



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

November 8, 2016

Mr. Ken Peters, Senior Vice President
and Chief Nuclear Officer
TEX Operations Company LLC
P.O. Box 1002
Glen Rose, TX 76043

**SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT – NRC INTEGRATED
INSPECTION REPORT 05000445/2016003 and 05000446/2016003**

Dear Mr. Peters:

On September 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Comanche Peak Nuclear Power Plant, Units 1 and 2. On September 29, 2016, the NRC inspectors discussed the results of this inspection with Mr. S. Sewell, Senior Director of Engineering and Regulatory Affairs, and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. All of these findings involved violations of NRC requirements.

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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at the Comanche Peak Nuclear Power Plant, Units 1 and 2.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV; and the NRC resident inspector at the Comanche Peak Nuclear Power Plant, Units 1 and 2.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's

K. Peters

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Sincerely,

/RA/

Jeremy R. Groom, Branch Chief
Project Branch A
Division of Reactor Projects

Docket Nos. 50-445 and 50-446
License Nos. NPF-87 and NPF-89

Enclosure:
Inspection Report 05000445/2016003 and
05000446/2016003
w/ Attachment: Supplemental Information

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K. Peters

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Letter to Ken Peters from Jeremy Groom dated November 8, 2016

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT-NRC INTEGRATED
INSPECTION REPORT 05000445/2016003 and 05000446/2016003

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Electronic Distribution for Comanche Peak Nuclear Power Plant

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000445, 05000446
License: NPF-87, NPF-89
Report: 05000445/2016003 and 05000446/2016003
Licensee: TEX Operations Company, LLC
Facility: Comanche Peak Nuclear Power Plant, Units 1 and 2
Location: 6322 N. FM-56, Glen Rose, Texas
Dates: July 1 through September 30, 2016
Inspectors: J. Josey, Senior Resident Inspector
R. Kumana, Resident Inspector
W. Cullum, Reactor Inspector
Approved By: Jeremy R. Groom
Chief, Project Branch A
Division of Reactor Projects

SUMMARY

IR 05000445/2016003 and 05000446/2016003; 07/01/2016 – 09/30/2016; Comanche Peak NPP, Units 1 and 2; Maintenance Effectiveness, Problem Identification and Resolution

The inspection activities described in this report were performed between July 1, 2016, through September 30, 2016, by the resident inspectors at the Comanche Peak Nuclear Power Plant and an inspector from the NRC's Region IV office. Two findings of very low safety significance (Green) are documented in this report. Both of these findings involved a violation of NRC requirements. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Initiating Events

- Green. The inspectors identified a non-cited violation of 10 CFR 50.65(a)(4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," for the licensee's failure to adequately manage the increase in risk associated with the potential for a loss of decay heat removal during refueling outages. Specifically, the licensee implemented a risk management action that did not reduce the risk, but instead called for placing a safety injection pump in service during periods where this action is prohibited by plant's technical specifications for low temperature over pressure protection. The inspectors determined this was an ineffective risk management action because the use of a safety injection pump during low pressure and temperature conditions would place the plant in an unanalyzed condition, resulting in an increase in risk. As an immediate corrective action, the licensee initiated Condition Report CR-2015-009109 to evaluate appropriate risk management actions. This finding was entered into the licensee's corrective action program as Condition Report CR-2015-009109.

The failure to manage the increase in risk associated with the potential for a loss of decay heat removal during refueling activities is a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the procedure quality attribute of the Initiating Events Cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Using Inspection Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," dated May 19, 2005, Flowchart 1, "Assessment of Risk Deficit," the inspectors determined the need to calculate the risk deficit to determine the significance of this issue. A senior reactor analyst performed a bounding qualitative assessment and determined the incremental core damage probability deficit was less than 1E-6 and the incremental large early release probability deficit was less than 1E-7, based on the availability of additional equipment to mitigate the loss of decay heat removal. In accordance with Flowchart 1 in Appendix K, because incremental core damage probability deficit was less than 1E-6 and incremental large early release probability deficit was less than 1E-7, the finding screened as having very low safety significance (Green). The finding has a human performance cross-cutting aspect associated with bases for decisions, in that, the licensee failed to ensure that operations leadership adequately communicate potential

problems with the risk management action to start a safety injection pump when in a mode of applicability for low temperature over pressure protection [H.10]. (Section 4OA2)

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of 10 CFR 50.65(a)(2), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Specifically, the licensee failed to demonstrate that the performance of the Unit 2 auxiliary feedwater check valves was being effectively controlled through the performance of appropriate preventive maintenance. The licensee's failure to perform appropriate maintenance resulted in several failures of the check valves. The licensee entered this issue into corrective action program as CR-2016-008312.

The licensee's failure to effectively monitor the performance of maintenance rule scoped equipment in accordance with 10 CFR 50.65(a)(2) was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to demonstrate that the performance of the Unit 2 auxiliary feedwater check valves was being effectively controlled through the performance of appropriate preventive maintenance which resulted in failures of the valves. Using Inspection Manual Chapter (IMC) 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, inspectors determined that this finding was of very low safety significance (Green) because the finding (1) was not a deficiency affecting the design and qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality, (2) did not represent a loss of system and/or function, (3) did not represent an actual loss of function of at least a single train for longer than its allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time, and (4) did not represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant for greater than 24 hours in accordance with the licensee's maintenance rule program. A cross-cutting aspect was not assigned to this finding because the performance deficiency occurred in 1996, and therefore, is not indicative of current licensee performance. (Section 1R12)

Licensee-Identified Violations

None

PLANT STATUS

Unit 1 and Unit 2 began the inspection period at approximately 100 percent power and operated at that power level for the entire inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Summer Readiness for Offsite and Alternate AC Power Systems

a. Inspection Scope

On July 20, 2016, the inspectors completed an inspection of the station's off-site and alternate-ac power systems. The inspectors inspected the material condition of these systems, including transformers and other switchyard equipment to verify that plant features and procedures were appropriate for operation and continued availability of off-site and alternate-ac power systems. The inspectors reviewed outstanding work orders and open condition reports for these systems. The inspectors walked down the switchyard to observe the material condition of equipment providing off-site power sources. The inspectors verified that the licensee's procedures included appropriate measures to monitor and maintain availability and reliability of the off-site and alternate-ac power systems.

These activities constituted one sample of summer readiness of off-site and alternate-ac power systems, as defined in Inspection Procedure 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walk-Down

a. Inspection Scope

The inspectors performed partial system walk-downs of the following risk-significant systems:

- August 4, 2016, Unit 2, turbine driven and motor driven auxiliary feedwater pumps
- August 23, 2016, Unit 1, train A 125 VDC distribution system
- September 20, 2016, Units 1 and 2, fire protection piping in the service water intake structure

The inspectors reviewed the licensee's procedures and system design information to determine the correct lineup for the systems. They visually verified that critical portions of the systems or trains were correctly aligned for the existing plant configuration.

These activities constituted three partial system walk-down samples as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Inspection

a. Inspection Scope

The inspectors evaluated the licensee's fire protection program for operational status and material condition. The inspectors focused their inspection on four plant areas important to safety:

- August 5, 2016, Fire area 2SC7, Unit 2 turbine driven auxiliary feedwater pump room
- September 19, 2016, Fire area SB2a, Unit 1 train A residual heat removal, safety injection, containment spray pumps rooms
- September 19, 2016, Fire area SE16, Unit 1 Electrical Equipment Room
- September 19, 2016, Fire area 2SE16, Unit 2 Electrical Equipment Room

For each area, the inspectors evaluated the fire plan against defined hazards and defense-in-depth features in the licensee's fire protection program. The inspectors evaluated control of transient combustibles and ignition sources, fire detection and suppression systems, manual firefighting equipment and capability, passive fire protection features, and compensatory measures for degraded conditions.

These activities constituted four quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

.2 Annual Inspection

a. Inspection Scope

On September 20, 2016, the inspectors completed their annual evaluation of the licensee's fire brigade performance. This evaluation included observation of two fire drills:

- March 22, 2016, Unit 1, announced drill, contaminated waste fire drill, 832 foot corridor
- June 22, 2016, Unit 2, announced drill, 858 foot elevation valve gallery

During these drills the inspectors evaluated the capability of the fire brigade members, the leadership ability of the brigade leader, the brigade's use of turnout gear and fire-fighting equipment, and the effectiveness of the fire brigade's team operation. The inspectors also reviewed whether the licensee's fire brigade met NRC requirements for training, dedicated size and membership, and equipment.

These activities constituted one annual inspection sample, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On September 23, 2016, the inspectors completed an inspection of the station's ability to mitigate flooding due to internal causes. After reviewing the licensee's flooding analysis, the inspectors selected one plant area containing risk-significant structures, systems, and components that were susceptible to flooding:

- Units 1 and 2, service water intake structure

The inspectors reviewed plant design features and licensee procedures for coping with internal flooding. The inspectors walked down the selected areas to inspect the design features, including the material condition of seals, drains, and flood barriers. The inspectors evaluated whether operator actions credited for flood mitigation could be successfully accomplished.

These activities constituted completion of one flood protection measures sample as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)

.1 Review of Licensed Operator Requalification

a. Inspection Scope

On September 27, 2016, the inspectors observed a portion of an annual requalification test for licensed operators. The inspectors assessed the performance of the operators and the evaluators' critique of their performance.

These activities constituted completion of one quarterly licensed operator requalification program sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

Inspectors observed the performance of on-shift licensed operators in the plant's main control room. At the time of the observations, the plant was in a period of heightened activity or risk due to testing being performed on reactor protection and response to unusual plant conditions. The inspectors observed the operators' performance of the following activities:

- July 13, 2016, Unit 2, Observation during slave relay testing
- August 8, 2016, Unit 2, Observation of operators response to heater drain pump seal water low pressure alarm
- September 26, 2016, Unit 1, Observation of reactor trip breaker testing

In addition, the inspectors assessed the operators' adherence to plant procedures, including conduct of operations procedure and other operations department policies.

These activities constituted completion of one quarterly licensed operator performance sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed two instances of degraded performance or condition of safety-related structures, systems, and components (SSCs):

- August 20, 2016, Unit 2, main feedwater system split flow bypass check valves
- September 23, 2016, Unit 1, pressurizer heater group C blown fuse

The inspectors reviewed the extent of condition of possible common cause SSC failures and evaluated the adequacy of the licensee's corrective actions. The inspectors reviewed the licensee's work practices to evaluate whether these may have played a role in the degradation of the SSCs. The inspectors assessed the licensee's characterization of the degradation in accordance with 10 CFR 50.65 (the Maintenance Rule), and verified that the licensee was appropriately tracking degraded performance and conditions in accordance with the Maintenance Rule.

These activities constituted completion of two maintenance effectiveness samples, as defined in Inspection Procedure 71111.12.

b. Findings

Introduction. The inspectors identified a Green, non-cited violation of 10 CFR 50.65(a)(2), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Specifically, the licensee failed to demonstrate that the performance of the Unit 2 auxiliary feedwater check valves was being effectively controlled through the performance of appropriate preventive maintenance.

Description. On November 11, 2015, the licensee conducted in-service testing on feedwater check valve 2FW-0191, one of four steam generator split flow bypass check valves. During the test, check valve 2FW-0191 failed to meet the site's acceptance criteria indicating the valve failed to seat. The licensee stopped the test and initiated Condition Report CR-2015-10961 to document the test failure.

Subsequently, the system engineer performed a maintenance rule functional failure review of this issue. This review determined that the failure of valve 2FW-0191 to seat was not a maintenance rule functional failure and the function would remain in (a)(2) status. Inspectors questioned this assessment because one of the scoped functions of this feedwater check valve is to shut to prevent bypassing flow from the steam generators. During discussions with the licensee, the inspectors determined that system engineer was only evaluating the split flow check valves performance against the main feedwater system's criteria to provide feedwater to the steam generator, and not against the criteria related to the valve's ability to shut to prevent bypassing flow from the steam generators. Inspectors also determined that the licensee was not performing preventative maintenance on the check valves to ensure their ability to close and seat properly.

The inspectors subsequently reviewed the last test data for all four of the steam generator split flow bypass check valves. In this review the inspectors noted that in 2011 valve 2FW-0192 had failed to meet the established acceptance criteria, yet the failure was not noted as a functional failure. Additionally, in 2012, valves 2FW-0191, 2FW-0192, and 2FW-0193 all failed to meet the established acceptance criteria, and again the failures were not noted as functional failures.

The inspectors noted that 10 CFR 50.65(a)(2) requires, in part, that monitoring as specified in 10 CFR 50.65(a)(1) is not required where it has been demonstrated that the

performance of a system is being effectively controlled through the performance of appropriate preventive maintenance, such that the system remains capable of performing its intended function. Based on their review, the inspectors determined that the licensee failed to demonstrate that the performance of the Unit 2 feedwater check valves was being effectively controlled. Specifically, the licensee was not performing preventative maintenance on the check valves, resulting in the valves failing to close on multiple occasions during testing.

The inspectors informed the licensee of the concerns and the licensee initiated condition report CR-2016-008312 to capture this issue in the station's corrective action program. The licensee recognized that they were not correctly monitoring the function of these check valves. Specifically, the licensee determined that monitoring the check valves only as part of the main feedwater system was not adequate since the system's performance criteria is to provide feedwater to the steam generators, and the check valves function is to close to prevent bypass flow. The licensee subsequently performed a review to determine if other safety-related check valves were also not being monitored correctly. Based on this review the licensee determined that there were 841 safety-related check valves (of which 230 were classified as run to failure) that were not being monitored against their scoped criteria. To correct this issue, the licensee created a new monitoring function for safety related check valves which monitors the close function, and moved the equipment to 10 CFR 50.65(a)(1) monitoring requirements because they determined that they were not able to demonstrate that the performance of the check valves was being effectively controlled.

Analysis. The licensee's failure to effectively monitor the performance of maintenance rule scoped equipment in accordance with 10 CFR 50.65(a)(2) was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to demonstrate that the performance of the Unit 2 auxiliary feedwater check valves was being effectively controlled through the performance of appropriate preventive maintenance which resulted in failures of the valves. Using Inspection Manual Chapter (IMC) 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, inspectors determined that this finding was of very low safety significance (Green) because the finding (1) was not a deficiency affecting the design and qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality, (2) did not represent a loss of system and/or function, (3) did not represent an actual loss of function of at least a single train for longer than its allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time, and (4) did not represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant for greater than 24 hours in accordance with the licensee's maintenance rule program. A cross-cutting aspect was not assigned to this finding because the performance deficiency occurred in 1996 when the steam generator split flow bypass check valve was initially scoped under the Maintenance Rule, and therefore, is not indicative of current licensee performance.

Enforcement. Title 10 CFR 50.65(a)(1) requires, in part, that holders of an operating license shall monitor the performance of systems and components against licensee

established goals, in a manner sufficient to provide reasonable assurance that such structures, systems, and components are capable of fulfilling their intended safety functions. 10 CFR 50.65(a)(2) states, in part, that monitoring as specified in 10 CFR 50.65(a)(1) is not required where it has been demonstrated that the performance of a system is being effectively controlled through the performance of appropriate preventive maintenance, such that the system remains capable of performing its intended function. Contrary to the above, from initial maintenance rule scoping in 1996 to September 2016, the licensee did not monitor the performance of the Unit 2 auxiliary feedwater system check valves against licensee-established goals in a manner sufficient to provide reasonable assurance that the check valves were capable of fulfilling their intended safety functions, and the licensee did not demonstrate that the performance of check valves was being effectively controlled through the performance of appropriate preventive maintenance, such that the system remained capable of performing its intended function. In response to this issue the licensee created a new monitoring function for safety related check valves, and moved the equipment to 10 CFR 50.65(a)(1) monitoring requirements pending further review. Since this violation was of very low safety significance (Green) and has been entered into the corrective action program as Condition Report CR-2016-008312, this violation is being treated as a non-cited violation consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000446/2016003-01, Failure to Adequately Monitor Feedwater System Check Valve Performance)

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

On July 7, 2016, the inspectors reviewed a risk assessment and the risk management actions taken by the licensee in response to elevated risk associated with performing an oil sample on spent fuel pool pump X-01.

The inspectors verified that this risk assessment was performed timely and in accordance with the requirements of 10 CFR 50.65 (the Maintenance Rule) and plant procedures. The inspectors reviewed the accuracy and completeness of the licensee's risk assessment and verified that the licensee implemented appropriate risk management actions based on the result of the assessment.

The inspectors also observed portions of three emergent work activities that had the potential to affect the functional capability of mitigating systems:

- August 18, 2016, Unit 2, Steam generator blowdown isolation valve 2-HV-2399 elastomer replacement
- September 1, 2016, Units 1 and 2, unanalyzed condition associated with the turbine driven auxiliary feedwater pumps
- September 16, 2016, Unit 2, loop A safety chiller emergent maintenance

The inspectors verified that the licensee appropriately developed and followed a work plan for these activities. The inspectors verified that the licensee took precautions to minimize the impact of the work activities on unaffected SSCs.

These activities constituted completion of four maintenance risk assessments and emergent work control inspection samples, as defined in Inspection Procedure 71111.13.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed seven operability determinations that the licensee performed for degraded or nonconforming SSCs:

- March 28, 2016, CR-2016-003089, operability determination for control room air conditioner X-01 partial refrigerant charge
- July 12, 2016, CR-2016-006613, operability determination for diesel generator 2-01 86-2 lockout relay actuation
- August 22, 2016, CR-2016-007251, operability determination for turbine driven auxiliary feedwater pump 1-01 indicating light socket/bulb melted
- August 24, 2016, CR-2016-007653, operability determination for motor driven auxiliary feedwater pump room heat up analyses
- August 31, 2016, CR-2016-007840, operability determination for safety injection pump 2-01 oil leak
- September 8, 2016, CR-2016-008000, operability determination for diesel generator 2-01 failed KVAR meter
- September 21, 2016, CR-2016-007880, operability determination for auxiliary feedwater pumps following identification of an unanalyzed condition

The inspectors reviewed the timeliness and technical adequacy of the licensee's evaluations. Where the licensee determined the degraded SSC to be operable the inspectors verified that the licensee's compensatory measures were appropriate to provide reasonable assurance of operability. The inspectors verified that the licensee had considered the effect of other degraded conditions on the operability of the degraded SSC.

These activities constituted completion of seven operability and functionality review samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Temporary Modifications

a. Inspection Scope

On September 15, 2016, the inspectors reviewed a temporary plant modification to remove sentinel valves from the turbine driven auxiliary feedwater pumps on Unit 1 and 2.

The inspectors verified that the licensee had installed these temporary modifications in accordance with technically adequate design documents. The inspectors verified that these modifications did not adversely impact the operability or availability of affected SSCs. The inspectors reviewed design documentation and plant procedures affected by the modifications to verify the licensee maintained configuration control.

These activities constituted completion of one sample of temporary modifications, as defined in Inspection Procedure 71111.18.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed four post-maintenance testing activities that affected risk-significant SSCs:

- April 5, 2016, Unit 1, offsite power supply breaker 1EA2-1 post maintenance test
- May 25, 2016, Unit 1, service water pump 1-01 replacement
- August 23, 2016, Unit 2, Steam generator 2-03 blowdown isolation valve 2-HV-2399 testing following elastomer replacement
- September 15, 2016, Unit 1 and Unit 2, turbine driven auxiliary feedwater pumps following temporary modification

The inspectors reviewed licensing and design-basis documents for the SSCs and the maintenance and post-maintenance test procedures. The inspectors observed the performance of the post-maintenance tests to verify that the licensee performed the tests in accordance with approved procedures, satisfied the established acceptance criteria, and restored the operability of the affected SSCs.

These activities constituted completion of four post-maintenance testing inspection samples, as defined in Inspection Procedure 71111.19.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed four risk-significant surveillance tests and reviewed test results to verify that these tests adequately demonstrated that the SSCs were capable of performing their safety functions:

Other surveillance tests:

- May 26, 2016, Unit 1, stroke test of power operated relief valve 1-PCV-456
- August 5, 2016, Unit 2, start and flow test of the turbine driven auxiliary feedwater pump
- August 23, 2016, Unit 1, stroke test of containment sump pump discharge line outside-containment isolation valve 1-HV-5157
- September 8, 2016, Unit 2, start test of diesel generator 2-01

The inspectors verified that these tests met technical specification requirements, that the licensee performed the tests in accordance with their procedures, and that the results of the test satisfied appropriate acceptance criteria. The inspectors verified that the licensee restored the operability of the affected SSCs following testing.

These activities constituted completion of four surveillance testing inspection samples, as defined in Inspection Procedure 71111.22.

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors observed an emergency preparedness drill on September 28, 2016, to verify the adequacy and capability of the licensee's assessment of drill performance. The inspectors reviewed the drill scenario, observed the drill from the simulator and emergency operations facility, and attended the post-drill critique. The inspectors verified that the licensee's emergency classifications, off-site notifications, and protective action recommendations were appropriate and timely. The inspectors verified that any

emergency preparedness weaknesses were appropriately identified by the licensee in the post-drill critique and entered into the corrective action program for resolution.

These activities constituted completion of one emergency preparedness drill observation sample, as defined in Inspection Procedure 71114.06.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security

40A1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index: Emergency AC Power Systems (MS06)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of July 1, 2015 through June 30, 2016 to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the mitigating system performance index for emergency ac power systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index: High Pressure Injection Systems (MS07)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of July 1, 2015 through June 30, 2016 to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the mitigating system performance index for high pressure injection systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index: Heat Removal Systems (MS08)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of July 1, 2015 through June 30, 2016 to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the mitigating system performance index for heat removal systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

40A2 Problem Identification and Resolution (71152)

.1 Routine Review

a. Inspection Scope

Throughout the inspection period, the inspectors performed daily reviews of items entered into the licensee's corrective action program and periodically attended the licensee's condition report screening meetings. The inspectors verified that licensee personnel were identifying problems at an appropriate threshold and entering these problems into the corrective action program for resolution. The inspectors verified that the licensee developed and implemented corrective actions commensurate with the significance of the problems identified. The inspectors also reviewed the licensee's problem identification and resolution activities during the performance of the other inspection activities documented in this report.

b. Findings

No findings were identified.

.2 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors selected two issues for an in-depth follow-up:

- During refueling outage 2RF15, October 2015, and refueling outage 1RF18, May 2016, the licensee credited defense in depth contingency plans, risk assessments with specified risk management actions, for time periods when the reactor coolant system would be in a loops not filled condition or when shutdown

cooling would be in a reduced availability condition due to the increase in risk for the activities.

The inspectors assessed the licensee's risk assessments and the specified risk management actions. The inspectors identified that the licensee failed to appropriately manage the risk associated with the activities.

- On May 18, 2016, after completion of preventative maintenance on the lube oil cooler for coolant charging pump 1-01, a service water leak was discovered coming from the cooler head. Upon disassembly, the licensee discovered significant pitting on the head for the heat exchanger. The licensee initiated Condition Report 2016-004868 to evaluate the issue, though an operability evaluation was not performed at the time because the unit was not in a mode of applicability for the charging pump. The licensee determined that this condition had been previously identified in Condition Report CR-2014-001804, and parts were on order to replace the pitted head. The licensee's corrective action was to apply Loctite #2, a sealant material, to stop the leak, noting that this had previously been evaluated as acceptable in Condition Report CR-2006-001208.

Upon further review inspectors determined that the evaluation performed in CR-2006-001208 was a one-time evaluation for use of Loctite #2, and did not establish a basis for the current use. Therefore, an operability evaluation was required for the subsequent use of Loctite. The licensee initiated Condition Reports CR-2016-004936 and CR-2016-006674 to address this issue, and documented a current operability evaluation for use of the Loctite.

Inspectors determined that this issue was a minor violation of Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which requires, in part, that activities affecting quality shall be accomplished in accordance with documented instructions, procedures, or drawings, of a type appropriate to the circumstances. Station Procedure STI-442.01, "Operability Determination and Functionality Assessment Program," is an Appendix B quality related procedure that is appropriate to the circumstances for evaluating the operability of safety-related components. Station Procedure STI-442.01 step 6.1, requires, in part, that when a potential degraded or nonconforming condition is identified, the shift manager should ensure the operability determination process is initiated to determine the operability of the structure, system or component.

The inspectors assessed the licensee's problem identification threshold, cause analyses, extent of condition reviews and compensatory actions. The inspectors verified that the licensee appropriately prioritized the planned corrective actions and that these actions were adequate to correct the condition.

These activities constituted completion of two annual follow-up sample as defined in Inspection Procedure 71152.

b. Findings

Introduction. The inspectors identified a Green non-cited violation of 10 CFR 50.65(a)(4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," for the licensee's failure to adequately manage the increase in

risk associated with the potential for a loss of decay heat removal during refueling outages.

Description. During refueling outage 2RF15, October 2015, when the licensee was setting up for vacuum fill of the reactor coolant system, inspectors reviewed the station's defense in depth contingency plan 2RF15-01. The inspectors determined that this contingency plan was a risk assessment with specified risk management actions for periods when the reactor coolant system would be in a "loops not filled condition" or periods of reduced availability of the shutdown cooling system. Inspectors noted that the contingency plan for these periods of increased risk directed that if residual heat removal (shutdown cooling) is lost, operators should establish alternate cooling flow path using Station Procedure ABN-104, "Residual Heat Removal System Malfunction," Revision 9, section 8.

Inspectors reviewed ABN-104, section 8 and noted that it directed operators to start a safety injection pump in response to a loss of shutdown cooling. Inspectors identified a concern that the action to start a safety injection pump would occur while in the mode of applicability for technical specification 3.4.12, "Low Temperature Overpressure Protection System." Technical specification 3.4.12 requires the safety injection pumps be made incapable of injecting due to concerns of over pressurizing the reactor coolant system in modes 4, 5, and 6 (the latter only when the reactor vessel head is installed). The licensee initiated Condition Report CR-2015-009109 to capture the inspector's concern in the station's corrective action program.

Subsequently, during refueling outage 1RF18, May 2016, inspectors noted that the licensee again credited a defense in depth contingency plan (1RF18-01) which again would have operators start a safety injection pump when technical specification 3.4.12 was in effect. During subsequent reviews, the inspectors determined that the licensee did not have an evaluation for starting a safety injection pump when low temperature overpressure protection was in effect.

Inspectors determined that the specified risk management action to start a safety injection pump would restore flow to the core to mitigate the loss of shutdown cooling. However, the inspectors also determined that the plant is not analyzed for using a safety injection pump during periods when the reactor coolant system is at low temperatures requiring low temperature overpressure protection. The proposed use of safety injection pumps as described in ABN-104, section 8, without analyses for sufficient relief capability, created the potential for vessel overpressurization and a challenge to the reactor coolant system barrier. Any challenge to the reactor coolant system barrier would serve to increase risk. The inspectors also noted that the licensee had several options to mitigate a potential loss of shutdown cooling that are analyzed during period where low temperature overpressure protection is required. Specifically, the inspectors identified that the licensee could start centrifugal charging pumps to restore core flow following a loss of shutdown cooling. These pumps have slightly less capacity than the safety inspection pumps which would be bounded by the relief capability required in technical specification 3.4.12.

Inspectors informed the licensee of the additional concerns and the licensee added them to Condition Report CR-2015-009109. Inspectors determined that the licensee had not started a safety injection pump when technical specification 3.4.12 was in effect during

1RF19 or 2RF18. As corrective actions, the licensee amended Condition Report CR-2015-009109 to evaluate appropriate risk management actions.

Analyses. The failure to manage the increase in risk associated with the potential for a loss of decay heat removal during refueling activities is a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the procedure quality attribute of the Initiating Events Cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Using Inspection Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," dated May 19, 2005, Flowchart 1, "Assessment of Risk Deficit," and determined the need to calculate the risk deficit to determine the significance of this issue. A senior reactor analyst performed a bounding qualitative assessment, using insights from Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the incremental core damage probability deficit was less than 1E-6 and the incremental large early release probability deficit was less than 1E-7. The influential assumptions used by the senior reactor analyst included the low exposure time that the plant is in LTOP conditions, the initiating event frequency associated with a loss of decay heat removal, available operator mitigation actions that would prevent the use of safety injection pumps, and the availability of additional equipment to mitigate the loss of decay heat removal.

In accordance with Flowchart 1 in Appendix K, because incremental core damage probability deficit was less than 1E-6 and incremental large early release probability deficit was less than 1E-7, the finding screened as having very low safety significance (Green). The finding has a human performance cross-cutting aspect associated with bases for decisions, in that, the licensee failed to ensure that operations leadership adequately communicate potential problems with the risk management action to start a safety injection pump when in a mode of applicability for low temperature over pressure protection [H.10].

Enforcement. Title 10 CFR 50.65(a)(4) requires, in part, that licensees shall assess and manage the increase in risk that may result from proposed maintenance activities. Defense in depth contingency plans 2RF15-01 and 1RF18-01 implement pre-planned risk assessments and specified risk management actions for times during refueling outages when the reactor coolant system is depressurized and level is lowered. Contrary to the above, from October 3, 2015, through May 31, 2016, the licensee failed to manage the increase in risk from proposed maintenance activities. Specifically, the licensee implemented a risk management action that did not reduce the risk, instead it called for placing the plant in an unanalyzed condition which could elevate risk. As an immediate corrective action the licensee initiated Condition Report CR-2015-009109 to evaluate appropriate risk management actions. Since this violation was of very low safety significance (Green) and has been entered into the corrective action program as Condition Report CR-2015-009109, this violation is being treated as a non-cited violation consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000445/2016003-02; 05000446/2016003-02, Failure to Manage Risk During Refueling Outages)

40A5 Other Activities

a. Inspection Scope

The inspectors evaluated the impact of financial conditions on continued safe performance at Comanche Peak. In that the licensee's parent company, Energy Future Holdings, was under bankruptcy protection/reorganization during the inspection period, NRC Region IV conducted special reviews of processes at Comanche Peak. The inspectors evaluated several aspects of the licensee's operations to determine whether the financial condition of the station impacted plant safety. The factors reviewed included: (1) impact on staffing, (2) corrective maintenance backlog, (3) changes to the planned maintenance schedule, (4) corrective action program implementation, and (5) reduction in outage scope, including risk-significant modifications. In particular, the inspectors verified that licensee personnel continued to identify problems at an appropriate threshold and enter these problems into the corrective action program for resolution. The inspectors also verified that the licensee continued to develop and implement corrective actions commensurate with the significance of the problems identified.

The special review of processes at Comanche Peak included continuous reviews by the Resident Inspectors, as well as the specialist-led baseline inspections completed during the inspection period which are documented previously in this report.

b. Findings

No findings were identified.

40A6 Meetings, Including Exit

Exit Meeting Summary

On July 7, 2016, the resident inspectors presented the inspection results to Mr. S. Sewell, Senior Director of Engineering and Regulatory Affairs, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

G. Struble, Manager, Operations/Simulator Training
J. Alldredge, Technician, Radiation Protection
T. Curtis, Lead Environmental Technician
S. Darter, Coordinator, Radiation Protection
S. Dixon, Consulting Licensing Analyst/Regulatory Affairs
T. Emery, Technician, Radiological Environmental Monitoring Program
T. Hope, Manager, Regulatory Affairs
B. Knapp, Acting Manager, Radiation Protection
M. Macho, Supervisor, Radiation Protection
S. Peterson, Senior Calibration Laboratory Technician, Radiation Protection
K. Powell, Supervisor, Radiation Protection
M. Syed, Engineer, Systems Engineer
M. Watkins, Lead Technician, Instruments and Controls Maintenance
J. Barnette, Consultant, Licensing Technologist
S. Bartholomew, Analyst, Emergency Preparedness
G. Bryan, Operations Specialist, Emergency Preparedness
K. Faver, Planner, Emergency Preparedness
R. Fishencord, Planner, Emergency Preparedness
J. Hull, Manager, Emergency Preparedness
R. Marquez, Planner, Emergency Preparedness
S. Sewell, Senior Director of Engineering and Regulatory Affairs
D. Volkening, Manager, Nuclear Oversight
T. McCool, Site Vice President
B. Knowles, Radiation Protection Staff

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000446/2016003-01	NCV	Failure to Adequately Monitor Feedwater System Check Valve Performance (Section 1R12)
05000445/2016003-02;05000446/2016003-02	NCV	Failure to Manage Risk During Refueling Outages (Section 4OA2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
STA-629	Switchyard Control and Transmission Grid Interface	7

Section 1R04: Equipment Alignment

Condition Reports

CR-2016-007245

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
E1-0020	125V DC One Line Diagram	CP-20
E1-0021	Common Auxiliary Control Fuel and Turbine Buildings Normal 480VC MCCs One Line Diagram	CP-22

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
SOP-904	Fire Protection Main Water Supply and Fire Pumps System	16
OPT-215	Class 1E Electrical Systems Operability	15

Section 1R05: Fire Protection

Condition Reports

CR-2016-002654

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
E1-2020	Safeguard Building Fire Detection Plan EL 773'-0", 790'-6" and 800'-6"	CP-2

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
SAF-104	Inspection of Respiratory Protection Equipment (Maintenance and Repair)	11

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
ABN-901	Fire Protection System Alarms or Malfunctions	2
FPI-103A	Fire Preplan Instruction Manual, Unit 1 Safeguards Building Elevation 810'-6", Rad. Pen. Area & Elec. Equip. Rm	4

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
--	Fire Protection Report	30

Work Orders

4789803

Section 1R06: Flood Protection Measures

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
SI-CA-0000-693	Miscellaneous Building - Flooding Analysis	1

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EOP-3.0A	Steam Generator Tube Rupture	9

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Condition Reports

CR-2016-007272 CR-2016-000493 CR-2016-007720 CR-2016-007428 CR-2016-007690

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
DID XPWR-SFP-01	SFP Cooling During Non-Refueling Outage Conditions	-
STI-600.01	Protecting Plant Equipment and Sensitive Equipment Controls	1
MSM-GO-0213	Sway Strut Maintenance	1

Work Orders

5320735 5210636

Section 1R15: Operability Determinations and Functionality Assessments

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1-EB-302-4	As Built HVAC Calculation - Auxiliary Feedwater Pump Room Unit 1	5

Condition Reports

CR-2016-003089 CR-2016-007251 CR-2016-007653 CR-2016-007840

Work Orders

5010266

Section 1R18: Plant Modifications

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
FDA-2016-000123-01-00	Create Temp Mod FDA to Remove the Sentinel Valves on the Casing of the TDAFW Pump Turbines	00

Work Orders

5330786 5330788

Section 1R19: Post-Maintenance Testing

Condition Reports

CR-2016-000493 CR-2016-007559 TR-2016-004759 CR-2016-005744 CR-2016-005216
CR-2016-003163

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
E1-0031-07	6.9 kV Switchgear Bus 1EA2 Breaker 1EA2-2 Schematic Diagram	CP-13

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
MSM-G0-0213	Sway Strut Maintenance	1
MSM-G0-4004	Baker On-line Motor Testing	5
MSM-C0-7310	Service Water Pump Maintenance	5
SOP-603A	6900 V Switchgear	16
MSE-G0-0020	Relay Calibration	5

Work Orders

5210636	5330786	4297555	5008028	4947477
4986918	5008083	5136434	4913385	

Section 1R22: Surveillance Testing

Condition Reports

CR-2016-007588

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
M2-0206	Flow Diagram Auxiliary Feedwater System	CP-15

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OPT-206B	AFW System	22
OPT-503A	Cntmt Isol Valves ASME Testing	15

Work Orders

5270846

Section 1EP6: Drill Evaluation

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EPP-121	Re-Entry, Recovery and Closeout	10
EPP-116	Emergency Repair & Damage Control and Immediate Entries	9

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EPP-109	Duties and Responsibilities of the Emergency Coordinator / Recovery Manager	15
ABN-907	Acts of Nature	15

Section 40A2: Problem Identification and Resolution

Condition Reports

CR-2006-001208 CR-2014-001804 CR-2016-004868 CR-2016-004936