UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

October 21, 2005

Virginia Electric and Power Company
ATTN: Mr. David A. Christian
Sr. Vice President and
Chief Nuclear Officer
Innsbrook Technical Center - 2SW
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION - NRC INTEGRATED INSPECTION REPORT NOS. 05000280/2005004 AND 05000281/2005004

Dear Mr. Christian:

On September 30, 2005, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Surry Power Station, Units 1 and 2. The enclosed report documents the inspection findings which were discussed on October 13, 2005, with Mr. Jernigan and other members of your staff.

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

Based on the results of this inspection, the inspectors identified one issue of very low safety significance (Green). This issue was determined to involve a violation of NRC requirements. However, because of its very low safety significance and because it had been entered into your corrective action program, the NRC is treating this issue as a non-cited violation in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny this non-cited violation you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Surry Power Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) 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/

Kerry D. Landis, Chief
Reactor Projects Branch 5
Division of Reactor Projects

Docket Nos.: 50-280, 50-281
License Nos.: DPR-32, DPR-37

Enclosure: NRC Integrated Inspection Report 05000280, 05000281/2005004
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-280, 50-281
License Nos.: DPR-32, DPR-37

Report Nos.: 05000280/2005004, 05000281/2005004

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 & 2

Location: 5850 Hog Island Road
Surry, VA 23883

Dates: July 1 - September 30, 2005

Inspectors: N. Garrett, Senior Resident Inspector
D. Arnett, Resident Inspector
L. Garner, Senior Project Engineer (Partial Sections 1R01 and 4R04)
M. Scott, Senior Reactor Inspector (Sections 1R02 and 1R17)
R. Taylor, Reactor Inspector (Sections 1R02 and 1R17)
M. Maymi, Reactor Inspector (Sections 1R02 and 1R17)
R. Rodriquez, Reactor Inspector (Sections 1R02 and 1R17)

Approved by: K. Landis, Chief, Reactor Projects Branch 5
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000280/2005-04, IR 05000281/2005-04; on 07/01/2002 - 09/30/2005; Surry Power Station Units 1 & 2, Maintenance Effectiveness.

The report covered a three month period of inspection by resident inspectors, a senior project engineer, a senior reactor inspector, and three reactor inspectors. One Green, non-cited violation (NCV) was identified. 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 may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process, Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Green. A self-revealing non-cited violation of 10CFR50, Appendix B, Criterion III, Design Control, was identified for failure to correctly translate design changes into design specifications. The licensee developed a design change for the Unit 1 and Unit 2 charging pump lube oil cooler heat exchangers to prevent corrosion related tube failure. The licensee failed to transfer this design change into an applicable procurement specification to procure lube oil cooler heat exchangers with coated tubes.

The finding is determined to be more than minor because it affects the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capacity of systems that respond to initiating events to prevent undesirable consequences. The finding was associated with the equipment and human performance attributes of the cornerstone. The finding was evaluated using Manual Chapter 0609 and determined to be of low safety significance. The finding affects the Mitigating Systems Cornerstone for short term decay heat removal and is of low safety significance because it did not result in the actual loss of a safety system and is not risk significant in response to external events. (Section 1R12)

B. Licensee-Identified Violations

None

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near rated power for the report period except a downpower on July 17, 2005, to 95 percent to isolate and repair a steam leak on the 1B moisture separator reheater. The unit was returned to rated power on July 18, 2005. On September 24, 2005, the unit was also downpowered to 90 percent to perform additional repairs on the 1B moisture separator reheater and perform turbine valve testing.

Unit 2 operated at or near rated power the entire reporting period except for a downpower to 96 percent on September 27, 2005. An electrical fault, which occurred in motor control center 2C1-2 located in the normal switchgear room, resulted in the isolation of the Unit 2 moisture separator reheaters.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

The inspectors evaluated the implementation of the adverse weather preparation procedures on July 7, 2005, in preparation for the high winds and heavy rains approaching the site. The inspectors reviewed operations checklist OC-21 “Severe Weather Checklist,” and walked down portions of the plant to assess preparations.

b. Findings

No findings of significance were identified.

.2 Hot Weather Preps

a. Inspection Scope

During the week of July 25 - 29, 2005, the licensee entered hot weather conditions when temperatures reached over 90EF. The inspectors reviewed operations checklist OC-21 , “Severe Weather Checklist,” operations logs, and performed walkdowns of various components in the auxiliary building, turbine building and monitored temperature readings associated with the Intake Canal and Containment temperature to verify adequate compensatory actions were taken to mitigate the effects of hot weather.

b. Findings

No findings of significance were identified.

.3 Site Hurricane and Hurricane Ophelia Preparations

a. Inspection Scope

The inspectors reviewed the Dominion Hurricane Response Plan (Nuclear) (HRP-N) and observed general site hurricane preparations on August 11, 2005. The inspectors performed a site walkdown to evaluate general preparations to store and secure plant equipment and material that could be damaged or cause damage during a hurricane. On September 12, 2005, the inspectors evaluated the implementation of the adverse weather preparation procedures and compensatory measures prior to the arrival of Hurricane Ophelia. The inspectors reviewed operations checklist OC-21 "Severe Weather Checklist," abnormal procedure AP-37.01 "Abnormal Environmental Conditions," and the Dominion Hurricane Response Plan (Nuclear) (HRP-N). Inspectors assured that vital systems and components were protected from high winds and flooding associated with hurricanes. Additionally, the inspectors conducted walkdowns of the plant to check for any vulnerabilities, such as inadequate sealing of water tight penetrations, inoperable sump pumps, and other sources of potential internal and external flooding.

b. Findings

No findings of significance were identified.

1R02 Evaluations of Changes, Tests or Experiments

a. Inspection Scope

The inspectors reviewed selected samples of evaluations to confirm that the licensee had appropriately considered the conditions under which changes to the facility, Updated Final Safety Analysis Report (UFSAR), or procedures may be made, and tests conducted, without prior NRC approval. The inspectors reviewed evaluations for seven changes and additional information, such as calculations, supporting analyses, the UFSAR, and drawings to confirm that the licensee had appropriately concluded that the changes could be accomplished without obtaining a license amendment. The seven evaluations reviewed are listed in the List of Documents Reviewed.

The inspectors also reviewed samples of changes for which the licensee had determined that evaluations were not required, to confirm that the licensee's conclusions to "screen out" these changes were correct and consistent with 10CFR50.59. The seventeen "screened out" changes reviewed are listed in the List of Documents Reviewed.

The inspectors also reviewed corrective action documentation to confirm that problems were identified at an appropriate threshold, were entered into the corrective action system, and appropriate corrective actions were initiated.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns

a. Inspection Scope

The inspectors performed partial walkdowns of the following three systems to verify correct system alignment. The inspectors checked for correct valve and electrical power alignments by comparing positions of valves, switches, and breakers to the procedures and drawings listed in the Attachment. Additionally, the inspectors reviewed the corrective action system to verify that equipment alignment problems were being identified and properly resolved.

- Unit 1 emergency service water (ESW) pumps 1-SW-P-1A & 1C while 1-SW-P-1B was tagged out for maintenance
- Unit 1 ESW pumps 1-SW-P-1A & 1B while 1-SW-P-1C was tagged out for maintenance
- Unit 2 motor driven auxiliary feedwater (MDAFW) pump 2-FW-P-3B and turbine driven auxiliary feedwater (TDAFW) pump 2-FW-P-2 while 2-FW-P-3A was tagged out for maintenance
- Unit 1 MDAFW pumps 1-FW-P-3A & 3B while TDAFW pump 1-FW-P-2 was tagged out for maintenance

b. Findings

No findings of significance were identified.

.2 Complete System Walkdown

a. Inspection Scope

The inspectors performed a detailed walkdown on the accessible portions of the Service Water (SW) System and applicable portions of the Unit 1 and Unit 2 circulating water system. Specific items inspected included the circulating water piping at the low level intake, the SW valves and piping in the valve pits in the turbine building, the recirculation spray SW piping and valves in Unit 1 and Unit 2 safeguards buildings and piping and components associated with the Unit 2 Charging Pump SW System. Visual inspections were performed of the materiel condition of the piping, pipe supports, valves, valve motors, electrical conduits, instrumentation and motor control centers. The inspectors examined control indications and proper positioning of components to ensure that the system would perform its safety functions. Outstanding maintenance work orders were also reviewed. Drawing and operating procedures were utilized as necessary.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Fire Area Walkdowns

a. Inspection Scope

The inspectors conducted tours of the following nine areas to assess the adequacy of the fire protection program implementation. The inspectors checked for the control of transient combustibles and the condition of the fire detection and fire suppression systems (using "SPS Appendix R Report,") in the following areas:

- Black battery room
- Number 3 emergency diesel generator room
- Unit 1 control room
- Unit 2 control room
- Number 1 mechanical equipment room (MER)
- Unit 2 emergency switchgear room
- Number 5 MER
- Fuel building
- Unit 1 safeguards including the basement

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program

Quarterly Requalification Activity Review

a. Inspection Scope

The inspectors observed licensed operator performance during simulator training sessions RQ-05.4-ST-3 to determine whether the operators:

- were familiar with and could successfully implement the procedures associated with a loss of a charging pump due to high temperature with the other charging pumps failing to auto start and a process vent particulate alarm;

- recognized the high-risk actions in those procedures; and,

- were familiar with related industry operating experiences.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

For the two equipment issues described in the plant issues listed below, the inspectors evaluated the licensee's effectiveness of the corresponding preventive and corrective maintenance. For each selected item below, the inspectors performed a detailed review of the problem history and surrounding circumstances, evaluated the extent of condition reviews as required, and reviewed the generic implications of the equipment and/or work practice problem. The inspectors performed walkdowns of the accessible portions of the system, performed in-office reviews of procedures and evaluations, and held discussions with system engineers. Inspectors compared the licensee's actions with the requirements of the Maintenance Rule (10 CFR 50.65), VPAP 0815, "Maintenance Rule Program," and the "Surry Maintenance Rule Scoping and Performance Criteria Matrix."

- Unit 1 and Unit 2 radiation monitors
- Unit 2 1A charging pump, 2-CH-P-1A, and Unit 1 1A charging pump, 1-CH-P-1A, lube oil cooler heat exchangers

b. Findings

Introduction. A Green self-revealing non-cited violation (NCV) was identified for failure to maintain design control during procurement of replacement lube oil cooler heat exchangers for Unit 1 and Unit 2 charging pump lube oil coolers.

Description. On August 25, 2005, a self-revealing finding was identified when the lube oil cooler heat exchanger for the Unit 2 1A charging pump catastrophically failed filling the bearing oil system with service water. A second example was identified on September 26, 2005 when the Unit 1 1A charging pump lube oil cooler heat exchanger catastrophically failed. The Unit 2 1A charging pump was in operation when the service water leak was discovered. The Unit 2 1B charging pump was started and the Unit 2 1A charging pump was promptly removed from service. The Unit 1 1A pump was in standby when the main control room operators observed the auxiliary oil pump cycling on and off. Operators promptly secured the auxiliary oil pump, determined the oil sump was full of service water, and declared the affected charging pump inoperable. As the result of the failure of the Unit 1 1A lube oil cooler heat exchanger, the licensee also declared the Unit 1 1B charging pump inoperable.

The original lube oil cooler heat exchanger installed in the six charging pumps (three in Unit 1 and three in Unit 2) had 90-10 copper-nickel tubes. The tube side of the heat exchanger is exposed to brackish water from the James River. In 1985, the licensee performed an engineering evaluation, EWR 85-476, "CH Pump LO Cooler Protective Coating," which established the lube oil cooler heat exchanger service life as 18 months

and that the life could be extended by applying a ceramic like epoxy coating named Specoat to the service water side of the tube sheets and the tubes. The licensee installed one epoxy coated heat exchanger in the charging system for evaluation and determined that the coating provided acceptable service. A failure analysis performed in 1990 on an uncoated heat exchanger identified that the 90-10 copper nickel tubes were failing because of a sulfide contaminated film, direct microbal influenced corrosion, and flow blockage by mud and silt. The coated heat exchanger prevented corrosion related failure and provided good service. The licensee installed coated lube oil coolers in all six charging pumps during the early 1990's. The licensee established a 10 year interval to clean and inspect the heat exchangers. In 2001, the licensee decided to replace the heat exchangers instead of cleaning them due to radiological controls concerns. In January 2004, the licensee procured a lot of three heat exchangers. The procurement specification used required the heat exchanger tube sheet to be coated with Platocor (substitute for Specoat) epoxy coating system. This lot of three heat exchangers were installed in the Unit 1 1A charging pump on February 23, 2005, the Unit 1 1B charging pump on October 18, 2004, and the Unit 2 1A charging pump on September 15, 2004. The Unit 2 1A heat exchanger failed in operation on August 25, 2005 and the failed heat exchanger was replaced with the heat exchanger that had been removed from the lube oil cooler in 2004. The licensee determined that the two coolers remaining in service should provide at least one year of operation prior to failure. However, the Unit 1 1A heat exchanger failed in standby on September 26, 2005, following seven months of operations. As a result, the licensee also replaced the Unit 1 1B heat exchanger on September 30, 2005. The Unit 1 1A and 1B coolers were replaced with new, uncoated heat exchangers. The licensee determined the uncoated heat exchangers will provide at least six months of service life prior to catastrophic failure, allowing time to procure properly coated heat exchangers.

Analysis. The inspectors consider the licensee's failure to include the specifications for protective coating for the charging pump lube oil cooler heat exchanger in plant design documentation to be a performance deficiency. The licensee determined and implemented an effective corrective action to prevent failure of the heat exchanger due to corrosion. The licensee had adequate opportunity to include the protective coating specification in the system design requirements.

The finding is determined to be more than minor because it affects the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capacity of systems that respond to initiating events (loss of coolant accidents) to prevent undesirable consequences (core damage). The finding was associated with the equipment performance and human performance attributes of the cornerstone. The finding was evaluated using Manual Chapter 0609 and determined to be of very low safety significance (Green). The finding affects the Mitigating Systems Cornerstone for short term decay heat removal and is of very low safety significance (Green) because it did not result in the actual loss of a safety system and is not risk significant in response to external events (seismic, flood, and severe weather).

Enforcement.

10CFR50, Appendix B, Criterion III, Design Control, requires, in part, that design changes for those structures, systems, and components to which this appendix applies are correctly translated into design specifications. Contrary to this requirement, the licensee failed to translate the design change to coat the service water side of the charging pump lube oil cooler heat exchanger tubes with an epoxy coating into a design specification. However, because of the very low safety significance and because the issue was entered into the corrective action system as Plant Issues S-2005-4087, S-2005-4186, and S-2005-4464, and the deficient condition was corrected, this finding is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000280,281/2005004-01, Failure to Translate a Design Change into Design Specifications.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors evaluated the adequacy, accuracy, and completeness of seven plant risk assessments performed prior to changes in plant configuration for maintenance activities or in response to emergent conditions. When applicable, inspectors assessed if the licensee entered the appropriate risk category in accordance with plant procedures. Specifically, the inspectors reviewed:

- POD for week July 16 - 22, 2005, for schedule changes and risk impact including schedule changes for risk significant surveillances, work in the switchyard, emergency diesel generator (EDG) air compressor, 1-EG-C-2, maintenance and maintenance on motor driven fire pump, 1-FP-P-1.
- POD for week July 25 - 30, 2005, for schedule changes and risk impact including number 1 EDG run, service air compressor addition, extension of 1A ESW pump and deferment of risk significant surveillances.
- POD for week July 30 - August 5, 2005, for schedule changes and risk impact including schedule changes for risk significant surveillances, maintenance packages on the number 3 EDG and 1B ESW pump, extension on the 1C ESW pump modification package, and emergent work on the 1A component cooling heat exchanger, 1-CC-E-1A.
- POD for week August 8 - 11, 2005, for Orange PSA when the mechanical equipment room number 3 watertight door was found open and for addition of emergent work to the schedule such as component cooling heat exchanger cleaning, 1-CC-E-1B.
- POD for week August 22 - 26, 2005, for leak in the Unit 1 charging pump intermediate seal cooler service water and failure of Unit 2 charging pump lube oil cooler.
- POD for week August 29 - September 2, 2005, for 2-CH-P-1A being added to the schedule due to being tagged out sooner than expected, 1-FW-P-2 was added to the PSA due to emergent work and 1-FP-P-2 was added due to a sheared turbocharger.

- POD for week September 4 - 9, 2005, for schedule changes and risk impact including schedule changes for the AAC Diesel and addition of 1-FP-P-2 and 1-CH-P-1B for emergent work.

b. Findings

No findings of significance were identified.

1R14 Operator Performance During Nonroutine Evolutions and Events

a. Inspection scope

For the non-routine events described below, the inspectors observed operator actions, reviewed operator logs, and reviewed plant computer data and strip charts to determine what occurred and how the operators responded, and to verify if the response was in accordance with plant procedures;

- Unit 1 power reduction to 95 percent for leak repairs on moisture separator reheater 1B, 1-MS-E-1B.
- Service water leak in the Unit 1 turbine building basement.
- Unit 2 electrical fault in the normal switchgear room and downpower to 96 percent.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors evaluated the technical adequacy of the five operability evaluations to ensure that operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The operability evaluations were described in the engineering transmittal (ET) and plant issues listed below:

- S-2003-4473, Past operability of Unit 2 low head safety injection pump, 2-SI-P-1B, with high vibrations
- S-2005-3684, Unit 1 containment spray pump, 1-CS-P-1B, initially declared inoperable due to excessive oil leakage
- S-2005-3701 & 3673, Unit 2 motor driven auxiliary feedwater (MDAFW) pump, 2-FW-P-3A, inoperable due to elevated copper and high amps
- S-2005-3911, Emergency service water (ESW) pump, 1-SW-P-1B, went into “abnormal” range for fuel dilution at 2.90%
- S-2005-3848, Water and particulate in the oil for Unit 1 MDAFW pump, 1-FW-P-3A

b. Findings

No findings of significance were identified.

1R16 Operator Workarounds

a. Inspection Scope

The inspectors reviewed the licensee's list of identified operator workarounds as of August 1, 2005, to assess the cumulative effects of operator workarounds on the reliability, availability, and potential for mis-operation of a system to verify that there was no increase in overall plant risk. This assessment included increases of initiating event frequencies, effects on multiple mitigating systems, and the ability of operators to correctly respond to abnormal plant conditions.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

.1 Biennial Review

a. Inspection Scope

The inspectors evaluated design change packages for eight modifications, in the Initiating Events and Mitigating Systems Cornerstone areas, to evaluate the modifications for adverse effects on system availability, reliability, and functional capability. There was no Barrier Integrity modification evaluated. The modifications, design change packages (DCPs), and the associated attributes reviewed are as follows:

03-057, Allow More Design Margin for Various Motor Operated Valves (mitigating system)
- Response Time (Stroke Time)
- Plant Document Updating (Calculations)
- Post-Modification Testing
- Failure Modes

00-039, NI Source Detectors (initiating event and mitigating system)
- Energy Needs (Electricity)
- Materials / Replacement (Material Compatibility / Functional Properties)
- Process Medium (Voltage)

02-058, New Power Sources for Residual Heat Removal Heat Exchanger Component Cooling (RHR HX CC) Outlet Trip Valves (mitigating system)
- Energy Needs (Electricity)
- Materials / Replacement (Functional Properties / Classification)

- Process Medium (Voltage)

03-057, Allow More Design Margin for Various Motor Operated Valves/S.1&2 (mitigating system)
- Materials / Replacement (Material Compatibility / Functional Properties)

98-038, Emergency Service Water (ESW) Pump Modifications, Unit 1 (mitigation system)
- Functional Properties
- Materials / Replacement (Material Compatibility / Functional Properties)
- Post-Modification Testing

03-022, Modification Emergency Diesel Generator (EDG) #3 Output Breaker 15J3 Closing Circuit (initiating event and mitigating system)
- Post-Modification Testing
- Timing (Sequence / Response)
- Seismic Qualification
- Functional Properties

01-026, Circuit Breaker Additions/Replacements in 125 VDC Battery Switchboards 2A & 2B (mitigating system)
- Post-Modification Testing
- Seismic Qualification
- Energy Needs (Electricity)

04-006, Replace Steam Flow Orifices of the Turbine Driven Auxiliary Feedwater Pump (mitigating system)
- Process Medium (Pressure / Flow Rate)
- Flow Paths
- Operations (Procedures / Training)
- Failure Modes

For selected modification packages, the inspectors observed the as-built configuration. Documents reviewed included procedures, engineering calculations, modification design and implementation packages, work orders, site drawings, corrective action documents, applicable sections of the UFSAR, supporting analyses, Technical Specifications, and design basis information.

The inspectors also reviewed selected corrective action documents associated with modifications to confirm that problems were identified at an appropriate threshold and were entered into the corrective action process, and that appropriate corrective actions were initiated.

b. Findings

No findings of significance were identified.

.2 Annual Review

a. Inspection Scope

The inspectors evaluated the DCP 04-013, EDG Air Start System Dryer Installation. This modification installed air dryers on the number 2 EDG air compressors, 2-EG-C-1 and 2-EG-C-2. The inspectors verified the following attributes:

- Materials
- Flowpaths
- Pressure Boundary
- Licensing basis
- Post Modification Testing

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed the six post maintenance test procedures and activities associated with the repair or replacement of the following components to determine whether the procedures and test activities were adequate to verify operability and functional capability following maintenance:

- Maintenance Work Order (MWO) 609268-01, Major maintenance overhaul of the Unit 2 charging pump, 2-CH-P-1A
- MWO 720812-04, -05, and -06, Repair of Unit 1 charging intermediate seal water cooler service water piping through wall leak
- MWO 604263-01, Torque trunnion screws on Unit 1 turbine drive auxiliary feedwater (TDAFW) pump trip valve, 1-FW-P-2
- MWO 605266-01, Implement DCP 02-075 to install a pre-lube starter and fuel filter modifications on “A” emergency service water (ESW) pump, 1-SW-P-1A
- MWO 720341-01, Repair leaking fuel oil supply connector on “B” ESW pump, 1-SW-P-1B
- MWO 607299-02, Lube oil replacement and sump cleaning for unit 1 motor driven auxiliary feedwater (MDAFW) pump, 1-FW-P-3A

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the five surveillance tests listed below, the inspectors examined the test procedure and either witnessed the testing and/or reviewed test records to determine whether the scope of testing adequately demonstrated that the affected equipment was functional and operable:

Surveillance Tests

- 1-NPT-RX-002, Reactor Core Flux Maps
- 1-OSP-EG-6.1, 1-OPT-EG-001/005, #1 Emergency Diesel Generator Monthly Run
- 1-OPT-FW-003, Turbine Drive Auxiliary Feedwater Pump 1-FW-P-2

In-service Test

- 1-OPT-CH-001, Charging Pump Operability and Performance test for 1-CH-P-1A

Reactor Coolant Leak Test

- 1-OPT-RC-10.0, Reactor Coolant Leakage-Computer Calculation

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed Temporary Modification, S1-05-70, 1-GW-RM-130-1 (Process Vent Low), to determine whether system operability/availability was affected, that configuration control was maintained, and that the associated safety evaluation adequately justified implementation.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed simulator scenario RQ-05.4-SP-1:PMS which started with a Reactor Coolant System loop flow instrument failure and ended with a steam generator tube rupture. The scenario included the licensee entering the Alert emergency classification. The inspectors evaluated whether the training crew responded appropriately.

b. Findings

No findings of significance were identified.

4 OTHER ACTIVITIES

4OA2 Problem Identification and Resolution

Daily Review of Plant Issues

a. Inspection Scope

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program. This review was accomplished by reviewing hard copies of each condition report, attending daily screening meetings, and accessing the licensee's computerized database as required.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 (Closed) Licensee Event Report (LER) 050000280/2001-003-00, NRC Bulletin 2001-02, Inspection of Surry Unit 1 Reactor Pressure Vessel Head

On October 20, 2001, while performing a bare metal visual inspection of the reactor pressure vessel head, the licensee identified 16 penetrations that required additional examinations due to boric acid and debris masking concerns. Under the head ultrasonic (UT) examinations of the 16 control rod drive mechanism (CRDM) penetration nozzles were performed. Liquid penetrant tests of the J-groove weld surface were performed on 10 of the 16 penetrations. As a result of the examinations, the licensee reported that penetrations 27 and 40 contained through-wall flaws. Additionally, penetrations 18, 47,

65 and 69 were rejected due to unacceptable indications following partial excavation of the indications on the weld. Through-wall flaws on these additional 4 penetrations were not confirmed; however examinations did not necessarily rule them out. The licensee's corrective actions were: 1) immediately repair all six penetrations using the half-nozzle repair method, and 2) inspect the repaired welds with ultrasonic testing and penetrant testing. Additionally, the licensee replaced the head in the Spring of 2003. The new head was constructed with nozzles using material less susceptible to cracking. This was the first inspection the licensee did on this unit as a commitment in response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," which was issued on August 3, 2001. The NRC did not identify a performance deficiency associated with this event.

The NRC evaluated this issue for risk and considered the fact that the nozzles had not previously been examined by techniques that would have identified circumferential flaws. The analysis used the most recent version of the NRC's risk assessment tool, a spreadsheet developed by Argonne National Laboratory. This tool is based on the results of plant inspections and laboratory experiments. It infers the probabilities for early crack initiation and rapid crack growth from operating experience of leaking CRDM nozzles that have been discovered. This information is adjusted for the operating temperature of the reactor head to place it in context with data from other plants and laboratory experiments. The calculation is performed for nozzles that intersect the head surface at several different angles, and interpolation is used to obtain a result for the angle(s) of the leaking nozzle(s) in a specific plant evaluation. The probability that a leaking nozzle will develop a circumferential crack is an empirical value (0.2) observed in the population of plants inspected to date. The spreadsheet calculates a distribution for the probability that a leaking nozzle will be ejected, as a function of plant age. The mean of the probability distribution for the year prior to discovery is used as the increase in the frequency of medium loss of coolant accident (LOCA) for that year (i.e., if a nozzle were ejected, a medium LOCA would result). The increase in the core damage frequency is estimated by multiplying this increase in medium LOCA frequency by the conditional core damage probability for medium LOCAs in the licensee's model for the plant.

The parameters for the risk evaluation are the 6 nozzles (18, 27, 40, 47, 65, 69). The angle of each nozzle in the head is (19.8, 27.0, 33.1, 37.3, 42.6 and 42.6). Penetrations 27 and 40 were found by the licensee to contain through-wall flaws. Penetrations 18, 47, 65, and 69 were rejectable; through-wall flaws were not confirmed nor ruled out. Additional parameters are: 65 total CRDM nozzles and 1 vent nozzle, 20.1 effective full power years (EFPYs) at time of discovery, head temperature changed since initial startup from 597.8°F (first 4.6 EFPYs), to 599.8°F (next 10 EFPYs), and finally to 597.8°F (last 4.9 EFPYs through February 2001). The yield stress values for the different heats used in construction of the head varied from 32.5 ksi to 60 ksi. The location and quantity of each heat is unknown.

The NRC evaluated the condition of the 2 penetrations with confirmed through-wall flaws and determined this to have resulted in a risk of low to moderate safety significance. The NRC additionally evaluated the condition assuming the 4 additional rejectable

nozzles were leaking, for a total of 6 leaking nozzles, and determined this would have resulted in a risk of substantial safety significance.

.2 (Discussed) Temporary Instruction (TI) 2515/163, "Operational Readiness of Offsite Power"

Completion of this TI was documented in NRC Inspection Reports 05000280, 281/2005003. However, after an NRC headquarters review of the data provided, additional information related to the TI was requested. The inspectors collected this information from licensee discussions, site procedures and licensee documentation. The information was subsequently provided to the headquarters staff for further analysis.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On October 13, 2005, the resident inspectors presented the inspection results to Mr. Jernigan and other members of his staff who acknowledged the findings.

The inspectors confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
M. Adams, Director, Nuclear Station Safety and Licensing
B.Garber, Supervisor, Licensing
M. Crist, Manager, Operations
T. Huber, Manager, Engineering
D. Jernigan, Site Vice President
L. Jones, Manager, Radiation Protection and Chemistry
C. Luffman, Manager, Protection Services
R. MacManus, Manager, Training
J. Grau, Manager, Nuclear Oversight
R. Simmons, Manager, Outage and Planning
K. Sloane, Director, Nuclear Station Operations and Maintenance
B. Stanley, Manager, Maintenance

NRC
K. Landis, Chief, Branch 5, Division of Reactor Projects, Region II

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed		
05000280,281/2005004-01	NCV	Failure to Translate a Design Change into Design Specifications (Section 1R12)
Closed		
05000280/2001-003-00	LER	NRC Bulletin 2001-02, Inspection of Surry Unit 1 Reactor Pressure Vessel Head (Section 4OA5.1)
Discussed		
2515/163	TI	Operational Readiness of Offsite Power (Section 4AO5.2)

LIST OF DOCUMENTS REVIEWED

Section 1R02: Evaluations of Changes, Tests or Experiments

Full Evaluations (Regulatory Evaluation Number = REN, is the first number listed, except as observed)
04-001, FSAR Change Request FS 2003-055, Fuel Handling Accident under Alternate Source Term
04-002, FSAR Change Section 18.3.2.4, Environmentally Assisted Fatigue of Safety Injection Nozzles

04-004, DCP 04-006, Replace Steam Flow Orifices of the TDAFW Pump
04-005, DCP 04-002, Replace AFW Isolation Valves with Stop-Check Valves
03-003, Evaluation of Parallel Test Data - P250 v.s. Ovation Software
03-004, Flowcalc and Calclcalc Programs
DCP 97-37, CCHX SW Inlet Pipe Repair

Items Screened (full evaluation not performed)
DCPs
00-039, NI Source Detectors
01-012, IRPI Replacements
01-025, 26 EPD 125 VDC Breaker Additions/Replacements
01-061, Install a Pre-Lube System for the EDG's
02-031, PZR PORV Backup Air SetPoint Change
02-058, New Power Sources for RHR HX CC Outlet Trip Valves
02–021, 03-37, Reconfigure Pressurizer Heater Circuits /S/1
03-022, Modification of EDG #3 Output Breaker 15J3 Closing Circuit
03-033, Restoration of Automatic Control Mode for Steam Header Pressure Controller PC-1464A/B/S/1
03-078, Safety Injection Accumulator Isolation MOV Modifications
98-038, Vibrations of 1-SW-P-1A,B,C ESWP's
Equivalencies
SEL0840-000, Gamma-metrics Power Supply - obsolete
SEL00868-000, Time Delay Relay AGASAT
SEL00889-000, RLY-591 Potter & Brumfield Relay
SOM-104-001, EDG Lube Oil Pump
Temporary Modifications - Alterations
S2-03-019, ESW Pump Battery temp charger
S2–04-026, Install alternate flow path to allow repair of Unit 2 AFW Pump oil cooler

Corrective Action Documents
Nuclear Oversight Audit Number 04-09, Design Control and Engineering Programs, dated 5/27/04

Self Assessment SLA-02-02, Implementation of the Amended 10CFR50.59 Rule, dated 8/13/02

Section 1R04: Equipment Alignment

Plant Procedures
0-OP-SW-002, Emergency Service Water Pump Operation
0-OP-SW-002A, Emergency Service Water System Alignment

Plant Drawings
11448-FM-071A
11448-FM-071E
11448-FM-068A
11548-FM-068A

Section 1R05: Fire Protection

Plant Procedures
0-FS-FP-166, Black Battery Room
0-FS-FP-123, Diesel Generator Room Number 3
0-FS-FP-116, Control Room
1-FS-FP-126, Mechanical Equipment Room Number 1
2-FS-FP-107, Unit 2 Emergency Switchgear Room
0-FS-FP-224, Mechanical Equipment Room Number 5
0-FS-FP-163/4, Fuel Building
1-FS-FP-141, Safeguards Spray Side - Unit 1
1-FS-FP-140, Safeguards Basement - Unit 1

Section 1R12: Maintenance Effectiveness

Plant Procedures
0-AP-5.24, Radiation Monitor System Kaman Monitor Malfunction
2-OP-CH-002, Charging Pump A Operations
2-OPT-CH-001, Charging Pump Operability and Performance Test for 2-CH-P-1A
2-OPT-RM-002, Radiation Monitoring Equipment Checklist
0-OPT-RM-001, Radiation Monitoring Equipment Checklist
1-IPM-HT-HTP-13, Heat Trace Panel Kaman Process Vent Radiation Monitor Outlet
0-NSP-RM-001, Radiation Monitoring Trending
EWR 85-476, Charging Pump Lube Oil Cooler Protective Coating

Work Orders
102351, 310941-01, 428185-01, 439651-01, 449406-01, 452212-01, 470373-01, 473860-01, 482734-01, 482735-01, 502053-01, 6048001-01, 604804-01, 603814-02,

Plant Issues
S-2002-3589, S-2005-0802, S-2005-1339, S-2005-1486, S-2005-2064, S-2005-2096, S-2005-3135, S-2005-3437, S-2005-3603, S-2005-3646, S-2005-3669, S-2005-4015, S-2005-4087, S-2005-4186, S-2005-4470,

Drawings
2E-2029, 2E-2030, S-000024

Vendor Technical Manual
38-B940-00001, Byron Jackson Pump Company

Section 1R17: Permanent Plant Modifications

Nuclear Oversight Audit Number 04-09, Design Control and Engineering Programs, dated 5/27/04

Self Assessment SLA-02-02, Implementation of the Amended 10CFR50.59 Rule, dated 8/13/02

Section 1R19: Post Maintenance Testing

Plant Procedures
VPAP-0307, Repair and Replacement of ASME Section XI or High Safety Significant Components Program/Plan
1-OPT-FW-001, Motor Driven Auxiliary Feedwater Pump 1-FW-P-3A
2-OPT-CH-001, Charging Pump Operability and Performance Test for 2-CH-P-1A
GMP-E-139, Internal Wiring
VPAP-1302
0-OPT-SW-001, Emergency Service Water Pump 1-SW-P-1A
1-MOP-FW-002, Removal from and Return to Service of Turbine Driven AFW Pump 1-FW-P-2

Plant Documents
Installation Problem Report (IPR) - 05-0274
IPR 05-0268
IPR 05-0272
Engineering Transmittal S-05-0073, Charging Pump intermediate Seal Cooler Discharge Pipe Leak Repair

Drawings
11448-FM-071A