



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

May 14, 2008

Mr. Charles G. Pardee
Chief Nuclear Officer and
Senior Vice President
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville IL 60555

**SUBJECT: BYRON STATION, UNITS 1 AND 2 NRC INTEGRATED INSPECTION
REPORT 05000454/2008002; 05000455/2008002**

Dear Mr. Pardee:

On March 31, 2008, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Byron Station, Units 1 and 2. The enclosed report documents the inspection results, which were discussed on April 11, 2008, with Mr. David Hoots 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 selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, two NRC-identified findings of very low safety significance were identified. These findings involved violations of NRC requirements. In addition, two licensee-identified violations which were determined to be of very low safety significance are listed in this report. Because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating these issues as Non-Cited Violations in accordance with Section VI. A. 1 of the NRC Enforcement Policy.

If you contest the subject or severity of a 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission – Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Byron Station.

C. Pardee

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Sincerely,

/RA/

Richard A. Skokowski, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 50-454; 50-455
License Nos. NPF-37; NPF-66

Enclosure: Inspection Report 05000454/2008002; and 05000455/2008002
w/Attachment: Supplemental Information

cc w/encl: Site Vice President - Byron Station
Plant Manager - Byron Station
Regulatory Assurance Manager - Byron Station
Chief Operating Officer and Senior Vice President
Senior Vice President - Midwest Operations
Senior Vice President - Operations Support
Vice President - Licensing and Regulatory Affairs
Director - Licensing and Regulatory Affairs
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Associate General Counsel
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Illinois Emergency Management Agency
J. Klinger, State Liaison Officer, State of Illinois
P. Schmidt, State Liaison Officer, State of Wisconsin
Chairman, Illinois Commerce Commission
B. Quigley, Byron Station

C. Pardee

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Vice President - Licensing and Regulatory Affairs
Director - Licensing and Regulatory Affairs
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SUBJECT: BYRON STATION, UNITS 1 AND 2 NRC INTEGRATED INSPECTION
REPORT 05000454/2008002; 05000455/2008002

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-454; 50-455

License No: NPF-37; NPF 66

Report No: 05000454/2008002 and 455/2008002

Licensee: Exelon Generating Company, LLC

Facility: Byron Station, Units 1 and 2

Location: Byron, IL 61010

Dates: January 01, 2008, through March 31, 2008

Inspectors: B. Bartlett, Senior Resident Inspector
R. Ng, Resident Inspector
C. Scott, Reactor Engineer
J. Cassidy, Senior Health Physicist
C. Thompson, Illinois Emergency Management Agency
Resident Inspector

Approved by: R. Skokowski, Chief
Branch 3
Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

IR 05000454/2008002, 05000455/2008002; 01/01/2008 – 03/31/2008; Byron Station, Units 1 and 2; Access Control to Radiologically Significant Areas; Problem Identification and Resolution.

This report covers a three-month period of inspection by resident inspectors and an announced baseline inspections by regional health physics inspectors. Two Green findings were identified by the inspectors. The findings were considered to be non-cited violation of NRC regulations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (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 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Barrier Integrity

- Green. A finding of very low safety significance and associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified by the inspectors for the licensee's failure to follow plant procedures. Plant maintenance workers left hoses running through a ventilation barrier door that caused the door to be open more than the allowed one inch. The licensee took immediate corrective actions which included closing the door and completing an evaluation which demonstrated operability of the door for ventilation purposes.

The finding was more than minor because, if left uncorrected, the issue would have become a more significant safety concern. The inspectors determined this finding represented a degradation of the radiological barrier function provided for the auxiliary building, therefore, the finding was considered to be of very low safety significance (Green). Additionally, the inspectors determined that the finding had a cross-cutting aspect in the area of human performance. Specifically, Work Control - The licensee plans and coordinates work activities, consistent with nuclear safety (H.3(a)). (Section 4OA2.3)

Cornerstone: Occupational Radiation Safety

- Green. The inspectors identified a finding of very low safety significance and associated Non-Cited Violation (NCV) of Technical Specification 5.4.1 for failure to implement procedures required to evaluate radiological hazards for alpha contamination. The corrective actions taken by the licensee included notification of RP supervision to reject all surveys with beta/gamma contamination in excess of 100,000 dpm/100 cm² that do include alpha information. The issue was entered in the licensee's corrective action program as Action Request 755986.

The finding is more than minor because it impacted the program and process attribute of the Occupational Radiation Safety Cornerstone and affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that the failure to fully evaluate the radiological hazards present in work areas could

result in unplanned exposure to workers. The finding was determined to be of very low safety significance because it was not an As-Low-As-Is-Reasonably-Achievable (ALARA) planning issue, there was no overexposure nor potential for overexposure, and the licensee's ability to assess dose was not compromised. This finding was caused by inadequate review and approval of survey data by RP Supervision. Consequently, the cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported. H.4(c) (Section 2OS1.7)

B. Licensee-Identified Violations

Two violation of very low safety significance that were identified by the licensee have been reviewed by the inspectors. Corrective actions planned or taken 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 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near full power throughout the inspection period with minor exceptions:

- On March 20, 2008, operators reduced power to 93 percent to conduct main steam safety valve test and auxiliary feedwater full flow test. The unit returned to full power on March 22, 2008.
- On March 23, 2008, the unit shut down for refueling outage B1R15. The unit remained in the outage at the end of this reporting period.

Unit 2 operated at or near full power throughout the inspection period with minor exceptions:

- On February 23, 2008, operators reduced power to 95 percent to swap main feedwater pumps. The unit returned to full power on February 24, 2008.
- On March 25, 2008, operators reduced power to 96 percent due to an auto-start of the auxiliary feedwater pump as both system auxiliary transformers tripped offline. The unit returned to full power on March 26, 2008.

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 2 Train A Auxiliary Feedwater (AF) While Unit 2 Train B AF was Out of Service

The inspectors selected this systems based on its risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, Updated Final Safety Analysis Report (UFSAR), Technical Specification (TS) requirements, Administrative TS, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the system incapable of performing their intended functions. The inspectors also walked down accessible portions of the system to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious

deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

These activities constituted one partial system walkdown sample as defined by Inspection Procedure 71111.04.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

The inspectors conducted fire protection walkdowns which were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- Unit 2 Auxiliary Building General Area 364' (Zone 11.3-0);
- Auxiliary Building 459 Elevation HVAC Exhaust Complex (Zone 11.7-0);
- Auxiliary Building 459 Elevation Unit 1 Purge Room (Zone 11.7-1);
- Auxiliary Building 459 Elevation Unit 2 Purge Room (Zone 11.7-2);
- Auxiliary Building 463 Elevation Upper Cable Spreading Room (Zone 3.3A-1);
and
- Auxiliary Building 463 Elevation Upper Cable Spreading Room (Zone 3.3A-2).

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and had implemented adequate compensatory measures for out of service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the Attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed, that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program.

These activities constituted six quarterly fire protection inspection samples as defined by Inspection Procedure 71111.05.

b. Findings

No findings of significance were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee's testing of Unit 1 Train B Essential Service Water (SX) Oil Cooler Heat Exchangers to verify that potential deficiencies did not mask the licensee's ability to detect degraded performance, to identify any common cause issues that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors reviewed the licensee's observations as compared against acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. The inspectors also verified that test acceptance criteria considered differences between design conditions and testing conditions. Documents reviewed are listed in the Attachment.

This inspection constituted one sample as defined in Inspection Procedure 71111.07.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On Tuesday, February 26, 2008 the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification examinations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms;
- correct use and implementation of abnormal and emergency procedures;
- control board manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications.

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements. Documents reviewed are listed in the Attachment.

This inspection constituted one quarterly licensed operator requalification program sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant systems:

- Unit 2 Train C Feedwater Water Controller Malfunction; and
- Unit 1 Train B AF Insulation Fire.

The inspectors reviewed events such as where ineffective equipment maintenance has resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- implementing appropriate work practices;
- identifying and addressing common cause failures;
- scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;
- characterizing system reliability issues for performance;
- charging unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, and components/functions classified as (a)(2) or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

This inspection constituted two quarterly maintenance effectiveness samples as defined in Inspection Procedure 71111.12.

b. Findings

No findings of significance were identified.

.2 1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- Unit 2 Train A Emergency Diesel Generator (EDG) Work Window while Unit 0 Train B Essential Service Water Make-up Pump was Out of Service;
- Unit 2 Train B Residual Heat Removal System Work Window while Unit 0 Train C Non-essential Service Water Pump was Out of Service;
- Emergent Debris Blockage of River Screen House Travelling Screen and Offsite Line 0624 Trip;
- Unit 1 Train B AF Out of Service due to Insulation Fire;
- Emergent Unit 2 System Auxiliary Transformer (SAT) 242-2 Failure; and
- Emergent Unit 2 Train C Feedwater Water Controller Malfunction.

These activities were selected based on their potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met. Documents reviewed are listed in the Attachment.

These activities constituted six samples as defined by Inspection Procedure 71111.13.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

.3 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Evaluation of Unit 2 Train B Heat Removal System Floor Plug on Auxiliary Building Safety Related Ventilation Requirements;
- Unit 1 Train B SX Pump Oil Leak;
- Unit 0 Train B SX Makeup Pump Stuffing Box Lower Bushing; and
- Unit 2 SAT 242-1 Evaluation Following Actuation of Differential Protection for SAT 242-2.

The inspectors selected these potential operability issues based on the risk-significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee's evaluations, to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

This inspection constituted four samples as defined in Inspection Procedure 71111.15.

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

.1 Permanent Modification

a. Inspection Scope

The following engineering design package was reviewed and selected aspects were discussed with engineering personnel:

- Unit 0 Train B SX Makeup Pump Anti-siphon Check Valve Modification.

This document and related documentation were reviewed for adequacy of the associated 10 CFR 50.59 safety evaluation screening, consideration of design parameters, implementation of the modification, post-modification testing, and relevant procedures, design, and licensing documents were properly updated. The inspectors observed ongoing and completed work activities to verify that installation was consistent with the design control documents. The modification installed a new check valve in each of the SX makeup lines going to the SX cooling tower to prevent drain-down of the SX cooling tower basin in the event of significant tornado damage to the makeup lines at the river screen house. Documents reviewed are listed in the Attachment.

This inspection constituted one sample as defined in Inspection Procedure 71111.18.

b. Findings

No findings of significance were identified.

.2 1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the following post maintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- Unit 2 Train A Emergency Diesel Generator Work Window;
- Unit 1 Train A Centrifugal Charging Pump Work Window; and
- Unit 2 Train B Residual Heat Removal System Work Window.

These activities were selected based upon the structure, system, or component's ability to impact risk. The inspectors evaluated these activities for the following (as applicable): the effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed; acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate; tests were performed as written in accordance with properly reviewed and approved procedures; equipment was returned to its operational status following testing (temporary modifications or jumpers required for test performance were properly removed after test completion), and test documentation was properly evaluated. The inspectors evaluated the activities against TS, the UFSAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the corrective action program and that the problems were being corrected commensurate with their importance to safety. Documents reviewed are listed in the Attachment.

This inspection constituted three samples as defined in Inspection Procedure 71111.19.

b. Findings

No findings of significance were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Shutdown Risk Plan and contingency plans for the Unit 1 refueling outage, scheduled March 23 through April 14, 2008, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below. The inspectors also performed walkdowns of the containment after shutdown, to verify that structures, piping, and supports in containment did not include stains or deposited material that could indicate previously unidentified leakage

from components containing reactor coolant. Documents reviewed during the inspection are listed in the Attachment.

- Licensee configuration management, including maintenance of defense-in-depth commensurate with the Outage Shutdown Risk Plan for key safety functions and compliance with the applicable TS when taking equipment out of service.
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Controls over the status and configuration of electrical systems to ensure that TS and outage safety plan requirements were met, and controls over switchyard activities.
- Monitoring of decay heat removal processes, systems, and components.
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system.
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss.
- Controls over activities that could affect reactivity.
- Refueling activities, including fuel handling.
- Reactor vessel head lift activities.
- Licensee identification and resolution of problems related to refueling outage activities.

Since the refueling outage was still ongoing at the conclusion of this inspection period, this inspection did not constitute a sample as defined in Inspection Procedure 71111.20 and will be completed in the next routine quarterly inspection.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Routine Surveillance Testing

a. Inspection Scope

The inspectors reviewed the test results for the following activities to determine whether risk-significant systems and equipment were capable of performing their intended safety function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- Unit 1 Moderator Temperature Coefficient Measurement at Power; and
- Unit 2 Train B EDG Semi-annual Operability Surveillance.

The inspectors observed in-plant activities and reviewed procedures and associated records to determine whether: any preconditioning occurred; effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing; acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis; plant

equipment calibration was correct, accurate, and properly documented; as left setpoints were within required ranges; the calibration frequency was in accordance with TS, the UFSAR, procedures, and applicable commitments; measuring and test equipment calibration was current; test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used; test data and results were accurate, complete, within limits, and valid; test equipment was removed after testing; where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable; where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure; where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished; prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test; equipment was returned to a position or status required to support the performance of the safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the Attachment.

This inspection constituted two routine surveillance testing samples as defined in Inspection Procedure 71111.22.

b. Findings

No findings of significance were identified.

.2 Inservice Testing (IST) Surveillance

a. Inspection Scope

The inspectors reviewed the test results for the following activities to determine whether risk-significant systems and equipment were capable of performing their intended safety function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- Unit 1 Train B Containment Spray Comprehensive IST Surveillance.

The inspectors observed in-plant activities and reviewed procedures and associated records to determine whether: any preconditioning occurred; effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing; acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis; plant equipment calibration was correct, accurate, and properly documented; as left setpoints were within required ranges; and the calibration frequency were in accordance with TSs, the UFSAR, procedures, and applicable commitments; measuring and test equipment calibration was current; test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures;

jumpers and lifted leads were controlled and restored where used; test data and results were accurate, complete, within limits, and valid; test equipment was removed after testing; where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers Code, and reference values were consistent with the system design basis; where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable; where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure; where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished; prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test; equipment was returned to a position or status required to support the performance of its safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the Attachment.

This inspection constituted one inservice inspection sample as defined in Inspection Procedure 71111.22.

b. Findings

No findings of significance were identified.

2. RADIATION PROTECTION

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

.1 Review of Licensee Performance Indicators for the Occupational Exposure Cornerstone

a. Inspection Scope

The inspectors reviewed the licensee's occupational exposure control cornerstone performance indicators (PIs) to determine whether the conditions resulting in any PI occurrences had been evaluated, and identified problems had been entered into the corrective action program for resolution. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

b. Findings

No findings of significance were identified.

.2 Plant Walkdowns and Radiation Work Permit Reviews (RWP)

a. Inspection Scope

The inspectors reviewed licensee controls and surveys in the following radiologically significant work areas within radiation areas, high radiation areas and airborne radioactivity areas in the plant to determine if radiological controls including surveys, postings and barricades were acceptable:

- RWP 10008257; Reactor Head and Upper Internals Lift;
- RWP 10008253; Reactor Head – Disassembly;
- RWP 10008266; Demin Filters – Remove/Replace/Restore; and
- RWP 10008256; Fuel Transfer Cart Inspection.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

The inspectors reviewed the RWPs and work packages used to access these areas and other high radiation work areas to identify the work control instructions and control barriers that had been specified. Electronic dosimeter alarm set points for both integrated dose and dose rate were evaluated for conformity with survey indications and plant policy. Workers were interviewed to verify that they were aware of the actions required when their electronic dosimeters noticeably malfunctioned or alarmed.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

The inspectors walked down and surveyed (using an NRC survey meter) these areas to verify that the prescribed RWP, procedure, and engineering controls were in place, that licensee surveys and postings were complete and accurate, and that air samplers were properly located.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

The inspectors reviewed RWPs for airborne radioactivity areas to verify barrier integrity and engineering controls performance (e.g., high-efficiency particulate air ventilation system operation) and to determine if there was a potential for individual worker internal exposures of >50 millirem committed effective dose equivalent. Work areas having a history of, or the potential for, airborne transuranics were evaluated to verify that the licensee had considered the potential for transuranic isotopes and provided appropriate worker protection.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.3 Problem Identification and Resolution

a. Inspection Scope

The inspectors reviewed corrective action reports related to access controls and high radiation area radiological incidents (non-PIs identified by the licensee in high radiation areas <1R/hr). Staff members were interviewed and corrective action documents were reviewed to verify that follow-up activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk based on the following:

- Initial problem identification, characterization, and tracking;
- Disposition of operability/reportability issues;
- Evaluation of safety significance/risk and priority for resolution;
- Identification of repetitive problems;
- Identification of contributing causes;
- Identification and implementation of effective corrective actions;
- Resolution of Non-Cited Violations (NCVs) tracked in the corrective action system; and
- Implementation/consideration of risk significant operational experience feedback.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

The inspectors evaluated the licensee's process for problem identification, characterization, prioritization, and assessed whether problems that were entered into the corrective action program and resolved. For repetitive deficiencies and/or significant individual deficiencies in problem identification and resolution, the inspectors verified that the licensee's self-assessment activities were capable of identifying and addressing these deficiencies. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

b. Findings

No findings of significance were identified.

.4 Job-In-Progress Reviews

c. Inspection Scope

The inspectors observed the following jobs that were being performed in radiation areas, airborne radioactivity areas, or high radiation areas for observation of work activities that presented the greatest radiological risk to workers:

- RWP 10008257; Reactor Head and Upper Internals Lift;
- RWP 10008253; Reactor Head – Disassembly;
- RWP 10008266; Demin Filters – Remove/Replace/Restore; and
- RWP 10008256; Fuel Transfer Cart Inspection.

The inspectors reviewed radiological job requirements for these activities including RWP requirements and work procedure requirements.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

Job performance was observed with respect to these requirements to assess whether radiological conditions in the work area were adequately communicated to workers through pre-job briefings and postings. The inspectors also evaluated the adequacy of radiological controls including required radiation, contamination, and airborne surveys for system breaches; radiation protection job coverage, including any applicable audio and visual surveillance for remote job coverage; and contamination controls.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

Radiological work in high radiation work areas having significant dose rate gradients was reviewed to evaluate the application of dosimetry to effectively monitor exposure to personnel and to assess the adequacy of licensee controls.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.5 High Risk Significant, High Dose Rate High Radiation Area (HRA) and Very Radiation Area (VHRA) Controls

d. Inspection Scope

The inspectors conducted plant walkdowns to assess the posting and locking of entrances to high dose rate HRAs, and VHRA's. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

e. Findings

No findings of significance were identified.

.6 Radiation Worker Performance

a. Inspection Scope

During job performance observations, the inspectors evaluated radiation worker performance with respect to stated radiation protection work requirements and evaluated whether workers were aware of the significant radiological conditions in their workplace, the RWP controls and limits in place, and that their performance had accounted for the level of radiological hazards present. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

b. Findings

No findings of significance were identified.

.7 Radiation Protection Technician (RPT) Proficiency

a. Inspection Scope

During job performance observations, the inspectors evaluated RPT performance with respect to radiation protection work requirements and evaluated whether they were aware of the radiological conditions in their workplace, the RWP controls and limits in place, and if their performance was consistent with their training and qualifications with respect to the radiological hazards and work activities. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.01.

b. Findings

Introduction: A Green NRC-identified finding of very low safety significance and associated NCV of TS 5.4.1 was identified for failure to implement procedures required to evaluate radiological hazards for alpha radiation.

Description: The inspectors identified several supervisor approved contamination surveys performed during the refueling outage in March 2008 that were performed in areas with known or suspected alpha contamination, such as the reactor cavity and fuel transfer cart, that did not include alpha contamination information.

Radioactive contamination controls minimize contamination of areas, equipment, and personnel. Contamination surveys identify sources of contamination in the plant and validate the expected conditions that are used when planning work. Radiation Protection Procedure RP-AA-300, Radiological Survey Program, Revision 2, provided instructions and requirements for performance and documentation of radiological surveys. Step 4.3.5 states that 10 percent of the smears be analyzed for alpha contamination when the beta/gamma contamination levels exceed 100,000 dpm/100 cm² in known or suspected alpha areas. The inspectors observed that the requirement for performing alpha surveys was also discussed in each of the ALARA briefs for conducting work in the reactor cavity and transfer cart area.

Radiological surveys are completed by radiation protection technicians, then routed to RP supervision for review to ensure they are complete and adequately identify the conditions of the area. If the survey is complete the RP supervisor approves the surveys and files as appropriate. If the survey is not complete or there is some other issue, it is returned to the technician for corrections.

The inspectors reviewed the corrective actions taken to ensure alpha analysis in performed as required. Specifically, the licensee notified RP supervision to reject all surveys with beta/gamma contamination in excess of 100,000 dpm/100 cm² that do not include alpha information. Additionally, the licensee will evaluate the issue and generate long term actions to prevent recurrence.

Analysis: The inspectors determined that this finding was a performance deficiency because licensees are required to comply with TS requirements and implement various radiological control procedures. The inspectors also determined that the deficiency was reasonably within the licensee's ability to foresee and correct. The finding is more than minor because it is associated with the Occupational Radiation Safety cornerstone attribute of Program and Process and adversely affects the cornerstone objective of protecting worker health and safety from exposure to radiation. The finding was assessed using the Occupational Radiation Safety Significance Determination Process (SDP). The finding was determined to be of very low safety significance (Green) because it was not an ALARA planning issue, there was no overexposure or potential for overexposure, and the licensee's ability to assess dose was not compromised.

As described above, the surveys were approved by RP Supervision without the required alpha contamination analysis. Consequently, the cause of this deficiency had a cross cutting aspect in the area of Human Performance. Specifically, the licensee failed to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported (H.4(c)).

Enforcement: Technical Specification 5.4.1.a. and Regulatory Guide 1.33, Revision 2, Appendix A, February 1978 required that the licensee establish, implement and maintain program procedures for contamination control. Radiation Protection Procedure RP-AA-300, Radiological Survey Program, Revision 2, provides instructions and requirements for performance and documentation of radiological surveys. Step 4.3.5 states that 10 percent of the smears be analyzed for alpha contamination when the beta/gamma contamination levels exceed 100,000 dpm/100 cm² in known or suspected alpha areas. Contrary to this, as of March 28, 2008, the licensee failed to perform alpha analysis of smears collected in known or suspected alpha areas. Because this finding is of very low safety significance and has been entered into the licensee's corrective action program as Action Request 755986, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy. **(NCV 05000454/2008002-01; 05000455/2008002-01, Failure to evaluate radiological hazards for alpha radiation.)**

2OS2 As-Low-As-Is-Reasonably-Achievable (ALARA) Planning And Controls (71121.02)

.1 Radiological Work Planning.

a. Inspection Scope

The inspectors evaluated the licensee's list of work activities ranked by estimated exposure that were in progress and reviewed the following work activities of highest exposure significance:

- RWP 10008257; Reactor Head and Upper Internals Lift;
- RWP 10008253; Reactor Head – Disassembly;
- RWP 10008266; Demin Filters – Remove/Replace/Restore; and
- RWP 10008256; Fuel Transfer Cart Inspection.

This inspection constitutes one sample as defined by Inspection Procedure 71121.02.

For these activities, the inspectors reviewed the ALARA work activity evaluations, exposure estimates, and exposure mitigation requirements in order to verify that the licensee had established procedures and engineering and work controls that were based on sound radiation protection principles in order to achieve occupational exposures that were ALARA. This also involved determining that the licensee had reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.02.

b. Findings

No findings of significance were identified.

.2 Verification of Dose Estimates and Exposure Tracking Systems

b. Inspection Scope

The licensee's process for adjusting exposure estimates or re-planning work, when unexpected changes in scope, emergent work or higher than anticipated radiation levels were encountered, was evaluated. This included determining that adjustments to estimated exposure (intended dose) were based on sound radiation protection and ALARA principles and not adjusted to account for failures to control the work. The frequency of these adjustments was reviewed to evaluate the adequacy of the original ALARA planning process. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.02.

c. Findings

No findings of significance were identified.

.3 Job Site Inspections and ALARA Control

a. Inspection Scope

The inspectors observed the following jobs that were being performed in radiation areas, airborne radioactivity areas, or high radiation areas for observation of work activities that presented the greatest radiological risk to workers.

- RWP 10008257; Reactor Head and Upper Internals Lift;
- RWP 10008253; Reactor Head – Disassembly;
- RWP 10008266; Demin Filters – Remove/Replace/Restore; and
- RWP 10008256; Fuel Transfer Cart Inspection.

The licensee's use of engineering controls to achieve dose reductions was evaluated to verify that procedures and controls were consistent with the licensee's ALARA reviews, that sufficient shielding of radiation sources was provided for and that the dose expended to install/remove the shielding did not exceed the dose reduction benefits afforded by the shielding.

This inspection constitutes one sample as defined by Inspection Procedure 71121.02.

Job sites were observed to determine if workers were utilizing the low dose waiting areas and were effective in maintaining their doses ALARA by moving to the low dose waiting area when subjected to temporary work delays.

This inspection constitutes one optional sample as defined by Inspection Procedure 71121.02.

Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.4 Radiation Worker Performance

d. Inspection Scope

Radiation worker and RPT performance was observed during work activities being performed in radiation areas, airborne radioactivity areas, and high radiation areas that presented the greatest radiological risk to workers. The inspectors evaluated whether workers demonstrated the ALARA philosophy in practice by being familiar with the work activity scope and tools to be used, by utilizing ALARA low dose waiting areas and that work activity controls were being complied with. Also, radiation worker training and skill levels were reviewed to determine if they were sufficient relative to the radiological hazards and the work involved. Documents reviewed are listed in the Attachment.

This inspection constitutes one sample as defined by Inspection Procedure 71121.02.

e. Findings

No findings of significance were identified.

4. Other Activities

4OA1 Performance Indicator Verification (71151)

Cornerstone: Initiating Events

.1 Data Submission Issue

a. Inspection Scope

The inspectors performed a review of the data submitted by the licensee for the fourth Quarter 2007 performance indicators for any obvious inconsistencies prior to its public release in accordance with IMC 0608, "Performance Indicator Program."

This review was performed as part of the inspectors' normal plant status activities and, as such, did not constitute a separate inspection sample.

b. Findings

No findings of significance were identified.

.2 Unplanned Scrams per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams per 7000 Critical Hours performance indicator for Byron Unit 1 and for Byron Unit 2 for the period from April 2007 to March 2008. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in Revision 5 of the Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC Inspection reports for the period of April 2007 to March 2008 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment.

This inspection constituted two unplanned scrams per 7000 critical hours samples as defined by Inspection Procedure 71151.

b. Findings

No findings of significance were identified.

.3 Unplanned Scrams with Complications

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications performance indicator for Byron Unit 1 and for Byron Unit 2 for the period from the April 2007 to March 2008. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in Revision 5 of the Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC Integrated Inspection reports for the period of April 2007 to March 2008 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment.

This inspection constituted two unplanned scrams with complications sample as defined by Inspection Procedure 71151.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of items Entered Into the Corrective Action Program

a. Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program (CAP) at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included: the complete and accurate identification of the problem; that timeliness was commensurate with the safety significance; that evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews were proper and adequate; and that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's CAP as a result of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished through inspection of the station's daily condition report packages.

These daily reviews were performed by procedure as part of the inspectors' daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings of significance were identified.

.3 Selected Issue Follow-up Inspection: Plant Barrier Impairment Permit Not Followed

a. Scope

During a review of items entered in the licensee's CAP, the inspectors selected a corrective action item documenting a Plant Barrier Impairment (PBI) as an item for additional follow-up. This item was chosen for follow-up because it involved a risk significant maintenance activity involving a failure to follow procedures. On a periodic basis, NRC inspectors verify licensee compliance with PBIs, however, this PBI had not been selected for verification. Compliance with the PBI had originally been questioned by the Illinois Emergency Management Agency (IEMA) inspector. The NRC inspectors performed significant follow-up to this issue in an effort to ensure appropriate identification and resolution. Documents reviewed are listed in the Attachment.

The above inspection constituted completion of one in-depth problem identification and resolution sample.

b. Findings

Introduction: The inspectors identified a finding of very low safety significance and an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to follow plant procedures. Plant maintenance workers left hoses running through a door that caused the door to be open more than the allowed one inch.

Description: Auxiliary building door 0DSD246 between the Unit 2 Train A Containment Spray pump room and the hallway was required to be partially open to allow hoses for maintenance activities. The licensee's PBI process utilized Procedure BAP 1100 and required that the door be open less than one inch. During the maintenance activities the hoses through the door fell down and the door was determined by the NRC inspectors to be open approximately 3 inches.

After the NRC inspectors notified the licensee the door was closed and an issue report (IR) was issued. Subsequent engineering analysis determined that auxiliary building ventilation system remained operable. The fire protection function portion of the door had previously been declared inoperable and appropriate actions taken.

Analysis: The inspectors determined that the failure to properly control a portion of the auxiliary building ventilation boundary was a performance deficiency warranting a significance evaluation. Using Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," dated September 20, 2007, the inspectors concluded that the finding is greater than minor because, if left uncorrected, the issue would have become a more significant safety concern. The inspectors evaluated the finding using IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Finding," dated January 10, 2008, for the Barriers Cornerstone. The inspectors determined this finding represented a degradation of the radiological barrier function provided by the auxiliary building, therefore, the finding is considered to be of very low safety significance (Green). Additionally, the inspectors determined that the finding had a cross-cutting aspect in the area of human performance. Specifically, Work Control - The licensee plans and coordinates work activities, consistent with nuclear safety. (H.3(a))

Enforcement: 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," required, in part, that activities affecting quality shall be prescribed by procedures and accomplished in accordance to these procedure. Contrary to this, licensee personnel failed to control door 0DSD246 in accordance with BAP 1100 and allowed the door to be open more than the 1 inch allowed. Because this violation was of very low safety significance and was captured in the licensee's corrective action program (IR 719985), it is treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000455/2008002-02)**

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)

.4 (Closed) Licensee Event Report (LER) 05000454/2007-002-00: Technical Specification Required Shutdown of Unit 1 and Unit 2 Due to an Ultimate Heat Sink Pipe Leak Common to Both Unit

On October 19, 2007, the common ultimate heat sink for both Byron units was declared inoperable due to a leaking pipe. The leak was discovered during cleanup of corrosion buildup in preparation for ultrasonic wall thickness examinations. Both units were brought to Mode 5 on October 21, 2007, in accordance with Technical Specification Limiting condition for Operations 3.7.9, Ultimate Heat Sink, Condition G. The licensee repaired the pipe leak as well as other ultimate heat sink piping vulnerable to external corrosion and returned to full power on November 2, 2007. Documents reviewed are listed in the Attachment.

The inspectors reviewed the licensee's LER. The regulatory aspects of this issue were documented in Special Inspection Report 05000454/2007009; 05000455/2007-009 and Notice of Violation EA-08-046. This LER is closed.

.5 (Closed) LER 05000454/2007-003-00: Technical Specification Non-Compliance on a Single Reactor Trip Instrument Channel due to an Instrument Maintenance Procedure Revision Error

On January 4, 2008, during the performance of the channel operational test for the Unit 1 Trane B reactor coolant delta temperature / average temperature protection channel, licensee instrument maintenance technicians identified an incorrect jumper installation. It was determined that the jumper had been installed on October 5, 2007. The channel remained inoperable until discovery and correction on January 4, 2008. The licensee determined the cause to be a revision to the calibration procedure that introduced the incorrect jumper configuration. Corrective actions included a revision to the specific calibration procedure, a review of other procedure revisions involving the same preparer and reviewer. Documents reviewed are listed in the Attachment.

The LER was reviewed by the inspectors. The regulatory aspects of this issue were documented in Section 4OA7 of this report. This LER is closed.

.6 (Open) Unresolved Item (URI) 05000455/2008002-03: Unit 2 Notice of Unusual Event due to Loss of Both System Auxiliary Transformers (SAT)

On March 25, 2008, Unit 2 SAT 242-2 de-energized upon receipt of a C phase to ground relay actuation. As designed the upstream switchyard breakers opened de-energizing both SAT 242-1 and 242-2. Also as designed the downstream breakers opened

resulting in a fast transfer of the 6.9KiloVoltage buses to the Unit Auxiliary Transformers and the transfer of the 4KiloVoltage buses to the emergency diesel generators which had automatically started. The licensee entered a Notification of Unusual Event and the NRC entered the Monitoring Mode. The licensee subsequently transferred the 4KiloVoltage loads to the Unit 1 SATs and began troubleshooting efforts. Following verification that a fault did not exist on the SAT 242-1 circuit all Unit 2 house loads were transferred to SAT 242-1. Subsequently the licensee exited the Unusual Event and the NRC exited the Monitoring Mode.

The inspectors reviewed the plant's and the operators' responses to the loss of both unit SATs to determine if the responses were appropriate and in accordance with design, procedures and training.

At the close of the inspection period additional information was required to determine if the loss of the SAT was a finding, or if it constituted a deviation or violation. The additional information needed was the results of the licensee's root cause evaluation and proposed corrective actions. Based on the root cause of the fault a possible performance deficiency existed and the root cause analysis would assist the inspectors in making such a determination. Documents reviewed are listed in the Attachment. **(URI 05000455/2008002-03)**

.7 (Open) Unresolved Item 05000454/2008002-04: Unit 1 Train B Auxiliary Feedwater Pump Diesel Fire and Shutdown During Surveillance

On March 21, 2008, during a routine 18 month surveillance test, the operator in the room reported that the diesel was on fire. The diesel driven pump was shut down and declared inoperable resulting in the licensee entering 72 hour shutdown Limiting Condition for Operation 3.7.5. Subsequently the licensee performed a planned shutdown for a refueling outage, exiting the applicable modes and negating the need to repair the diesel within 72 hours. The refueling outage continued past the end of the inspection report period.

The inspectors observed plant personnel responding to an unexpected fire during the surveillance test. The inspectors were in the control room to observe the surveillance test when a fire developed at the AF diesel engine. The inspectors responded to the diesel engine room and observed the fire brigade activities and subsequent operability determination of the AF pump.

At the close of the inspection period additional information was required to determine if the failure of the 1B was acceptable, was a finding, or if it constituted a deviation or violation. Additional information needed included the results of the licensee's cause evaluation and proposed corrective actions. Based on the root cause of the fire a possible performance deficiency existed and the cause analysis would assist the inspectors in making such a determination. Documents reviewed are listed in the Attachment. **(URI 05000455/2008002-04)**

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted the following observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

- Multiple tours of operations within the security alarm stations;
- Tours of selected security officer response posts;
- Direct observation of personnel entry screening operations within the plant's Main Access Facility; and
- Security force shift turnover activities.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On April 11, 2008, the inspector presented the inspection results to Mr. D. Hoots, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Interim Exit Meetings

An interim exit was conducted for:

- Occupational radiation safety program for Access to Radiologically Significant Areas and ALARA Planning and Controls with Mr. D. Hoots and other members of the licensee's staff on March 28, 2008. The licensee acknowledged the issues presented. The inspector asked the licensee 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 significance (Green) were identified by the licensee and were violations of NRC requirements, which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

Cornerstone: Mitigating System

- Technical Specification 3.3.1, Condition E allowed one channel of reactor trip instrumentation to be inoperable indefinitely provided it is placed in the tripped condition within 6 hours. On January 4, 2008, during the performance of the channel operational test for the Unit 1 Train B reactor coolant delta temperature/average temperature protection channel licensee instrument maintenance technicians identified an incorrect jumper installation. It was determined that the jumper had been installed in accordance with procedures which were incorrect on October 5, 2007. The channel remained inoperable until discovery and correction on January 4, 2008. The channel had not been placed in the tripped condition in violation of TS 3.3.1, Condition E. The one channel of reactor trip instrumentation was inoperable through the forced shutdown and Mode change in October 2007. This issue was documented in the licensee's corrective action program as IR 717993. This issue represented a finding of very low safety significance because the other three channels of reactor trip instrumentation remained operable during the same time frame. The 1B channel remained available but the effect of the jumper would have been to delay the dynamic compensation designed into the channel.

Cornerstone: Barrier Integrity

- Technical Specification 5.4.1 requires that written procedures be established and implemented for activities provided in Appendix A of Regulatory Guide 1.33, Revision 2. Procedures specified in Regulatory Guide 1.33 include general procedures for the control of maintenance. Byron Procedure MA-BY-716-026-1001, Seismic Housekeeping, provides guidance and requirements for storage and staging of temporary plant equipment that was used to support plant maintenance. The use of this procedure would prevent temporary stored items from adversely impacting safety-related components during or following a seismic event. Contrary to these requirements, materials were transitionally staged in the Unit 2 Train B containment spray room following the Unit 2 Train B residual heat removal pump overhaul without proper restraint per procedure. This issue was documented in the licensee's corrective action program as IR 733689 and IR 733692. This issue represented a finding of very low safety significance because it did not involve an actual open pathway or an actual reduction in function of hydrogen removal equipment in the reactor containment.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Hoots, Site Vice President
W. Grundmann, Regulatory Assurance Manager
B. Askren, Security Manager
B. Barton, Rad Engineering Manager
D. Thompson, Radiation Protection Manager

Nuclear Regulatory Commission

R. Skokowski, Chief, Reactor Projects Branch 3
C. Settles, Section Head, Resident Inspection and Code Compliance, IEMA

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000454/2007-002-00	LER	Technical Specification Required Shutdown of Unit 1 and Unit 2 Due to an Ultimate Heat Sink Pipe Leak Common to Both Units.
05000454/2007-003-00	LER	Technical Specification Non-Compliance on a Single Reactor Trip Instrument Channel due to an Instrument Maintenance Procedure Revision Error
05000454/2008002-01	NCV	Failure to Evaluate Radiological hazards for Alpha Radiation
05000455/2008002-02	NCV	Plant Barrier Impairment Permit Not Followed
05000455/2008002-03	URI	Unit 2 Notice of Unusual Event Due to Loss of Both System Auxiliary Transformers
05000454/2008002-04	URI	Unit 1 Train B Auxiliary Feedwater Pump Diesel Fire and Shutdown During Surveillance

Closed

05000454/2007-002-00	LER	Technical Specification Required Shutdown of Unit 1 and Unit 2 Due to an Ultimate Heat Sink Pipe Leak Common to Both Units.
05000454/2007-003-00	LER	Technical Specification Non-Compliance on a Single Reactor Trip Instrument Channel due to an Instrument Maintenance Procedure Revision Error
05000454/2008002-01	NCV	Failure to Evaluate Radiological Hazards for Alpha Radiation
05000455/2008002-02	NCV	Plant Barrier Impairment Permit Not Followed

LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspector reviewed the documents in their entirety, but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

1R04 Equipment Alignment

- Drawing M-122; Diagram of Auxiliary Feedwater, Revision AW
- Drawing M-2122; P&ID/C&I Diagrams Auxiliary Feedwater Byron/Braidwood Station Unit 2, Revision F
- Drawing M-2122; P&ID/C&I Diagrams Auxiliary Feedwater Systems, Byron Station Unit 2, Revision E
- Drawing M-2122; P&ID/C&I Diagram Auxiliary Feedwater System Byron Station Unit 2, Revision L
- BOP AF-E2C; Auxiliary Feedwater Train "C" Electrical Lineup, Revision 1
- BOP AF-E2A; Auxiliary Feedwater Train "A" Electrical Lineup,, Revision 1
- BOP AF-E2; Auxiliary Feedwater Electrical Lineup, Revision 5
- BOP AF-M2A; Auxiliary Feedwater System Train "A" Valve Lineup
- BOP AF-ME' Auxiliary Feedwater System Valve Lineup, Revision 10
- BOP AF-M2C; Auxiliary Feedwater System Train "C" Valve Lineup, Revision 1

1R05 Fire Protection

- Drawing A-278; Auxiliary Building Ventilating Room Floor Plan Elevation 467'-4" , Area 6, Revision AH
- Drawing A-1237; Block Wall Elevations, Revision C
- Fire Protection Report; Section 2.3.11.59, December 1998
- Engineering Change 369384; Evaluate 3 Hour Fire Wall with Partial Floor Drain, Revision 0
- Figure 2.3-5; Fire Protection Report, Floor at Elevation 467'-4" Auxiliary Building Ventilation Room, December 1998
- Figure 2.3-6; Fire Protection Report, Auxiliary Building Ventilation Room,
- Pre Fire Plan; Auxiliary Building General Area 364', South, January 31, 2007
- Pre Fire Plan; Auxiliary Building General Area 364', West, January 31, 2007
- Pre Fire Plan; Auxiliary Building General Area, 364' North. January 31, 2007
- IR 742848; Fire Protection Surveillance Action Plan and Discussion, February 29, 2008
- IR 727611; Need WR to T/S and Clear Annunciator 0-31-D9, January 28, 2008
- IR 727616; Need WR to T/S and Clear Annunciator 0-34-D8, January 28, 2008
- IR 728529; Walkdown of Fire Zone 11.7 Unit 2, January 29, 2008
- IR 728560; Unit 1 HVAC Panel Room, January 29, 2008
- IR 731340; TRM Procedure, February 04, 2008
- IR 731924; TRM Surveillance, February 05, 2008
- IR 736311; Loose Fire Door Astragal Makes Fire Door Inoperable, February 14, 2008
- Byron Station Pre-Fire Plans; Auxiliary Building – 463' Elevation – Upper Cable Spreading Room – Zone 3.3A-1, Revision 4
- IR 736324; Missed TRM Inspections of Fire Barriers, February 14, 2008
- Section 2.4.2.127; Auxiliary Building HVAC Exhaust Complex (Fire Zone 11.7-0)
- Byron Station Pre-Fire Plans; Zone 11.7-0, Revision 6

- Table A5.8.2; Deviation No: 0A.2, December 2002
- Table 2.4-1; Systems Required to Perform Safe Shutdown Functions, December 2004
- IR 719985 4D; PBI Compensatory Action Not Followed, January 09, 2008
- IR 727499; Unplanned LCOAR, NRC Identified Degraded Fire Seal, January 27, 2008
- IR 727515; Unplanned LCOAR Due to Fire Door 0DSD-181 Inoperable, January 27, 2008
- IR 727525; NRC Identified Several Issues When on Plant Tour, January 27, 2008
- IR 728113; NRC Identified Housekeeping Concern 459' Auxiliary Building, January 27, 2008
- IR 728117; NRC Identified General Area Lighting Concern, January 27, 2008
- IR 728431; Procedures Missing from Local Bar Book, January 28, 2008
- IR 728551; Fire Wall Inoperable Based on Drain Underneath Wall, January 29, 2008

1R07 Heat Sink Performance

- WO 1074731; 1SX01AB 0 HX Inspection Per Generic Letter 89-13, February 28, 2008

1R12 Maintenance Effectiveness

- Drawing 6E-2-4031FW69; Loop Schematic Diagram Feedwater Control System Loop 2C Digital Positioner Control Cabinet 7 Part 3, Revision D
- Drawing 6E-2-4031MS03; Loop Schematic Diagram SG "2C" Flow & Press Protection (2FT-0530.0532, 2PT-0534) Protection Cabinet 1 (2PA01J), Revision I
- Drawing 6E-2-4031FW25; Steam Generator Narrow Range Level Loop 2B & 2C (2LT 0557 0558) Protection Cabinet 2 (2PA02J), Revision G
- Drawing 6E-2-4031FW18; Loop Schematic Diagram Feedwater Control System Loop 2C I/P Converter Control Cabinet 7 Part 1 (2PA07J), Revision F
- Drawing 6E-2-4031FW68; Loop Schematic Diagram Feedwater Control System Loop 2C I/P Converter Control Cabinet 7 Part 2 (2PA07J) Revision G
- Maintenance Rule Evaluation for Feedwater System, February 15, 2008
- IR 740671; 2FCY-0530 Failed to Control in Auto, February 25, 2008
- Maintenance Rule Evaluation for Engineered Safety Feature System, February 11, 2008
- Maintenance Rule Performance Criteria – Engineered Safety Feature System
- Westinghouse 7300 System NTD (2838A45G01) Circuit Card Trending, February 29, 2008

1R13 Maintenance Risk Assessments and Emergent Work Control

- Unit 1 Risk Configurations; Weeks of March 03, 2008, Revision 6 & March 17, 2008, Revision 4
- Protected Equipment Log, January 13, 2008
- Unit 2 Risk Configurations; Weeks of January 14, 2008, Revision 2, February 04, 2008, Revision 1, February 25, 2008, and March 24, 2008
- Policy No: 400-47; Byron Operating Department Policy Statement, On Line Risk/Shutdown Risk/Protected Equipment, Revision 12
- WC-AA-101; On Line Work Control Process, Revision 13
- WC-AA-101; On Line Work Control Process, Revision 14
- BB PRA-017.77B; Risk Assessment – Heavy Load Lift – 2B RH Floor Plugs, Revision 0
- Protected Equipment Log, February 04, 2008
- Protected Equipment Log, March 18, 2008
- Protected Equipment Log, March 23, 2008
- Protected Equipment Log, March 25, 2008
- WC-AA-101, Attachment 9; High Risk Evolution Determination, Revision 14

1R15 Operability Evaluations

- EC 339734; Evaluation of Past Operability of 2B SX Pump W/30 D/Min Oil Leak, November 11, 2002
- EC 352636; Floor Plugs for the 2B RH Pump Need to be Removed and Stacked, Revision 0
- EC 363001; Evaluate Structural Steel at Elevation 374' in Area 7 for Rigging of 2B RH Floor Plugs (2DSP303), Revision 0
- EC 370080 00; Engineering Evaluation of the SAT 242-1 Testing Requirements Following the Actuation of the Differential Protection for SAT 242-2, March 27, 2008
- WO 408112 41; See Support Floor Plug Removal, February 08, 2008
- WO 1097109 09; ECCS Room DP with Floor Plug Restored, January 31, 2008
- WO 1097109 08; ECCS Room DP During Floor Plug Removal, January 31, 2008
- WO 1097109 07; ECCS Room DP Testing Before Removal of Floor Plug, January 30, 2008
- Drawing 6E-0-4030SX10; Schematic Diagram Essential Service Water Make-up Pump 0B 0SX02PB, Revision p
- Drawing 6E-0-4030SX09; Schematic Diagram Essential Service Water Make-up pump 0A 0SX02PA, Revision 0
- Drawing 6E-2-4001A; Station One Line Diagram, Revision N
- Drawing 6E-2-4016D; Relaying & Metering Diagram Differential Relay Transfer Scheme System Auxiliary Transfer 242-1 and 242-2, Revision D
- Drawing H-5573-DN; Essential Service Water Make-up Pump Outline, Revision 7
- Operability Evaluation – EC 369012; 0B SX M/U Pump Stuffing Box Lower Bushing Concern
- IR 092998; Heating Observed on 0A SX M/U Pump Seal Housing, January 29, 2002
- IR 713008; Unplanned LCOAR Entry 0A SX MU Pump, December 18, 2007
- IR 717883; Need SX Makeup Pump Spare Parts Expedited, January 03, 2008
- IR 722216; Possible Degradation of the Mechanical Seal Box, January 14, 2008
- IR 723862; CCA Recommended on Timeliness of Implementing Actions, January 17, 2008
- IR 723359; Application of 0B SX M/U Pump Results to 0A SX M/U Pump, January 17, 2008
- IR 723394; 0B SX M/U Pump Crankcase Oil Level, January 17, 2008
- IR 737422; Minor Oil Leak at Inboard Oil Return Sightglass, February 17, 2008
- BAR 0-37-A8; SX Cooling Tower Basin level High Low, Revision 8
- BAR 0-37-B7; SX Makeup Pump Auto Start, Revision 7
- Design Summary EC 369021; Provide Alternate Detail to Secure the 0A & 0B Essential Service Water Makeup Pump Lower Bushing to the Mechanical Seal Stuffing Box, Revision 0
- Byron UFSAR; Section 9.2.5.2.2, Category I Essential Service Water Makeup Pump System
- Byron UFSAR; Section 9.2.5.5, Instrumentation Requirements
- Figure 9.2-28; Byron River Screen House, Byron Station Updated Final Safety Analysis Report
- BOP SX-300-1; Sampling the Essential Service Water Pumps Lubricating Oil Reservoirs (SX01PA,B), Revision 6
- Policy No: 400-29; Byron Operating Department Policy Statement, Guidance on Performing Operating Round Including Electronic Rounds, Revision 7
- 0BOSR NLO-TRM; Non-Licensed Operator TRM and NPDES Data Daily Logs, Revision 5
- OP-AA-102-102; General Area Checks and Operator Field Rounds, Revision 5
- Policy No: 400-33; Byron Operations Department Policy Statement, Non-Licensed Operator Auxiliary Building U-2 Logs (12-Hour), Revision 6

Corrective Action Documents as a Result of NRC Inspection

- IR 723780; NRC Question on SXCT Level Control, January 17, 2008

1R18 Permanent Plant Modifications

- EC 366122 001; Install Check Valve in 0SX10BB-12 in Valve Chamber A-2, March 08, 2008
- WO 1036952 15; SEP – PMT Flow Test
- WO 1109744 01; 0SX02PB Comprehensive IST REQ for SX MU Pump, March 12, 2008
- WO 1036952 25; ST Verify Valve Hinge Pin is Installed in Vertical Position, March 11, 2008
- WO 1036952 27; ST Verify Valve Installed in Proper Flow Direction, March 11, 2008
- WO 1036952 23; ST EPP Perform NDE Surface Exams on Welds, March 14, 2008
- WO 1036952 15; SEP – PMT Flow Test, March 12, 2008
- WO 1036952 08; SEP-VT-2 Leak Check at NOP/NOT & Temperature, March 12, 2008
- WO 1036952 14; Unit 1 Check Valve Non-Intrusive Testing, March 12, 2008

1R19 Post Maintenance Testing

- IR 723771; 2A DG Slow Start Unsuccessful After Work Window, January 17, 2008
 - IR 733689; Entered 2BOL 6.6 Material From 2B RH Work Window in 2B CS RM, February 08, 2008
 - WO 910242 01; 2A DG ESF Auto Start, Non Emergency Trip Bypass and Generator Differential Trip Test, January 17, 2008
 - WO 983139 01; Repair Seal Weld Leak, January 23, 2008
 - WO 983139 02; Operations PMT Verify No Leakage, January 23, 2008
 - WO 945366 01; Perform Non-Intrusive Cleaning and Inspection, January 23, 2008
 - WO 945366 02; Operations Run Cooler and Check for Proper Operation, January 23, 2008
 - WO 1080664 01; 2RH01PB Group A IST Requirements for Residual Heat Removal Pump, February 08, 2008
 - WO 408112 39; OPS PMT Verification 2DSP303, February 10, 2008
 - WO 408112 10; OP Functional Test, February 08, 2008
 - WO 408112 11; OP Visual (NON-ISI), February 08, 2008
 - WO 663710 01; Replace Unlabeled Spray Valve to the 1A CV Pump Gear Box, January 23, 2008
 - WO 663710 02; Operations PMT Verify Gear Oil Pressure 15-20 PSIG, January 24, 2008
 - Drawing 1918C55, Revision 6
 - Mobilgear 600 XP Series: Gear Oil, Product Description
- IR 725892; Local Light 0LL075E Trickle Charge Light Not Lit, January 23, 2008

1R20 Outage Activities

- Selected B1R15 Shutdown Risk, March 24, 2008 – March 31, 2008
 - Selected B1R15 OCC Turnover, March 24, 2008 – March 31, 2008
 - Selected B1R15 Outage News, March 24, 2008 – March 31, 2008
- NRC Identified Items During Their Initial Walkdown for B1R15, March 24, 2008

1R22 Surveillance Testing

- WO 1054582 01; 2B Diesel Generator Operability Semi-Annual Surveillance, February 07, 2008
- WO 1080681 03; EM Hookup/Remove Recorder – Per 2BOSR 8.1.2-2, February 07, 2008
- WO 1054582 04; Unit 2 Pre-Cal Yokogawa Recorder for 2BOSR 8.1.2-2 DG Test, February 07, 2008

- WO 1062179 01; 1CS01PB Comprehensive IST Requirements for Containment Spray Pump, March 25, 2008
- Report #: 08-017; IST Pump Evaluation Form, Pump EPN 1CS01PB, March 25, 2008
- Drawing 9506D30; AC Motor Frame Outline, Revision 4
- IR 755048; Motor AMP Discrepancy During Unit 1 CS Full Flow Testing, March 26, 2008

2OS1 Access Control to Radiologically Significant Areas

- AR 753770; B1R15LL – Lack Of Dedicated Rigging Personnel To Support RP; March 24, 2008
- AR 753606; High Rad Turnstiles Are Too Large; March 24, 2008
- AR 753718; Entire Work Crew Did Not Receive Pre-Job Brief; March 24, 2008
- AR 753547; R2 Containment Evacuation Strobe Light Not Working; March 23, 2008
- AR 755986; Alpha Survey Documentation Gaps; March 28, 2008
- RP-AA-441; Evaluation And Selection Process For Radiological Respirator Use; Revision 4
- RP-AA-300; Radiological Survey Program; Revision 4
- RP-AA-302; Determination Of Alpha Monitoring Levels; Revision 1
- RP-AA-210; Dosimetry Issue, Usage, And Control; Revision 11
- RWP 10008257; Rx Head And Upper Internals Lift/Remove/Restore; Revision 0
- RWP 10008253; Rx Head – Disassemble/Reassemble – All Activities; Revision 0
- RWP 10008266; Demin Filters – Remove/Replace/Restore; Revision 0
- RWP 10008256; Fuel Transfer Cart Inspection And Repairs; Revision 0

2OS2 As Low As Reasonably Achievable Planning And Controls

- AR 754069; Site May Benefit From Dose Tracking Database; March 24, 2008
- RP-AA-401; Operational Alara Planning And Controls; Revision 8
- RWP 10008257; Rx Head And Upper Internals Lift/Remove/Restore; Revision 0
- RWP 10008253; Rx Head – Disassemble/Reassemble – All Activities; Revision 0
- RWP 10008266; Demin Filters – Remove/Replace/Restore; Revision 0
- RWP 10008256; Fuel Transfer Cart Inspection And Repairs; Revision 0

4OA1 Performance Indicator Verification

- IR 732826; NRC Unplanned Power Change PI Discrepancy, February 07, 2008

4OA2 Problem Identification and Resolution

- IR 719985; PBI Compensatory Action Not Followed, January 09, 2008
- IR 730101; NRC Identified Issue IR 725599 Not Entered in DEL, February 01, 2008
- IR 739352; Procedure Revision Needed to Remove Jordan Memo Reference, February 21, 2008

4OA3 Followup of Events and Notices of Enforcement Discretion

- WO 1069140 01; Functional Test for Loop 1T-0421 Delta T/TAVG Protection, October 11, 2007
- 1BISR 3.1.7-002; Channel Operation Test of Delta T/Tave Loop 1B Protection Channel II (1RC-0421), Revision 13

LIST OF ACRONYMS USED

AF	Auxiliary Feedwater System
ALARA	As-Low-As-Is-Reasonably-Achievable
CAP	Corrective Action Program
CFR	Code of Federal Regulations
EDG	Emergency Diesel Generator
HRA	High Radiation Area
IEMA	Illinois Emergency Management Agency
IMC	Inspection Manual Chapter
IR	Issue Report
IST	Inservice Testing
LER	Licensee Event Report
NCV	Non-Cited Violation
NRC	U.S. Nuclear Regulatory Commission
PBI	Plant Barrier Impairment
PI	Performance Indicators
RPT	Radiation Protection Technician
RWP	Radiation Work Permit
SAT	System Auxiliary Transformer
SDP	Significance Determination Process
SX	Essential Service Water System
TS	Technical Specification
URI	Unresolved Item
UFSAR	Updated Final Safety Analysis Report
VHRA	Very High Radiation Area