06-1565	0825	May 18, 2006
C06-1566	1035	May 18, 2006
C06-1567	0845	May 18, 2006
C06-1614	0900	June 6, 2006
C06-1623	1325	June 9, 2006
C06-1624	0935	June 13, 2006
C06-1628	1305	June 14, 2006
C06-1633	1005	June 17, 2006
C06-1634	1255	June 17, 2006
C06-1648	0805	June 25, 2006

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C06-1671	0740	June 28, 2006
C06-1672	0902	June 28, 2006
C06-1699	0830	July 13, 2006
C06-1703	0840	July 18, 2006
C06-1710	1220	July 21, 2006
C06-1715	0835	July 25, 2006
C06-1716	1010	July 25, 2006
C06-1779	0855	August 3, 2006
C06-1786	0740	August 9, 2006
C06-1789	0930	August 10, 2006
C06-1809	0915	August 24, 2006
C06-1810	1105	August 24, 2006
C06-1817	0835	August 29, 2006
C06-1831	0855	September 5, 2006
C06-1869	0945	September 19, 2006
C06-1874	0750	September 20, 2006
C06-1906	0810	September 27, 2006
C06-1938	0810	October 11, 2006
C06-1942	0925	October 13, 2006
C06-1946	1240	October 15, 2006

Diesel Fuel Oil Samples:

NUMBER	TIME (LOCAL/24 HR)	DATE
C06-1955	0900	October 24, 2006
C06-1963	0920	October 29, 2006
C06-1983	0800	November 2, 2006
C06-1984	0830	November 2, 2006
C06-1994	0840	November 15, 2006
C06-2011	0850	November 22, 2006
C06-2012	0915	November 28, 2006
C06-2062	0850	December 15, 2006
C06-2075	0755	December 15, 2006
C06-2085	0825	December 19, 2006
C06-2104	1015	December 27, 2006
C06-2105	0845	December 27, 2006
C06-2106	0835	December 28, 2006
C07-1157	0855	January 11, 2007
C07-1175	0900	January 25, 2007
C07-1201	0910	February 8, 2007
C07-1230	0845	February 21, 2007
C07-1232	0905	February 22, 2007

Drawings:

NUMBER	TITLE	REVISION
01-E-PBA-001	Single Line Diagram, 4.16 KV Class 1E Power System Switchgear 1E-PBA-S03	6
01-E-PKA-005	Single Line Diagram, 125V DC Class 1E Power System DC Control Center 1E-PKB-M42	10
01-J-DFL-001	Control and Logic Diagram DGFO Pumps and System Alarms	2
01-M-AFP-001	P. & I. Diagram - Auxiliary Feedwater System	34
01-M-CTP-001	P. & I. Diagram - Condensate Storage and Transfer System	19
01-M-DGP-001	P. & I. Diagram - Diesel Generator System	48
01-M-ECP-001	P&I Diagram Essential Chilled Water System	31
01-M-EWP-001	P. & I. Diagram - Essential Cooling Water System	30
01-M-SPP-001	P. & I. Diagram - Essential Spray Pond System	40
01-P-ZYA-019	Reactor Make-Up Water Area Piping Plan & Section	0
02-E-PKA-005	Single Line Diagram, 125V DC Class 1E Power System DC Control Center 2E-PKB-M42	7
02-M-ECP-001	P&I Diagram Essential Chilled Water System	29
02-M-SIP-001	P&I Diagram Safety Injection & Shutdown Cooling System	35
02–M-SGP-001	P&I Diagram Main Steam System	58
03-E-PKA-005	Single Line Diagram, 125V DC Class 1E Power System, DC Control Center 3E-PKB-M42	6
03-M-AFP-001	P&I Diagram Auxiliary Feedwater System	22
03-M-ECP-001	P&I Diagram Essential Chilled Water System	22

Drawings:

NUMBER	TITLE	REVISION
10407-13-MM-105 (2 of 2)	Diesel Fuel Oil Storage Tanks	8
10407-13-MM-105 (1 of 2)	Diesel Fuel Oil Storage Tanks	8
12-P-ZYA-07	Diesel Oil Storage Tank Area Piping Plan and Sections	11
13-E-MAA-001	Main Single Line Diagram	21
13-E003-00015	OA/FOA/FOA Transformer Control Schematic Wiring Diagram	14
13-J-03K-084	Reactor Makeup Water Tank	4
13-M-DFP-001	P. & I. Diagram - Diesel Fuel Oil and Transfer System	17
469621A-C149760, Sheet 26	T-G #1 Electrical Schematic	B
469621A-C149760, Sheet 6	T-G #1 Electrical Schematic	D
469621A-C149760, Sheet 9	T-G #1 Electrical Schematic	A
A0-104-W311-96	Draw-off sump- Double Nozzle Sump	1
A0-C-ZVC-186	Station Blackout Gas Turbine Generator Site Plan	3
A0-E-NAA-006	Single Line Diagram, Station Blackout Gas Turbine Generator Switchgear AE-NAN-S07	2
A0-E-NAB-024	Elementary Diagram, 13.8KV Non-Class 1E Power System, Station Blackout GTG Bus AE-NAN-S07 Feeder Breakers for Units 1, 2, & 3	2
A0-E-NAB-025	Elementary Diagram, Stand-By Generation System Gas Turbine Generators AE-NEN-G01A & B 13.8KV Breaker	1

Drawings:

NUMBER	TITLE	REVISION
A0-EN609-A084	13.8KV System One Line Diagram	5
A0-EN609-A114-5	GTG Lube Oil Tank Drawing	5
A0-M-GTP-001	Station Blackout P&I Diagram	2
A0-P-ZYA-093	Station Blackout Gas Turbine Generator Underground Piping Plan	2
DS-C-61167	Nozzle Type Relief Valve	C
DS-C-61167	Nozzle Type Relief Valve	0
DS-C-61169-1	Nozzle Type Relief Valve	0
DS-C-61169-2	Nozzle Type Relief Valve	C
DS-C-61170-1	Nozzle Type Relief Valve	0
DS-C-61173-1	Nozzle Type Relief Valve	0
DS-C-61181	Nozzle Type Relief Valve	H
SDOC M105-00025	Diesel Fuel Oil Storage Tanks	11
SDOC M105-00024	Diesel Fuel Oil Storage Tanks	14
SPEC-13-MM-0105	Diesel Fuel Oil Storage Tanks	5

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
	Memo 280-1762-MAR, CRDR Action 950169.04 Complete Actions 2, 3, and 4	June 7, 1995
	E-mail Smith to Buzard, EDG L.O. Consumption Rate	March 6, 2007

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
	E-mail Borrero to Murphy, RWT Temperature	February 27, 2007
	E-mail Smith to Buzard, Max Lube Oil	March 6, 2007
	E-mail Smith to Buzard, Max Turbo Oil Pressure	March 6, 2007
	E-mail Hodgkins to Bressett, Generator Bearing Level Gauges	March 5, 2007
	Component Design Basis Review, Mini Report for PK Components, 125 VDC Class 1E Battery 1EPKBF12 & 14, Train B	0
	PRA Risk Assessment of missed inspection of ASME Class 1, 2, 3 Bolted Connections without Corrosion Resistant Bolting	1
	Unit 1 Inservice Inspection Report, 12th Refueling Outage	0
	Unit 2 Inservice Inspection Report, 13th Refueling Outage	0
	Unit 3 Inservice Inspection Report, 12th Refueling Outage	0
	Operator Burdens	February 12, 2007
	Unit 1 2 3 Night Order	March 22, 2007
102-02300 (File: 92-001-419.8)	Response to NRC comments on Periodic Testing of Alternate AC (AAC) Sources. APS letter to NRC.	October 2, 1992
102-02440 (File: 93-056-026)	Response to NRC comments on Periodic Testing of Alternate AC (AAC) Sources. APS letter to NRC.	March 8, 1993
13-J-083-034	Data Sheet Process Solenoid Valves	3

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
13-J-083-062	Data Sheet Process Solenoid Valves	1
13-J-083-078	Data Sheet Process Solenoid Valves	1
13-JM-603	Material Specification-Nuclear Service Solenoid Valves	18
13-JN-0699	Specification Class 1 Solenoid Valves	2
13-NS-B062	At-power PRA Study for Human Reliability Analysis	6
13-NS-C083	Appendix E, Human Actions List by CDF RAW Importance	1
13-SM-AF-042	Design Change SGA-UV-134A &138A installation	2
161-04146 (File: 91-0560-026)	Revised Response to the Station Blackout Rule (10 CFR 50.63) APS letter to NRC	August 31, 1991
161-04684 (File: 92-056-026)	Response to the NRC Station Blackout Safety Evaluation. APS letter to NRC.	March 20, 1992
294-01941-DWV	Company Correspondence - Review of Operability Determinations carried over into 2C14	November 17, 2006
324-00129-CDC (File: 91-014-00)	Operations Participation in Station Blackout (SBO) - APS Letter	June 12, 1991
AF - Auxiliary Feedwater	System Health Report	January 1 - June 30, 2006
APS 161-03025 (File: 90-056-026)	Supplemental Information on Station Blackout, APS letter to NRC.	March 26, 1990
APS 161-01842 (File: 89-056-026)	Response to the Station Blackout Rule. APS letter to NRC	April 14, 1989
CH - Chemical and Volume Control	System Health Report	January 1 - June 30, 2006

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
DG - Diesel Generators	System Health Report	January 1 - June 30, 2006
E003-29-1	Westinghouse Electric Corporation Report of Transformer Tests, S/N 7002700	October 18, 1979
EW - Essential Cooling Water	System Health Report	January 1 - June 30, 2006
File: 93-056-026 (TAC M68579)	Station Blackout Supplemental Safety Evaluation PVNGS	April 14, 1993
File: 92-014-000 (TAC M68579)	Supplemental Station Blackout Safety Evaluation PVNGS	July 28, 1992
File: 93-014-000 (TAC M68579)	Station Blackout Supplemental Safety Evaluation PVNGS	January 4, 1993
File: 92-056-026	Station Blackout Safety Evaluation PVNGS	February 11, 1992
Generic Letter 88-14	Instrument Air Supply System Problems Affecting Safety-Related Equipment for PVNGS. Letter to NRC	January 3, 1991
GT - Gas Turbine Generators	System Health Report	January 1 - June 30, 2006
GTG1.02	GTG Test Record	October 24, 1993
IEEE Std 1106	IEEE Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications	1995 & 2005
IN 06-14, Supplement 1	Potentially Defective External Lead-Wire Connections in Barton Pressure Transmitters	September 25, 2006

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
IN 06-14	Potentially Defective External Lead-Wire Connections in Barton Pressure Transmitters	July 10, 2006
LT - Large Transformers	System Health Report	January 1 - June 30, 2006
MME 02252	Material Engineering Evaluation - Target Rock Corporation SOV High Temperature Coil P/N 303703-1, Part Substitution Evaluation	2
NA - Non-Class 1E 13.8KV Power	System Health Report	January 1 - June 30, 2006
NRC Regulatory Issue Summary 2000-03	Performance of Safety Related Power Operated Valves Under Design Basis Conditions	March 15, 2000
NUMARC 87-00	Station Blackout Coping Duration-Guidelines and Technical Bases	1
PB - Class 1E 4.16KV Power	System Health Report	January 1 - June 30, 2006
PRIME Engineering Report No. R3-764-79	Connector P/N 0764-1221B Design Change Acceptability	June 23, 2006
Regulatory Guide 1.155	Station Blackout	August 1988.
RSS-02-1681	2ENANS03AB, Non-Class 1E, 13.8kV, 51/51N Station Blackout Feed to 2ENANS03A and 2ENBNX03 ESF XFMR	3
RSS-03-0044	3ENANS03A, Non-Class 1E, 13.8kV, Cubicle A, Feed to ESF Service Transformer, 3-E-NBN-X03, 10/12.5MVA, 13.8-4.16kV	1

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
RSS-AO-1678	AENANS07D, Non-Class 1E, 13.8kV Station Blackout Feed to 1ENANS03 and 1ENBNX03 ESF Transformer	4
RSS-AO-1679	AENANS07E, Non-Class 1E, 13.8kV Station Blackout Feed to 2ENANS03 and 2ENBNX03 ESF Transformer	4
RSS-AO-1680	AENANS07F, Non-Class 1E, 13.8kV Station Blackout Feed to 3ENANS03 and 3ENBNX03 ESF Transformer	4
S-05-0139	10 CFR 50.59 Screening - The proposed activity will upgrade twenty four non-qualified plant instruments and their associated lines and supports to the quality class Q.	0
S-05-0257	10 CFR 50.59 Screening - Revision to 73ST-9SG05 ADV Nitrogen Accumulator Drop Test	0
S-05-0442	Safety Evaluation for Calculation 13-MC-CT-307 Revise Minimum CST Level Setpoint to Prevent Air Entrainment	0
S-06-0331	10 CFR 50.59 Screening - Add new vendor documents to support maintenance of ADV Rupture Disc	0
S-06-0392	10CFR 50.59 screening-GTG procedure changes	September 14, 2006
S-07-0017	10 CFR 50.59 Screening - Implement modification to install (1) a supplemental nitrogen supply to the nitrogen accumulator for each Atmospheric Dump Valve (ADV) and (2) a two-way radio system to facilitate communication between operators in the GTG control room and operators in the Unit 1, 2 and 3 main control rooms.	0
SG-1039	Design Change Request, 16 Hour Station Blackout Coping Modification	November 16, 2006

Miscellaneous:

NUMBER	TITLE	REVISION / DATE
SP - Spray Pond	System Health Report	January 1 - June 30, 2006
Startup Field Report Job No. 10407	Battery Charger / Power Conversion	August 11, 1983
VTD-A160-0103	Allen-Bradley Power Supply Modules Installation Data (Cat. No. 1771-P3, -P4 and -P5) [Pub. # 1771-2.111]	2
WSL MI 2304213	Instructions for Testing and Calibrating the Startup Transformer Instruments and Performing the Large Transformer Internal CT Testing	March 25, 2004
WSL 244336	Recharge Task Class 1E Battery "PK" Following a Surveillance Battery Test Discharge	October 28, 2005

Modifications:

NUMBER	TITLE	DATE
DCR SG-1039	16 Hour Station Blackout Coping Modifications	November 16, 2006
DFWO 2882666	Relocate Valve SI UV0651	September 6, 2006
DMWO 806536	Replace the 4 Class 1E Batteries (AT&T Round Cells) and Battery Racks with Rectangular Batteries and New Racks in All 3 Units	Unit 1: January 2, 2002 Unit 2: May 21, 1999 Unit 3: June 1, 2000
DMWO 2827452	Changes needed to extend PVNGS' ability to cope with a Station Blackout for a 16-hour loss of all alternating current power, as committed to the NRC via APS letter No. 102-05370, dated October 28, 2005	0, Pen & Ink 1

Modifications:

NUMBER	TITLE	DATE
EDC 2006-00315	Engineering Document Change - Doc No. 01-EC-MA-0221	A
WO 00693599	AF Turbine Steam Supply Modification	February 19, 1995
1-SM-EC-002	Setpoint Change	March 14, 1988

Operability Determinations:

NUMBER	TITLE	REVISION
	POD for PVAR 2962981	0
	POD for PVAR 2981257	0
285	POD for WO# 2762951, Water Intrusion into Diesel Storage Tank	0
305	U2 Essential Pipe Chase Seepage	0
CRDR 2719463	Evaluation of Operability Impact to A Train Auxiliary Feedwater Pump when M23 and M24 Steam Traps are Out of Service - Supplement 1	0

Procedures:

NUMBER	TITLE	REVISION / DATE
111-00606-MLH (File: 94-0140-000)	Closure of Station Blackout Test Procedure. APS letter	February 23, 1994
240ST-9EC03	Essential Chilled Water & Ventilation Systems Inoperable Action Surveillance	12
32ST-9PK04	60-Month Surveillance Test of Station Batteries	27

Procedures:

NUMBER	TITLE	REVISION / DATE
33TI-9EC01	Essential Chilled Water System Flow Balance	1
36MT-9SG01	ADV Bonnet Cavity Pressure and Instrument Installation	6
39DP-9ZZ02	Air Operated Valve Program	10
40AL-9MA01	Transformer Trouble Alarm Responses	23
40 DP-9AP08	Technical Guideline for LOCA	
40DP-9OP06	Operations Department Repetitive Task Program	91
40DP-9OP08	Diesel Generator Test Record	43
40DP-9OP26	Operability Determination and Functional Assessment	18
40DP-9OPA4	Area 4 Operator Logs, Mode 1-4	75
40EP-9EO03	Loss of Coolant Accident	22
40EP-9EO04	Steam Generator Tube Rupture	20
40EP-9EO05	Excess Steam Demand	19
40EP-9EO06	Loss of all Feedwater	13
40EP-9EO07	Blackout	8
40EP-9EO08	Functional Recovery	27
40EP-9EO09	Standard Appendices	53
40EP-9EO10	Lower Mode Functional Recovery	17
40EP-9EO11	Loss of Coolant Accident	22
40OP-9AF01	Essential Auxiliary Feedwater System	36

Procedures:

NUMBER	TITLE	REVISION / DATE
40OP-9EC01	Essential Chilled Water Train “A” (EC)	8
40OP-9NA03	13.8 kV Electrical System (NA)	23
40OP-9SG01	Main Steam	50
40ST-9ZZM1	Operations Mode 1 Surveillance Logs	44
41AL-1RK2A	Window No. 2A07A - ESS CHLD WTR SYS TRBL	48
41AL-1RKGA	CST Empty	44
41ST-1EC01	Essential Chilled Water Valve Verification	17
42AL-2RK1B	Panel B01B Alarm Responses	24
42ST-2EC01	Essential Chilled Water Valve Verification	13
43ST-2EC01	Essential Chilled Water Valve Verification	9
55OP-0GT01	Gas Turbine Generator #1 Operating Instructions	46
55OP-0GT02	Gas Turbine Generator #2 Operating Instructions	44
70DP-0MR01	Maintenance Rule	14
70DP-9GT01	Gas Turbine Generator (GTG) Test Record	September 22, 1993
70TI-9ZC01	Boric Acid Walkdown Leak Detection	6
73DP-9EE02	Inservice Inspection Examination Activities	8
73DP-9XI03	ASME Section XI Inservice Inspection	6
73ST-9AF02	AFA-P01 Inservice Test	36
73ST-9EC01	Essential Chilled Water Pumps - Inservice Test	16

Procedures:

NUMBER	TITLE	REVISION / DATE
73ST-9SG01	MSIVs - Inservice Test	26
73ST-9SG05	ADV Nitrogen Accumulator Drop Test	23
73ST-9XI20	Atmosphere Dump Valves (ADV)- Inservice Test	20
73ST-9ZZ20	ASME Section XI Off-Line Set Pressure Verification	22
74DP-9CY04	System Chemistry Specifications	46
74DP-9DF01	Diesel Fuel Oil Program	5
74ST-9DF02	Diesel Generator Fuel Oil Receipt Surveillance Test	4
81DP-0EE10	Plant Modifications	12
90DP-0IP10	Condition Reporting	32
A0-104-W311-104	Tank Elevation FSN-T02	1
A0-W-FSP-300	Water Reclamation Plant Fuel Oil System P&ID	Rev 11.
Fuel Oil Sample	APS Water Reclamation Facility- Service Report Fuel Tank Thermal Stability.	June 28, 2001
GTG1.02	Gas Turbine Generator (GTG) Test Record	October 20, 1993
Sample 10923	Fuel Oil Sample Data for Gas Turbines	June 28, 2001
WROP- 8FS01	WRF Fuel System (FS) Operating Procedure	7

Scenarios and Job Performance Measures (JPMs)

NUMBER	TITLE
Scenario	Failure of Spray Pond pump to start/Align Class AF pump suctions to the Refueling Makeup Water Tank (RMWT)

Scenario	Gas Turbine Generator (GTG) Failure
Scenario	Align Auxiliary Feedwater Pump “N” (AFN) suction manually
Scenario	Failure of Containment Spray Pump/Class Battery Charger Alignment
Scenario	Feed with Condensate/Failure to depressurize
JPM	In-plant performance of 40OP-9PK01 section 4.5 to place the AC battery charger on PKA-M41
JPM	In-plant performance to manually open CTA-HV-1
JPM	Plant Performance of GTG Start
JPM	In-Plant Performance of Attachment 80A
JPM	In-plant Performance of Alarm Response to Align AFB-P01 to the RMW

Surveillance Test Work Order Results:

NUMBER	TITLE	DATE
2662494	Auxiliary Feedwater System Surveillance Test Results	January 18, 2005
2663158	Auxiliary Feedwater System Surveillance Test Results	January 25, 2005
2663156	Auxiliary Feedwater System Surveillance Test Results	February 15, 2005
2662788	Auxiliary Feedwater System Surveillance Test Results	February 21, 2005
2662882	Auxiliary Feedwater System Surveillance Test Results	March 17, 2005
2662496	Auxiliary Feedwater System Surveillance Test Results	March 22, 2005
2696235	Auxiliary Feedwater System Surveillance Test Results	April 12, 2005
2696505	Auxiliary Feedwater System Surveillance Test Results	April 18, 2005
2751270	Auxiliary Feedwater System Surveillance Test Results	May 5, 2005
2665891	Auxiliary Feedwater System Surveillance Test Results	June 9, 2005

Surveillance Test Work Order Results:

NUMBER	TITLE	DATE
2696237	Auxiliary Feedwater System Surveillance Test Results	June 15, 2005
2701800	Auxiliary Feedwater System Surveillance Test Results	July 5, 2005
2703435	Auxiliary Feedwater System Surveillance Test Results	July 15, 2005
2703430	Auxiliary Feedwater System Surveillance Test Results	August 1, 2005
2702537	Auxiliary Feedwater System Surveillance Test Results	August 9, 2005
2702932	Auxiliary Feedwater System Surveillance Test Results	August 31, 2005
2701805	Auxiliary Feedwater System Surveillance Test Results	September 9, 2005
2701801	Auxiliary Feedwater System Surveillance Test Results	September 27, 2005
2703436	Auxiliary Feedwater System Surveillance Test Results	October 3, 2005
2703431	Auxiliary Feedwater System Surveillance Test Results	October 24, 2005
2702538	Auxiliary Feedwater System Surveillance Test Results	November 2, 2005
2702933	Auxiliary Feedwater System Surveillance Test Results	November 22, 2005
2701806	Auxiliary Feedwater System Surveillance Test Results	December 11, 2005
2767668	Auxiliary Feedwater System Surveillance Test Results	December 14, 2005
2703437	Auxiliary Feedwater System Surveillance Test Results	December 27, 2005
2727996	Auxiliary Feedwater System Surveillance Test Results	January 17, 2006
2727905	Auxiliary Feedwater System Surveillance Test Results	January 25, 2006
2727627	Auxiliary Feedwater System Surveillance Test Results	February 14, 2006
2727206	Auxiliary Feedwater System Surveillance Test Results	February 24, 2006
2727203	Auxiliary Feedwater System Surveillance Test Results	March 15, 2006

Surveillance Test Work Order Results:

NUMBER	TITLE	DATE
2728006	Auxiliary Feedwater System Surveillance Test Results	March 21, 2006
2727906	Auxiliary Feedwater System Surveillance Test Results	April 17, 2006
2727998	Auxiliary Feedwater System Surveillance Test Results	May 4, 2006
2819601	Auxiliary Feedwater System Surveillance Test Results	May 5, 2006
2727629	Auxiliary Feedwater System Surveillance Test Results	May 11, 2006
2727207	Auxiliary Feedwater System Surveillance Test Results	May 27, 2006
2768430	Auxiliary Feedwater System Surveillance Test Results	June 6, 2006
2899504	Auxiliary Feedwater System Surveillance Test Results	June 11, 2006
2769608	Auxiliary Feedwater System Surveillance Test Results	June 13, 2006
2768770	Auxiliary Feedwater System Surveillance Test Results	June 26, 2006
2769606	Auxiliary Feedwater System Surveillance Test Results	July 5, 2006
2768772	Auxiliary Feedwater System Surveillance Test Results	July 10, 2006
2902608	Auxiliary Feedwater System Surveillance Test Results	July 20, 2006
2768824	Auxiliary Feedwater System Surveillance Test Results	August 3, 2006
2768824	Auxiliary Feedwater System Surveillance Re-Test Results	August 3, 2006
2768433	Auxiliary Feedwater System Surveillance Test Results	August 7, 2006
2769607	Auxiliary Feedwater System Surveillance Test Results	August 21, 2006
2768431	Auxiliary Feedwater System Surveillance Test Results	August 29, 2006
2769609	Auxiliary Feedwater System Surveillance Test Results	September 8, 2006
2793600	Auxiliary Feedwater System Surveillance Test Results	September 25, 2006

Vendor Manuals:

NUMBER	TITLE	REVISION
13-VTD-C628-00051	Cooper Energy Instruction Manual for KSV Turbo charged Diesel Generating Unit for Nuclear Power Plant Emergency Stand-by Service (Pub. # 010997)	10
13-VTD-S903-00002	Solar Turbines Systems Operator's Guide for Centaur Taurus Gas Turbine-Driven Generator Set (Pub. # SOG-93-45521)	3
SM-100, Section 3.2	Ideal Electric Instruction Manual for Synchronous Motors, Generators, D.C. Exciters & Brushless Equipment	

Work Orders:

NUMBER	TITLE	DATE
2565413	Inspect/Lubricate and Overhaul of G.E./VAC Vacuum Circuit Breakers	October 25, 2003
2611733	Inspect/Lubricate and Overhaul of G.E./VAC Vacuum Circuit Breakers	April 24, 2004
2647003	Inspect/Lubricate and Overhaul of G.E./VAC Vacuum Circuit Breakers	October 11, 2004
2868734	Inspect AENANX02 Startup Transformer	January 9, 2007
2868735	Inspect/Test Transformer, Perform Procedure 32MT-9NA03 and Cycle the Tie-Breakers	February 27, 2007
2868839	Obtain AENANX02 Transformer Oil Sample While the Transformer is Energized	January 12, 2007
2869536	Calibrate the S/U XFMR Instruments and Perform the Large Transformer Internal CT Testing	February 14, 2007
2890298	Predictive Maintenance Group to Perform Thermography per 37TI-9ZZ01	January 30, 2007

Work Orders:

NUMBER	TITLE	DATE
2914801	GTG #1 Control Battery Failed the Discharge Test on 7/5/06, Need to Re-perform the Capacity Discharge Test per DFWO Disposition	March 20, 2007
2914802	GTG #1 Diesel Start Battery Failed the Discharge Test on 7/6/06, Need to Re-perform the Capacity Discharge Test per DFWO Disposition	March 20, 2007