UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

January 27, 2003

William T. Cottle, President and
Chief Executive Officer
STP Nuclear Operating Company
P.O. Box 289
Wadsworth, Texas 77483

SUBJECT: SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION - NRC INSPECTION REPORT 50-498/02-05; 50-499/02-05

Dear Mr. Cottle:

On December 28, 2002, the NRC completed an inspection at your South Texas Project Electric Generating Station, Units 1 and 2, facility. The enclosed report documents the inspection findings which were discussed on January 9, 2003, with Mr. J. Sheppard and other members of your staff.

This inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. 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 (SDP) as having very low safety significance (Green). One of these issues was a violation which is being treated as a noncited violation (NCV), consistent with Section VI.A of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the South Texas Project Electric Generating Station, Units 1 and 2, facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response will be made 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).

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

William D. Johnson, Chief
Project Branch A
Division of Reactor Projects

Dockets: 50-498
50-499
Licenses: NPF-76
NPF-80

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NRC Inspection Report
50-498/02-05; 50-499/02-05

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	50-498 50-499
Licenses:	NPF-76 NPF-80
Report No:	50-498/02-05 50-499/02-05
Licensee:	STP Nuclear Operating Company
Facility:	South Texas Project Electric Generating Station, Units 1 and 2
Location:	FM 521 - 8 miles west of Wadsworth Wadsworth, Texas 77483
Date:	September 22 through December 28, 2002
Inspectors:	N. F. O'Keefe, Senior Resident Inspector G. L. Guerra, Resident Inspector J. M. Keeton, Project Engineer, Project Branch A J. F. Melfi, Reactor Inspector M. P. Shannon, Senior Health Physicist
Approved By:	W. D. Johnson, Chief, Project Branch A, Division of Reactor Projects
Attachment:	Supplemental Information

SUMMARY OF FINDINGS

South Texas Project Electric Generating Station, Units 1 and 2
NRC Inspection Report 50-498/02-05; 50-499/02-05

IR 05000498-02-05; IR 05000499-02-05; on 9/23/2002 - 12/28/2002; STP Nuclear Operating Company; South Texas Project Electric Generating Station; Units 1 & 2. Integrated Resident and Regional Report; operability evaluation, problem identification and resolution.

The inspection was conducted by resident inspectors and region-based engineering and plant support inspectors. One Green noncited violation and one Green finding were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. Inspector Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

Green. The licensee did not properly control or review vendor design work when upgrading safety related 480V motor control center breaker units. As a result, the breakers for the hydraulic pumps for Steam Generator Power Operated Relief Valves 1B, 2B and 2C had undersized overload heaters installed, such that the valves would not have functioned as designed during periods of prolonged use or under degraded voltage conditions. Failure to assure that the design change for installing replacement 480V breaker units satisfied design requirements was a violation of 10 CFR 50, Appendix B, Criterion III, "Design Control." This violation is being treated as a noncited violation (NCV), consistent with Section VI.A of the Enforcement Policy.

The safety significance of this issue was determined to be very low since this issue screened as Green during a Phase 1 significance determination process (SDP) assessment. The issue was considered more than minor because it affected the mitigating system cornerstone objective for design control and plant modifications by affecting the reliability of a system that responds to initiating events to prevent undesirable consequences (Section1R15.1).

Cornerstone: Initiating Events

Green. The licensee was not adequately monitoring the declining performance of the circulating water system and treated problems with this system symptomatically rather than finding the cause. Several near-miss failures were experienced which could have resulted in plant trips. Failing to assess the cause of system problems contributed to an event where the pump discharge valve becoming separated from the operator and slamming shut, catastrophic failure of the pump, and a plant trip.

The safety significance associated with this issue was very low because it resulted in a manual plant trip with all safety-related equipment available to provide mitigation capability. The issue affected the performance objectives of the initiating events cornerstone for design control, and screened as Green during a Phase 1 SDP evaluation (Section 4OA2.1).

B. <u>Licensee-Identified Violations</u>

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

Report Details

Plant Status

Unit 1 began the inspection period at 100 percent power. Operators manually tripped Unit 1 on November 16, 2002, in response to a failed circulating water pump. The unit was restarted on November 24, 2002, and resumed full power operations shortly after. Unit 1 operated at full power for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent power. The plant was shutdown on October 2, 2002, for a planned refueling and steam generator replacement outage. The unit was started up on December 4, and full power was reached on December 12. On December 15, Unit 2 was manually tripped due to high turbine generator vibrations and indications of turbine damage. Unit 2 remained in a forced outage at the end of the inspection period.

2. REACTOR SAFETY
Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope

During the week of September 30, 2002, the inspectors reviewed the licensee's adverse weather preparations for Hurricane Lili. The inspection included a review of the following licensee procedures:

- 0PGP03-ZV-0001, "Severe Weather Plan," Revision 7
- 0POP04-ZO-0002, "Natural or Destructive Phenomena Guidelines," Revision 18

The inspectors discussed the extent of preparations with the licensee's emergency preparedness coordinator. A walkdown of the site facilities and protected area had been conducted by the licensee. The inspectors specifically reviewed hurricane and tornado preparations for the following risk-significant systems by performing walkdowns of the system enclosures and exposed features in accordance with inspection procedure guidance:

- Units 1and 2 electrical transformers and switch yard
- Units 1and 2 essential cooling water building and intake structure

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial System Walkdown

a. Inspection Scope

The inspectors performed a partial system walkdown of the Unit 1 auxiliary feedwater system while it was in operation in support of maintaining Mode 3 conditions on November 19, 2002. The inspectors verified the proper standby equipment and control board lineup in accordance with Plant Operating Procedure 0POP02-AF-0001, "Auxiliary Feedwater," Revision 16, and system piping and instrumentation diagrams to verify that the trains were in a proper standby lineup. The inspectors also examined component material condition.

The inspectors performed a partial system walkdown of the Unit 1 steam generator power operated relief valves in Trains B, C, and D on October 2, 2002, while the associated valve in Train A was out of service for maintenance. The inspectors verified the proper standby equipment and control board lineup, compared the material condition between trains, and held discussions with plant operators.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Fire Area Walkdowns

a. Inspection Scope

The inspectors used Inspection Procedure 71111.05 to evaluate the control of transient combustibles and ignition sources. The licensee's individual plant examination, fire preplans, and Fire Hazards Analysis Report were used to identify important plant equipment, design fire loading, fire detection and suppression equipment locations, and planned actions to respond to a fire in each of the plant areas selected. The inspection included observing the operational lineup and material condition of fire protection systems and fire barriers used to prevent fire damage or propagation. The following six plant areas were inspected:

- Unit 2 reactor containment building throughout the steam generator replacement outage starting on October 2, 2002 (Fire Area 63)

- Unit 2 electrical auxiliary building 60 foot elevation electrical penetration room on October 7, 2002 (Fire Zone Z046)

- Unit 1 main control room on October 10, 2002 (Fire Zones Z034 and Z083)

- Unit 2 electrical auxiliary building 10 foot elevation electrical penetration room on October 30, 2002 (Fire Zone Z006)

- Unit 1 essential cooling water pump bays on October 13, 2002 (Fire Zones Z600, Z601, and Z602)

- Unit 1 safety injection pump rooms on October 14, 2002 (Fire Zones Z305, Z306, and Z307)

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection Activities (71111.08)

.1 Inspection Activities Other than Steam Generator Tube Inspections

Performance of Nondestructive Examination (NDE) Activities

The South Texas Project Inservice Inspection (ISI) Program is committed to the ASME Code, Section XI, “Rules for Inservice Inspection of Nuclear Power Plant Components,” 1989 Edition, no addendum for the second 10-year interval. The second 10-year interval will end September 24, 2010, for Unit 1 and October 18, 2010, for Unit 2.

a. Inspection Scope

The inspectors observed most of the scheduled inservice inspection examinations listed below.

System	Component/Weld Identification	Examination Method
RCS	4-RC-2126-BB1, weld 2	Ultrasonic Examination
RCS	4-RC-2126-BB1, weld 3	Ultrasonic Examination
RCS	4-RC-2126-BB1, weld 6	Ultrasonic Examination

The inspectors also reviewed the documentation for the ultrasonic examination of the Residual Heat Removal Heat Exchanger 2A shell to flange. During the performance of each examination, the inspectors verified that the correct NDE procedure was used, procedural requirements or conditions were as specified in the procedure, and test instrumentation and equipment were properly calibrated. The inspectors reviewed the NDE certification packages of the observed contractor personnel and verified that they had been properly certified in accordance with ASME Code requirements. The inspectors also verified that indications revealed by the examinations were compared against the ASME Code-specified acceptance standards and appropriately dispositioned.

The inspectors reviewed the licensee's NDE records for certain examinations that were performed during the current outage to verify that either required or committed NDE activities were performed in accordance with ASME Code requirements, and indications and defects, if present, were appropriately dispositioned. The licensee representatives stated that they did not have any defects that needed to be dispositioned.

b. Findings

No findings of significance were identified.

.2 ASME Code Repair and Replacement Activities

a. Inspection Scope

The inspectors reviewed Repair/Replacement Packages 02-02-019, 02-00-022, 02-01-024, and 02-01-045 ASME Code Section XI repair and replacement of a Boric Acid Tank 2B drain valve, Essential Cooling Water Strainer 2A emergency backwash valve, chemical and volume and control system letdown heat exchanger channel head fasteners, and a reweld of essential cooling water lube water supply line following removal and replacement of Pump 2B, respectively.

The inspectors reviewed the documentation and verified that these activities were in accordance with the specified welding procedure specifications. The welding procedure specifications were verified, by review of the procedure qualification records, to be appropriately qualified. All welding material used on these work orders was properly identified and controlled.

The inspectors observed and verified that controls were in place to assure that welding materials were properly stored, identified, certified, and distributed.

b. Findings

No findings of significance were identified

1R11 Licensed Operator Requalification (71111.11)

a. Inspection Scope

The inspectors used the guidance in Inspection Procedure 71111.11 to assess licensed operator requalification training on October 31, 2002. The inspectors observed classroom training of Crews 1A, 1D, 2A, and 2C. The training covered midloop operations, industry events, Technical Specification changes, outage modifications, and management expectations.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation (71111.12)

a. Inspection Scope

The inspectors used the guidance provided in Inspection Procedure 71111.12 to independently assess maintenance effectiveness, including Maintenance Rule Program activities, work practices, and common cause failure issues. The following equipment performance problem was reviewed:

- Failed load center supply Breaker E1C2 (Work Authorization Number (WAN) 238518, Condition Reports (CR) 02-15278 and 02-15959)

- Inverter failures for DP-1202 in Unit 2 (WAN 234680, CRs 02-9755, 02-11228, and 02-17816)

The inspectors verified that system, structure, and component (SSC) performance or condition problems were properly characterized in the scope of the Maintenance Rule Program. The inspectors assessed the adequacy of the licensee's significance classification for the SSC. This included the appropriateness of the performance criteria established for the SSC (if applicable) and the adequacy of corrective actions for SSCs classified in accordance with 10 CFR 50.65 a(1) as applicable.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors assessed whether the licensee's performance of risk assessments for selected planned and emergent maintenance activities was in accordance with 10 CFR 50.65(a)(4) by reviewing selected planned and emergent work items. The inspectors assessed the completeness and accuracy of the information considered in the risk assessments, and compared the actions taken to manage the resultant risk with the requirements of the licensee's Configuration Risk Management Program. The inspectors discussed emergent work issues with work control personnel and reviewed the potential risk impact of these activities to verify that the work was adequately planned, controlled, and executed. The activities reviewed were associated with:

- (Unit 1) Feedwater regulating valve repair on line to replace current to pressure (I/P) converter on October 16-18, 2002 (CR 02-14502, WAN 238111)

- (Unit 2) E1C2 Breaker failure on October 31, 2002 (CRs 02-15278 and 02-15959, WAN 238518)

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Nonroutine Plant Evolutions (71111.14)

.1 Ultrasonic Fuel Cleaning

a. Inspection Scope

On October 21, 2002, the inspectors observed portions of work activities in support of the ultrasonic fuel assembly cleaning activities in Unit 2. This was a first-time evolution using equipment which was specially designed for South Texas Project fuel. The inspectors reviewed Plant Operating Procedure 0POP08-FH-0013, "Ultrasonic Fuel Cleaning System," Revision 2, and the associated work package used to control the work. The inspectors also reviewed the following documents to evaluate the testing used to establish the safe operating conditions and the impact on the fuel, as well as to compare the conditions between the tests and the actual plant procedure:

- "South Texas Project Ultrasonic Fuel Cleaner Qualification Test Report R-3712-01-1," Revision 0, dated May 2002 by Dominion Engineering, Inc.

- Electric Power Research Institute Technical Report 1001095: "Fuel Pellet Integrity Assessment for the EPRI Ultrasonic Fuel Cleaning Device," dated December 2000

- Electric Power Research Institute Technical Report 1003229: "Ultrasonic Fuel Cleaning Efficacy Campaign Results at Callaway"

- 50.59 Evaluation 00-17679

b. Findings

No findings of significance were identified.

.2 Control Rod Drive Mechanism Canopy Seal Repairs

a. Inspection Scope

The inspectors accompanied licensee system engineers during the performance of reactor coolant system pressure boundary walkdowns on October 2, 2002, in Unit 2 shortly after shutdown. The inspectors followed up on the licensee's actions to document, evaluate, and repair minor leakage identified from three control rod drive mechanism canopy seals. The inspectors discussed the repair method and postmaintenance testing with licensee engineers and observed vendors performing the repairs. The inspectors also evaluated the impact of inspection and repair activities to other outage work and plant conditions, as well as actions to perform the work such that radiological conditions were as-low-as-reasonably-acheivable (ALARA) (CR 02-13745).

b. Findings

No findings of significance were identified.

.3 Unit 1 Manual Reactor Trip (71111.14, 71153, 71152)

a. Inspection Scope

On November 16, 2002, Unit 1 was manually tripped in response to indications of a loss of all open loop cooling caused by the rupture of the adjacent circulating water pump casing. The inspectors responded to the site to assess operator performance, command and control, procedure use, reactivity control, communications, and event classification. Plant equipment was verified to perform as expected in response to the trip (CR 02-17026).

b. Findings

No findings of significance were identified.

.4 Unit 2 Manual Reactor Trip

a. Inspection Scope (71111.14, 71153)

On December 15, 2002, Unit 2 was manually tripped in response to high turbine generator vibrations and indications of turbine damage. The inspectors responded to the site to assess operator performance, command and control, procedure use, reactivity control, communications and event classification. Plant equipment was verified to perform as expected in response to the trip (CR 02-19072).

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

.1 Improperly Sized Overcurrent Protection

a. Inspection Scope

The inspectors reviewed four operability evaluations conducted by the licensee personnel during the report period involving risk-significant systems or components. The inspectors used Inspection Procedure 71111.15 to review the selected operability evaluations. The inspectors evaluated the technical adequacy of the operability determinations, reviewed any compensatory measures, and checked to see that the impact of other pre-existing conditions were considered, as applicable. Additionally, the inspectors evaluated the adequacy of the problem identification and resolution program as it applied to operability evaluations. Specific operability evaluations reviewed are listed below.

- (Unit 2) Review of Unit 2 turbine driven auxiliary feedwater pump on December 5, 2002 (Condition Report Engineering Evaluation (CREE) 02-18295, WAN 241429)

- (Unit 2) RT-8011 loss of flow failures on October 11, 2002 (CR 02-14602, 02-14919)

- (Unit 2) Electrical auxiliary building ventilation fans tripped during surveillance testing (CR 02-16534)

- (Common) 480 Volt motor control center overcurrent settings on November 22, 2002 (CR 02-17395)

For the latter two issues, the inspectors reviewed the licensee's operability assessment and probable cause analysis associated with a trip of Steam Generator Power Operated Relief Valve (SG PORV) 1B. When the licensee recognized that the issue affected many more 480V motor control center (MCC) breakers, the inspectors discussed the issue with design engineering personnel, reviewed operating performance data, and assessed the potential impact. A review of the licensee's corrective action database was performed to identify any potential past failure history. The following documents were reviewed:

- Condition Reports 02-1653, 02-5705, 02-16068, 02-16090, 02-16093, 02-16120, 02-16194, and 02-17395

- Risk Management Analysis/Assessment PRA 02-019, "Risk Evaluation of EAB Supply Fans Tripping on Overload Current," Revision 0

- Risk Management Analysis/Assessment PRA 02-020, "Evaluation of SG PORV Unavailability," Revision 0

- Calculation EC 5000, "Voltage Regulation Study," Revision 9

- Design Change Package 02-17395-10, "Thermal Overload Relay Dial Setting for Various Class 1E Motor Control Center Buckets"

a. <u>Findings</u>

A Green NCV was identified for not properly controlling vendor design work when upgrading safety related 480V MCC breaker units. While many breakers were affected, the only safety-significant loads identified as having had their ability to perform their design function affected were three SG PORVs.

Following an unexpected trip of the breaker for a SG PORV hydraulic pump, the licensee identified that the overload was marginally undersized. In assessing the cause, the licensee identified that all the breakers which had been upgraded due to obsolescence during several refueling outages were potentially affected by the same error. This included five of the 15 Class-1E MCCs in Unit 1 and eight of the 15 Class-1E MCCs in Unit 2. The contractor performing the work purchased the hardware from a different vendor than the one which supplied original equipment. The licensee determined that the contractor, Nuclear Logistics, Inc., performed the sizing of the overload heaters using practices which were inconsistent with South Texas practices. Specifically, the heaters were sized using the National Electric Code, relying on nominal values for the heaters and nameplate data for the equipment to be protected. This practice was inadequate in some cases to ensure that safety-related equipment would be available during the higher current expected during design degraded voltage conditions. In the case of the three SG PORVs, repeated load cycling during prolonged operation could also trip the overload device. In the cases of several fan motors, the actual full load current values were higher than motor nameplate data due using a special rating due to the cooling from the associated fans, so their overload settings were based on to low a value.

The licensee made a prompt assessment of each load affected. In many cases, the margin was improved by increasing the setting on the overcurrent relay. If insufficient margin was available, the heater was changed using a design change package.

The licensee later refined their understanding of the issue as the cause was better understood. Using actual full load current values for each affected load, the licensee was able to determine that the only risk-significant equipment that did not have sufficient margin under prolonged operation or degraded voltage conditions were three SG PORVS (1B, 2B and 2C).

Title 10 CFR 50, Appendix B, Criterion III, “Design Control,” requires that the licensee shall establish design control measures to assure that applicable regulatory requirements and the design basis are translated into design documents. It further requires that design changes shall be subject to design control measures commensurate with those applied to the original design. Failure to assure that the design change for installing replacement 480V breaker units satisfied design requirements, such as degraded voltage requirements, was a violation. The safety significance of the possible unnecessary overcurrent trip of up to two SG PORVs in a unit was determined to be very low safety significance since this issue screened as Green during a Phase 1 SDP. The issue was considered more than minor because it affected the mitigating system cornerstone objective for design control and plant modifications by affecting the reliability of a system that responds to initiating events to prevent undesirable consequences.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

The inspectors witnessed or reviewed the results of postmaintenance testing for the following three maintenance activities:

- (Unit 2) Auxiliary Feedwater Pump 24 stem binding and speed control problems, December 3 and 4, 2002 (WAN 241429)

- (Unit 2) Control rod drive mechanism canopy seal repairs during the week of November 4, 2002 (WAN 238438, CR 02-13745)

- (Unit 2) Control rod drive mechanism position K10 replacement on November 29, 2002 (WAN 2388885)

In each case, the associated work orders and test procedures were reviewed to determine the scope of the maintenance activity and determine if the test adequately verified proper performance of the components affected by the maintenance. The Updated Final Safety Analysis Report, Technical Specifications, and design-basis documents were also reviewed as applicable to determine the adequacy of the acceptance criteria listed in the test procedures.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

.1 Review of the Unit 1 Outage Plan

a. Inspection Scope

The inspectors reviewed the Unit 2 Ninth Refueling Outage Shutdown Risk Assessment to verify that the licensee appropriately considered risk in planning and scheduling the outage activities. The results of the licensee's Outage Risk Assessment and Management Program, time to boil, and time to core damage profiles were reviewed against the schedule of activities to identify periods of increased risk and activities for additional inspection focus. The work schedule and risk profiles were discussed with the operations support outage coordinator.

The inspectors focused on the following activities:

- Transition and midloop operation
- Fuel offload and reload
- Periods with reduced cooling to the spent fuel pool

b. Findings

No findings of significance were identified.

.2 Monitoring of Reactor Shutdown and Plant Cooldown Activities

a. Inspection Scope

The inspectors observed control room operator actions during the reactor shutdown and assessed the licensee's compliance with Technical Specification limits during plant cooldown on October 2-3, 2002. Plant Operating Procedures 0POP03-ZG-0006, "Plant Shutdown from 100% to Hot Standby," Revision 21, and 0POP03-ZG-0007, "Plant Cooldown," Revision 33, were reviewed.

b. Findings

No findings of significance were identified.

.3 Control of Outage Activities

a. Inspection Scope

The inspectors reviewed plant conditions and observed selected refueling outage activities throughout the outage to verify that the licensee maintained the plant in a configuration consistent with the requirements of Technical Specifications and with the assumptions of the outage risk assessment. The inspectors verified that emergent issues were properly assessed for their impact on plant risk.

Electrical power availability was periodically verified to meet Technical Specification requirements and outage risk assessment recommendations. Control room operators were observed and interviewed on the status of plant conditions. The inspectors reviewed equipment tagout activities, controls for reactivity management, decay heat removal, spent fuel pool cooling, containment integrity, and reactor coolant system inventory.

b. Findings

No findings of significance were identified.

.4 Reduced Inventory and Midloop

a. Inspection Scope

The inspectors observed activities involving reduced inventory and midloop operations during the Unit 2 outage. Because of the steam generator replacement (see IR50-498; 499/2002009) no front end (shutdown) midloop was necessary. A back end (start up) midloop was performed to facilitate vacuum fill activities on the reactor coolant system. The inspectors verified that multiple sources of electrical power, multiple reactor vessel level indications, and multiple reactor coolant system temperature indications were available. The pre-midloop shutdown risk assessment group meeting was observed on November 13, 2002, to assess the adequacy of the licensee's control of work activities to avoid negative impact on the safe conduct of midloop activities. The inspectors observed licensee compliance with the following procedures:

- 0POP03-ZG-0009, “Mid-Loop Operation,” Revision 31
- 0POP03-RC-0100, “Reactor Coolant System Vacuum Fill,” Revision 18

b. Findings

No findings of significance were identified.

.5 Refueling Activities

a. Inspection Scope

The inspectors observed portions of core offload and core reload activities on October 8-10 and November 18, 2002, to determine if these activities were conducted in accordance with the Technical Specifications and administrative procedures.

b. Findings

No findings of significance were identified.

.6 Monitoring of Heatup and Startup Activities

a. Inspection Scope

The inspectors observed control room operations and reviewed control room logs to verify that the Unit 2 operational mode changes, heatup, and startup were conducted in compliance with Technical Specifications and administrative procedures and requirements. The inspectors also performed a detailed containment walkdown on November 29, 2002, to assess containment cleanliness and material condition of components at the end of the outage. The following procedures were reviewed:

- 0POP03-ZG-0004, “Reactor Startup,” Revision 22

- 0PEP02-ZX-0002, “Initial Criticality and Low Power Physics Testing,” Revision 15

b. Findings

No findings of significance were identified.

.7 Identification and Resolution of Problems

a. Inspection Scope

The inspectors screened CRs that documented problems identified during the Unit 2 outage to assess the threshold for problem reporting, and the effectiveness of significance screening, mode restraint screening, operability assessment, and impact to shutdown risk. The inspectors followed up on the licensee's actions regarding the following issues:

- Residual Heat Removal Pump 2C run without minimum flow protection (CR 02-14181)
- Low head safety injection pump cavitated during reactor cavity floodup, no CR written (CR 02-17351)
- Supplemental purge of reactor building not secured when declaring the associated radiation monitor inoperable (CR 02-18147)
- Unauthorized screens installed on sample piping for containment particulate radiation monitor (CR 02-14919)
- Overflowed essential cooling water sump into essential chiller rooms (CRs 02-15857, 02-15858)

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors evaluated the adequacy of four periodic tests of important nuclear plant equipment. This review included aspects such as preconditioning, the impacts of testing during plant operations, the adequacy of acceptance criteria, test frequency, procedure adherence, record keeping, the restoration of standby equipment, the effectiveness of the licensee's problem identification and resolution program, and test equipment accuracy, range, and calibration. The inspectors observed or reviewed the following tests:

- (Unit 2) 0PSP03-AF-0007, "Auxiliary Feedwater Pump 24 Inservice Test," Revision 23, on December 4, 2002
- (Unit 2) 0PSP03-RI-0001, "Digital Rod Position Indication Operability Test," Revision 6, on November 29, 2002
- (Unit 2) 0PSP11-HE-0002, "Control Room Emergency Air Cleanup System Function Test," Revision 15, on November 12, 2002
- (Unit 2) 0PSP03-DG-0008, "Standby Diesel 12(22) LOOP Test," Revision 11, on November 7, 2002

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY
Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope

To review and assess the licensee's performance in implementing physical and administrative controls for airborne radioactivity areas, radiation areas, and high radiation areas, the inspector interviewed radiation workers and radiation protection personnel involved in high dose rate and high exposure jobs during Unit 2 Refueling Outage 2RE09. The inspector also conducted plant walkdowns within the radiologically controlled area and conducted independent radiation surveys of selected work areas. The inspector focused on work activities pertaining to steam generator replacement (see Inspection Report 50-499/2002009). The following items were reviewed and compared with regulatory requirements:

- Area postings and other access controls for airborne radioactivity areas, radiation areas, and high radiation areas in Unit 2 reactor containment building and Units 1 and 2 mechanical auxiliary buildings

- Radiation work permits and radiological surveys involving airborne radioactivity areas and high radiation areas

- Dosimetry placement when work involved a significant dose gradient

- High radiation area key controls

- Controls involved with the storage of highly radioactive items in the spent fuel pool

- Selected corrective action documents involving access controls to radiologically significant areas (CR01-15901, CR01-16009, CR01-16085, CR01-16511, CR01-17251, CR02-1058, CR02-1500, CR02-2719, CR02-5991, CR02-9454, CR02-9500, CR02-10818, CR02-13377, CR02-13766, CR02-13853, and CR02-14158)

- Quality Audit 01-03, "Radiological Controls/Radwaste," and Health Physics Division Self-Assessment CR 01-8175

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES (OA)

4OA1 Performance Indicator Verification (71151)

.1 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspector reviewed corrective action program records involving locked high radiation areas (as defined in Technical Specification 6.12.2), very high radiation areas (as defined in 10 CFR 20.1003), and unplanned exposure occurrences (as defined in NEI 99-02) for the past 12 months to confirm that these occurrences were properly recorded as performance indicators. Radiological controlled area entries with exposures greater than 100 millirems within the past 12 months were reviewed and selected examples were examined to determine whether they were within the dose projections of the governing radiation work permits. Whole body counts or dose estimates were reviewed if the radiation worker received a committed effective dose equivalent of more than 100 millirems. Where applicable, the inspector reviewed the summation of unintended deep dose equivalent and committed effective dose equivalent to verify that the total effective dose equivalent did not surpass the performance indicator threshold without being reported.

b. Findings

No findings of significance were identified.

.2 Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences

a. Inspection Scope

The inspector reviewed radiological effluent release program corrective action records, licensee event reports, and annual effluent release reports documented during the past four quarters to determine if any doses resulting from effluent releases exceeded the performance indicator thresholds (as defined in NEI 99-02).

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Catastrophic Failure of Circulating Water Pump 11 - Selected Issue Followup

a. Inspection Scope

On November 16, 2002, the inspectors responded to the site following notification that Unit 1 was manually tripped in response to indications of a loss of all open loop cooling. The inspectors reviewed maintenance records, Maintenance Rule records, system health reports, and the licensee's corrective action database to assess the performance history of the circulating water system. The inspectors reviewed the Event Review Report and root cause (CR 02-17026), and discussed them with the event review team leader. The inspectors reviewed the event review reports for two previous failures (Station Problem Reports 890872 and 870011), as well as the design change intended to correct the cause (Engineering Change Notice Packages 89-M-0194 and 0195). A work order which improperly implemented the design change on a replacement actuator was also reviewed (WAN 226743).

b. Findings

A Green finding was identified because the licensee was not adequately monitoring the declining performance of the circulating water system and was treating problems with this system symptomatically rather than finding the cause. This contributed to an event where a pump discharge valve became separated from the operator and slammed shut, causing the catastrophic failure of the pump and a plant trip.

Circulating Water Pump 11 experienced catastrophic failure when its discharge valve became disconnected from its motor operator and slammed shut due to flow-induced forces. The sudden stopping of flow induced a large pressure spike, estimated at about 400 psig, which caused the circulating water pump casing to fail. The resulting hole allowed some of the 225,000 gpm pump flow to flood the intake structure and damage adjacent equipment. The collateral damage to open loop cooling water system components resulted in the operators inserting a manual trip to protect the main turbine.

A nearly identical event occurred in 1989, and a very similar event occurred in 1987, although the plant was shut down during the latter event. The inspectors concluded that the licensee had done a good job identifying the cause and potential fixes in the 1989 failure. In 1989, the actuator had become disconnected from the disk when the spline adapter became loose and dropped down enough to allow the actuator to become disengaged from the valve shaft. Although there were recommendations to strengthen the pump casings to withstand such a failure, or otherwise prevent the rapid pressure spike, the licensee elected to attach a stiffback bar with screws across the top of the valve shaft so the splined adaptor would stay engaged. This was successful until this event 13 years later.

The licensee determined that the original stiffback was replaced when a new operator was installed in May 2002. Maintenance personnel substituted stainless steels screws for the carbon steel screws, and galvanized bar stock for the carbon steel bar stock specified in the original design change. While this was thought to be “at least equivalent” to the materials specified, the licensee determined that this made it more difficult to stake the screws in place. The screws backed out prior to the event because the screws were not adequately dimpled during the required staking.

The inspectors reviewed the available system performance data and concluded that numerous problems existed with the systems in both units. The licensee was aware that there were design problems. These included having the pump discharge valves closer than was the usual design practice to the pump, which resulted in unstable flow at the valve. The discharge valves were 96-inch Allis Chalmers butterfly valves. The unstable flow caused the valve disks to flutter, resulting in very large forces on the valve actuator which caused excessive wear and failures. The licensee identified that a number of failures this system had experienced could have resulted in the disk separating from the actuator and slamming shut. However, the licensee had not taken prompt action to address these issues other than to repair the problem component.

The inspectors concluded that the licensee’s Maintenance Rule Program was not providing useful performance monitoring for this system because it only tracked failures that caused plant trips; several failures which could have caused trips were detected and corrected but were not considered as functional failures. While the system health monitoring process included pertinent information about problems, the system was considered to be performing acceptably because the indicators were heavily weighted toward the support of generation and minimizing economic impact, which had not been impacted by the problems. The licensee had not been considering the potential impact to safety caused by failures which could initiate a plant trip or transient. As a result, there was no priority to assess the root causes, even though there was some engineering thought given to the problems.

The licensee’s root cause analysis reached a similar conclusion. The licensee planned to step up efforts to reduce valve flutter in order to reduce the likelihood of future valve failures, as well as plans to review the system design. An improved valve disk design was installed in one Unit 2 valve to assess its effectiveness at reducing the forces which caused valve flutter.

The safety significance associated with this issue was very low because it resulted in a manual plant trip with all safety-related equipment available to provide mitigation capability. The issue affected the performance objectives of the initiating events cornerstone for design control, and screened as Green during a Phase 1 SDP evaluation.

.2 Inverter DP-1202 Blowing Fuses - Selected Issue Followup

a. Inspection Scope

The inspectors reviewed the circumstances surrounding the blowing of fuses in Inverter DP-1202. As documented in CRs 02-9755, 02-11228, and 02-17816, this resulted in a plant trip in July 2002 and a minor steam generator water level transient in August 2002. Following these two events, the licensee and vendor were unable to identify the source of the intermittent failure and were unable to reproduce the problem. The inspectors reviewed the licensee's investigation and troubleshooting plans (WAN 234680) and results, vendor information and troubleshooting results, and design-basis information. The basis for operability was also reviewed. The inspectors considered the following attributes in evaluating this issue: (1) complete and accurate identification of the problem in a timely manner commensurate with its significance; (2) evaluation and disposition of performance issues; (3) evaluation and disposition operability/reportability issues; (4) consideration of extent of condition, generic implications, common cause, and previous occurrences; (5) classification and prioritization of the resolution of the problem commensurate with its safety significance; (6) identification of root and contributing causes of the problem; (7) identification of corrective actions which are appropriately focused to correct the problem; and (8) completion of corrective actions in a timely manner commensurate with the safety significance.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 Reactor Vessel Head Inspection for Circumferential Cracking of Penetration Nozzles (Temporary Instruction 2515/145)

a. Inspection Scope

The inspectors used the guidance in Temporary Instruction 2515/145 to assess the licensee's efforts to identify potential circumferential cracking of reactor pressure vessel head penetration nozzles in accordance with NRC Bulletin 2002-01. This unit was a low-susceptibility plant (Bin 4). The inspectors observed the licensee's visual inspection of the reactor head, reviewed video tapes of the inspection results, and compared them to the inspection records. The inspectors reviewed the training and qualifications of the NDE inspectors and evaluators and discussed the examination results with the NDE inspectors. The inspectors reviewed the cleaning plans, results, and reexamination results.

b. Findings

The licensee was able to conduct a 360-degree visual inspection of all reactor vessel head penetration nozzles and no leaks were identified. Minor boron deposits were removed or cleaned. The training, procedures, and equipment used were adequate to ensure detection of leaks or corrosion.

The licensee performed a visual examination of the upper side of the reactor head without removing insulation. The insulation was a metal-canned type set in three tiers on a metal frame, with a gap of 2 inches or more between the insulation and the head. The control rod drive mechanism (CRDM) nozzles extended up through the insulation, terminating in a threaded connection to the CRDM housing with a canopy seal weld. While the head inspection did not intentionally include anything above the bottom of the insulation, the licensee performed a separate inspection of the area above the insulation due to the identification of canopy seal leakage in three CRDMs.

The licensee conducted a VT-2 bare metal reactor head inspection in Unit 2 from October 7 - 9, 2002. The inspections were performed by qualified VT-2 NDE inspectors with experience conducting a similar inspection at another site using the same equipment. Training was performed for the NDE inspectors on procedure OPEP10-ZA-0031, "Reactor Vessel Closure Head and Control Rod Drive Mechanism Penetration Visual VT-2 Examination," the examination acceptance criteria, and documentation requirements. The procedures used were adequate and consistent with the guidance provided in the Electric Power Research Institute Report 1006899, "Visual Examination for Leakage of PWR Reactor Head Penetrations on Top of RPV Head."

The inspections were performed using high-quality video cameras mounted on a remotely piloted crawler, where accessibility existed. In areas where the canned insulation or structures inhibited access, a boroscope-type video probe was used. The inspection was adequate to be able to detect the primary water stress corrosion cracking phenomenon because the licensee was able to inspect 360 degrees around all nozzle penetrations, and was able to detect and assess very small quantities of boron. A nitrogen hose was used to blow away moveable debris and boron. The small quantity of adherent boron was sufficiently thin such that it did not prevent examination of the head material for evidence of corrosion. A reinspection was conducted after head cleaning to remove adherent boron.

The reactor head was free of leaks and without any major boron deposits. The head had never been cleaned prior to this examination, so there was a layer of dust and minor construction debris (e.g., small pieces of lockwire, metal flakes from machining). Some boron deposits were observed and were characterized. The majority of boron was in the form of loose "snowflakes," which had formed elsewhere and was observed against the uphill sides of some nozzle penetrations. These flakes were easily removed with puffs from a nitrogen hose. Several nozzle penetrations were observed to have a boron residue around much of the penetration extending upwards 1/4 to ½ inch. These were judged by the licensee to have leaked from elsewhere, as no evidence of pressurized spraying (popcorn-like boron) existed near the nozzle. On one area of the head between nozzles, a patch of adherent boron existed which had leaked through an insulation joint above and dripped onto the head. None of the areas of boron accumulation prevented the licensee from examining the condition of the reactor head metal, and none exhibited any head corrosion of significance. No repairs were required as a result of this inspection. Three CRDM canopy seals were found to be leaking at the beginning of the outage. Alluvial tracks of boron were observed on many CRDM nozzles and housings, as well as some spattering. These boron tracks were very light and mostly did not extend all the way down to the reactor head.

The licensee documented the results of the inspection in Report RHVT2-2002-001 and retained video records for future comparison. Some cleaning of the head area was later performed to remove dust and debris as well as cleaning up boron deposits. Two CRDM canopy seals were repaired by weld overlay, and the third CRDM was replaced.

Two head penetrations (26 and 75) had previously exhibited some leakage in 1992. The licensee attributed some of the boron in the vicinity of these penetrations to the earlier leakage which was not previously cleaned up.

4OA6 Meetings, including Exit

Site Visit

On November 8, 2002, Mr. E. Merschoff, Regional Administrator, NRC Region IV, visited the site to tour the plants, observe security measures and steam generator replacement activities, and to be briefed on plant issues. The tour included areas of the Unit 2 containment building. The visit included a drop-in meeting with Mr. G. Parkey, Vice President, Generation.

Exit Meeting Summary

The results of the inservice inspection were presented to Mr. J. Sheppard, Vice President and Assistant to President/CEO and other members of licensee management on October 25, 2002.

The results of the access control to radiologically significant areas inspection were presented to Mr. T. Jordan, Vice President Engineering and Technical Services, and other members of licensee management at the conclusion of the inspection on October 25, 2002.

The results of the resident inspection were presented to Mr. J. Sheppard and other members of licensee management at the conclusion of the inspection on January 9, 2003.

In each case, the inspectors asked the licensee representatives whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violations

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

1. 10 CFR 20.1902(a) requires areas with radiation levels greater than 5 millirem per hour to be posted as a radiation area. All entrances to the Unit 2 mechanical auxiliary building Rooms 47 and 49 were not posted as a radiation area for about 6 days. Specifically, the ladder leading from the 19 foot to 10 foot elevation hallway was not posted. General area radiation levels were as high as 10 millirem per hour, as described in the licensee’s corrective action program CR 02-1058. Because the finding was not an ALARA planning or work control issue, there was no overexposure or significant potential for an overexposure, and the ability to assess dose was not

compromised. This violation is not more than of very low safety significance and is being treated as a NCV.

2. 10 CFR 20.1501(a) requires, in part, that a licensee make surveys that are reasonable to evaluate the extent of radiation levels. A high radiation area with general area radiation levels as high as 120 millirem per hour in Room 108 of Unit 2 mechanical auxiliary building was not identified for about 9 days after a plant startup, as described in the licensee's corrective action program CR 02-9454. During this 9-day period plant personnel had access to this area. Because the finding was not an ALARA planning or work control issue, there was no overexposure or significant potential for an overexposure, and the ability to assess dose was not compromised. This violation is not more than of very low safety significance and is being treated as a NCV.

ATTACHMENT

Supplemental Information

PARTIAL LIST OF PERSONS CONTACTED

Licensee:

M. Berrens, Manager, Generation Support
W. Bullard, Supervisor, Health Physicist
J. Calvert, Manager, Operations Training
J. Crain, Manager, Maintenance
J. Crenshaw, Manager, Systems Engineering
R. Foote, Acting Manager, Operating Experience Group
E. Halpin, Plant General Manager
S. Head, Manager, Licensing
T. Jordan, Vice President, Engineering and Technical Services
A. Kent, Manager, Testing/Programs
M. Lashley, Supervisor, Test Engineering
F. Mangan, Vice President, Business Services
M. McBurnett, Manager, Quality and Licensing
M. Meier, Manager, Generation Station Support
G. Parkey, Vice President, Generation
T. Powell, Manager, Health Physics
S. Query, Refuel Coordinator
D. Rencurrel, Manager, Operations
J. Sheppard, Vice President and Assistant to President and CEO
P. Silva, NDE level III examiner
L. Speiss, Examiner, Nondestructive Examination
S. Thomas, Manager, Plant Design Engineering
T. Walker, Manager, Engineering and Spec Staff Quality
J. Winters, Maintenance Rule Coordinator

Others:
G. Klein, Welding Supervisor (Bechtel)

LIST OF ACRONYMS USED

ALARA	as-low-as-reasonably-acheivable
CR	condition report
CRDM	control rod drive mechanism
DCP	design change package
EPRI	Electric Power Research Institute
IP	inspection procedure
ISI	inservice inspection
MCC	motor control center
NCV	noncited violation
NEI	Nuclear Energy Institute
RIS	Regulatory Information Summary
SG PORV	steam generator power operated relief valve

SSCs	structures, systems, or components
UFSAR	Updated Final Safety Analysis Report
WAN	Work Authorization Number

DOCUMENTS REVIEWED

Miscellaneous

NUMBER	TITLE	REVISION/ DATE
	Second Interval Inservice Inspection Program Plan for the South Texas Project Electric Generating Station Units 1 and 2	1/31/2001
	Inservice Inspection Program Plan for Examination of Welds and Component Supports, System Pressure Testing Program and Repair and Replacement Program for the Second Inspection Interval of The South Texas Project Electric Generating Station Units 1 and 2	revision 0
	Examination Plan for the 2RE09 Inservice Inspection of Unit 2 South Texas Project Electric Generating Station	September 2002
RT-02-039	Radiograph of HFW0418, Steam Generator ‘A’ pipe to elbow	
RT-02-045	Radiograph of HFW0444, Steam Generator ‘C’ pipe to elbow	
RT-02-048	Radiograph of HFW0450, Steam Generator ‘D’ pipe to elbow	
	Ultrasonic Calibration sheets UTCAL-2002–039;-040;-041	10/22/02
	Ultrasonic Examination sheets UT Exam 2002–039; -040; -041; -042; -43	10/22/02
	Ultrasonic Instrument Linearity Verification, ULV-2002-008	10/2/02

Procedures

NUMBER	TITLE	REVISION
OPMP02-ZW-0004	Control of Filler Materials	12
OPMP02-ZW-0004	Control of Filler Materials	13

Procedures

NUMBER	TITLE	REVISION
UTI-032	Ultrasonic Examination of Pressure-Retaining Welds in Thin-Walled Vessels	1

Drawings

9F04001	Figure A-RC-4	2
D-5770 606	4" Pipe Ultrasonic Calibration Block	0

Condition Reports

02-15623
02-13995
02-109
01-13781
01-15555
02-5650