UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

May 17, 2011

Rafael Flores, Senior Vice President
and Chief Nuclear Officer
Attention: Regulatory Affairs
Luminant Generation Company LLC
Comanche Peak Nuclear Power Plant
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2 - NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000445/2011007 AND 05000446/2011007

Dear Mr. Flores:

On May 3, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Comanche Peak Nuclear Power Plant, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed in a debrief meeting on February 17, 2011, and in an exit meeting on May 3, 2011, with Mr. M. Lucas, Site Vice President, and other members of your staff.

The inspection examined activities conducted under your license as they relate to public health and safety to confirm compliance with the Commission's rules and regulations, orders, and with the conditions of your license. Within these areas, the inspection consisted of examination of selected procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of this inspection, the NRC has identified three issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that violations are associated with these issues. These violations are being treated as Noncited Violations (NCVs), consistent with Section 2.3.2 of the Enforcement Policy. These NCVs are described in the subject inspection report. If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to: (1) the Regional Administrator, Region 4; (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector at Comanche Peak Nuclear Power Plant facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

Sincerely,

Neil O'Keefe, Chief
Engineering Branch 2
Division of Reactor Safety

Dockets: 50-445, 50-446
Licenses: NPF-87, NPF-89
Enclosure: Inspection Report No. 0500445/2011007 and 0500446/2011007
w/Attachment: Supplemental Information

cc w/Enclosure:
Distribution via Listserv for Comanche Peak

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	50-445, 50-446
Licenses:	NPF-87, NPF-89
Report Nos.:	05000445/2011007 and 05000446/2011007
Licensee:	Luminant Generation Company LLC
Facility:	Comanche Peak Nuclear Power Plant, Units 1 and 2
Location:	FM-56, Glen Rose, Texas
Dates:	January 31 through May 3, 2011
Team Leader:	S. Graves, Senior Reactor Inspector, Engineering Branch 2
Inspectors:	J. Mateychick, Senior Reactor Inspector, Engineering Branch 2 S. Alferink, Reactor Inspector, Engineering Branch 2 N. Okonkwo, Reactor Inspector, Engineering Branch 2 J. Watkins, Reactor Inspector, Engineering Branch 2
Accompanying Personnel:	J. Bowen, Office of Nuclear Reactor Regulation
Approved By:	Neil O'Keefe, Branch Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000445/2011007 and 05000446/2011007; January 31, 2011 – May 3, 2011; Comanche Peak Nuclear Power Plant, Units 1 and 2; Triennial Fire Protection Inspection.

The report covered a two week triennial fire protection team inspection by specialist inspectors from Region IV and the Office of Nuclear Reactor Regulation. Three noncited violations of very low significance (Green) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The crosscutting aspects were determined using Inspection Manual Chapter 0310, "Components within the Crosscutting Areas." Findings for which the significance determination process (SDP) 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 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a noncited violation of License Condition 2.G for the failure to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the team identified two examples where the licensee failed to implement effective corrective actions to ensure that time-critical manual actions would be accomplished within analyzed times for alternative shutdown scenarios. The first example involved the failure to close a spuriously opened pressurizer power-operated relief valve within the time allowed by the postfire safe shutdown analysis. The second example involved the failure to restore station service water cooling before damage could occur to the credited emergency diesel generator in the event of a control room fire with a loss of offsite power. The licensee entered this issue into their corrective action program as Condition Reports CR-2011-001647, CR-2011-001742 and CR-2011-001836. In response to this issue, the licensee re-ordered the procedure steps to isolate the power-operated relief valves and ensure the standby service water pump was running sooner. The licensee planned to perform a validation of the revised procedures.

  Failure to implement effective corrective actions to ensure that time-critical manual actions would be accomplished within analyzed times for alternative shutdown scenarios is a performance deficiency. This performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of this finding could not be evaluated using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because the performance deficiency involved a control room fire that led to control room abandonment. A senior reactor analyst performed a Phase 3 evaluation bounding analysis that concluded this finding had very low safety significance (Green) because the number of electrical cabinets in the control room and cable spreading room that contained circuits that could have a fire that could affect the power-operated relief valves or station service water system was a small

fraction of the total. This performance deficiency had a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program because the licensee did not take appropriate corrective actions to address safety issues in a timely manner, commensurate with their safety significance. [P.1 (d)] (Section 1R05.05)

- Green. The team identified a noncited violation of License Condition 2.G for failure to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to recognize that electrical cables for the pressurizer power-operated relief valves and associated block valves were installed in many of the same cable trays, leaving the plant susceptible to fire damage that could spuriously open the power-operated relief valve and prevent the ability to shut the block valve. This scenario could challenge operators by creating a loss of coolant during a plant fire. The licensee entered this issue into their corrective action program as Condition Reports CR-011-001319, CR-2011-001807, CR-2011-001808 and CR-2011-002430. As a compensatory measure, the licensee revised attachment 17 to Procedure ABN-901, "Fire Protection System Alarms or Malfunctions," Revision 9, to close the affected pressurizer block valves in the event of a fire in the Auxiliary or Safeguards buildings in order to mitigate potential circuit interactions that could spuriously open a power-operated relief valve.

  Failure to identify and mitigate or correct an existing plant configuration that was susceptible to single spurious failures while performing expert panel reviews of fire damage scenarios that could prevent safely shutting down the plant in the event of a fire is a performance deficiency. This performance deficiency was more than minor because it is associated with the protection against external events (fire) attribute of the Mitigating Systems cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team used Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because the performance deficiency affected fire protection defense-in-depth strategies involving post-fire safe shutdown. Because the Phase 1 screening criteria were not met, the analysis continued to Phase 2. Because the finding did not screen as Green during the Phase 2 analysis, a senior reactor analyst performed a Phase 3 analysis. Using information from the Phase 2 worksheets and discussions with the licensee PRA staff, the senior reactor analyst's Phase 3 analysis calculated the total change in core damage frequency to be 3.2E-7/yr (Green), based on the proximity of fire sources available to damage these circuits. This finding had a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not identify the issues completely, accurately, and in a timely manner commensurate with their safety significance while conducting expert panel reviews of this and other scenarios in 2009. [P.1(a)] (Section 1R05.06)

- Green. The team identified a noncited violation of License Condition 2.G for failure to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to establish a maintenance and/or test program that demonstrated that emergency lighting had an 8-hour capacity in areas required for safe shutdown. When inspectors questioned the licensee's practice of replacing the emergency light batteries without ever testing to confirm that the replacement interval was appropriate to ensure an 8-hour capacity, the licensee conducted tests that showed

that 22 percent of the batteries on a 3-year replacement interval failed in less than 8 hours. The licensee entered this issue into their corrective action program as Condition Report CR-2011-001821. The licensee created action items to CR-2011-001821 for additional testing on a broader sample of emergency lights to aid in determining the correct replacement interval to ensure operability, and shortened the 3-year replacement interval for lights which failed to meet operability requirements as a result of testing to a more conservative 2-year replacement interval which had no demonstrated testing failures.

The failure to establish a maintenance and/or test program that demonstrated operability for 8-hour emergency lighting required for operator manual actions at safe shutdown equipment is a performance deficiency. The performance deficiency was more than minor because it is associated with the protection against external events (fire) attribute of the Mitigating Systems cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure of the emergency lights to last 8 hours could adversely affect the ability of operators to perform the manual actions required to support safe shutdown in the event of a fire. The significance of this finding was evaluated using Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because the performance deficiency affected fire protection defense-in-depth strategies involving post-fire safe shutdown systems. Using Appendix F, Attachment 2, "Degradation Rating Guidance Specific to Various Fire Protection Program Elements," the finding was assigned a low degradation rating because the finding minimally impacted the performance and reliability of the fire protection program element. The team also noted that operators were required to obtain and carry flashlights. Therefore, the finding screened as having very low safety significance (Green). This finding did not have a crosscutting aspect because it was not indicative of current licensee performance, in that the replacement program had been used for longer than 3 years. (Section 1R05.08)

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (71111.05T)

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure 71111.05T, "Fire Protection (Triennial)," at the Comanche Peak Nuclear Power Plant, Units 1 and 2. The inspection team evaluated the implementation of the approved fire protection program in selected risk significant areas with an emphasis on fire-induced circuit failures and operator manual actions, procedures, equipment, fire barriers, and systems associated with assuring safe shutdown capability.

Inspection Procedure 71111.05T requires the selection of three to five fire areas for review. The inspection team used the fire hazards analysis section of the Comanche Peak Steam Electric Station Individual Plant Examination of External Events to select the following risk significant fire areas (inspection samples) for review:

1SE	Unit 1 Remote Safety Related Panels/Train B Switchgear (831' -6" and 852'-6") – Fire Zones SE 16 & 18
2SE	Unit 2 Remote Safety Related Panels/Train B Switchgear (831'-6" and 852'-6") – Fire Zones SE 16 & 18
AA	Unit 1 Auxiliary / Electrical Control Building (778'-0" and 790'-6") – Fire Zone 21A
EM	Unit 2 Cable Spreading Room (807'-0" and 810'-0")

The inspection team evaluated the licensee's fire protection program using the applicable requirements, which included plant Technical Specifications, Operating License Condition 2.G, NRC safety evaluations and supplements, 10 CFR 50.48, and Branch Technical Position 9.5-1, Appendix A. The team also reviewed related documents that included the Final Safety Analysis Report (FSAR), Sections 9.5 and 13.3B; the fire protection report; and the postfire safe shutdown analysis.

Specific documents reviewed by the team are listed in the attachment. Six fire area inspection samples were completed and two B.5.b strategy review samples were completed.

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the piping and instrumentation diagrams, safe shutdown equipment list, safe shutdown design basis documents, and the postfire safe shutdown analysis to verify that the licensee properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for fires in the selected fire areas. The team observed walkdowns of the procedures used for achieving and maintaining safe

shutdown in the event of a fire to verify that the procedures properly implemented the safe shutdown analysis provisions.

For each of the selected fire areas, the team reviewed the separation of redundant safe shutdown cables, equipment, and components located within the same fire area. The team also reviewed the licensee's method for meeting the requirements of 10 CFR 50.48; Branch Technical Position 9.5-1, Appendix A; and 10 CFR Part 50, Appendix R, Section III.G. Specifically, the team evaluated whether at least one postfire safe shutdown success path remained free of fire damage in the event of a fire. In addition, the team verified that the licensee met applicable license commitments.

b. Findings

Findings related to this review are documented in Sections 1R05.05 and 1R05.06. No additional findings were identified.

.02 Passive Fire Protection

a. Inspection Scope

The team walked down accessible portions of the selected fire areas to observe the material condition and configuration of the installed fire area boundaries (including walls, fire doors, and fire dampers) and verify that the electrical raceway fire barriers were appropriate for the fire hazards in the area. The team compared the installed configurations to the approved construction details, supporting fire tests, and applicable license commitments.

The team reviewed installation, repair, and qualification records for a sample of penetration seals to ensure the fill material possessed an appropriate fire rating and that the installation met the engineering design. The team also reviewed similar records for the rated fire wraps to ensure the material possessed an appropriate fire rating and that the installation met the engineering design.

b. Findings

No findings.

.03 Active Fire Protection

a. Inspection Scope

For the selected fire areas, the team evaluated the adequacy and material condition of fire suppression and detection systems. The team reviewed design documents and supporting calculations for these systems, including the modifications which installed additional suppression in the Unit 1 Safeguards Building (Fire Area 1SE) to address NFPA 13-1978 compliance as a result of a previous NRC-identified finding. In addition, the team reviewed license basis documentation such as NRC safety evaluation reports and deviations from NRC regulations and NFPA codes to verify that fire suppression and detection systems met license commitments.

The team performed a walkdown of accessible portions of the detection and suppression systems in the selected fire areas. The team also performed a walkdown of major system support equipment in other areas (e.g., Halon supply systems) to assess the material condition of these systems and components.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. The team also reviewed prefire plans and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact postfire safe shutdown capability. In addition, the team inspected fire brigade equipment to determine operational readiness for fire fighting.

The team observed an unannounced site fire drill and the subsequent drill critique using the guidance in Inspection Procedure 71111.05AQ. The fire brigade simulated fighting a fire in the "Ops Kelly Booth" in Room 96 of the Unit 2 Safeguards Building (Fire Area 2SE). The inspectors verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were: (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient firefighting equipment brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) search for victims and propagation of the fire into other plant areas; (7) smoke removal operations; (8) utilization of preplanned strategies; (9) adherence to the preplanned drill scenario; and (10) completion of drill objectives.

b. Findings

No findings.

.04 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The team performed plant walkdowns and document reviews to verify that redundant trains of systems required for safe shutdown, which are located in the same fire area, would not be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, the team verified that:

- A fire in one of the selected fire areas would not directly, through production of smoke, heat, or hot gases, cause activation of suppression systems that could potentially damage all redundant safe shutdown trains.

- A fire in one of the selected fire areas or the inadvertent actuation or rupture of a fire suppression system would not indirectly cause damage to all redundant trains (e.g., sprinkler-caused flooding of other than the locally affected train).

- Adequate drainage is provided in areas protected by water suppression systems.

b. Findings

No findings.

.05 Alternative Shutdown Capability

a. Inspection Scope

Review of Methodology

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings, electrical drawings, the Final Safety Analysis Report, and other supporting documents to verify that hot and cold shutdown could be achieved and maintained from outside the control room for fires that require evacuation of the control room, with or without offsite power available.

Plant walkdowns were conducted to verify that the plant configuration was consistent with the description contained in the safe shutdown and fire hazards analyses. The team focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor decay heat removal, process monitoring instrumentation, and support systems functions.

The team also verified that the systems and components credited for shutdown would remain free from fire damage. Finally, the team verified that the transfer of control from the control room to the alternative shutdown location would not be affected by fire-induced circuit faults (e.g., by the provision of separate fuses and power supplies for alternative shutdown control circuits).

Review of Operational Implementation

The team verified that licensed and non-licensed operators received training on alternative shutdown procedures. The team also verified that sufficient personnel to perform a safe shutdown were trained and available onsite at all times, exclusive of those assigned as fire brigade members.

A walkthrough of the postfire safe shutdown procedure with licensed and non-licensed operators was performed to determine the adequacy of the procedure. The team verified that the operators could be reasonably expected to perform specific actions within the time required to maintain plant parameters within specified limits. Time critical actions that were verified included restoring electrical power, establishing control at the remote shutdown panel, establishing reactor coolant makeup, and establishing decay heat removal.

The team reviewed manual actions to ensure that they had been properly reviewed and approved and that the actions could be implemented in accordance with plant procedures in the time necessary to support the safe shutdown method for each fire area.

The team also reviewed the periodic testing of the alternative shutdown transfer capability and instrumentation and control functions to verify that the tests were

adequate to demonstrate the functionality of the alternative shutdown capability. The licensee was performing a re-analysis of the transfer and isolation capability of the circuits and switches used in transferring control from the control room to the alternative shutdown location. This team reviewed the licensee's progress in this effort.

b. Findings

Introduction. The team identified a Green noncited violation of License Condition 2.G for the failure to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the team identified two examples where the licensee failed to implement effective corrective actions to ensure that time-critical manual actions would be accomplished within analyzed times for alternative shutdown scenarios.

Description. During the 2008 triennial fire protection inspection, the team identified a noncited violation (NCV 2009004-06) associated with the failure to maintain adequate written procedures covering an alternative shutdown. Specifically, the team identified two examples of time-critical manual actions that could not be completed in the time required by the postfire safe shutdown analysis.

Example 1 – Spurious Opening of a Pressurizer Power-Operated Relief Valve

In the first example, the team noted that a fire in the control room or cable spreading room could result in a pressurizer power-operated relief valve (PORV) spuriously opening. In accordance with the alternative shutdown procedure, the reactor operator and relief reactor operator would transfer control of the PORVs from the control room to the remote shutdown panel. This action was intended to isolate fire-induced circuit faults and allow the PORV to return to its closed position.

As part of the 2008 inspection, the team performed a timed walkdown of Procedure ABN-803A, "Response to a Fire in the Control Room or Cable Spreading Room," Revision 8. The team observed that the relief reactor operator transferred control of the train A PORV 10 minutes and 30 seconds after the reactor trip, which exceeded the time allowed by the postfire safe shutdown analysis to avoid overfilling the pressurizer.

During the walkdown, the team noted that the procedure also required the relief reactor operator to wait for the reactor operator to perform immediate control room actions and establish control at the remote shutdown panel before transferring control to the remote shutdown panel. The team noted that it took the relief reactor operator approximately 7 minutes and 30 seconds to transfer control to the remote shutdown panel because the procedure required the operator to transfer and then verify the transfer of each piece of safe shutdown equipment individually.

In response to this NCV 2009004-06, the licensee changed the alternative shutdown procedure to direct the relief reactor operator to transfer control of all components and then verify completion of the transfers. The licensee did not, however, verify that operators could complete the time-critical actions within the allowed time limits using the updated procedure.

During the 2011 triennial fire protection inspection, the team performed a timed walkdown of Procedure ABN-803B, "Response to a Fire in the Control Room or Cable

Spreading Room," Revision 5. The team observed that the relief reactor operator transferred control of the train A PORV 7 minutes and 10 seconds after reactor trip, and the reactor operator transferred control of the train B PORV 8 minutes and 40 seconds after reactor trip. This amount of time still exceeded the time allowed by the postfire safe shutdown analysis to avoid overfilling the pressurizer.

During the walkdown, the team observed that the alternative shutdown procedure directed the reactor operator to perform 10 additional steps after tripping the reactor in the control room prior to evacuation. Only the reactor trip step was credited in the fire protection program, and none of the additional actions taken would close a spuriously opened PORV. The team noted that the performance of these additional actions added 3 minutes and 30 seconds to the performance of the time-critical manual actions. This delay was increased by the procedural requirement for the relief reactor operator to wait for the reactor operator to establish control at the remote shutdown panel prior to repositioning the transfer switches.

Engineering Report ER-ME-125, "Thermal/Hydraulic Analysis of the Fire Safe Shutdown Scenario," Revision 0, concluded that operators had 6 minutes to close a spuriously opened PORV prior to the pressurizer exceeding its maximum indicated level and to avoid voiding in the hot leg piping or the reactor vessel head area and interrupt the natural circulation cooling of the core.

The absence of voiding in the hot leg piping or the reactor vessel head area is best demonstrated by maintaining a positive subcooling margin in the reactor coolant system. The engineering report provided a plot of the subcooling margin for a base case fire scenario (no spurious actuations assumed), but did not provide plots of the subcooling margin for the thirteen different scenarios postulated in the analysis. In response to the team's questions, the licensee calculated plots of the subcooling margin for several alternative shutdown scenarios involving different spurious operations. These plots demonstrated that the reactor coolant system could lose subcooling 5 minutes after the reactor trip if operators failed to close a PORV that had spuriously opened.

The team noted that Comanche Peak's fire protection license basis required them to meet the requirements of 10 CFR Part 50, Appendix R, Section III.L, which requires, in part, that the reactor coolant system process variables be maintained during the postfire shutdown within those predicted for a loss of normal ac power. Since the licensee's base case analysis demonstrated that the reactor coolant system would not lose subcooling during a loss of normal ac power, the team determined that the appropriate amount of time allowed to close a spuriously opened PORV should have been 5 minutes, not the 6 minutes that was documented.

The team determined that, although the licensee had improved the procedure, the corrective actions were ineffective to ensure that operators could complete the time-critical actions within the times allowed by the postfire safe shutdown analysis and the time allowed did not address the most limiting parameter.

The licensee entered this example into their corrective action program as Condition Reports CR-2011-001647 and CR-2011-001836. In response to this issue, the licensee reordered steps in the alternative shutdown procedures to require operators to isolate the power-operated relief valves sooner. The licensee planned to perform a validation of

the revised procedures.

Example 2 - Loss of Station Service Water Cooling to the Emergency Diesel Generators

In the second example, the team noted that a fire in the control room or cable spreading room could result in a loss of offsite power with the subsequent automatic start of both emergency diesel generators. The team noted that fire damage could prevent an automatic start of the station service water system, resulting in a loss of cooling to the emergency diesel generators. The alternative shutdown procedure directed operators to start service water at the remote shutdown panel if it was not operating.

During the 2008 timed walkdown of the alternative shutdown procedure, the team observed that the operator restarted service water approximately 12 minutes after the reactor trip. The licensee provided Evaluation 2003-000404-01, "EDG Loss of Service Water Analysis," Revision 0, which analyzed the effects of a loss of station service water cooling on an emergency diesel generator. This evaluation determined that an emergency diesel generator could fail within approximately 4 to 5 minutes during an emergency start from standby with a load of 6.3 MW. The team noted that the time to failure under the expected load during postfire safe shutdown had not been specifically analyzed; however, the emergency start from standby scenario approximated the postfire safe shutdown loading scenario.

In response to this violation, the licensee changed the alternative shutdown procedure to direct operators to verify that the service water pumps were operating by observing indications in the control room prior to evacuation. If either service water pump was not operating, the procedure directed operators to ensure the affected diesel generator was stopped prior to evacuation. The licensee did not perform an evaluation to credit this additional control room action. Instead, the licensee's fire protection program still relied upon the manual actions taken outside of the control room to initiate service water from the remote shutdown panel.

During the 2011 timed walkdown of the alternative shutdown procedure, the team observed that the operator initiated service water from the remote shutdown panel 11 minutes after the reactor trip. The team observed that this action occurred 7 minutes and 20 seconds after the reactor operator verified the status of the service water pumps in the control room. The team noted that this time still exceeded the limits provided in Evaluation 2003-000404-01.

The team determined that, although the licensee had modified the procedure, the corrective actions were ineffective to ensure that operators could complete the time-critical actions within the times allowed by the postfire safe shutdown analysis. The team also noted that the addition of extra operator actions in the control room prior to evacuation required additional time and had the unintended consequence of making it more difficult for operators to complete other time-critical actions, such as closing a stuck open PORV.

The licensee entered this issue into their corrective action program as Condition Report CR-2011-001742. In response to this issue, the licensee reordered steps in the alternative shutdown procedures to require operators to ensure the credited standby service water pump was running sooner. The licensee planned to perform a validation

of the revised procedures.

Analysis. The failure to implement effective corrective actions to ensure that time-critical manual actions would be accomplished within analyzed times for alternative shutdown scenarios was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems cornerstone and it could adversely affect the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

The significance of this finding could not be evaluated using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because the performance deficiency involved a control room fire that led to control room abandonment. A senior reactor analyst performed a Phase 3 bounding evaluation to determine an upper limit for the change in core damage frequency.

Example 1 – Spurious Opening of a Power-Operated Relief Valve

The analyst used the fire ignition frequency for the control room (FIF_{CR}) and the cable spreading room (FIF_{CSR}) listed in the Comanche Peak Steam Electric Station Individual Plant Examination of External Events for Severe Accident Vulnerabilities, Revision 0 as the best available information. The analyst multiplied the fire ignition frequencies by a severity factor (SF) and a non-suppression probability. For the control room, the non-suppression probability (NP_{CR}) indicated the probability that operators failed to extinguish the fire within 20 minutes (assuming 2 minutes for detection), which required control room evacuation. For the cable spreading room, the non-suppression probability indicated the probability that the automatic Halon system failed (NP_{CSR-A}) and the probability that the fire brigade failed to manually suppress the fire prior to damage that required control room evacuation (NP_{CSR-M}). The resulting control room ($F_{CR-EVAC}$) and cable spreading room ($F_{CSR-EVAC}$) evacuation frequencies were:

$$F_{CR-EVAC} = FIF_{CR} * SF * NP_{CR}$$

$$= 1.9E\text{-}2/yr * 0.1 * 0.013$$

$$= 2.5E\text{-}5/yr$$

$$F_{CSR-EVAC} = FIF_{CSR} * SF * NP_{CSR-A} * NP_{CSR-M}$$

$$= 3.2E\text{-}3/yr * 0.1 * 0.05 * 0.24$$

$$= 3.8E\text{-}6/yr$$

The Unit 2 control room has 116 electrical panels for both Unit 2 and common equipment, and the cable spreading room has 72 electrical panels. The controls and cables for the power-operated relief valves are located in four different panels in the control room, one of which contains cables for both valves, and four cabinets in the cable spreading room, one of which contains cables for both valves. Additionally, at least one hot-short would have to occur in a cabinet or panel to cause a PORV to

spuriously open. The analyst estimated the conditional probability of this hot-short to be 0.6 using accepted industry values.

For the control room, the analyst calculated a bounding change in core damage frequency (ΔCDF_{CR}) by multiplying the control room evacuation frequency by the fraction of panels containing only one valve and the probability of a single hot short plus the fraction of panels containing two valves and the probability of one or two hot shorts. For the cable spreading room, the analyst calculated a bounding change in core damage frequency (ΔCDF_{CSR}) by multiplying the cable spreading room evacuation frequency by the fraction of panels containing only one valve and the probability of a single hot short plus the fraction of panels containing two valves and the probability of one or two hot shorts.

$$\Delta CDF_{CR} = F_{CR\text{-}EVAC} * (3/116 * 0.6 + 1/116 * (0.6 + 0.6 - 0.6^2))$$

$$= 2.5E\text{-}5/yr * 0.023$$

$$= 5.7E\text{-}7/yr$$

$$\Delta CDF_{CSR} = F_{CSR\text{-}EVAC} * (3/72 * 0.6 + 1/72 * (0.6 + 0.6 - 0.6^2))$$

$$= 3.8E\text{-}6/yr * 0.037$$

$$= 1.4E\text{-}7/yr$$

Because the postulated fire ignition frequencies for the control room and cable spreading room are independent of each other, the total change in core damage frequency can be determined by a simple addition of the change in core damage frequency from the two rooms calculated separately. The resulting overall change in core damage frequency was calculated to have an upper bound of 7.1E-7/yr (Green).

This frequency was considered to be bounding because it assumed:

1) A fire induced hot short in the applicable cabinets would cause the power-operated relief valves to spuriously open and lead to voiding in the reactor coolant system which challenged natural circulation;

2) The conditional core damage probability given either a control room or cable spreading room fire with evacuation and the spurious opening of a power-operated relief valve was equal to one; and

3) The performance deficiency accounted for the entire change in core damage frequency (i.e., the base line core damage frequency for this event was zero).

In accordance with the guidance in Inspection Manual Chapter 0609, Appendix H, the senior risk analyst screened the performance deficiency for its potential risk contribution to large early release frequency since the bounding change in core damage frequency provided a risk significance estimate greater than 1E-7/yr. Given that Comanche Peak has a large, dry containment and that control room abandonment sequences do not include steam generator tube ruptures or intersystem loss of coolant accidents, the

analyst determined that this example was not significant with respect to large early release frequency. The analyst determined this example was of very low risk significance (Green).

Example 2 - Loss of Station Service Water Cooling to the Emergency Diesel Generators

The analyst used the fire ignition frequency for the control room (FIF_{CR}) and the cable spreading room (FIF_{CSR}) listed in the Comanche Peak Steam Electric Station Individual Plant Examination of External Events for Severe Accident Vulnerabilities, Revision 0 as the best available information. The analyst multiplied the fire ignition frequencies by a severity factor (SF) and a non-suppression probability. For the control room, the non-suppression probability (NP_{CR}) indicated the probability that operators failed to extinguish the fire within 20 minutes (assuming 2 minutes for detection), which required control room evacuation. For the cable spreading room, the non-suppression probability indicated the probability that the automatic Halon system failed (NP_{CSR-A}) and the probability that the fire brigade failed to manually suppress the fire prior to damage that required control room evacuation (NP_{CSR-M}). The resulting control room ($F_{CR-EVAC}$) and cable spreading room ($F_{CSR-EVAC}$) evacuation frequencies were:

$$F_{CR-EVAC} = FIF_{CR} * SF * NP_{CR}$$

$$= 1.9E\text{-}2/yr * 0.1 * 0.013$$

$$= 2.5E\text{-}5/yr$$

$$F_{CSR-EVAC} = FIF_{CSR} * SF * NP_{CSR-A} * NP_{CSR-M}$$

$$= 3.2E\text{-}3/yr * 0.1 * 0.05 * 0.24$$

$$= 3.8E\text{-}6/yr$$

The Unit 2 control room has 116 electrical panels for both Unit 2 and common equipment, and the cable spreading room has 72 electrical panels. The team determined that fires in one cabinet in the control room and one panel in the cable spreading room could cause the credited emergency diesel generator to start.

For the control room, the analyst calculated a bounding change in core damage frequency (ΔCDF_{CR}) by multiplying the control room evacuation frequency by the fraction of panels containing the circuitry for the credited emergency diesel generator. Similarly, the analyst calculated a bounding change in core damage frequency for the cable spreading room (ΔCDF_{CSR}) by multiplying the cable spreading room evacuation frequency by the fraction of panels containing the circuitry for the credited emergency diesel generator.

$$\Delta CDF_{CR} = F_{CR-EVAC} * 1/116$$

$$= 2.5E\text{-}5/yr * 8.6E\text{-}3$$

$$= 2.2E\text{-}7/yr$$

ΔCDF_{CSR} = $F_{CSR\text{-}EVAC}$ * 1/72

= 3.8E-6/yr * 0.014

= 5.3E-8/yr

Because the postulated fire ignition frequencies for the control room and cable spreading room are independent of each other, the total change in core damage frequency can be determined by a simple addition of the change in core damage frequency from the two rooms calculated separately. The resulting overall change in core damage frequency was calculated to have an upper bound of 2.7E-7/yr.

This frequency was considered to be bounding because it assumed:

1) A fire in the applicable cabinets would cause the credited emergency diesel generator to start and load without the service water system;

2) The conditional core damage probability given either a control room or cable spreading room fire with evacuation and the subsequent starting of the emergency diesel generator without service water was equal to one; and

3) The performance deficiency accounted for the entire change in core damage frequency (i.e., the base line core damage frequency for this event was zero).

In accordance with the guidance in Inspection Manual Chapter 0609, Appendix H, the senior risk analyst screened the performance deficiency for its potential risk contribution to large early release frequency because the bounding change in core damage frequency provided a risk significance estimate greater than 1E-7/yr. Given that Comanche Peak has a large, dry containment and that control room abandonment sequences do not include steam generator tube ruptures or intersystem loss of coolant accidents, the analyst determined that this example was not significant with respect to large early release frequency. The analyst determined this finding was of very low risk significance (Green) because the number of electrical cabinets in the control room and cable spreading room that contained circuits that could have a fire that could affect the power-operated relief valves or station service water system was a small fraction of the total.

This performance deficiency had a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program because the licensee did not take appropriate corrective actions to address safety issues in a timely manner, commensurate with their safety significance. [P.1(d)]

Enforcement. License Condition 2.G requires the licensee to implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report through Amendment 87 and as approved in the Safety Evaluation Report (NUREG-0797) and its supplements through SSER 27. Section 13.3B.5 of the Final Safety Analysis Report describes the fire protection quality assurance program, which requires, in part, that measures be established to ensure that conditions adverse to fire protection are promptly identified, reported, and corrected.

Contrary to the above, from October 27, 2009 to May 3, 2011, the licensee failed to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to correct conditions adverse to fire protection by failing to implement effective corrective actions that ensured time-critical manual actions would be accomplished within analyzed times for alternative shutdown scenarios. The licensee entered this issue into their corrective action program as Condition Reports CR-2011-001647, CR-2011-001742, and CR-2011-001836. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with the Enforcement Policy: NCV 05000445/2011007-01; 05000446/2011007-01, "Failure to Implement Effective Corrective Actions for a Condition Adverse to Fire Protection."

.06 Circuit Analysis

a. Inspection Scope

The team reviewed the postfire safe shutdown analysis to verify that the licensee identified the circuits that may impact the ability to achieve and maintain safe shutdown. The team verified, on a sample basis, that the licensee properly identified the cables for equipment required to achieve and maintain safe shutdown conditions in the event of a fire in the selected fire areas. The team verified that these cables were either adequately protected from the potentially adverse effects of fire damage or were analyzed to show that fire-induced faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown. For cables that were important to safe shutdown, the team verified that the licensee's analysis considered potential spurious operations due to fire-induced cable faults.

The team's evaluation focused on the cables of selected components from the reactor coolant system, specifically the pressurizer power-operated relief and block valves, chemical volume and control system, and the residual heat removal system. For the sample of components selected, the team reviewed process and instrumentation drawings, electrical elementary and block diagrams and identified power, control, and instrument cables necessary to support their operation. In addition, the team reviewed cable routing information to verify that fire protection features were in place as needed to satisfy the separation requirements specified in the fire protection license basis. Specific components reviewed by the team are listed in the attachment.

b. Findings

Introduction. The team identified a Green noncited violation of License Condition 2.G for the failure to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to recognize that electrical cables for the pressurizer power-operated relief valves and associated block valves were installed in many of the same cable trays, leaving the plant susceptible to fire damage that could spuriously open the power-operated relief valve and prevent the ability to shut the block valve.

Description. Comanche Peak Units 1 and 2 each have two power-operated relief valves (PORVs) connected to the pressurizer steam space. Each PORV is solenoid-operated by 125Vdc power. Upstream of each PORV is a normally-open block valve operated by

a 3-phase ac motor. The inspectors identified that all four PORV power cables were routed in the same cable trays as their associated block valves in some locations.

The inspectors determined that the licensee's Fire Protection Report (Section 3.1.3.1) stated that fire-induced spurious operation of associated circuits of concern (i.e., those that could prevent safe shutdown) would be terminated and/or corrected by one of six methods involving operator manual actions. Section 4.2.4 specifically discussed mitigation of spurious operation of high/low pressure interface valves (a subset of associated circuits of concern). Section 4.2.4 stated that the separation provided for high/low pressure interface valves would ensure adequate time was available to mitigate spurious operation, and that either of the two series valves was capable of preventing spurious operation of the other. The inspectors noted that the separation provided did not meet the fire protection requirements of 10 CFR 50, Appendix R, Section III.G.2, but rather met the criteria for independence of electrical safety systems of Regulatory Guide 1.75. This configuration did not prevent fire damage from occurring, so the licensee credited operator manual actions to terminate or correct spurious operation prior to impairing proper fire safe shutdown.

On the basis of the applicant's submittals and evaluation, the NRC approved the Comanche Peak design for safe shutdown capability in Supplement 12 to the Safety Evaluation Report (NUREG-0797), dated October 1985. Supplement 12 stated that the PORVs are high/low pressure interface valves, and the licensee relied on operator actions to disconnect power from the high/low pressure interface valves to prevent the spurious actions from occurring. The staff concluded that this was an acceptable means of preventing spurious operations in high/low pressure interfaces.

The team noted that procedure ABN - 804B, "Response to a Fire in the Safeguards Building," Revision 3, included steps to open the supply breakers for the PORVs in fire areas where the cables were routed with the intent that removing the normal power would cause the PORV to fail closed; however, operators were not instructed to shut the associated block valve and open its supply breaker. The team identified that, because the PORV power cables were routed in some of the same cable trays as the control cables for the associated block valves, a single fire could disable the block valve while it was in the normally-open position and also create the potential to spuriously open the PORV.

The team noted that a block valve control cable could be disabled by fire damage (i.e., no spurious operation needed). Further, spurious operation of the PORV was possible, even with the PORV supply breaker open. A fire in certain cable trays could potentially allow 125Vdc power to be shorted to the PORV cable from another cable (more than 30 cables with 125Vdc power were located in the same cable tray). Therefore, this scenario did not involve a multiple spurious operation.

Attachment 2.25 of Calculation ME-CA-0000-1086, "Fire Safe Shutdown Analysis for CPSES Unit 1, Unit 2, and Common," Revision 2, stated that, after removing power, the possibility of experiencing two external hot shorts of proper polarity without grounds in this high/low pressure interface valve was not considered credible. However, in analyzing the circuit, the team identified that a proper-polarity (i.e., positive-to-positive and negative-to-negative) short was not needed to open the PORV. The PORV manufacturer's engineering information sheet and responses to information requests

confirmed that the valve could open by applying a voltage of 102 Vdc across the solenoid, regardless of the polarity. Therefore, any combination of circuit failures that produce sufficient voltage across the solenoid would open the PORV, not just proper-polarity shorts.

The team determined that the licensee's method to prevent spuriously open PORV would not work in some possible cases. Further, the NRC's acceptance of the proposed method of preventing spurious operation of the PORV high/low pressure interface was based on a flawed evaluation of the possible failure modes created by routing the PORV cables in the same cable trays as the block valve control cables, and the possible spurious operation would not be mitigated by the proposed actions. The team concluded that the Fire Safe Shutdown Analysis did not demonstrate that a safe shutdown condition could be reached and maintained with a spuriously open PORV concurrent with the normally-open block valve control circuit damaged by fire. The team was concerned that operators would be challenged to mitigate this condition using the equipment that was assured to be protected from fire damage, because it could create a loss of coolant at the same time as a plant fire.

The team noted that the licensee missed an opportunity in 2010 to identify this vulnerability while specifically reviewing potential spurious and multiple spurious operations due to fire-induced failures that needed to be addressed. The team reviewed Engineering Report ER-ME-130, "Summary of Expert Panel Activities Related to Postulation of Multiple Spurious Operations for the CPNPP Fire Safe Shutdown Analysis," Revision 0, and noted that the expert panel had reviewed a postulated scenario involving loss of reactor coolant system inventory through the PORVs and block valves (Scenario MSO ID # 19). The report stated that no follow up actions were required because the scenario was addressed by the existing fire safe shutdown analysis.

As an interim compensatory measure, Attachment 17 to Procedure ABN-901, "Fire Protection System Alarms or Malfunctions," Revision 9, was changed to have control room operators close the affected pressurizer PORV block valve in the event of a fire in the Auxiliary or Safeguards buildings to mitigate potential circuit interactions that could spuriously open a power-operated relief valve.

Analysis. Failure to identify and mitigate or correct an existing plant configuration that was susceptible to single spurious failures while performing expert panel reviews of fire damage scenarios that could prevent safely shutting down the plant in the event of a fire is a performance deficiency. The team determined that this performance deficiency was more than minor because it was associated with the protection against external events attribute of the Mitigating Systems cornerstone, and it could adversely affect the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (fire) to prevent undesirable consequences.

Guidance contained in Regulatory Issues Summary 2004-03, "Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Inspections," Revision 1 states, in part, that if an inspector discovers a circuit configuration whose failure could prevent operation or cause maloperation of redundant trains of systems necessary to achieve and maintain hot shutdown conditions, and if this configuration is not mitigated by an approved scheme in accordance with 10 CFR Part 50, Appendix R, paragraph III.G, or the plant's

specific licensing basis, enforcement may be pursued in accordance with the risk-informed ROP. As discussed above, the team concluded that this scenario was not mitigated by one of those approved methods.

The team used Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process" because the performance deficiency affected fire protection defense-in-depth strategies involving post-fire safe shutdown. The team categorized the finding as having a high degradation rating because the post-fire safe shutdown analysis was not complete for circuits whose maloperation could impact the plant's ability to achieve and maintain safe shutdown conditions. Because the Phase 1 screening criteria were not met, the analysis continued to Phase 2. The team performed walkdowns of the affected fire areas as part of the Phase 2 quantitative screening. The team identified fire ignition sources and targets, and specific fire growth and damage scenario combinations. The team determined that the largest potential ignition sources in the fire areas could not form a hot gas layer sufficient to impact the protected cable raceways or their supports using the spreadsheet, "Predicting Hot Gas Layer Temperature in a Room Fire With Forced Ventilation," contained in NUREG-1805, "Fire Dynamics Tools (FDT) Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program." The finding did not screen as Green during the Phase 2 analysis, in part, because during the walkdown the team identified a temporary transient combustible storage area adjacent to vertical cable trays containing PORV and block valve cables.

A senior reactor analyst performed a bounding Phase 3 significance determination to calculate the change in core damage frequency for the finding. First, the analyst used results from 11 fire damage scenarios identified in the Phase 2 analysis to determine the revised fire frequencies with PORVs and Block valves failed open. The licensee verified that cabling associated the emergency core cooling system in the non-effected train was not located within the affected zone of the fire. To calculate the risk impact, the analyst made a bounding assumption that all equipment in either train A or train B was lost in the fire by failing the train A or train B 6.9-kV busses. The analyst used the Comanche Peak SPAR model, Revision 8.15, dated August 21, 2010, to calculate the conditional core damage probabilities for the event that included the affected PORV and block valve failed open with no recovery. The analyst used a cutset truncation of 1.0×10^{-13} and assumed a duration of 1 year, except for two scenarios (Case 1) involving transient combustible materials located adjacent to target cable trays, which used a duration of 2 months. Case 1 transient combustible scenarios involved staged combustible materials. Case 2 analyzed random placement of transient combustibles within the zone of influence for fire. The table presents the results:

Fire Sources	Revised Fire Frequency with PORV and Block Valve failed open	Exposure Time	Revised Frequency for Exposure Time	CCDP (Train A or Train B 6.9kV bus failed + PORV and Block failed open)	Delta-CDF
MCC 2EB3-2	1.08E-6	1 year	1.08E-6	1.713E-2	1.9E-8
Transformer T2EB3-2000 kVA, 6.9 kV/480 V	1.08E-7	1 year	1.08E-7	1.713E-2	1.9E-9
Transients - 832' (Case 1)	3.06E-5	2 mos.	5.10E-7	1.713E-2	8.7E-9
Transients - 832' (Case 1)	3.40E-6	2 mos.	5.67E-7	1.713E-2	9.7E-9
Transients - 832' (Case 2)	3.06E-6	1 year	3.06E-6	1.713E-2	5.2E-8
Transients - 832' (Case 2)	3.40E-7	1 year	3.40E-7	1.713E-2	5.8E-9
MCC 2EB4-2	1.08E-6	1 year	1.08E-6	1.809E-2	2.0E-8
6.9 kV Switchgear 2EA2	1.88E-6	1 year	1.88E-6	1.809E-2	3.4E-8
6.9 kV Switchgear 2EA2 High Energy Fault	1.62E-6	1 year	1.62E-6	1.809E-2	2.9E-8
Transients (852')	3.06E-6	1 year	3.06E-6	1.809E-2	5.5E-8
Transients (852')	3.40E-7	1 year	3.40E-7	1.809E-2	6.2E-9
Total Delta-CDF					**3.2E-7/yr**

The risk impact of the finding was determined to be 3.2E-7/yr (Green). The dominant sequences involved a transient, a failed open PORV and block valve, loss of one train of emergency core cooling systems, and a loss (unrelated to the fire) of a critical component in the other emergency core cooling system train. Since the calculated ΔCDF was less than 1 E-6, the finding was of very low safety significance (Green). The analyst determined that the core damage sequences represented a negligible increase in the large early release frequency.

This finding had a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not identify the issues completely, accurately, and in a timely manner commensurate with their safety significance while conducting expert panel reviews of this and other scenarios in 2009. [P.1(a)]

Enforcement. License Condition 2.G states, in part, that the licensee shall implement and maintain in affect all provisions of the approved fire protection program as described in the Final Safety Analysis Report through Amendment 87 and as approved in the Safety Evaluation Report (NUREG-0797) and its supplements through Supplemental Safety Evaluation Report 27. Final Safety Analysis Report Section 9.5.1 states that the licensee committed to meeting the requirements of the Fire Protection Report. Section 4.2.4 of the Fire Protection Report stated that the separation provided for high/low pressure interface valves, including the pressurizer PORVs and their associated block valves, would ensure adequate time was available to mitigate spurious operation, and that either of the two series valves was capable of preventing spurious operation of the other from impairing proper fire safe shutdown. Section 3.1.3.1 stated that spurious operation of high/low pressure interface valves would be terminated and/or corrected by one of six listed methods. Procedure ABN - 804B, "Response to a Fire in the Safeguards Building," Revision 3, Attachments 5 and 7 included steps to open the supply breakers for the PORVs in fire areas where the cables were routed, to fail the PORV closed.

Contrary to the above, since original construction, the licensee failed to implement and maintain in effect all provisions of the approved fire protection program. Specifically the licensee failed to demonstrate that spurious operation of a pressurizer PORV, a high/low pressure interface valve whose maloperation could prevent achieving and maintaining hot shutdown conditions, would be terminated and/or corrected in all cases. The inspectors identified a scenario where the proceduralized operator manual actions would not terminate or correct the loss of coolant caused by spurious opening of the PORV.

The licensee has entered this issue into their corrective action program as Condition Reports CR-2011-001319, CR-2011-001807, CR-2011-001808 and CR-2011-002430. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with the Enforcement Policy: NCV 05000445/2011007-02; 05000446/2011007-02, "Failure to Mitigate or Correct Potential Single Spurious Failures."

.07 Communications

a. Inspection Scope

The team inspected the contents of designated emergency storage lockers and reviewed the alternative shutdown procedure to verify that portable radio communications and fixed emergency communications systems were available, operable, and adequate for the performance of designated activities. The team verified the capability of the communication systems to support the operators in the conduct and coordination of their required actions. The team also verified that the design and location of communications equipment such as repeaters and transmitters would not cause a loss of communications during a fire. The team discussed system design, testing, and maintenance with the system engineer.

b. Findings

No findings.

.08 Emergency Lighting

a. Inspection Scope

The team reviewed the portion of the emergency lighting system required for alternative shutdown to verify that it was adequate to support the performance of manual actions required to achieve and maintain hot shutdown conditions and to illuminate access and egress routes to the areas where manual actions would be required. The team evaluated the locations and positioning of the emergency lights during a walkthrough of the alternative shutdown procedure.

The team verified that the licensee installed emergency lights with an 8-hour capacity, maintained the emergency light batteries in accordance with manufacturer recommendations, and tested and performed maintenance in accordance with plant procedures and industry practices.

b. Findings

Introduction. The team identified a Green noncited violation of License Condition 2.G for the failure to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to establish a maintenance and/or test program that demonstrated that emergency lighting had an 8-hour capacity in areas required for safe shutdown.

Description. The licensee's fire protection program required that emergency 8-hour minimum battery powered lighting be provided at fire safe shutdown equipment locations for operator manual actions during safe shutdown. To meet the 8-hour requirement, the licensee developed a preventive maintenance program that scheduled the replacement of the emergency light batteries at prescribed intervals, which were shorter than the vendor recommendations, as a conservative method of ensuring the batteries would demonstrate a high level of reliability and remain capable of providing 8 hours of illumination throughout their life.

The licensee divided the emergency lights required for performing fire safe shutdown operations into two groups, depending upon the environmental conditions in the areas where the batteries were located. The licensee's program replaced the batteries every 2 years for emergency lights located in high temperature or humidity environments, which can shorten battery life, and every 3 years for lights located in milder environments. In addition, the licensee performed functional and visual inspections every 6 months for the first group and annually for the second group.

The team reviewed the licensee's preventive maintenance and testing program for the emergency lights and was concerned the program did not demonstrate that the lights maintained an 8-hour capacity throughout their installed life. In particular, the team noted that the licensee did not perform testing to validate that the 8-hour capacity requirement was being met when the batteries were replaced at the prescribed intervals, and that the maintenance and testing program did not ensure a high level of reliability.

In response to the team's concerns, the licensee performed an 8-hour discharge test on a sample of emergency light batteries. The sample included 60 batteries on the 2-year

replacement interval and 46 batteries on the 3-year replacement interval. The test demonstrated that all 60 batteries in the 2-year replacement group performed satisfactorily, but only 36 batteries in the 3-year replacement group had the required minimum capacity. The licensee's review of the test data concluded the second group had a 22 percent failure rate. The failures occurred in batteries that were located near the main feedwater isolation valves in an area that experienced elevated temperatures.

The team also reviewed the licensee's implementation of their Maintenance Rule program with respect to the emergency lighting system. An objective of the Maintenance Rule is to require monitoring of the overall continuing effectiveness of licensee maintenance programs to ensure that certain system, structures and components are reliable (i.e., capable of performing their intended functions upon demand at any time). One method of monitoring maintenance effectiveness is through comparison with licensee-established performance criteria. Although the licensee included the emergency lighting system in the Maintenance Rule program, the team noted that the licensee's performance criteria for the emergency lighting system did not monitor whether the lights would be able to provide illumination for 8 hours, as required by the fire protection program.

Since the licensee did not include the 8-hour battery capacity requirement for the emergency lighting system in their performance criteria, the licensee's Maintenance Rule program did not ensure that effective maintenance was being performed on 8-hour emergency lights, as demonstrated by the results of the test performed on the sample of lights during this inspection. The team noted that including the 8-hour battery capacity requirement for the emergency lighting system into the Maintenance Rule performance criteria would have led the licensee to perform testing that demonstrated the 8 hour capacity of the emergency lighting batteries.

In response to this issue, the licensee created action items to CR-2011-001821 for additional testing to be performed on a broader sample of emergency lights at the next replacement period and stated that they would modify the replacement interval for the failed batteries and replace them every 2 years.

Analysis. The failure to establish a maintenance and/or test program that demonstrated operability for 8-hour emergency lighting required for operator manual actions at safe shutdown equipment was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure of emergency lighting to last 8 hours could adversely affect the ability of operators to perform the manual actions required to support safe shutdown in the event of a fire.

The significance of this finding was evaluated using Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," because the performance deficiency affected fire protection defense-in-depth strategies involving postfire safe shutdown systems. The team assigned the performance deficiency to the Postfire Safe Shutdown category since it affected systems or functions relied upon for postfire safe shutdown. The finding was assigned a low degradation rating because the finding minimally impacted the performance and reliability of the fire protection program

element. The team also noted that operators were required to obtain and carry flashlights. Therefore, the finding screened as having very low safety significance (Green).

This finding did not have a crosscutting aspect because it was not indicative of current licensee performance. Specifically, the replacement program has been in use for longer than three years.

Enforcement. License Condition 2.G required the licensee to implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report through Amendment 87 and as approved in the Safety Evaluation Report (NUREG-0797) and its supplements through Supplemental Safety Evaluation Report 27. Supplemental Safety Evaluation Report 12 stated:

> Emergency lighting will be installed in all areas of the plant that may have to be manned for safe shutdown operations and at access and egress routes to and from all areas. The emergency lighting consists of fixed, individual, 8-hour lighting, battery-power supplies.

The Final Safety Analysis Report stated that the licensee committed to meeting the requirements of the Fire Protection Report. The Fire Protection Report stated that the battery operated emergency lighting units required for fire safe shutdown were confirmed operable by replacing the emergency lighting battery packs at approximately 3-year intervals for emergency lighting units outside reactor containment.

Contrary to the above, prior to May 3, 2011, the licensee failed to implement and maintain in effect all provisions of the approved fire protection program. The licensee failed to ensure emergency lighting maintained an 8-hour battery power supply in all areas required for fire safe shutdown. Specifically, the licensee replaced emergency lighting battery packs on a 3-year replacement interval without ensuring this replacement frequency confirmed operability. When tested, 22 percent of the lights at the end of their 3-year life failed to provide illumination for the required 8 hours.

The licensee entered this issue into their corrective action program as Condition Report CR-2011-001821. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with the Enforcement Policy: NCV 05000445/2011007-03; 05000446/2011007-03, "Failure to Ensure Emergency Lights with 8-Hour Capacity were Provided in Safe Shutdown Areas."

.09 Cold Shutdown Repairs

a. Inspection Scope

The team verified that the licensee identified repairs needed to reach and maintain cold shutdown and had dedicated repair procedures, equipment, and materials to accomplish these repairs. Using these procedures, the team evaluated whether these components could be repaired in time to bring the plant to cold shutdown within the time frames specified in their design and licensing bases. The team verified that the repair

equipment, components, tools, and materials needed for the repairs were readily available and accessible on site.

b. Findings

No findings.

.10 Compensatory Measures

a. Inspection Scope

The team verified that compensatory measures were implemented for out-of-service, degraded, or inoperable fire protection and postfire safe shutdown equipment, systems, or features (e.g., detection and suppression systems and equipment; passive fire barriers; or pumps, valves, or electrical devices providing safe shutdown functions). The team also verified that the short-term compensatory measures compensated for the degraded function or feature until appropriate corrective action could be taken and that the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings.

.11 B.5.b Inspection Activities

a. Inspection Scope

The team reviewed the licensee's implementation of guidance and strategies intended to refill the condensate storage tank to provide water for the auxiliary feedwater system under the circumstances associated with loss of large areas of the plant due to explosions or fire as required by Section B.5.b of the Interim Compensatory Measures Order, EA-02-026, dated February 25, 2002 and 10 CFR 50.54(hh)(2).

The team reviewed the licensee's strategies to verify that they continued to maintain and implement procedures, maintain and test equipment necessary to properly implement the strategies, and ensure station personnel are knowledgeable and capable of implementing the procedures. The team performed a visual inspection of portable equipment used to implement the strategy to ensure availability and material readiness of the equipment, including the adequacy of portable pump trailer hitch attachments, and verify the availability of on-site vehicles capable of towing the portable pump. The strategies and procedures selected for this inspection sample included:

- Extreme Damage Mitigation Guideline A.4.5, "Condensate Storage Tank Makeup," Revision 2

- Extreme Damage Mitigation Guideline 3, "AME Pump Operation and Alternate Water Supplies," Revision 0

- Engineering Report ER-ME-127, "Mitigating Actions for Safe Shutdown Beyond Design Basis," Revision 2

b. Findings

No findings.

4. OTHER ACTIVITIES [OA]

4OA2 Identification and Resolution of Problems

Corrective Actions for Fire Protection Deficiencies

a. Inspection Scope

The team selected a sample of condition reports associated with the licensee's fire protection program to verify that the licensee had an appropriate threshold for identifying deficiencies. In addition the team reviewed the corrective actions proposed and implemented to verify that they were effective in correcting identified deficiencies. The team also evaluated the quality of recent engineering evaluations through a review of condition reports, calculations, and other documents during the inspection.

b. Findings

Findings related to this review are documented in Sections 1R05.01 and 1R05.06. No additional findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented the inspection results to Mr. M. Lucas, Site Vice President and other members of the licensee staff at a debrief meeting on February 17, 2011, and in a telephonic exit meeting held on May 3, 2011.

The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Lucas	Site Vice President
D. Kross	VP, Nuclear Engineering and Support
F. Madden	Director, Nuclear Oversight and Regulatory Affairs
D. Goodwin	Director, Engineering Support
T. Hope	Nuclear Licensing Manager
J. Hicks	Regulatory Affairs
R. Plunkett	Fire Protection Engineer
F. Ames	Maintenance Supervisor
J. Stone	Supervisor, Operations Procedures
J. Atwood	Design Engineer
G. Bryan	Operations Day Shift Supervisor
D. Scorziello	Engineering Programs
F. He	System Engineering, Electrical
H. Beck	Fire Safe Shutdown Analysis Engineer

NRC personnel

J. Kramer, Senior Resident Inspector
D. Frumkin, Fire Protection Branch, Office of Nuclear Reactor Regulation
P. Qualls, Fire Protection Branch, Office of Nuclear Reactor Regulation

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000445/2011007-01 05000446/2011007-01	NCV	Failure to Implement Effective Corrective Actions for a Condition Adverse to Fire Protection (Section 1R05.05)
05000445/2011007-02 05000446/2011007-02	NCV	Failure to Identify and Mitigate or Correct Potential Single Spurious Fire Damage Scenario (Section 1R05.06)
05000445/2011007-03 05000446/2011007-03	NCV	Failure to Ensure Emergency Lights in Safe Shutdown Areas had an 8-Hour Capacity (Section 1R05.08)

Closed

None

LIST OF DOCUMENTS REVIEWED

CALCULATIONS

Number	Title	Revision
0210-063-0034	Emergency Lighting Evaluation	3
0210-063-0059	Flooding Analysis Input	2
0210-063-0064	Partial Sprinkler Coverage Evaluation	2
0210-063-0074	Suppression System Flooding Analysis	0
2-FP-0088	Fire Protection Inadvertent Operation Analysis (Unit 2)	3
ME-CA-0000-1086	Fire Safe Shutdown Analysis for CPSES Unit 1, Unit 2, and Common	2
ME-CA-0600-2075	Unit 1 Safeguards – Electrical Equipment Room Elevation 852'-6"	1

DESIGN BASIS DOCUMENTS (DBD)

Number	Title	Revision
ME-001	CPSES Fire Protection Program	7
ME-002	Penetration Seals	9
ME-020	Fire Safe Shutdown Analysis	11
ME-047	Lighting System	10
ME-063	Fire Barriers	6
ME-218	Instrument Air System	18

DESIGN CHANGE AUTHORIZATIONS (DCA)

95554	97081	97610	97611
95975	99744	97609	97259

CONDITION REPORTS (CR)

2003-000404	2010-004242	2010-004313	2010-006696	2011-001319*
2004-003866	2010-004243	2010-004314	2010-007806	2011-001647*
2005-000316	2010-004244	2010-004315	2010-009912	2011-001649*
2005-000318	2010-004246	2010-004316	2010-009983	2011-001668*
2005-000335	2010-004250	2010-004318	2010-009984	2011-001686*
2007-002810	2010-004251	2010-004319	2010-010037	2011-001714*
2008-003181-00	2010-004253	2010-004320	2010-010103	2011-001742*
2008-000324-00	2010-004255	2010-004341	2010-010616	2011-001780*
2008-003181	2010-004257	2010-004261	2011-000098*	2011-001789*
2009-000421-00	2010-004261	2010-004262	2011-000100*	2011-001803*
2009-002241-00	2010-004262	2010-004313	2011-000102*	2011-001807*
2009-004453	2010-004272	2010-004314	2011-000103*	2011-001808*
2009-004455	2010-004273	2010-004315	2011-000124*	2011-001821*
2009-006954	2010-004279	2010-004318	2011-000125*	2011-001836*
2009-008335	2010-004280	2010-004319	2011-000130*	2011-001838*
2009-008843	2010-004281	2010-005127	2011-001149	2011-001839*
2010-004238	2010-004283	2010-006120	2011-001314*	
2010-004239	2010-004286	2010-006253	2011-001316*	
2010-004240	2010-004312	2010-006565	2011-001318*	

* Issued as a result of inspection activities.

DRAWINGS

Number	Title	Revision
2323-E1-0703-12	Auxiliary Bldg. Cable Tray Segments, EL. 852'-6"	6
2323-E2-0602-03	Safeguard Bldg Conduit Plan, EL. 810'-6"	14
2323-E2-0602-05	Safeguard Bldg Conduit Plan, EL. 831'-6"	7
2323-E2-0603-01	Safeguard Bldg Conduit Plan, EL. 852'-6"	7
2323-E2-07160	Elect. Equip. Area, Conduit & Equip. Arrangment Plan EL. 810'-6"	13
7185AB	Series DCF Controller for Cummins Diesel Engine CPX-FPCTLV-05 and 06, Schematic Diagram Unit 1 and 2	CP2

Number	Title	Revision
E1-0001	Plant One Line Diagram Units 1 And 2	CP-30
E1-0004 Sh. A	6.9 kV Auxiliaries One Line Diagram Safeguard Buses	CP-27
E1-0005 Sh. A	480V Auxiliaries One Line Diagram Safeguard Buses	CP-22
E1-0005 Sh. B	Safeguard And Auxiliary Buildings Safeguard 480V MCCs One Line Diagram	CP-35
E1-0007 Sh. C	Safeguard And Auxiliary Buildings Safeguard 480V MCCs One Line Diagram	CP-41
E1-0008 Sh. B	Containment And Common-Fuel Building Normal 480V MCCs One Line Diagram	CP-20
E1-0009 Sh. B	Containment And Diesel Generator Safeguard 480V MCCs One Line Diagram	CP-8
E1-0018 Sh. 01G	208/120 Vac One Line Diagram	CP-13
E1-0018 Sh. 1	208/120 Vac One Line Diagram	CP-47
E1-0020 Sh. H	125 Vdc One Line Diagram	CP-16
E1-0029 Sh. J	125 Vdc One Line Diagram	CP-10
E1-0066 Sh. 73	SOVS-X-HV-4104, 1-HV-4104 A AND B Control Room Standpipe, Cable Spreading Room Speaker system Pre-action Isolation Valves Schematic Diagram	CP-2
E1-2000 Sh. 1A	Antenna Mounting Sections and Details	CP-4
E1-2001 Sh. D	Miscellaneous Systems One-Line Diagram PNL XEC2-7	CP-2
E1-2042	Local Fire Detection Cont. PNL CPX-EIPRLV-29, External Wiring Diagram	CP-6
E1-2042 Sh. 1	Local Fire Detection Cont. PNL CPX-EIPRLV-29B, External Wiring Diagram	CP-6
E1-2049 Sh. A	Fire Protection System, Halon Control panels CPX-EIPRLV-42 and 43 External Wiring Diagram	CP-3
E1-2049 Sh. B	Fire Protection System, Halon Control panels CPX-EIPRLV-42A and 43A External Wiring Diagram	CP-5
E1-2053	Fire Prot and Fire Det. Sys. Misc Wiring Diagram	CP-3
E2-0020 Sh. G	125 Vdc One Line Diagram	CP-7
E2-0061 Sh. 19	Air Operated Valve 2-LCV-0459 Letdown Isolation Valve	CP-5
E2-0061 Sh. 20	Air Operated Valve 2-LCV-0460 Letdown Isolation Valve	CP-4

Number	Title	Revision
E2-0061 Sh. 30	Air Operated Valve 2-8153 Excess Letdown Isolation Valve	CP-5
E2-0061 Sh. 31	Air Operated Valve 2-8154 Excess Letdown Isolation Valve	CP-4
E2-0061 Sh. 36	Air Operated Valve 2-8149A Letdown Orifice Isolation Valve	CP-5
E2-0061 Sh. 37	Air Operated Valve 2-8149B Letdown Orifice Isolation Valve	CP-5
E2-0061 Sh. 38	Air Operated Valve 2-8149C Letdown Orifice Isolation Valve	CP-5
E2-0061 Sh. 40	Air Operated Valve 2-8152 Letdown Isolation Valve	CP-3
E2-0061 Sh. 86	Air Operated Valve 2-8160 Letdown Isolation Valve	CP-3
E2-0063 Sh. 01	Motor Operated Valve 2-8701A Residual Heat Removal Loop 1 Inlet Isolation Valve Schematic Diagram	CP-4
E2-0063 Sh. 01A	Motor Operated Valve 2-8701A Residual Heat Removal Loop 1 Inlet Isolation Valve Schematic And Connection Diagram	CP-4
E2-0063 Sh. 02	Motor Operated Valve 2-8701B Residual Heat Removal Loop 2 Inlet Isolation Valve Schematic Diagram	CP-4
E2-0063 Sh. 02A	Motor Operated Valve 2-8701B Residual Heat Removal Loop 2 Inlet Isolation Valve Connection Diagram	CP-2
E2-0063 Sh. 03	Motor Operated Valve 2-8702A Residual Heat Removal Loop 1 Inlet Isolation Valve Normal Power Supply	CP-4
E2-0063 Sh. 03A	Motor Operated Valve 2-8702A Residual Heat Removal Loop 1 Inlet Isolation Valve Normal Power Supply	CP-2
E2-0063 Sh. 04	Motor Operated Valves 2-8702A Residual Heat Removal Loop 2 Inlet Isolation Valve	CP-4
E2-0063 Sh. 12	Motor Operated Valves 2-8702A Residual Heat Removal Loop 1 Inlet Isolation Valve Alternate Power Supply	CP-2
E2-0064 Sh. 01	Motor Operated Valve 2-8000A Pressurizer Relief Isolation Valve	CP-5
E2-0064 Sh. 02	Motor Operated Valve 2-8000B Pressurizer Relief Isolation Valve	CP-4
E2-0064 Sh. 11	Nitrogen Operated Valve 2-PCV-0455A Pressurizer Power Relief Valve	CP-4

Number	Title	Revision
E2-0064 Sh. 12	Nitrogen Operated Valve 2- PCV -0456 Pressurizer Power Relief Valve	CP-6
E2-0064 Sh. 40	Reactor Vessel Head Vent SOV 2-HV-3607 Schematic And Connection Diagram	CP-4
E2-0064 Sh. 41	Reactor Vessel Head Vent SOV 2-HV-3608 Schematic And Connection Diagram	CP-4
E2-0064 Sh. 42	Pressurizer Vent SOV 2-HV-3609 Schematic And Connection Diagram	CP-3
E2-0064 Sh. 43	Pressurizer Vent SOV 2-HV-3610 Schematic And Connection Diagram	CP-3
E2-0066 Sh. 73	SOVS-X-HV-4104A, 2-HV-4104 B Control Room Standpipe, Cable Spreading Room Speaker system pre-action Isolation Valves Schematic Diagram	CP-1
E2-0171 Sh. 05A	Main Control Board CP-2-ECPRCB-05 External Connection Diagram	CP-3
E2-0172 Sh. 14	Terminal Rack CP2-ECPRTC-14 External Connection Diagram	CP-5
E2-0172 Sh. 14A	Motor Operated Valve 2-8701B Residual Heat Removal Loop 2 Inlet Isolation Valve Schematic Diagram	CP-3
E2-0173 Sh. 01	Hot Shutdown Panel CP2-ECPRLV-01 External Connection Diagram	CP-3
E2-2021 Sh. T	Safeguard and Diesel Buildings, Plan at EL 810'-6"	CP-3
E2-2022 Sh. T	Safeguard and Diesel Buildings, Fire Detection Plan, EL 831'-6" and 844'-0"	CP-2
E2-2023 Sh. T	Safeguard Building, Fire Detection Plan, EL 852'-6"	CP-1
E2-2042	Local Fire Detection Cont. PNL CPX-EIPRLV-29A, External Wiring Diagram	CP-5
E2-2042 Sh. 1	Local Fire Detection Cont. PNL CPX-EIPRLV-29C, External Wiring Diagram	CP-5
E2-2052	Fire Protection and Fire Detection System Miscellaneous Wiring	CP-3
FPR-10 Sh. 1	Fire Protection Report, Auxiliary / Electrical Control Building, Common Plans at EL. 852' 6" and 854'-4"	1
FPR-27 Sh. 1	Fire Protection Report, Unit 2 Containment / Safeguards Building, Plans at EL. 831' 6" and 832'-6"	0

Number	Title	Revision
FPR-27 Sh. 2	Fire Protection Report, Unit 2 Containment / Safeguards Building, Plans at EL. 831'-6" and 832'-6"	0
FPR-28 Sh. 1	Fire Protection Report, Unit 2 Containment / Safeguards Building, Plans at EL. 852' 6" and 860' 0"	0
FPR-3 Sh. 1	Fire Protection Report, Containment / Safeguards Building, Unit 1Plans at EL. 831' 6" and 832'6"	1
FPR-4 Sh. 1	Fire Protection Report, Containment / Safeguards Building, Unit 1Plans at EL. 852' 6" and 860'-0"	1
FPR-7 Sh. 1	Fire Protection Report, Auxiliary / Electrical Control Building, Common Plans at EL. 778' 0" and 790' 6"	2
FPR-8 Sh. 1	Fire Protection Report, Auxiliary / Electrical Control Building, Common Plans at EL. 807' 0" and 810' 6"	1
FPR-9 Sh. 1	Fire Protection Report, Auxiliary / Electrical Control Building, Common Plans at EL. 830'-0" and 831'-6"	1
M1 - 0220 Sh. 1	Flow Diagram Instrument Air Turbine Building	CP-33
M1 - 1920 Sh. 1A	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Plan at EL. 773'-0" and Misc. Plans	CP-3
M1 - 1922 Sh. 1	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Plan at EL. 831'-6" and 832'-6" and 844' 0"	CP-5
M1 - 1923 Sh. 1	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Plan at EL. 852'-6" and 860'-0"	CP-7
M1 - 1923 Sh. 1A	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Miscellaneous Plan at Details	CP-3
M1- 0218 Sh. 1A	Flow Diagram Instrument Air Safeguards Building Unit 2	CP-20
M1- 0218 Sh. 2	Flow Diagram Instrument Air Safeguards Building Unit 2	CP-17
M1- 0219	Flow Diagram Instrument Air	CP-20
M1- 0219 Sh. 1	Flow Diagram Instrument Air Supply Fuel Building	CP-15
M1- 0219 Sh.2	Flow Diagram Instrument Air Supply Auxiliary Building	CP-20
M1- 0219 Sh. 2A	Flow Diagram Instrument Air Supply Auxiliary Building	CP-15
M1- 0219 Sh. 3	Flow Diagram Instrument Air Supply Auxiliary Building	CP-25
M1- 0220	Flow Diagram Instrument Air	CP-48
M1- 0220 Sh.1A	Flow Diagram Instrument Air Turbine Building	CP-26

Number	Title	Revision
M1- 1920 Sh. 1	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Plan at EL. 790'-0"	CP-4
M1- 1921 Sh. 1	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Plan at EL. 808'-0" and 810' 0"	CP-6
M1- 1922 Sh. 1A	Fire Hazard Analysis – Unit 2, Containment And Safeguards Buildings, Plan at EL. 841'-6" and 842' 0", 849' 0" and Section G-G	CP-3
M1- 1927 Sh. 1	Fire Hazard Analysis – Unit 1, Auxiliary/Electrical Control Bldg, EL. 778'-0" and 790' 6"	CP-5
M1- 1927 Sh. 1A	Fire Hazard Analysis – Unit 1, Auxiliary/Electrical Control Bldg, Partial Plan EL. 792'-0"	CP-3
M1- 1928 Sh. 1	Fire Hazard Analysis – Unit 2, Auxiliary And Electrical Control Bldg, EL. 807'-0" and 810' 6"	CP-3
M1- 1928 Sh. 1A	Fire Hazard Analysis – Unit 2, Auxiliary And Electrical Control Bldg, EL. 807'-0" and 810' 6"	CP-2
M1- 1929 Sh. 1A	Fire Hazard Analysis – Unit 1, Auxiliary/Electrical Control Bldg, EL. 830'-0"	CP-2
M1- 1930 Sh. 1	Fire Hazard Analysis – Unit 1, Auxiliary/Electrical Control Bldg, EL. 852'-6" and 854' 4"	CP-3
M1-0206 Sh. 01	Flow Diagram Auxiliary Feedwater System Pump Trains	CP-15
M1-0206 Sh. 02	Flow Diagram Auxiliary Feedwater System Yard Layout	CP-20
M1-0216	Flow Diagram Compressed Air System	CP-45
M1-0216 Sh. 1	Flow Diagram Instrument Air Supply Electrical and Control	CP-27
M1-0216 Sh. A	Flow Diagram Compressed Air System	CP-40
M1-0216 Sh. B	Flow Diagram Compressed Air System	CP-21
M1-0216 Sh. C	Flow Diagram Compressed Air System	CP-11
M1-0218	Flow Diagram Instrument Air	CP-14
M1-0218 Sh. 1	Flow Diagram Instrument Air Safeguards Building Unit 2	CP-20
M1-0231	Flow Diagram Component Cooling Water System	CP-24
M1-0233 Sh. A	Flow Diagram Station Service Water System	CP-18
M1-0234	Flow Diagram Station Service Water System	CP-24
M1-0250	Flow Diagram Reactor Coolant System	CP-31

Number	Title	Revision
M1-0251	Flow Diagram Reactor Coolant System	CP-32
M1-0253	Flow Diagram Chemical And Volume Control System	CP-10
M1-0260	Flow Diagram Residual Heat Removal System	CP-35
M1-1701 Sh. 5A	Unit 1 and 2 Thermo-Lag® Typical Details	CP-3
M1-1922 Sh. 1	Fire Hazards Analysis – Unit 1, Containment & Safeguards Buildings, Floor Plan at EL 831'-6", 832'-6"	CP-5
M1-1923 Sh. 1	Fire Hazards Analysis – Unit 1, Containment and Safeguards Buildings, Plans at EL 852'-6", and 860'-0"	CP-6
M1-1927 Sh. 1	Fire Hazards Analysis – Unit 1, Auxiliary/Electrical Control Buildings, EL 778'-0", and 790'-6"	CP-5
M1-1928 Sh. 1A	Fire Hazards Analysis – Unit 1, Auxiliary and Electrical Control Buildings, EL 807'-0", and 810'-6"	CP-2
M1-1929 Sh. 1A	Fire Hazards Analysis – Unit 1, Auxiliary/Electrical Control Bldg, EL 830'-0"	CP-2
M1-1990 Sh. 103	Fire Suppression Systems, Auxiliary Building, South Half Corridor Elevation 831' 6" System, 337.785-X161	CP-1
M1-1990 Sh. 103A	Fire Suppression Systems, Auxiliary Building, South Half Corridor Elevation 831' 6" System, 337.785-X161	CP-1
M1-1990 Sh. 115	Fire Suppression Systems, Unit 1 Safeguards Building, Electrical Equipment Room, Plan at El 831' 6" System, 334.782-6161	CP-1
M1-1990 Sh. 115A	Fire Suppression systems, Unit 1 Safeguards Building, Electrical Equipment Room, Plan at El 831' 6" System, 334.782-6161	CP-1
M1-1990 Sh. 124	Fire Suppression systems, Unit 1 Safeguards Building, Electrical Equipment Room, Plan at El 852' 6" System, 334.782-6221	CP-1
M1-1990 Sh. 127	Fire Suppression systems, Unit 1 Safeguards Building, Electrical Equipment Room, El 852'- 6" System, 334.782-6221	CP-1
M1-1990 Sh. 130	Fire Suppression systems, Auxiliary Building, North Half Corridor Elevation 831' 6" System, 334.785-X181	CP-1
M1-1990 Sh. 130A	Fire Suppression systems, Auxiliary Building, North Half Corridor Elevation 831' 6" System, 334.785-X181	CP-1
M1-1990 Sh. 139	Fire Suppression systems, Auxiliary Building EL. 852' 6", Stair Area A-10 EL. 831-6" System, 337.785-X261	CP-1

Number	Title	Revision
M1-1990 Sh. 139A	Fire Suppression systems, Auxiliary Building EL. 852' 6", Stair Area A-10 EL. 831-6" System, 337.785-X261	CP-1
M1-1990 Sh. 99A	Fire Suppression systems, Auxiliary Building, South Half Corridor and Chiller Room, Elevation 778'-0" - 792'-0" System, 334.785-X061	CP-1
M1-1990 Sh. A	Fire Suppression systems, Systems Index, Unit 1 and 2 Common Areas	CP-6
M1-2206 Sh. 01	Instrumentation & Control Diagram Auxiliary Feedwater System Channel 2450, 2451	CP-13
M1-2225 Sh. 11	Instrumentation & Control Diagram Fire Detection/Protection System Channel 4110	CP-3
M1-2225 Sh. 16	Instrumentation & Control Diagram Fire Detection/Protection System Channel 4104	CP-4
M2-0216	Flow Diagram Compressed Air System	CP-21
M2-0216 Sh. A	Flow Diagram Compressed Air System	CP-10
M2-0216 Sh. B	Flow Diagram Compressed Air System	CP-20
M2-0218	Flow Diagram Instrument Air	CP-8
M2-0218 Sh. 1	Flow Diagram Instrument Air Safeguards Building Unit 2	CP-19
M2-0218 Sh. 2	Flow Diagram Instrument Air Safeguards Building Unit 2	CP-12
M2-0218 Sh. 4	Flow Diagram Instrument Air Containment Building	CP-10
M2-0218 Sh. 4A	Flow Diagram Instrument Air Containment Building	CP-8
M2-0219	Flow Diagram Instrument Air Unit 2	CP-15
M2-0220 Sh. 1	Flow Diagram Instrument Air Turbine Building	CP-12
M2-0220 Sh. 1A	Flow Diagram Instrument Air Turbine Building	CP-9
M2-1920 Sh. 01A	Fire Hazard Analysis – Unit 2 Containment And Safeguard Buildings Plan At EL 773'-0" and Miscellaneous Plans	CP-3
M2-1922 Sh. 1	Fire Hazard Analysis – Unit 2 Containment & Safeguard Buildings Floor Plan At EL 831'-6", 832'-6" and 844'-0"	CP-5
M2-1923 Sh. 1	Fire Hazards Analysis – Unit 2, Containment & Safeguard Buildings, Plans at EL 852'-6", and 860'-0"	CP-7
M2-1990 Sh. 163A	Fire Suppression Systems, Unit 2 Safeguards Building, Elect. Equip. Rm. EL 810'- 6", Sprinkler Systems 334.783-4201	CP-3

Number	Title	Revision
M2-1990 Sh. 163B	Fire Suppression Systems, Unit 2 Safeguards Building, Elect. Equip. Rm., Plan at EL 810'- 6", Sprinkler Systems 334.783-4201	CP-2
M2-1990 Sh. 163D	Fire Suppression Systems, Unit 2 Safeguards Building, Sprinkler Systems 334.783-4201, Elect. Equip. Rm. Plan at EL 810'- 6"	CP-2
M2-1990 Sh. 163	Fire Suppression Systems, Unit 2 Safeguards Building, Sprinkler Systems 334.783-4201, Elect. Equip. Rm. Plan at EL 810'- 6"	CP-2
M2-1990 Sh. 165	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room EL 852'- 6", Sprinkler Systems 334.783-4221	CP-2
M2-1990 Sh. 165A	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room EL 852'- 6", Sprinkler Systems 334.783-4221	CP-3
M2-1990 Sh. 165B	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room EL 852'- 6", Sprinkler Systems 334.783-4221	CP-2
M2-1990 Sh. 169	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room Plan at EL 852'- 6", Sprinkler Systems 334.783-4221	CP-2
M2-1990 Sh. 169A	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room Plan at EL 852'- 6", Sprinkler Systems 334.786-4221	CP-2
M2-1990 Sh. 173	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room EL 831'- 6", Systems 334.786-4161	CP-2
M2-1990 Sh. 173A	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room EL 831'-6", Systems 334.786-4161	CP-2
M2-1990 Sh. 178	Fire Suppression Systems, Unit 2 Safeguards Building, Electrical Equipment Room EL 852'-6", Sprinkler Systems 334.786-4221	CP-2
M2-1990 Sh. 95	Fire Suppression Systems, Unit 2 Cable Spreading Room Pre-action Sprinkler Systems 334.786-9141 and 334.786-9181, Plan at EL 807'- 0"	CP-2
M2-1990 Sh. 95A	Fire Suppression Systems, Unit 2 Cable Spreading Room Pre-action Sprinkler Systems 334.786-9141 and 334.786-9181, Plan at EL 807'- 0"	CP-1

Number	Title	Revision
M2-1990 Sh. 95B	Fire Suppression Systems, Unit 2 Cable Spreading Room Pre-action Sprinkler Systems 334.786-9141 and 334.786-9181, Plan at EL 807'- 0"	CP-1
M2-1990 Sh. 95C	Fire Suppression Systems, Unit 2 Cable Spreading Room Pre-action Sprinkler Systems 334.786-9141 and 334.786-9181, Plan at EL 807'- 0"	CP-2
M2-2251 Sh. 03	Instrumentation & Control Diagram Reactor Coolant System Channel 0455, 0456	CP-2
MX-0225	Flow Diagram Fire Protection Treated Water Supply System	07
SK-0001-08-000324-03-00	Flow Diagram Safeguard Building Unit 1 Fire Protection	00
SK-0002-08-000324-03-01	Fire Suppression Systems System Index Unit 1 and Common Areas	01
SK-0003-08-000324-03-02	Fire Suppression Systems Unit 1 Safeguards Building Electrical Equipment Room Elevation 852'-6" System 334.782-6221	02
SK-0004-08-000324-03-01	Fire Suppression Systems Unit 1 Safeguards Building Electrical Equipment Room Elevation 852'-6" System 334.782-6221	01
SK-0005-08-000324-03-01	Fire Suppression Systems Unit 1 Safeguards Building Electrical Equipment Room Elevation 852'-6" System 334.782-6221	01
SK-0044-08-000324-03-00	Fire Hazards Analysis Unit 1 Containment and Safeguards Buildings Plans at Elevation 852'-6" and 860'-0"	00
W-TC14702-D Sh. 1	Wiring Diagram Termination Cabinet CP2-ECPRTC-14	CP-2
W-TC14702-D Sh. 2	Wiring Diagram Termination Cabinet CP2-ECPRTC-14	CP-2

ENGINEERING REPORTS (ER)

Number	Title	Revision
EE-005	Assessment of Rockbestos One Hour Fire Rated Cable at CPSES (Firezone "R" Cable)	0
ME-025	NFPA-12A Code Compliance Review	0
ME-082, Attachment A	Typical Design Details – Thermo-Lag®	3
ME-108	Assessment of Fire Protection Inspection/Test Measures	1
ME-125	Thermal/Hydraulic Analysis for the Fire Safe Shutdown Scenario	0
ME-126	Post-Fire Safe Shutdown Manual Action Feasibility	0
ME-127	Mitigating Actions for Safe Shutdown Beyond Design Basis	2
ME-129	Identification of Fire Safe Shutdown Manual Action Resolution Requirements on the Protected Shutdown Train	2
ME-130	Summary of Expert Panel Activities Related to Postulation of Multiple Spurious Operations for the CPNPP Fire Safe Shutdown Analysis	0

FIRE IMPAIRMENTS

12962	13090	12971	12875	13059	12928	13119
12963	12791	12750	13106	12750		

MISCELLANEOUS DOCUMENTS

Number	Title	Revision/Date
	Emergency Damage Mitigation Training Presentations Parts 1 - 4	
611-6R420429	Requisition Scope of Work for Communication System	
F11-01	Plant Fire Drill Package	February 16, 2011
Fire Protection Report	Units 1 and 2	27
FSAR §9.2.2 Amendment 100	Component Cooling Water System	
FSAR §9.3.1 Amendment 100	Compressed Air Systems	

Number	Title	Revision/Date
FSAR §9.3.4 Amendment 100	Chemical and Volume Control System (Including Boron Recycle System)	
FSAR §9.5.1 Amendment 78	Fire Protection System	
FSAR §9.5.1 Amendment 102	Fire Protection System	
FSAR §10.3.2.2 Amendment 100	Atmospheric Relief Valves	
FSAR §13.3B Amendment 103a	CPSES Fire Protection Program	
FSAR §10.4.9 Amendment 100	Auxiliary Feedwater System	
FSSAR05	Safe Shutdown Cable Logics	January 26, 2010
LO21ADMFP1	Fire Protection Administration	December 4, 2003
NFPA 12A	Standards on Halon 1301 Fire Extinguishing Systems	1980
NFPA 13	Standard for the Installation of Sprinkler Systems	1978
NFPA 72D	Standard for Proprietary Signaling Systems	1975
NRC Letter to Mike Blevins	NRC Inspection Site Specific Implementation of B.5.B Phase 2 and 3 Mitigating Strategies Temporary Instruction Report 05000445/2008008 and 05000446/2008008 dated October 21, 2008	
NRC Letter to Mike Blevins	Conforming License Amendments to Incorporate the Mitigation Strategies Required by Section B.5.B of Commission Order EA-02-026 (TAC Nos. MD4522 and MD4523) Dated July 26, 2007	
NUREG-0797	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	July, 1981
NUREG-0797 Supplement No. 1	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	October, 1981
NUREG-0797 Supplement No. 12	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	October, 1985

Number	Title	Revision/Date
NUREG-0797 Supplement No. 21	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	April, 1989
NUREG-0797 Supplement No. 23	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	February, 1990
NUREG-0797 Supplement No. 24	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	April, 1990
NUREG-0797 Supplement No. 25	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2	September, 1992
NUREG-0797 Supplement No. 26	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Unit 2	February, 1993
NUREG-0797 Supplement No. 27	Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Unit 2	April, 1993
SA-2010-011	CPNPP Fire Protection Self-Assessment Report	July 29, 2010
2323-MS-44B	Piping Specification	14
TXX-4321	Letter dated October 1, 1984 from John W. Beck, Manager, Licensing, Texas Utilities Generating Company, to B. Youngblood, NRC	
TXX-4528	Letter dated August 6, 1985 from W. Counsil, Texas Utilities Generating Company, to V. Noonan, NRC	
WCAP-16396-NP	Reactor Coolant Pump Seal Performance for Appendix R Assessments	
6235	Transient Combustible Permit for elevation 832', Room 2-096	March 14, 2011

B.5.b MITIGATION STRATEGIES

Number	Title	Revision
Extreme Damage Mitigation Guidelines - 3	AME Pump Operation and Alternative Water Supplies	0
Extreme Damage Mitigation Guidelines - A.4-5	Condensate Storage Tank Makeup	2
ER-ME-127	Mitigating Actions for Safe Shutdown Beyond Design Basis	2

MODIFICATIONS

Number	Title	Revision
FDA-2008-000324-01-03	Final Design Authorization – Fire Protection System in Room 1-083	3
FDA-2008-000324-02-02	Final Design Authorization – Fire Protection System in Room 1-096	2
FDA-2008-000324-03-03	Final Design Authorization – Fire Protection System in Room 1-103	3

PREVENTIVE MAINTENANCE TASKS

300151 339898 3760930

PROCEDURES

Number	Title	Revision
ABN - 301	Instrument Air Malfunction	11
ABN - 803B	Response to a Fire in the Control Room or Cable Spreading Room	5
ABN - 804B	Response to Fire in The Safeguards Building	3
ABN - 805B	Response to Fire in the Auxiliary Building or the Fuel Building	5
ABN - 805B	Response to Fire in The Auxiliary Building or the Fuel Handling Building	3
ABN - 901	Fire Protection System Alarms or Malfunctions	8
ABN - 901 Attachment 17	Control Room Main Fire Detection Board Alarm Response	9
ABN - 915	Security Event	8
FIR - 202	Fire Protection Inspections	4
FIR - 303	Halon Fire Suppression System Inspection	5
FIR - 309	Hose Station And Hydrant/Hose House Inspections	4
FIR - 310	Penetration Seal Inspection	3
FIR - 312	Hydrostatic Testing of Fire Hose	0
FP1-106B	Fire Pre Plan Instruction Unit 2 Safeguards Building, Elev. 831-6 Corridor, RB Access, Elect. Equip. Room	3
FP1-401	Fire Pre Plan Instruction Auxiliary Building, Elev. 790'-6	3

Number	Title	Revision
FP1-504	Fire Pre Plan Instruction Electrical & Control Building, Elev. 807'-0" Unit 2 Cable Spreading Room	3
MSE - P2 - 7704	Halon Fire System Test - Unit 2 Cable Spread Room	3
MSE - P2 - 7706	Unit 2 Cable Spread Room Halon System Air Flow Test	0
MSE - PX - 7715	Halon Fire System Test - CPX-EIPRLV-44A	2
MSE-P0-5306	Emergency Lighting Unit Inspection	7
MSE-P1-7704	Halon Fire System Test – CPX-EIPRLV-42	3
MSE-P1-7706	Unit 1 Cable Spread Room Halon System Air Flow Test	0
MSE-P2-7704	Halon Fire System Test – CPX-EIPRLV-42A	3
MSG-1018	Installation and Rework of Penetration Seals	1
MSM-P0-0705	Fire Damper Inspection and Cleaning	3
OSP-INST-B701	Remote Shutdown Panel Operability	12
STA-722	Fire Protection Program	6
STA-723	Fire Protection Systems/Equipment Requirements	5
STA-724	Fire Reporting And Response	2
STA-727	Fire Brigade	4
STA-728	Storage and Handling of Flammable/Combustible Material and Compressed/Cryogenic Gases	4
STA-729	Control Of Transient Combustibles, Ignition Sources And Fire Watches	8
STA-738	Fire Protection Systems/Equipment Impairments	6
TRA-104	Fire Protection Training	14

VENDOR MANUALS

Number	Title	Revision
CPF-07772-001	Emergency Lighting Technical Manual	6
EngineeringR2	ASCO Engineering Information – Solenoid Valves	

WORK ORDERS (WO)

3477321	3840873	3948619	3963365