UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

December 13, 2001

Otto L. Maynard, President and
Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, Kansas 66839

SUBJECT: WOLF CREEK NUCLEAR STATION - NRC INSPECTION REPORT 50-482/01-07

Dear Mr. Maynard:

On November 2, 2001, the NRC completed an inspection at your Wolf Creek Nuclear Generating Station. The enclosed report documents the inspection findings, which were discussed on November 2, 2001, with you and other members of your staff.

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

Based on the results of this inspection, the NRC has identified two issues that were evaluated under the risk significance determination process as having very low safety significance (green).

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Charles S. Marschall, Chief
Engineering and Maintenance Branch
Division of Reactor Safety

Docket: 50-482
License: NPF-42

Enclosure:
NRC Inspection Report
50-482/01-07

cc w/enclosure:
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	50-482
License:	NPF-42
Report No.:	50-482/01-07
Licensee:	Wolf Creek Nuclear Operating Corporation
Facility:	Wolf Creek Nuclear Generating Station
Location:	1550 Oxen Lane, NE Burlington, Kansas
Dates:	October 15 - November 2, 2001
Team Leader:	C. J. Paulk, Senior Reactor Inspector, Engineering and Maintenance Branch
Inspectors:	C. A. Clark, Reactor Inspector, Engineering and Maintenance Branch
	P. A. Goldberg, Reactor Inspector, Engineering and Maintenance Branch
	W. M. McNeill, Reactor Inspector, Engineering and Maintenance Branch
	M. F. Runyan, Senior Reactor Inspector, Engineering and Maintenance Branch
	J. E. Whittemore, Senior Reactor Inspector, Engineering and Maintenance Branch
Accompanying Personnel:	Robert Quirk, Consultant Beckman and Associates, Inc.
	J. L. Taylor, Reactor Inspector, Engineering and Maintenance Branch
Approved By:	Charles S. Marschall, Chief Engineering and Maintenance Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000482/01-07, on 10/15 - 11/02/2001, Wolf Creek Nuclear Operating Corporation, safety system design and performance capability, heat sink performance, and evaluation of changes, tests, or experiments.

The inspection was conducted by five regional inspectors and one contractor. The inspection identified two green findings. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process (SDP)." Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://www.nrc.gov/NRR/OVERSIGHT/index.html.

Cornerstone: Barrier Integrity

- Green. The team identified that the licensee's controls to minimize macro-biological growth and accumulation of foreign material in the essential service water system were not effective.

  This finding was of very low safety significance because the essential service water system and containment isolation functions remained operable. The licensee's biological control and system flushing programs were not adequate to prevent the growth and accumulation of clams and their debris (i.e., shells and shell pieces) at the essential service water containment isolation valves for the containment coolers. The clams and their debris were contributing causes of these valves' failure to fully close. There are no regulatory requirements for a biological control program, therefore, there was no violation of regulatory requirements. The licensee entered this issue into the corrective action program as Performance Improvement Request 20012802 to reassess the effectiveness of the biological control and system flushing programs (Section 1R21.2b.).

Cornerstone: Mitigating Systems

- Green. The team identified that licensee's lack of monitoring a small radius elbow, in Train A of the essential service water system in the Train B switchgear room, with a tee-connection approximately two pipe lengths downstream, did not allow the licensee to demonstrate that the piping stresses remained within design allowable to exclude the possibility of a pipe rupture that could defeat safety-function redundancy.

  This finding was of very low safety significance because there was no actual leakage in the area of concern and the system remained operable. There is no regulatory requirement for monitoring for erosion/corrosion, therefore, there was no violation of regulatory requirements. The licensee initiated Performance Improvement Request 20012794 to evaluate the condition of the piping in the Train B switchgear room. In addition, the licensee was considering to risk-inform the erosion/corrosion program (Section 1R21.2b.).

Report Details

1. REACTOR SAFETY

Introduction

Inspections of safety system design and performance capability, heat sink performance, and evaluations of changes, tests, or experiments were performed at Wolf Creek Nuclear Generating Station. These inspections were conducted to verify, respectively, that the initial design and subsequent modifications have preserved the design basis of selected system and related support systems, that safety-related heat exchangers were capable of performing their design functions, and that changes to the facility or procedures as described in the Updated Safety Analysis Report and tests or experiments not described in the Updated Safety Analysis Report are reviewed and documented in accordance with 10 CFR 50.59. Additionally, the inspection effort served to monitor the capability of the selected systems to perform the design basis functions and to verify that safety issues pertinent to the changes are resolved. These inspectable areas verify aspects of the initiating events, mitigating systems, and barrier integrity cornerstones.

The probabilistic risk analysis for Wolf Creek Nuclear Generating Station is based on the capability of the as-built safety systems to perform their intended safety functions successfully. The area and scope of the inspection were predetermined by reviewing the licensee's probabilistic risk analysis to identify the risk-dominant systems, structures, and components, ranked by importance, and their potential contribution to dominant accident sequences and/or initiators. The primary review prompted a parallel review of support and interfacing systems, such as, electrical power.

The objective of this inspection was to assess the adequacy of calculations, analyses, other engineering documents, and engineering and operating practices that were used to support the performance of the residual heat removal system. The inspection was performed by a team of inspectors that consisted of a team leader, Region IV inspectors, and a contractor. Acceptance criteria utilized by the NRC inspection team included the Wolf Creek Nuclear Generating Station technical specifications, applicable sections of the Updated Safety Analysis Report, applicable industry codes, and industry initiatives implemented by the licensee's programs.

1R02 Evaluations of Changes, Tests, or Experiments (71111.02)

a. Inspection Scope

The team reviewed a selected sample of nine safety evaluations, listed in the attachment to this report, to verify that the licensee had appropriately considered the conditions under which the licensee may make changes to the facility or procedures or conduct tests or experiments without prior NRC approval.

The team reviewed a selected sample of 11 safety evaluation screenings, listed in the attachment to this report, in which the licensee determined that safety evaluations were

not required, to ensure that the licensee's exclusion of a full evaluation was consistent with the requirements of 10 CFR 50.59, "Evaluations of Changes, Tests, or Experiments."

The team reviewed 10 performance improvement requests, listed in the attachment to this report, initiated by the licensee that addressed problems or deficiencies associated with evaluations of changes, tests, or experiments to ensure that appropriate corrective actions were being taken. The team also reviewed licensee self-assessments to ensure that problems or deficiencies were appropriately addressed.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07B)

.1 Performance of Testing, Maintenance, and Inspection Activities

a. Inspection Scope

The team reviewed the licensee's test methodology for the residual heat removal system and standby diesel generator jacket water heat exchangers and the residual heat removal pump room coolers. In addition, the team reviewed test data for the heat exchangers and design and vendor supplied information to ensure that the heat exchangers were performing within their design basis. The team also reviewed the heat exchanger inspection and test results. Specifically, the team verified proper extrapolation of test conditions to design conditions, appropriate use of test instrumentation, and appropriate accounting for instrument inaccuracies. Additionally, the team verified that the licensee appropriately trended these inspection and test results, assessed the causes of the trends, and took necessary actions for any step changes in these trends.

b. Findings

No findings of significance were identified.

.2 Verification of Conditions and Operations Consistent with Design Bases

a. Inspection Scope

For the selected heat exchangers, the team verified that the licensee established heat sink and heat exchanger condition, operation and test criteria were consistent with the design assumptions. Specifically, the team reviewed the applicable calculations to ensure that the thermal performance test acceptance criteria for the heat exchangers were being applied consistently throughout the calculations. The team also verified that the appropriate acceptance values for fouling and tube plugging for the selected heat exchangers remained consistent with the values used in the design-basis calculations. Finally, the team verified that the parameters measured during the thermal performance

and flow balance tests for the essential cooling water and component cooling water systems were consistent with those assumed in the design bases.

b. Findings

No findings of significance were identified.

.3 Identification and Resolution of Problems (71152)

a. Inspection Scope

The team examined the corrective action program for significant problems with the selected components over the past 3 years. The team selected a sample of 12 corrective action documents for review, which are identified in the attachment to this report.

b. Findings

No findings of significance were identified.

1R21 Safety System Design and Performance Capability (71111.21)

.1 System Requirements

a. Inspection Scope

The team reviewed the following attributes for the essential service water system: process medium (water and air), energy sources (electrical and air), control systems, and equipment protection. The team also reviewed applicable mechanical and electrical calculations. The team verified that procedural instructions to operators were consistent with operator actions required to meet, prevent, and/or mitigate design basis accidents. Additionally, the team reviewed the appropriate attributes for the 4160 Vac system.

To do this, the team reviewed abnormal and emergency operating procedures, and requirements and commitments identified in the Updated Safety Analysis Report, the technical specifications, design basis documents, and plant drawings. The team reviewed alarm setpoints and verified that instrumentation and alarms were available to operators for making necessary decisions in coping with postulated accident conditions. In addition, the team verified that system alignments were consistent with design and licensing basis assumptions. The review also considered requirements and commitments identified in the Updated Safety Analysis Report, technical specifications, design basis documents, and plant drawings. The purpose of these reviews was to verify that the essential service water and 4160 Vac systems' needs were met.

b. Findings

No findings of significance were identified.

.2 System Condition and Capability

a. Inspection Scope

The team reviewed periodic testing procedures (listed in the attachment) and results to verify that the design requirements were demonstrated by the performance of tests. The team also verified the environmental qualification of a sample of system components for operation under design environmental conditions and assumed operating parameters (e.g., voltage, speed, and power).

The team reviewed the systems' operations by conducting system walkdowns; reviewing normal, abnormal, and emergency operating procedures; and reviewing the Updated Safety Analysis Report, the technical specifications, design calculations, drawings, and procedures. In addition, the team reviewed the operations department list of active and closed standing orders and operator work-arounds to ensure no design assumptions were invalidated by past or current operator daily practices.

Additionally, the team checked the licensee's operating experience review program to ensure applicable lessons learned dealing with similar events, systems, and components were incorporated into the applicable essential service water and 4160 Vac system documentation and procedures.

b. Findings

The team identified two findings of very low safety significance (Green). The first was associated with controls established to minimize macro-biological growth and the accumulation of foreign material in the essential service water system. The second was associated with a lack of monitoring a small radius elbow in the essential service water supply to the Train A emergency diesel generator, with a tee-connection approximately two pipe lengths downstream.

The team observed the presence of clams in floor drains in Rooms 1206 and 1207 of the auxiliary building that were from flushing of the essential service water system. The team also noted repetitive failures of Valves EF HV-31, -32, -33, -34, -45, -46, -49, and -50, the containment air cooler containment isolation valves, because of clam shells on valve seats. These events indicated that the macro-biological and flushing controls, utilized by the licensee to control clams and their waste products (i.e., shells and sludge), were not effective.

The team determined that the presence of the clams and their waste products had a credible impact on safety (Group 1 questions). This determination was based on the facts that the containment isolation valves were tripping on excessive torque because of clam shells becoming wedged between the valve disk and the seat. As a result, the valves could not close completely when required.

The team then determined that the presence of the clams and their waste products could credibly affect the operability, availability, reliability, or function of the essential service

water system (Group 2 questions), as discussed above. Therefore, the team entered the significance determination process.

The team determined that the essential service water to the containment coolers was degraded as a result of the presence of clams and their waste deposits. As such, the team evaluated the degradation of a barrier cornerstone, in particular, a degraded containment barrier. The team answered each of the questions of the Phase 1 screening worksheet for containment barriers as "NO" because there were no actual failures of the essential service water system or containment isolation functions.

There are no regulatory requirements to for a biological control program, therefore, this issue screened out as a GREEN issue and was categorized as a finding since there was not a violation of regulatory requirements. The licensee entered this issue into the corrective action program as Performance Improvement Request 20012802.

The team also observed that an approximate 30-foot segment of the 8-inch diameter carbon steel essential service water supply line (EF074HBC-8) to the Train A emergency diesel generator was located in Essential Safety Features Switchgear Room 2, which contained the Train B Class 1E switchgear. The supply line also contained a tee-connection, located approximately 18 inches downstream from one of the 90-degree elbows, to a 4-inch line supplying cooling water to the Class 1E Switchgear Air-Conditioning Unit SGK05A.

The team reviewed the hydrodynamic conditions existing in the subject piping to determine whether it may be vulnerable to erosion because of the piping configuration and flow velocity. One of two flow conditions may exist at any given time. For approximately 500 hours per year, the essential service water pump is run, delivering a flow velocity of approximately 9.5 fps. During the remaining 8260 hours per year, the service water pump is run, delivering a flow velocity of approximately 8.0 fps. To prevent microbiological-induced corrosion, stagnant flow is not allowed. Document 16577-M-000(Q), "Design Criteria for the Wolf Creek Generating Station," Revision 9, specifies a limit of 8 fps flow velocities in general service water discharge applications for erosion control. The team noted that the flow velocity in this piping is normally equal to the specified limit and that it is somewhat greater than this limit for approximately 6 percent of the time (when the essential service water pump is running). Therefore, erosion of the piping could result in wall thinning and concomitant stresses that could, over time, exceed the Updated Safety Analysis Report stress limits for break exclusion.

The licensee's erosion/corrosion program did not include periodic monitoring of essential service water pipe wall thickness in the Train B switchgear room, but monitoring by ultrasonic testing was being conducted in the Train A diesel generator room on the essential service water discharge line just downstream of a throttle valve. This location was selected because of the known turbulent effects of throttle valves. This testing had not detected any discernible wall thinning.

However, the team questioned whether testing at this location bounded the erosion potentially occurring in the essential service water lines located in the Train B switchgear room. Because of the additional flow that is delivered to the Class 1E switchgear air-conditioning unit through the 4-inch tee, the flow velocity at this point was approximately 5 to 10 percent greater than the flow velocity at the monitored point downstream of the throttle valve.

Another consideration was that a break in the switchgear room had substantially greater risk significance than a break in the Train A diesel generator room. The team made this finding on the fact that a break in the Train A essential service water line in the Train B switchgear room would render both trains of safety related equipment inoperable. For these reasons, the team considered the licensee's erosion control program to be non-conservative with respect to this identified example. In response, licensee representatives initiated Performance Improvement Request 20012794 and informed the team that the noted piping location would be evaluated and most likely added to the erosion monitoring program.

The team determined that the lack of monitoring to assure that piping stresses remained within design allowable to exclude the possibility of a pipe rupture that could defeat safety-function redundancy represented a credible impact on safety (Group 1 questions). The team also determined that the lack of adequate monitoring could credibly affect the operability, availability, reliability, or function of the essential service water system as a result of reducing the strength of the pipe from wall thinning due to erosion (Group 2 questions). Therefore, the team entered the significance determination process.

The team determined that the essential service water piping in the Train B switch gear room was potentially degraded as a result of erosion. As such, the team evaluated the degradation of a mitigating system. The team answered each of the questions of the Phase 1 screening worksheet for mitigating systems as "NO" because there had not been any actual failure of a safety-related system, train, or component.

There are no regulatory requirements to monitor erosion/corrosion, therefore, this issue screened out as a GREEN issue and was categorized as a finding since there was not a violation of regulatory requirements.

.3 Identification and Resolution of Problems (71152)

a. Inspection Scope

The team reviewed a sample of essential service water and 4160 Vac system problems identified by the licensee in the corrective action program to evaluate the effectiveness of corrective actions related to design issues. The specific corrective action documents that were sampled and reviewed by the team are listed in the attachment to this report. Inspection Procedure 71152, "Identification and Resolution of Problems," was used as guidance to perform this part of the inspection.

The team reviewed the actions the licensee had taken in response to industry-identified problems associated with the essential service water and 4160 Vac systems and support equipment.

b. Findings

No findings of significance were identified.

.4 System Walkdowns

a. Inspection Scope

The team performed selective field inspections of the essential service water and 4160 Vac systems. The purpose of these walkdowns was to assess the adequacy of materiel condition and installed configurations by focusing on the installation and configuration of piping, components, and instruments; the placement of protective barriers and systems; the susceptibility to flooding, fire, or other environmental concerns; physical separation; provisions for high energy line break; accessibility for operator action; and the conformance of the currently installed configuration of the systems with the design and licensing bases.

b. Findings

No findings of significance were identified.

.5 Design Review

a. Inspection Scope

(i) Electrical, Instrumentation and Control

The team reviewed the electrical, and instrumentation and controls aspects of the essential service water and 4160 Vac systems. The team reviewed electrical calculations for ac and dc power to selected emergency pumps and motor operated valves. In addition, the team performed a selective review of instrument setpoint and uncertainty calculations, as well as control circuits supporting initiation and control of the essential service water system pumps and valves. The review included design assumptions, calculations, boundary conditions, and modifications.

The team also performed a single failure review of individual components to determine the potential effects of such failures on the capability of the system to perform its safety functions. Additionally, the team performed informal analyses in several areas to verify that design values were correct and appropriate, and translated into operational and maintenance procedures. Documentation reviewed included drawings, procedures, calculations, condition reports, and maintenance work orders identified in the attachment,

as well as, the design bases document for the essential service water and 4160 Vac systems, the technical specifications, the Technical Requirements Manual, the Updated Safety Analysis Report, operator training procedures, and risk analysis documents. The purpose of the reviews was to determine whether the design bases of the system were met by the installed and tested configurations.

(ii) Mechanical

The team reviewed the essential service water system's design to verify that the system would function as required under accident conditions. The review included design assumptions, calculations, boundary conditions, and modifications. The team also performed a single failure review of individual components to determine the potential effects of such failures on the capability of the system to perform its safety functions. Additionally, the team performed informal analyses in several areas to verify that design values were correct and appropriate. Documentation reviewed included drawings, procedures, calculations, safety evaluation reports, condition reports, and maintenance work orders identified in the attachment, as well as technical specifications, and the Updated Safety Analysis Report. The team verified implementation of seismic requirements by reviewing engineering analyses and operating procedures governing the configuration of the components in the essential service water system to ensure that their seismic qualification was maintained. The purpose of the reviews was to determine whether the design bases of the system were met by the installed and tested configurations.

b. Findings

No findings of significance were identified.

.6 Safety System Testing

a. Inspection Scope

The team reviewed the program and procedures for inservice testing and inspection of the safety-related valves and pumps in the essential service water system. The review included flow balancing and startup testing results; pump manufacturer pump curves; and pump and valve inservice test records.

b. Findings

No findings of significance were identified.

4 OTHER ACTIVITIES (OA)

4OA6 Management Meetings

Exit Meeting Summary

On November 2, 2001, the team leader presented the inspection results to Mr. O. Maynard, President and CEO, and other members of licensee management at the conclusion of the onsite inspection. The licensee's management acknowledged the findings presented.

The team asked the licensee's management whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT

KEY POINTS OF CONTACT

Licensee

M. Blow, Manager, Chemistry and Radiation Protection
S. Fellers, Engineer, Licensing
R. Flannigan, Manager, Nuclear Engineering
K. Hall, Supervisor, Licensing
T. Harris, Manager, Regulatory Affairs
D. Hooper, Program Administrator, 50.59
D. Jacobs, Plant Manager
D. Knox, Manager, Maintenance
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B. Norton, Director, Engineering
K. Scherich, Manager, Support Engineering
J. Stamm, Manager, Design Engineering
L. Yokum, Engineer, Licensing
J. Zell, Manager, Organizational Performance

NRC

F. Brush, Senior Resideent Inspector
J. Cruz, Resident Inspector

DOCUMENTS REVIEWED

The following documents were selected and reviewed by the team to accomplish the objectives and scope of the inspection and to support any findings:

CALCULATIONS

NUMBER	DESCRIPTION	REVISION
00-MH-001	Safety Related Room Cooler Heat Transfer Capacities and Available Design Margins	2
AN 96-090	UHS Pond Water Level Necessary to Supply Adequate NPSH for the Essential Service Water Pumps	0

CALCULATIONS

NUMBER	DESCRIPTION	REVISION
AN-00-011	RHR flow requirements and revised time to boil/time to core damage information for OFN EJ-015 update	00
AN-98-046	Wolf Creek Generating Station PSA Electrical Power System Notebook - 98 Update	0
AN-98-048	Wolf Creek Generating Station PSA ESW Notebook - 98 Update	0
EF-10	Essential Service Water Flow Requirements	2
EF-16-W	SGN01A, B, C, D Minimum Required ESW Cooling Water Backpressure	1
EF-29	EF-HV-43 & 44 Maximum Flow After Pipe Break of Non-Nuclear Piping Downstream	0
EF-35	ESW Pump Head Requirement	2
EF-C-006	Crane Use Over Buried ESW Pipe/ Duct	3
EF-HV-017	Thrust/Torque Calculation for EFPDV0019, 20	3
EF-HV-020	Required Torque Calculation for EFHV0037 and 38	1
EF-M-015	Thrust/Torque Calculation for EFHV0097/0098	3
EF-M-016	Thrust/Torque Calculation for EFHV0091/0092	3
EF-M-021	Required Torque Calculation for EFHV0039, 40, 41, 42	0
EF-M-024	Required Torque Calculation for EFHV0051, 52, 59, 60	1
EF-M-025	Required Torque Calculation for EFHV0023, 24, 25, and 26	0
EF-M-026	Required Torque Calculation for EFHV0031, 32, 33, 34, 45, 46, 49, 50	1

CALCULATIONS

NUMBER	DESCRIPTION	REVISION
EG-M-032	Component Cooling Water Heat Exchanger Performance During Normal Operations Shutdown @ Four Hours (and 12 hours) , and Post-LOCA Recirculation	0
EP-10	Essential Service Water System Flow Requirements	1
FL-04	Summary of Flood Levels in All Aux. Bldg. Rooms Due to Pipe Break or Crack	1
GL-04-W	RHR pump rooms 1109 and 1111 heat loads	01
J-K-EF01	System EF Loops 43 and 44 Uncertainty Estimate and Safety Related Setpoints	1
KJ-MW-001	Tube bundle test, over-pressure on EKJ-06A	00
KJ-MW-007	Determination of DG heat exchanger plugging criteria for EKJ03A, 03B, 04A, 04B, 6A and 6B	03
M-EF-14-W	Expected Pressure at EF-PI-109 and 110	1
NG-E-004	Class 1E 120Vac MCC Power Distribution System (NG) Voltage Drop and Short Circuit Protection	0
NK-E-001	Class 1E Voltage Drop	2
OO-MH-001	Safety-related room cooler heat transfer capacities and available design margin	02
RE-EF-010	Calculation of Heat Exchanger Effectiveness Ratios	5
XX-E-006	AC System Analysis	4
XX-E-009	System NB, NG, PG Undervoltage/Degraded Voltage Relay Setpoints	0
XX-E-012	Safety Related MCC Control Circuit Allowable Wire Length	1

DESIGN CHANGES

NUMBER	DESCRIPTION	REVISION
03478	Safety-Related Room Cooler Heat Transfer Capacities and Available Design Margins	2
CCP 01889	LF System Floor Drain	1
CCP 09761	ESW Pump Motor	0
PMR 04134	Motor Operated Valve Reconfigurations	2

DRAWINGS

NUMBER	TITLE	REVISION
10466-E-012.2-054-03	ESW Pump Motor Data Sheet	1B
10881 E-K1001	Single Line Diagram Essential Service Water System	2
E-025-00007 Pages 184 & 185	ESW A to Ultimate Heat Sink (Throttled) Limit Switch Contact Development	11
E-02NB03	NB01 and NB02 Bus Feeder Logic Diagram	7
E-11001	Main Single Line Diagram	4
E-11005	List of Loads Supplied by Emergency Diesel Generator	23
E-11023	System NB Relay Setting Tabulation and Coordination Curves	4
E-11NB01	Lower Medium Voltage Sys. Class 1E 4.16 KV Single Line Meter and Relay Diagram	0
E-11NB02	Lower Medium Voltage Sys. Class 1E 4.16 KV Single Line Meter and Relay Diagram	0
E-11NB02	Lower Medium Voltage System Class 1E 4.16kV Single Line Meter and Relay Diagram	0

DRAWINGS

NUMBER	TITLE	REVISION
E-13AL01A	Motor Driven Auxiliary Feedwater Pump A Schematic Diagram	2
E-13EC01	Fuel Pool Cooling Pumps Schematic Diagram	0
E-13EF01	ESW to Air Compressor Isolation Valves Schematic Diagram	1
E-13EF02	ESW to Service Water System Isolation Valves Schematic Diagram	3
E-13EF02A	ESW to Service Water System Isolation Valves Schematic Diagram	4
E-13EF03	ESW to Service Water System Isolation Valves Schematic Diagram	2
E-13EF04	ESW from Component Cooling Water Heat Exchanger Isolation Valves Schematic Diagram	2
E-13EF05	ESW to Component Cooling Water Heat Exchanger Isolation Valves Schematic Diagram	2
E-13EF06	ESW to Ultimate Heat Sink Isolation Valves Schematic Diagram	3
E-13EF06A	ESW to Ultimate Heat Sink Isolation Valves Schematic Diagram	4
E-13EF07	ESW to Containment Air Coolers Isolation Valves Schematic Diagram	2
E-13EF08	ESW from Containment Air Coolers Isolation Valves Schematic Diagram	8
E-13EF09	ESW to/from Containment Air Coolers Isolation Valves Schematic Diagram	2
E-13EG01A	Component Cooling Water Pump A Schematic Diagram	1
E-13EG01B	Component Cooling Water Pump C Schematic Diagram	0

DRAWINGS

NUMBER	TITLE	REVISION
E-13EG01C	Component Cooling Water Pump B Schematic Diagram	0
E-13EJ01	Residual Heat Removal Pumps Schematic Diagram	1
E-13EM01	Safety Injection Pumps Schematic Diagram	0
E-13EN01	Containment Spray Pumps Schematic Diagram	1
E-13GN03	Control Rod Drive Mechanism Cooling Fans and Discharge Dampers Schematic Diagram	2
E-13KJ01A	Diesel Generator KJ01A Engine Control (Start/Stop) Schematic Diagram	10
E-13NB12	Class 1E Bus NB01 Feeder Breaker 152NB0112 Schematic Diagram	0
E-13NB13	Class 1E Bus NB01 Feeder Breaker 152NB0109 Schematic Diagram	0
E-13NB14	Class 1E Bus NB02 Feeder Breaker 152NB0209 Schematic Diagram	0
E-13NB15	Class 1E Bus NB02 Feeder Breaker 152NB0212 Schematic Diagram	0
E-13NE10	4.16kV Diesel Generator Feeder Breaker 152NB0111	9
E-13QB01	Standby Lighting System Power Feeders Schematic Diagram	0
E-13QB02	Standby Lighting System Power Feeders Schematic Diagram	0
E-K3EF01	ESW Pump A Schematic Diagram	14
E-K3EF01A	ESW Pump B Schematic Diagram	8
E-K3EF02	Traveling Water Screens Schematic Diagram	15

DRAWINGS

NUMBER	TITLE	REVISION
E-K3EF03	Screen Wash Water Valves Schematic Diagram	10
E-K3EF04	ESW Self Cleaning Strainer	13
E-K3EF05	Self-Cleaning Strainer Trash Valve	05
E-K3EF06	ESW Pump Discharge Air Release Valve Schematic Diagram	11
E-K3GD02	ESW Pump Room Unit Heaters Schematic Diagram	6
E-K3GD02A	ESW Pump Room Unit Heaters Schematic Diagram	2
E-K3GD05	Valve Pit Unit Heaters Schematic Diagram	5
E-K3KT02	Emergency Service Water System Chemical Addition Building Heater Schematic Diagram	2
J-02EF01B	ESW System Motor Operated Isolation Valves Control Logic Diagram	0
J-02EF02	ESW System ESW To Air Compressors Isolation Valves Control Logic Diagram	0
J-02EN01	Containment Spray System Containment Spray Pumps Control Logic Diagram	4
J-104-00169-W13	Sequencer Relay Outputs	1W
J-12AL01	Auxiliary Feedwater System Motor Driven Auxiliary Feedwater Control Logic Diagram	0
J-12EF01A	ESW System Motor Operated Isolation Valves Control Logic Diagram	0
J-12EF03	ESW System ESW To/From Containment, Air Cooler Isolation Valves Control Logic Diagram	0

DRAWINGS

NUMBER	TITLE	REVISION
J-12EF05	ESW System Motor Operated Isolation Valves Control Logic Diagram	0
J-K2EF01B	ESW System Screen Wash Water Valve Control Logic Diagram	2
J-K2EF02A	ESW System ESW Pumps Control Logic Diagram	4
J-K2EF06	ESW System ESW Pump Discharge Air release Valve Control Logic Diagram	4
J-K4EF01	ES "A" Pre-Lube Storage Tank Lev.	3
J-K4EF01	ES Pump "1A" Disch. Press.	2
KD-7496	One Line Diagram	25
KN1090W Sheet 10	Load Shed Relay Outputs	D
KN1090W Sheet 11	Sequencer Relay Outputs	E
M-04EF07(Q)	Piping Isometric Essential Service Water System Control Building Diesel Generator Cooler (A&B) Train Supply and Return	6
M-12EF01	Piping & Instrumentation Diagram Essential Service Water System	13
M-12EF02	Piping & Instrumentation Diagram Essential Service Water System	19
M-13EF02	Piping Isometric Essential Service Water Sys. Aux. Bld. "A" Train Supply	8
M-13EF03	Piping Isometric Essential Service Water Sys. Aux. Bld. "A" Train Return	14
M-13EF06	Piping Isometric Essential Service Water Sys. Aux. Bld. "A" & "B" Train Supply & Return	12

DRAWINGS

NUMBER	TITLE	REVISION
M-13EF08	Piping Isometric Essential Service Water-Diesel Generator Bld.	0
M-13EF16	Piping Isometric Essential Service Water System Turbine Building	4
M-15EF02	Essential Service Water System Aux. Bldg. “A” Train Supply	24
M-K2EF01	Piping & Instrumentation Diagram Essential Service Water System	42
M-K2EF03	Piping & Instrumentation Diagram Essential Service Water System	6
M-KC0911	ESWS Pumphouse Piping Sections	16
SK-M-13EF08	Essential Service Water- Diesel Generator Building	C

HEAT EXCHANGER TEST RESULTS

NUMBER	DESCRIPTION	DATE
STN EG-001A	Train A component cooling water system flow verification	November 26, 1997
STN EG-001B	Train B component cooling water system flow verification	October 17, 1997
STN PE-033	CCW Heat Exchanger Performance Test	September 18, 1991, October 7, 1997, March 17, 1999, and September 27, 2000
STN PE-036	Safety Related Room Cooler Heat Transfer Verification and Performance Trending	January 20, 1997, February 13, 1998, April 5 and 12, 2001

HEAT EXCHANGER TEST RESULTS

NUMBER	DESCRIPTION	DATE
STN PE-037A	ESW Train A Heat Exchanger Flow and DP Trending	April 18, August 1 and 27, and September 12, 2001
STN PE-037B	ESW Train B Heat Exchanger Flow and DP Trending	March 20, August 1 and 27, 2001
STS CV-210B	ECCS SI and RHR inservice check valve test	November 10, 1997, April 11, 1999, and October 9, 2000
STS EF-100A/B	ESW System Inservice Pump A and ESW A/ Service Water Cross Connect Valve	May 24, June 3, August 23, and September 12, 2001
TMP EN-171	ESW Train A post-LOCA flow balance	October 19 and 20, 1994
TMP EN-173	ESW Train B post-LOCA flow balance	October 17, 1994

MISCELLANEOUS DOCUMENTS

NUMBER	DESCRIPTION	REVISION/DATE
	Functional Failure Determination Checklists	
	Maintenance Rule Data Base of Final Scope Evaluation	
	Maintenance Rule Expert Panel Meeting Minutes	
	Maintenance Rule Periodic Assessment Report	
	Maintenance Rule Self Assessment Report	
	Trend Log of Heat Exchanger Flow Rates and Differential Pressures	

MISCELLANEOUS DOCUMENTS

NUMBER	DESCRIPTION	REVISION/DATE
	Ultrasonic Thickness Report (ESW Outlet Piping from Diesel Generators	
10466-M-018	Diesel Generator Jacket Water Heat Exchanger Data Sheet	06
16577-M-000(Q)	Design Criteria for the Wolf Creek Generating Station	9
50.59 Resource Manual (USA)	Regulatory Affairs Desktop Manual	
90-XX-19	Feasibility of Reducing Esw Flow to CCW Heat Exchangers	1
E-00NB	Lower Medium Voltage System 4160V System Description	7
E-10NF	Emergency Diesel Generator Load Shedding and Emergency Load Sequencing	1
G-679150/1	Residual Heat Removal System Heat Exchanger Data Sheet	June 30, 1976
ITIP 02451	Industry Information on Fire Damper Testing and Inspection	0
M-089-0K029 W06	Instruction Manual for Installation, Operation and Maintenance of Essential Service Water Pumps for the Standardized Nuclear Unit Power Plant System (SNUPPS)	1
M-10EF(Q)	Essential Service Water System	5
M-612	Residual Heat Removal Pump Room Cooler Data Sheet	09
M-620-00117	Cooling Coil Pulldown Curves	September 10, 1991

MISCELLANEOUS DOCUMENTS

NUMBER	DESCRIPTION	REVISION/DATE
QCP 20-518	Visual Examination of Heat Exchangers and Piping Components	August 22, and September 12, 2001
SEL 01-017	Self Assessment SEL 01-017, Safety System Unavailability Goals	N/A
SEL 10-147	Self Assessment of the Implementation of the Revised 10 CFR 50.59 Rule Requirements	2
SP 93-062	Callaway QA Surveillance Report on Fire Damper Failures	July 12, 1993
Standing Order 17	Minimum Flow Requirements For Pump Operations within Regions of Low Flow Cavitation	
STN OQT-001A	Operation “A” Train Quarterly Tasks	May 17, and August 15, 2001
STN OQT-001B	Operation “B” Train Quarterly Tasks	May 5, and July 31, 2001
STS IC-208A	NB01 4KV Loss of Voltage & Loss of Off Site Power TADOT	October 8, 2001
STS IC-209A	4KV Degraded Voltage Trip Actuating Device Operational Test (TADOT) NB01 Separation Group 1	September 3, and October 8, 2001
STS IC-209B	4KV Degraded Voltage TADOT NB02 Separation Group 4	September 25, 2001
STS KJ-001A	Integrated Diesel Generator and Safeguards Actuation Test - Train A TADOT	October 3, 2000
STS PE-049B	Essential Service Water System ‘B’ Train Pressure Test	February 7, 1996, and February 25, 1999

MISCELLANEOUS DOCUMENTS

NUMBER	DESCRIPTION	REVISION/DATE
STS PE-049D	B Train Underground Essential Service Water System Piping Leakage Test	October 16, 1997, and October 11, 2000
SWA IC-345-63-01	Wolf Creek 345 kV Bus Connector Repair Electrical Load Flow Evaluation	0
SY 1406401	Emergency Diesel Generator and Load Shed and Emergency Load Sequencer Lesson Plan	0
SY1408900	Essential Service Water System	9
SY1506205	Powerblock AC Electrical Distribution	7
TMP EN-171	ESW Train A Post-LOCA Flow Balance	1
USAR Change Request 00-093	Deficiency in USAR Section 8.3.1.1.1.1	January 12, 2001
WIP-E-025-00007-W11-H	MOV Design Configuration Document	0

PERFORMANCE IMPROVEMENT REQUESTS REVIEWED FOR IP 71111.02

19931285	20010765	20010891	20011125	20011517	20012698
19990399	20010768	20011074	20011445	20012588	

PERFORMANCE IMPROVEMENT REQUESTS REVIEWED FOR IP 71111.07

19993814	20001364	20002347	20010901	20011676	20011743
20000036	20002018	20010855	20011518	20011702	20011952

PERFORMANCE IMPROVEMENT REQUESTS REVIEWED FOR IP 71111.21

19973371	19983546	20001712	20010583	20011971	20011977
19973372	19990388	20002768	20010764	20011971	20012119
19973523	19991144	20002911	20011086	20011975	20012200
19980853	19991282	20003564	20011445	20011977	20012911
19983329	19991401	20010522	20011676		

PERFORMANCE IMPROVEMENT REQUESTS INITIATED BY THE LICENSEE IN PREPARATION FOR THE INSPECTIONS

20012597 20012598 20012599 20012600

PERFORMANCE IMPROVEMENT REQUESTS INITIATED BY THE LICENSEE DURING THE INSPECTIONS

20012603	20012637	20012656	20012745	20012794	20012802
20012620	20012646	20012698	20012760	20012797	20012804
20012626	20012647	20012708	20012766	20012798	20012811
20012631	20012651	20012728	20012783	20012800	
20012635	20012655	20012730			

PROCEDURES

NUMBER	DESCRIPTION	REVISION
AI 07A-008	Lake Water Chemical Treatment Program	8
AI 23H-001	Guidelines For Technical Support of Flow Accelerated Corrosion (FAC) Monitoring Program	1
AI 23L-003	Heat Exchanger Program	0
AL 07A-008	Lake Water Chemical Treatment Program	08
ALR 00-016F	XPB03/04 XFMR Trouble	8
ALR 00-049C	Rhr Loop 1 Flow Lo	11
ALR 00-050C	RHR Loop 2 Flow Lo	10
ALR 00-051A	RHR HX CCW Flow Hi/Lo	07
ALR 00-053A	RHR HX CCW Flow Hi/Lo	06
ALR 00-127A	Aux Feedwater Pump Suction Pressure Low	4
ALR 00-127B	ESW Valve to Aux Feedwater Opening	5
ALR 00-127C	Aux Feedwater Suction Switch to ESW	7

PROCEDURES

NUMBER	DESCRIPTION	REVISION
AP 02-002	Chemistry Surveillance Program	13
AP 02-003	Chemistry Specification Manual	16
AP 02B-002	Closed Cooling Water Chemistry Control	00
AP 10-100	Fire Protection	0, 1, 4
AP 12-001	Housekeeping Control	4
AP 14-001	Control of Heavy Loads, Lifting, and Rigging	2
AP 21B-003	Control of Temporary Equipment	2
AP 21G-001	Control of Locked Component Status	20
AP 23D-001	Motor Operated Valve Program	2
AP 23H-001	Component Wall Thinning Monitoring Program	1
AP 23L-001	Lake Water Systems Corrosion and Fouling Mitigation Program	1
AP 26A-003	Screening and Evaluating Changes, Tests and Experiments	5, 6
AP 26C-004	Specific Technical Specification Operability Guidance	5
AP 28A-001	Performance Improvement Request	17
CKL AL-120	Auxiliary Feedwater Normal Lineup	30
CKL EF-120	Essential Service Water Valve, Breaker and Switch Lineup	36
CKL ZL-001	Auxiliary Building Reading Sheets	47
EMG C-0	Loss of All AC Power	13
EMG FR-Z1	Response to High Containment Pressure	9
EMG FR-Z2	Response to Containment Flooding	8

PROCEDURES

NUMBER	DESCRIPTION	REVISION
OFN AF-205	Unit Limitations	12
OFN EF-033	Loss of Essential Service Water	5
OFN NB-030	Loss of AC Emergency Bus NB01 (NB02)	6
OFN NB-034	Loss of All AC Power-Shutdown Conditions	4
QCP 20-518	Visual Examination of Heat Exchangers and Piping Components	1
STN FP-450	Fire Dampers 18 Month Visual Inspection	1, 2, 8
STN OQT-001A	Operation “A” Train Quarterly Tasks	10
STN OQT-001B	Operation “B” Train Quarterly Tasks	11
STN PE-033	Component Cooling Water Heat Exchanger Performance Test	6
STN PE-036	Safety Related Room Cooler Heat Transfer Verification and Performance Trending	08
STN PE-037A	Essential Service Water Train A Heat Exchanger Flow and DP Trending	0, 3
STN PE-037B	Essential Service Water Train B Heat Exchanger Flow and DP Trending	5
STN PE-073A	ESW Train A Heat Exchanger Flow and DP Trending	03
STS CR-001	Shift Log for Modes 1, 2, and 3	45
STS IC-209A	4kV Degraded Voltage Trip Actuating Device Operability Test (TADOT) NB01 Bus - Separation Group 1	5, Draft Revision 6
STS IC-209B	4kV Degraded Voltage TADOT NB02 Bus - Separation Group 4	4
STS IC-917A	Analog Channel Test Essential Service Water to Air Compressor A Isolation	4

PROCEDURES

NUMBER	DESCRIPTION	REVISION
STS IC-917B	Analog Channel Test Essential Service Water to Air Compressor A Isolation	4
STS IC-927A	ESW to Air Compressor High DP Isolation Train A	0
STS IC-927B	ESW to Air Compressor High DP Isolation Train B	0
STS PE-049B	Essential Service Water System 'B' Train Pressure Test	4
STS PE-049D	B Train Underground Essential Service Water System Piping Leakage Test	4
SYS AL-120	Feeding Steam Generators with a Motor Driven or Turbine Driven AFW Pump	25
SYS EF-200	Operation of the ES System	22
SYS EF-300	ESW/ Service Water Macrofoul Treatment	4
SYS GL-200	Inoperable Penetration Room Cooler	1
SYS NB-132	Energizing NB Buses From Alternate Power Supply	15
SYS NB-201	Transferring NB01 Power Sources	26, 28
SYS NB-202	Transferring NB02 Power Sources	25
SYS PB-131	Energizing PB Buses	16
WCP-20-518	Visual Examination of Heat Exchangers and Piping Components	01

SAFETY EVALUATIONS

NUMBER	DESCRIPTION	REVISION
59 1999-0054	Change Text Associated With Emergency Diesel Generator Sub-Systems in Sections 9.5.4 and 9.5.7 of the USAR	0

SAFETY EVALUATIONS

NUMBER	DESCRIPTION	REVISION
59 1999-0092	Change Text Associated With ECCS Systems in Section 6.3.2.2 of the USAR	0
59 2000-0003	Change Storage Location for Reactor Vessel Head Lift Rig and Load Cell for Modes 1-4	0
59 2000-0013	Update Containment Integrated Leak Rate Testing Design Documents to the Requirements of the Current Program	0
59 2000-0014	Change Text Associated With Safety Injection Pump Discharge Relief Valves in Section 6.3.2 of the USAR	0
59 2000-0026	Change Various Sections of the USAR to Specify Valves That Are Modified to Prevent Pressure Locking	0
59 2000-0052	Evaluation of Justification for Extending Temporary Modification Using Startup Transformer to Supply Buses Normally Powered by Auxiliary Transformer	1
59 2000-0061	Administrative Controls To Prevent Energizing SL-2 from both Switchyard SL-8 and PA02 Buses	0
59 2000-0064	Change Assumptions in USAR Chapter 15 Analysis for RCS Dilution During Reactor Startup	1
59 2001-0023	Inoperable Electric Penetration Room Cooler (SGL 15A/B)	5

SCREENING REVIEWS

NUMBER	DESCRIPTION	REVISION
AI 05-006	Electrical Load Growth	1
AP 10-100	Fire Protection Program Revision	1
BD-OFN BB-031	Various Revisions to Shutdown LOCA Procedure	6
CCP 07544	Cold Straighten 3 Bent Hold-Down Bolts for ESWS Pump House Missile Shield Hatch Cover	0

SCREENING REVIEWS

NUMBER	DESCRIPTION	REVISION
CCP 09671	Establish Allowable Bore Sizes for the Accumulators and Actuating Cylinder for FWIVs and MSIVs	0
CCP 09756	Remove Internals From EFV0241 and EFV0242	0
CCP 09774	Replacement of Valve WM09774	0
CCP 09813	Through-Wall Repair of Train B ESW Pump Pre-Lube Storage Tank	0
CCP 09816	Inoperable Electric Penetration Room Cooler (SGL 15A/B)	0
CO 00-0058	Technical Specification	138
QL-KJ-09-05	Remove EDG Valves from Q-List	9

WORK DOCUMENTS

110098	00-218596-001	00-216676-000	01-226987-000
06146-93	00-220511-000	00-216676-002	01-227284-000
52175-93	98-128419-010	00-218756-000	01-227285-000
70889-93	98-128420-010	00-222871-000	01-228881-001
98-200354-001	98-203723-001	00-222885-000	01-229978-000
98-200356-001	99-210846-001	01-225340-000	01-230108-000
00-218593-001	00-216641-000	01-226242-001	