

November 8, 2006

Mr. Christopher M. Crane  
President and Chief Nuclear Officer  
Exelon Nuclear  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: BYRON STATION, UNITS 1 AND 2 NRC INTEGRATED INSPECTION  
REPORT 05000454/2006004; 05000455/2006004

Dear Mr. Crane:

On September 30, 2006, 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 findings which were discussed on October 03, 2006, with Mr. Dave 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.

This report documents three NRC-identified findings of very low safety significance (Green). All three 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. However, because of the very low safety significance of the violations and because they were entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) consistent 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, D.C. 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, D.C. 20555-0001; and the Resident Inspector office at the Byron facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA PLOUDEN acting for/**

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 05000454/2006004; 05000455/2006004;  
w/Attachments 1: Supplemental Information  
2: Confirmatory Measurements Comparison Chart  
3: Tritium Sample Results

cc w/encl: Site Vice President - Byron Station  
Plant Manager - Byron Station  
Regulatory Assurance Manager - Byron Station  
Chief Operating Officer  
Senior Vice President - Nuclear Services  
Vice President - Mid-West Operations Support  
Vice President - Licensing and Regulatory Affairs  
Director Licensing  
Manager Licensing - Braidwood and Byron  
Senior Counsel, Nuclear  
Document Control Desk - Licensing  
Assistant Attorney General  
Illinois Emergency Management Agency  
State Liaison Officer, State of Illinois  
State Liaison Officer, State of Wisconsin  
Chairman, Illinois Commerce Commission  
B. Quigley, Byron Station

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report Nos: 05000454/2006004; 05000455/2006004

Licensee: Exelon Generation Company, LLC

Facility: Byron Station, Units 1 and 2

Location: 4450 N. German Church Road  
Byron, IL 61010

Dates: July 01, 2006, through September 30, 2006

Inspectors: B. Bartlett, Senior Resident Inspector  
R. Ng, Resident Inspector  
E. Bonano, Health Physicist  
J. Cassidy, Health Physicist  
T. Go, Health Physicist  
M. Kurth, Resident Inspector  
W. Snell, Senior Health Physicist  
C. Thompson, Resident Inspector, Illinois Emergency  
Management Agency

Observer: L. Killian, Nuclear Safety Professional

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

## SUMMARY OF FINDINGS

IR 05000454/2006004; 05000455/2006004; on 07/01/2006-09/30/2006; Byron Station, Units 1 and 2; Fire Protection; and Radiation Protection.

This report covers a 3-month period of baseline resident inspection and announced baseline inspections on Radiation Protection and Temporary Instruction (TI) 2515/166, "Pressurized Water Reactor Containment Sump Blockage." These inspections were conducted by four regional inspectors and the resident inspectors. Three Green findings, all of which were non-cited violations (NCV), were identified. 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. NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### A. Inspector-Identified and Self-Revealed Findings

#### **Cornerstone: Mitigating Systems**

Green. The inspectors identified a Non-Cited Violation of Byron Facility Operating License Nos. NPF-37 and NPF-66, Condition 2.c.6, for failing to maintain the firewall separating the Auxiliary Building from the penetration area in accordance with the approved fire protection program. Fire seals were required to be provided in this firewall, except where an evaluation had been performed and approved to allow a deviation. Two sleeves containing fire seals had pulling ropes embedded in the fire seals in the firewall separating the Auxiliary Building General Area 401 from the Unit 1 piping penetration area; also, no evaluation or exemption existed to justify this configuration. The licensee entered the issue into its corrective action program for resolution and implemented compensatory measures that included hourly fire watches.

This finding was more than minor because it affected the Mitigating Systems Cornerstone objective to ensure that external factors (i.e., fire, flood, etc) do not impact the availability, reliability, and capability of systems that respond to initiating events. The finding was of very low safety significance because the fire seals were in small diameter sleeves that traveled a distance of 45 feet and had two 90 degree bends and the location of combustibles were positioned such that the piping penetration end of the fire seals would not be subject to direct flame impingement. (Section 1R05)

#### **Cornerstone: Occupational Radiation Safety**

Green. An inspector-identified finding of very low safety significance and two associated Non-Cited Violations of NRC requirements were identified for the failure to post and control access to High Radiation Areas, as required by 10 CFR Part 20, to notify individuals of the radiological hazard present and to prevent the unauthorized entry to such areas. Specifically, the entrance to the Unit 1 Filter Valve Aisle located on the 383' elevation of the Auxiliary Building, a high radiation area with a radiation dose rate of approximately 135 millirem in one hour, was not posted or controlled by any of the

methods described in 10 CFR 20.1902, 10 CFR 20.1601, or Technical Specification 5.7.1.

The issue was more than minor because the issue was associated with the Program/Process attribute of the Occupational Radiation Safety Cornerstone and affected the cornerstone objective to ensure adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. The issue represents a finding of very low safety significance because the finding did not constitute an ALARA or work control issue, did not result in an overexposure or the substantial potential for an overexposure, and did not compromise the licensee's ability to assess dose. Non-Cited Violations of 10 CFR 20.1902 and 10 CFR 20.1601 were identified for the failure to post and control access to high radiation areas. Corrective actions taken by the licensee for this finding included establishing control through postings and barricades. The cause of this finding is related to the cross-cutting element of human performance. (Section 2OS1).

### **Cornerstone: Public Radiation Safety**

Green. An inspector-identified finding of very low safety significance and an associated Non-Cited Violation of NRC requirements were identified for the failure to perform surveys that are necessary to comply with the regulations in 10 CFR Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present prior to pumping liquids from blowdown line vacuum breaker valve vaults to the environment. Specifically, the conditions found at 0CW276 (vault No. 6) on July 7, 2005, were outside the parameters of the original assessment, and the licensee did not evaluate the change of conditions for the potential radiological hazards to ensure compliance with 10 CFR 20.1301, which limits radiation exposure to a member of the public to 0.1 rem.

The issue was more than minor because the issue was associated with the Program/Process attribute of the Public Radiation Safety Cornerstone and affected the cornerstone objective to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. Since the releases were limited to licensee owned property, the licensee has not measured any licensed material beyond its property line, and the licensee's REMP has a monitoring well in the vicinity of the blowdown lines, the finding did not represent a failure to assess dose nor a failure to assess the environmental impact. Consequently, the finding was determined to be of very low safety significance. A Non-Cited Violation of 10 CFR 20.1501 was identified for the failure to make surveys to ensure compliance with 10 CFR 20.1301, which limits radiation exposure to a member of the public to 0.1 rem. Corrective actions taken by the licensee for this finding included performing surveys of the soil surrounding the vacuum breaker vault for radionuclides, establishing additional groundwater monitoring wells, sealing the vacuum breaker vaults, and installing of an automated leak detection system. The cause of this finding is related to the cross-cutting element of problem identification and resolution. (Section 2PS1).

**B. Licensee Identified Violations**

Two violations of very low safety significance, which were identified by the licensee, have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and the licensee's 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 first part of the inspection period. On August 25, 2006, the unit commenced a coast down for the upcoming refueling outage. On September 10, 2006, at 11:00 p.m. the licensee opened the main generator output breaker and entered a planned refueling outage. At the end of the report period the licensee was still in the outage.

Unit 2 operated at or near full power throughout the inspection period with the following exception: on July 29, 2006, Unit 2 power was reduced to approximately 63% due to offsite transmission line issues. The unit was returned to full power the following day.

### **1. REACTOR SAFETY**

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

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

The inspectors performed three partial walkdown samples of accessible portions of trains of risk-significant mitigating systems equipment during times when the trains were of increased importance due to the redundant trains or other related equipment being unavailable. The inspectors utilized the valve and electric breaker lineups and applicable system drawings to determine that the components were properly positioned and that support systems were lined up as needed. The inspectors also examined the material condition of the components and observed operating parameters of equipment to determine that there were no obvious deficiencies. The inspectors used the information in the appropriate sections of the UFSAR and TS to determine the functional requirements of the systems.

The inspectors verified the alignment of the following:

- Unit 2 Emergency Core Cooling System;
- Unit 1 Electrical Bus 131X; and
- Unit 2 Train A Emergency Diesel Generator.

The inspectors also reviewed selected issues documented in IRs, to determine if they had been properly addressed in the licensee's corrective action program. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.2 Complete Walkdown

a. Inspection Scope

During the inspection, the inspectors finished one complete system alignment inspection of the accessible portions of the Spent Fuel Pool Cooling system after Unit 1 core was offloaded. This system was selected because it was considered both safety-related, and risk significant for the plant condition. The inspection consisted of the following activities:

- a review of plant procedures (including selected abnormal and emergency procedures), drawings, and the UFSAR to identify proper system alignment;
- a review of outstanding work requests on the system;
- a review of outstanding temporary modifications on the system;
- a review of the system health information; and
- a walkdown of the system to determine proper alignment, component accessibility, availability, and current condition.

The inspectors also reviewed selected issues documented in IRs, to determine if they had been properly addressed in the licensee's corrective actions program. The documents reviewed during this inspection were listed in the Attachment at the end of this report.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Walkdowns

a. Inspection Scope

The inspectors conducted fire protection walkdowns that were focused on availability, accessibility, and the condition of fire fighting equipment; the control of transient combustibles and ignition sources; and on the condition and operating status of installed fire barriers. The inspectors reviewed applicable portions of the Byron Station Fire Protection Report and selected fire areas for inspection based on their overall contribution to internal fire risk, as documented in the Individual Plant Examination of External Events Report.

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 that fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The Byron Station Pre-Fire Plans applicable for each area inspected were used by the inspectors to determine approximate locations of firefighting equipment.

The inspectors completed eight inspection samples by examining the plant areas listed below to observe conditions related to fire protection:

- Circulating Water Pump House (Zone 18.12-0);
- Auxiliary Building Elevation 383' General Area (Zone 11.4-0);
- Auxiliary Building Elevation 401' General Area (Zone 11.5-0);
- Turbine Building 451' General Area (Zone 8.6-0);
- Unit 2 Division 21 Miscellaneous Electrical Equipment and Battery Room (Zone 5.2-2);
- Unit 2 Auxiliary Electrical Equipment Room (Zone 5.5-2);
- Unit 1 Train B Diesel Generator & Day Tank Room (Zone 9.1-1 & 9.4-1); and
- Unit 1 Containment Pipe Penetration Area (Zone 11.3-1).

The inspectors reviewed selected issues documented in CRs, to determine if they had been properly addressed in the licensee's corrective action program. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

Failure to Maintain Fire Barriers in Accordance with Fire Protection Program

Introduction: The inspectors identified a Green finding and associated Non-Cited Violation of Byron Facility Operating License Nos. NPF-37 and NPF-66, Condition 2.c.6, for failing to maintain the firewall separating the Auxiliary Building from the penetration area in accordance with the approved fire protection program.

Description: On September 25, 2006, during a routine fire protection walkdown of the Unit 1 auxiliary building mechanical penetration room, referred to by the licensee as Area 5, the inspectors noted that there were ropes running through fire barriers in 5 inch diameter conduit in cable tray 1757D C1E. The inspectors notified the licensee who performed an independent walkdown and verified the installation of unapproved material in the fire seals. This was inconsistent with Section 2.3.11.41 of the Fire Protection Report, which described the fire area analysis for the 401 elevation of the Auxiliary Building and stated that rated fire barriers separate this zone from the remainder of the plant.

The inspectors reviewed the Fire Protection Report and did not identify any existing deviations allowing for the existence of this condition. The licensee entered this issue in their corrective action program for resolution (IR 536504) and implemented compensatory actions that included hourly fire watches. By the end of the report period the licensee had repaired the fire seals, restoring them to operable and then suspended the compensatory actions.

Analysis: The inspectors determined that the licensee's failure to maintain the fire seal between fire zone 11.3-1 and fire zone 11.5-0 in accordance with the approved fire protection program was a performance deficiency warranting a significance determination. Furthermore, the issue was considered more than minor because the

finding affected the attribute of protection against external factors (i.e. fire) of the Mitigating System Cornerstone. This finding was of very low safety significance because the fire seals were of small diameter, traveled 45 feet with two 90 degree bends and the location of combustibles were positioned such that the piping penetration end of the fire seals would not be subject to direct flame impingement.

Enforcement: Byron Plant Operating License Condition 2.c.6 stated, in part, that “The licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR.” Section 9.5.1 of the UFSAR stated that “The design bases, system descriptions, safety evaluation, inspection and testing requirements, personnel qualification, and training are described in Reference 1 [the Fire Protection Report].” Contrary to the above, the licensee failed to maintain the firewall separating the Auxiliary Building from the penetration area in accordance with the approved fire protection program. Fire seals were required to be provided in this firewall, except where an evaluation had been performed and approved to allow a deviation. Two sleeves containing fire seals had pulling ropes embedded in the fire seals in the firewall separating the Auxiliary Building General Area 401 from the Unit 1 piping penetration area; also, no evaluation or exemption existed to justify this configuration. Because this issue was entered into the corrective action program as IR 536504, and the finding was of very low safety significance, this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy. (NCV 05000454/2006004-01; 05000455/2006004-01, Failure to Maintain Fire Barrier in Accordance with Fire Protection Program)

.2 Annual Drill Observation

a. Inspection Scope

The inspectors assessed the fire brigade performance and the drill evaluator’s critique during a fire brigade drill conducted on August 31, 2006. The drill simulated a fire in the Nuclear Station Work Permit building. The inspectors also observed an actual fire brigade response to a fire alarm received in the Auxiliary Building on August 28, 2006. Details of the fire response were documented in Section 4OA3 of this report. The documents reviewed for this portion of the inspection are listed in the Attachment to this report.

The inspectors focused on command and control of the fire brigade activities; fire fighting and communication practices; material condition and use of fire fighting equipment; and implementation of pre-fire plan strategies. The inspectors evaluated the fire brigade performance using the licensee’s established fire drill performance procedure criteria. An annual inspection sample was not completed in this report since not all aspects of the inspectible areas were reviewed. Observation and evaluation of other important drill activities designated in Section 02.02 of the inspection procedure will be performed during subsequent observations of licensee drill activities.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification (71111.11)

.1 Resident Inspector Quarterly Review

a. Inspection Scope

The inspectors completed one inspection sample by observing and evaluating an operating crew during a steam line break outside containment with failure of all MSIV's to close. The inspectors evaluated crew performance in the areas of:

- Clarity and formality of communications;
- Ability to take timely actions;
- Prioritization, interpretation, and verification of alarms;
- Procedure use;
- Control board manipulations;
- Supervisor's command and control;
- Management oversight; and
- Group dynamics.

The inspectors verified that the crew completed the critical tasks listed in the above simulator guide. The inspectors also compared simulator configurations with actual control board configurations. For any weaknesses identified, the inspectors observed the licensee evaluators to determine whether they also noted the issues and discussed them in the critique at the end of the session. The inspectors verified that minor issues were placed into the licensee's corrective action program.

The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Resident Inspector Quarter Review

a. Inspection Scope

The inspectors completed two inspection samples by evaluating the licensee's implementation of the maintenance rule, 10 CFR 50.65, as it pertained to identified performance problems associated with the following structures, systems, and/or components:

- Unit 1 Train B Emergency Diesel Generator Trip During Cooldown Cycle; and
- Unit 1 Molded Case Circuit Breaker Failures.

The inspectors evaluated the licensee's appropriate handling of structures, systems, and components (SSC) condition problems in terms of appropriate work practices and

characterizing reliability issues. Equipment problems were screened for review using a problem oriented approach. Work practices related to the reliability of equipment maintenance were observed during the inspection period. Items chosen were risk significant, and extent of condition was reviewed as applicable. Work practices were reviewed for contribution to potential degraded conditions of the affected SSCs. Related work activities were observed and corrective actions were discussed with licensee personnel. The licensee's handling of the issues being reviewed was evaluated under the requirements of the maintenance rule.

The inspectors also reviewed selected issues documented in CRs, to determine if they had been properly addressed in the licensee's corrective action program. The documents reviewed during this inspection are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors reviewed the licensee's management of plant risk during emergent maintenance activities or during activities where more than one significant system or train was unavailable. The inspectors chose activities based on their potential to increase the probability of an initiating event or impact the operation of safety-significant equipment. The inspectors verified that the evaluation, planning, control, and performance of the work were done in a manner to reduce the risk and the work duration was minimized where practical. The inspectors also verified that contingency plans were in place where appropriate.

The inspectors reviewed configuration risk assessment records, UFSAR, TS, and Individual Plant Examination. The inspectors also observed operator turnovers, observed plan-of-the-day meetings, and reviewed other related documents to determine that the equipment configurations had been properly listed, that protected equipment had been identified and was being controlled where appropriate, and that significant aspects of plant risk were being communicated to the necessary personnel.

The inspectors completed five inspection samples by reviewing the following activities:

- Emergent Failure of the Unit 1 Train B Emergency Diesel Generator During Monthly Run;
- Unit 2 Train B Residual Heat Removal Pump Out of Service (OOS) while Unit 1 East Main Power Transformer Sensor was Replaced and while Unit 0 G train SX Cooling Tower was OOS;
- Unit 1 Train A Essential Service Water Pump Work Window while Unit 0 Essential Service Water Makeup Pump was OOS;
- Emergent Schedule Change Due to Thunderstorms and the Delay in the Flood-up of the Reactor Vessel for Unit 1 with a Consequential Increase in Loss of Core Cooling While at Reduced Inventory; and

- Unit 2 Train A Direct Current (DC) Bus Cross-tied to Unit 1 Train A while Unit 1 Train A Emergency Diesel Generator was OOS.

The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors evaluated plant conditions, selected condition reports, engineering evaluations, and operability determinations for risk-significant components and systems in which operability issues were questioned. These conditions were evaluated to determine whether the operability of components was justified.

The inspectors completed eight inspection samples by reviewing the following evaluations and issues:

- Unit 1 Train A Diesel Generator Excessive Combustion Air Moisture;
- Seismic Monitoring System Out of Service and Impact Upon EALs;
- Unit 1 Pressurizer Power Operated Relief Valve Elevated Tailpipe Temperature;
- Unit 1 Train A Containment Spray Additive System Valve Weld Leak;
- Unit 2 Train B Essential Service Water Pump Bearing Slinger Ring Not Rotating;
- Unit 2 Train B Auxiliary Feedwater Pump Jacket Water Expansion Tank Leak;
- Unit 1 Molded Case Circuit Breaker Failure; and
- Unit 1 Emergency Core Cooling System Piping Air Entrainment.

The inspectors compared the operability and design criteria in the appropriate section of the TS including the TS Basis, the Technical Requirements Manual (TRM) and UFSAR to the licensee's evaluations to determine that the components or systems were operable. The inspectors determined whether compensatory measures, if needed, were taken, and determined whether the evaluations were consistent with the requirements of licensee procedures. The inspectors also discussed the details of the evaluations with the shift managers and appropriate members of the licensee's engineering staff.

The inspectors also reviewed selected issues documented in IRs, to determine if they had been properly addressed in the licensee's corrective action program. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the post maintenance testing activities associated with maintenance or modification of mitigating, barrier integrity, and support systems that were identified as risk significant in the licensee's risk analysis. The inspectors reviewed these activities to determine that the post maintenance testing was performed adequately, demonstrated that the maintenance was successful, and that operability was restored. During this inspection activity, the inspectors interviewed maintenance and engineering department personnel and reviewed the completed post maintenance testing documentation. The inspectors used the appropriate sections of the TS, TRM, and UFSAR, and other related documents to evaluate this area.

The inspectors completed six inspection samples by observing and evaluating the post maintenance testing subsequent to the following maintenance activities:

- Unit 1 Train A Safety Injection to Charging Pump Suction Header Cross-Tie Isolation Valve Actuator Rebuild;
- Unit 1 Train A Emergency Diesel Generator valve work;
- Unit 1 Train A Essential Services Water Pump oil cooler inspection;
- Unit 1 Train B Centrifugal Charging Pump Work Window;
- Unit 0 Train B Essential Service Water Makeup Pump Work Window; and
- Unit 1 Division 11 DC Bus Circuit Breaker Change-out.

The inspectors also reviewed selected issues documented in CR's to determine if they had been properly addressed in the licensee's corrective action program. The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

a. Inspection Scope

The inspectors observed the licensee's performance during Refueling Outage B1R14 beginning September 10, 2006. As of September 30, 2006, the licensee has not finished all the outage activities. Therefore the inspection sample was not completed for this report.

The inspectors evaluated the licensee's conduct of refueling outage activities to assess the licensee's control of plant configuration and management of shutdown risk. The inspectors reviewed configuration management to verify that the licensee maintained defense-in-depth commensurate with the shutdown risk plan; reviewed major outage work activities to ensure that correct system lineups were maintained for key mitigating systems; and observed refueling activities to verify that fuel handling operations were performed in accordance with the TS, TRM, UFSAR and approved procedures. The inspectors interviewed operations, engineering, work control, radiological protection, and maintenance department personnel during their inspection activities. The inspectors



also attended outage-related status and pre-job briefings as well as Radiation Protection ALARA [As Low As Reasonably Achievable] briefings. Other major outage activities evaluated included evaluating the licensee's control of:

- containment penetrations in accordance with the TS;
- structures, systems or components (SSCs) which could cause unexpected reactivity changes;
- flow paths, configurations, and alternate means for reactor coolant system inventory addition;
- SSCs which could cause a loss of inventory;
- RCS pressure, level, and temperature instrumentation;
- spent fuel pool cooling during and after core offload;
- switchyard activities and the configuration of electrical power systems in accordance with the TS and shutdown risk plan; and
- SSCs required for decay heat removal.

The inspectors observed portions of the plant cooldown, including the transition to shutdown cooling, to verify that the licensee controlled the plant cooldown in accordance with the TS. In addition, the inspectors completed numerous visual inspections inside the Unit 1 containment. This included a tour of the Unit 1 containment at Mode 3 during the cooldown at the beginning of B1R14 so that the inspectors could assess the initial material condition of equipment inside containment immediately following the operating cycle. During the visual inspections the inspectors focused on the material condition of the equipment and particularly on any indication of boric acid.

In addition, the inspectors evaluated portions of the restart preparation activities to verify that requirements of the TS and administrative procedure requirements were met prior to changing operational modes or plant configurations. Major restart preparation inspection activities performed included:

- verification that core reload was completed in accordance with the core loading plan for Byron Unit 1 Cycle 14;
- evaluation of foreign material exclusion control practices during significant work activities;
- verification that correct system lineups were maintained for key mitigating systems; and
- inspection of the containment building to assess material condition and search for loose debris, which if present, could be transported to the containment recirculation sumps and cause restriction of flow to the emergency core cooling system pump suctions during loss-of-coolant accident conditions.

The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors witnessed selected surveillance tests and/or reviewed test data to determine that the equipment tested using the surveillance procedures met the TS, the TRM, the UFSAR and licensee procedural requirements. The inspectors also reviewed applicable design documents including plant drawings, to verify that the surveillance tests demonstrated that the equipment was capable of performing its intended safety functions. The activities were selected based on their importance in ensuring mitigating systems capability and barrier integrity.

These activities represented six routine samples. The following surveillance tests were selected:

- Unit 2 Train A Emergency Diesel Generator Monthly Operability Run;
- Unit 1 Reactor Containment Fan Cooler Monthly Surveillance;
- Unit 2 Train B Solid State Protection System Bi-Monthly Surveillance;
- Unit 1 Simultaneous Start of Both Auxiliary Feedwater Pumps;
- Unit 1 Train B Diesel Generator Safety Injection Sequencer Test; and
- Unit 1 Division 11 A Train 125V Battery Bank Service Test.

Additionally the inspectors used the documents listed in the attachment to this report to determine that the testing met the frequency requirements; that the tests were conducted in accordance with procedures, that the test acceptance criteria were met; and that the results of the tests were properly reviewed and recorded. The inspectors verified that the individuals performing the tests were qualified to perform the test in accordance with the licensee's requirements, and that the test equipment used during the test were calibrated within the specified periodicity. In addition, the inspectors interviewed operations, maintenance, and engineering department personnel regarding the tests and test results.

The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

On August 22, 2006, the inspectors complete one inspection sample by observing an Out of the Box Operator Requalification training that had emergency preparedness exercise aspects. The inspectors assessed the licensee's exercise performance and looked for weaknesses in the risk significance areas of emergency classification, notification and protective action development. The inspectors observed the licensee's performance from the simulator control room. The inspectors compared issues noted

during their observations to those identified during the licensee's critique. Additionally, the inspectors verified that items identified during the licensee's critique were appropriately entered into their corrective action program.

The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

**2. RADIATION SAFETY**

**Cornerstone: Occupational Radiation Safety**

2OS1 Access Control to Radiologically Significant Areas (IP 71121.01)

.1 Plant Walkdowns and Radiation Work Permit Reviews

a. Inspection Scope

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

- Emergency Core Cooling System (ECCS) Sump Modification;
- Pressurizer Weld Overlay; and
- Reactor Disassembly.

This review represented one inspection sample.

The inspectors reviewed the radiation work permits (RWPs) and work packages used to access these three 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 review represented one inspection sample.

The inspectors walked down and surveyed (using an NRC survey meter) these three 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 review represented one inspection sample.

The inspectors reviewed RWPs for potential airborne radioactivity areas to verify barrier integrity and engineering controls performance (e.g., HEPA ventilation system operation) and to determine if there was a potential for individual worker internal

exposures of greater than 50 millirem committed effective dose equivalent. There were no areas where there was a potential for individual worker internal exposures of greater than 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. There were no areas having a history of, or the potential for, airborne transuranics. This review represented one inspection sample.

The adequacy of the licensee's internal dose assessment process for any actual internal exposures greater than 50 millirem committed effective dose equivalent was assessed. There were no internal exposures greater than 50 millirem committed effective dose equivalent. This review represented one inspection sample.

b. Findings

Introduction: A finding of very low safety significance and two associated Non-Cited Violations of NRC requirements were identified for the failure to post and control access to a high radiation area.

Description: A walkdown of the facility was conducted by the NRC inspectors and a member of the licensee's staff during the afternoon of September 11, 2006. This walkdown identified that an opening of approximately 3'x4' in size that led to a pipe chase next to the Unit 1 Filter Valve Aisle located on the 383' elevation of the Auxiliary Building. This opening was created when a portion of a block shield wall was removed to support a specific job evolution in the Unit 1 Filter Valve Aisle. The inspectors questioned the licensee staff as to the systems that lie within the pipe chase that was rendered accessible by removing the blocks. Based upon the answer provided and the upcoming scheduled plant evolution of forced oxidation, the inspectors questioned the characterization of the pipe chase and the adequacy of the posting and controls for the current conditions or the expected conditions over the next few hours.

The forced oxidation process is performed to reduce or remove radioactive source term from the primary coolant system and, therefore, to lower the personnel dose that is accumulated during the refueling outage. The process introduces a chemical to the reactor coolant system which loosens material that has plated out inside the system. This material is removed from the system via plant demineralizers and through filtration, usually within 24 hours. The licensee implemented controls for areas that had been defined based upon previous plant experiences. The block shield wall was intact, different than current configuration, during previous evolutions of forced oxidation.

The licensee completed the survey of this area at 0100 hours on September 13, 2006, approximately 26 hours after initiating the forced oxidation process. That survey identified dose rates in excess of 100 mR/hour at the plane of the opening. These conditions met the definition as a High Radiation Area, but the area was not posted or controlled as a High Radiation Area.

Analysis: The failure to post and control access to High Radiation Areas represents a performance deficiency as defined in NRC Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening." The inspectors

determined that the issue was associated with the Program/Process attribute of the Occupational Radiation Safety Cornerstone and affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Therefore, the issue was more than minor and represented a finding which was evaluated using the Significance Determination Process (SDP).

Since the finding involved the ability to protect workers from exposure to radiation, the inspectors utilized IMC 0609, Appendix C, "Occupational Radiation Safety SDP," to assess its significance. The inspectors determined that the finding did not concern unintended collective dose resulting from a deficiency in the ALARA planning or work control or exposure control. The inspectors also determined that the finding did not involve an overexposure or the substantial potential for an overexposure. The inspectors determined that the finding did not compromise the licensee's ability to assess dose. Consequently, the inspectors concluded that the SDP assessment for this finding was of very low safety significance (Green).

As described above, the removal of the ~ 3'x4' block wall was authorized to support a work activity. However, the evaluation that provided this authorization was not sufficient to provide limits, controls, or compensatory actions for subsequent plant evolutions. Consequently, this deficiency has a cross cutting aspect for Human Performance. Specifically, the licensee did not use a systematic decision making process and did not obtain interdisciplinary input on a risk-significant decision.

Enforcement: 10 CFR 20.1902 requires the licensee to post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA. Additionally, 10 CFR 20.1601 specifies the requirements for control of access to high radiation areas. As provided in Technical Specification 5.7.1, the licensee is authorized to implement alternate controls to those stated in 10 CFR 20.1601 for areas that do not exceed 1000 millirem per hour.

Contrary to the above, as of 0100 hours on September 13, 2006, the entrance to the Unit 1 Filter Valve Aisle located on the 383' elevation of the Auxiliary Building, a high radiation area with a radiation dose rate of approximately 135 millirem in one hour at plane of the penetration, was not posted or controlled by any of the methods described in 10 CFR 20.1902, 10 CFR 20.1601, or Technical Specification 5.7.1.

Corrective actions taken by the licensee included making the pipe chase inaccessible by bolting a plate over the opening and placing information postings over the bolted plate. In addition, the licensee revised the posting and controls within the Unit 1 Filter Valve Aisle to that of a high radiation area. Since the licensee documented this issue in its corrective action program (IR 531013) and because the violations are of very low safety significance, they are being treated as Non-Cited Violations (NCV 05000454/2006004-02; 05000455/2006004-02).

## .2 Problem Identification and Resolution

### a. Inspection Scope

The inspectors reviewed three corrective action reports related to access controls and high radiation area radiological incidents. 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 review represented one inspection sample.

b. Findings

No findings of significance were identified.

.3 Job-In-Progress Reviews

a. Inspection Scope

The inspectors observed the following three 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:

- ECCS Sump Modification;
- Pressurizer Weld Overlay; and
- Reactor Disassembly.

The inspectors reviewed radiological job requirements for these three activities including RWP requirements and work procedure requirements, and attended As-Low-As-Is-Reasonably-Achievable (ALARA) job briefings. This review represented one inspection sample.

Job performance was observed with respect to these requirements to verify that radiological conditions in the work area were adequately communicated to workers through pre-job briefings and postings. The inspectors also verified the adequacy of radiological controls including required radiation, contamination, and airborne surveys for system breaches; radiation protection job coverage which included audio and visual surveillance for remote job coverage; and contamination controls. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

.4 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. This review represented one inspection sample.

The inspectors reviewed radiological problem reports which found that the cause of the event was due to radiation worker errors to determine if there was an observable pattern traceable to a similar cause and to determine if this perspective matched the corrective action approach taken by the licensee to resolve the reported problems. These problems, along with planned and taken corrective actions were discussed with the Radiation Protection Manager. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

.5 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. This review represented one inspection sample.

The inspectors reviewed radiological problem reports which, found that the cause of the event was radiation protection technician error, to determine if there was an observable pattern traceable to a similar cause and to determine if this perspective matched the corrective action approach taken by the licensee to resolve the reported problems. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

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

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed plant collective exposure history, current exposure trends, ongoing and planned activities in order to assess current performance and exposure challenges. This included determining the plant's current 3-year rolling average for collective exposure in order to help establish resource allocations and to provide a perspective of significance for any resulting inspection finding assessment. This review represented one inspection sample.

The inspectors reviewed the outage work scheduled during the inspection period and associated work activity exposure estimates for the following three work activities which were likely to result in the highest personnel collective exposures:

- Emergency Core Cooling System (ECCS) Sump Modification;
- Pressurizer Weld Overlay; and
- Reactor Disassembly.

This review represented one inspection sample.

The inspectors reviewed site specific trends in collective exposures and source-term measurements. The inspectors reviewed procedures associated with maintaining occupational exposures ALARA and processes used to estimate and track work activity specific exposures. This review represented two inspection samples.

b. Findings

No findings of significance were identified.

.2 Radiological Work Planning

a. Inspection Scope

The inspectors evaluated the licensee's list of planned work activities for Unit 1 Refueling Outage 14 ranked by estimated exposure that were in progress and reviewed the following three work activities of exposure significance:

- Emergency Core Cooling System (ECCS) Sump Modification;
- Pressurizer Weld Overlay; and
- Reactor Disassembly.

This review represented one inspection sample.

For these three 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 if the licensee had reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances. This review represented one inspection sample.

The inspectors compared the results achieved, including dose rate reductions and



person-rem used, with the intended dose established in the licensee's ALARA planning for these three work activities. Reasons for inconsistencies between intended and actual work activity doses were reviewed. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

.3 Verification of Dose Estimates and Exposure Tracking Systems

a. 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 whether 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. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

.4 Job Site Inspections and ALARA Control

a. Inspection Scope

The inspectors observed the following three 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.

- Emergency Core Cooling System (ECCS) Sump Modification;
- Pressurizer Weld Overlay; and
- Reactor Disassembly.

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, and that the dose expended to install/remove the shielding did not exceed the dose reduction benefits afforded by the shielding. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

.5 Radiation Worker Performance

a. 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. This review represented one inspection sample.

b. Findings

No findings of significance were identified.

2OS3 Radiation Monitoring Instrumentation and Protective Equipment (71121.03)

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed the Byron Station Updated Final Safety Analysis Report (UFSAR) to identify applicable radiation monitors associated with measuring transient high and very high radiation areas including those used in remote emergency assessment. The inspectors identified the types of portable radiation detection instrumentation used for job coverage of high radiation area work including instruments used for underwater surveys, fixed area radiation monitors used to provide radiological information in various plant areas, and continuous air monitors used to assess airborne radiological conditions and work areas with the potential for workers to receive a 50 millirem or greater committed effective dose equivalent (CEDE). Contamination monitors, whole body counters, and those radiation detection instruments utilized for the release of personnel and equipment from the radiologically controlled area (RCA) were also identified.

These reviews represented two inspection samples.

b. Findings

No findings of significance were identified.

.2 Walkdowns of Radiation Monitoring Instrumentation

a. Inspection Scope

The inspectors conducted walkdowns of selected area radiation monitors (ARMs) in the Unit 1 and 2 Auxiliary Buildings to verify that they were located as described in the UFSAR and were adequately positioned relative to the potential source(s) of radiation they were intended to monitor. Walkdowns were also conducted of those areas where portable survey instruments were calibrated/repared and maintained for

radiation protection (RP) staff use to determine if those instruments designated “ready for use” were sufficient in number to support the radiation protection program, had current calibration stickers, were operable, and were in adequate physical condition. Additionally, the inspectors observed the licensee’s instrument calibration units and the radiation sources used for instrument checks to assess their material condition and discussed their use with RP staff to determine if they were used appropriately. Licensee personnel demonstrated the methods for performing source checks of portable survey instruments and for source checking personnel contamination and portal monitors used at the egress to the RCA.

These reviews represented one inspection sample.

b. Findings

No findings of significance were identified.

.3 Calibration and Testing of Radiation Monitoring Instrumentation

a. Inspection Scope

Portable survey instrument calibrations were performed at an offsite Exelon facility. Licensee personnel were observed performing source checks of selected instruments. This included observing detector evaluation with check sources to determine if station requirements were met. The inspectors reviewed records of calibration, operability, and alarm setpoints of selected instruments and personnel monitoring devices. This review included, but was not limited to the following:

- Certificate of Calibration for Eberline Radiation Detection Device Model ASP-1/AC3-7, Serial No. 652/724197;
- Certificate of Calibration for Eberline Radiation Detection Device Model E-530, Serial No. 1337;
- Certificate of Calibration for Eberline Radiation Detection Device Model RM-14, Serial Nos. 7382 and 7528;
- Calibration of Nuclear Enterprises Small Articles Monitor (SAM), Serial No. 478;
- Units 1 and 2 High Range Containment Radiation Monitors; and
- Auxiliary Building Vent Stack Wide Range Gas Radiation Monitor.

The inspectors evaluated those actions that would be taken when, during calibration or source checks, an instrument was found to be out of calibration by more than 50 percent. Those actions included an investigation of the instrument’s previous usages and the possible consequences of that usage since the last calibration or source check. The inspectors also reviewed the licensee’s 10 CFR Part 61 source term analyses to determine if the calibration sources used were representative of the plant source term. This review represented one sample.

b. Findings

No findings of significance were identified.

#### .4 Problem Identification and Resolution

##### a. Inspection Scope

The inspectors reviewed the licensee's self-assessments, audits, and condition reports that involved personnel contamination monitor alarms due to personnel internal exposures to determine if identified problems were entered into the corrective action program for resolution. There were no internal exposure occurrences greater than 50 millirem committed effective dose equivalent that were evaluated during the inspection. However, the licensee's process for investigating this type of occurrence was reviewed to determine if the affected personnel would be properly monitored utilizing the appropriate equipment and if the data would be analyzed and internal exposures properly assessed in accordance with licensee procedures. This review represented one sample.

The inspectors reviewed corrective action program reports related to exposure of significant radiological incidents that involved radiation monitoring instrument deficiencies since the last inspection in this area. Staff members were interviewed and corrective action documents were reviewed to determine if follow-up activities were being conducted in an effective and timely manner commensurate with its 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 tracked in the corrective action system; and
- Implementation/consideration of risk significant operational experience feedback.

This review represented one sample.

The inspectors evaluated the licensee's self-assessment activities to determine if they would identify and address repetitive deficiencies or significant individual deficiencies observed in problem identification and resolution. This review represented one sample.

##### b. Findings

No findings of significance were identified.

#### 5 Radiation Protection Technician Instrument Use

##### a. Inspection Scope

The inspectors determined if the calibration expiration and source response check data records on radiation detection instruments staged for use were current and observed radiation protection technicians for appropriate instrument selection and self-verification of instrument operability prior to use. This review represented one sample.

b. Findings

No findings of significance were identified.

.6 Self-Contained Breathing Apparatus (SCBA) Maintenance/Inspection and User Training

a. Inspection Scope

The inspectors reviewed the status, maintenance and surveillance records of selected self-contained breathing apparatuses staged and ready for use in the plant and assessed the licensee's capability for refilling and transporting self-contained breathing apparatus air bottles to and from the control room during emergency conditions. The inspectors determined whether control room operators and other emergency response and radiation protection personnel were trained and qualified in the use of self-contained breathing apparatuses including personal bottle change-out. The inspectors also reviewed the training and qualification records for selected individuals on each control room shift crew and selected individuals from each designated department that were currently assigned emergency duties, including onsite search and rescue. This review represented one sample.

The inspectors reviewed the self-contained breathing apparatus manufacturer's maintenance training certifications for licensee personnel qualified to perform self-contained breathing apparatus maintenance on vital components (regulator and low pressure alarm). The inspectors reviewed maintenance records for several self-contained breathing apparatuses designated as "ready for service." The inspectors verified that maintenance was performed by qualified personnel over the past five years. The inspectors also determined if the required, periodic air cylinder hydrostatic testing was current and documented. The inspectors also evaluated if the licensee's maintenance procedures were consistent with the self-contained breathing apparatus manufacturer's maintenance manuals. This review represented one sample.

b. Findings

No findings of significance were identified.

**Cornerstone: Public Radiation Safety**

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01)

.1 Integrity of the Circulating Water Blowdown Line

a. Inspection Scope

The inspectors reviewed the licensee's evaluation associated with Unresolved Item (URI) 050000454/2006002-02; 050000455/2006002-02 regarding the licensee's lack of a circulating water blowdown line pipe integrity verification. Industry experience had shown that the failure of circulating water blow-down line vacuum breakers resulted in the release of contaminated water into the offsite environment resulting in groundwater contamination. On February 2, 2006, the licensee could not demonstrate the integrity of

circulating water blowdown line vacuum breakers. Leakage of water from the blow-down line could result in the release of radioactive material into the environment via a release path that was undefined in the ODCM and had no offsite dose estimates, and as documented as an URI.

The inspectors reviewed the licensee's radiological assessment of leaks from the circulating water (CW) blowdown line that was identified in February 2006. The inspectors reviewed historical records to evaluate the licensee's response to the leaks, including radiological surveys, dose assessments, and mitigative actions. The inspectors' evaluation was performed to determine if the licensee adequately implemented the requirements contained in 10 CFR Part 20 and the licensee's Technical Specifications. The inspectors also reviewed:

- Radiation protection surveys for affected areas;
- Maintenance work orders for selected vacuum breaker valves associated with the releases;
- Identification of potential pathways based upon release location;
- Reports contained in the licensee's corrective action program for these events;
- Parameters and results of licensee's groundwater characterization study;
- Files that contain environmental contamination events; and
- Select annual effluent release reports.

Additionally, the inspector's evaluated the licensee's corrective actions that included:

- Sealing the vacuum breaker valve vaults (via grout and a waterproofing application);
- Performing inspection and maintenance on the vacuum breaker valves;
- Installation of additional groundwater monitoring wells;
- Visual observations of each vacuum breaker valve vault during radioactive releases to identify leakage (compensatory action); and
- Installation of an automated leak detection system.

b. Findings

Introduction: A finding of very low safety significance and an associated non-cited violation of NRC requirements were identified for the failure to survey water for radioactive materials before releasing to the ground.

Description: The licensee began formally inspecting vacuum breaker valves in 1999 as result of a failure of similar vacuum breaker valves at the Braidwood facility. The licensee attributed the presence of small amounts of water found in the vacuum breaker vaults to be ground water that infiltrated the through a drain in the vault or from rain water that seeped under the vault cover. On July 7, 2005, the vault containing valve 0CW276 (vault No. 6) was filled with water, and there were other indications that the source was not ground water infiltration. Despite these indications, the vault was emptied by pumping the water to ground. The licensee did not assess the source of the water nor did the licensee perform a radiological survey prior to pumping the water to the ground. The licensee recognized the potential for this water to contain radioactive material from the liquid radioactive waste program when the failed valve was entered

into the corrective action program. Subsequently, the licensee performed an investigation that included sampling the soil around the vault for the presence of radionuclides. The investigation was limited to analyzing the soil surrounding the affected vault, as the area did not have free standing water. This analysis was completed within two weeks from the time the condition was identified and determined that the area was free from gamma emitting radionuclides.

During an NRC baseline inspection in the area of Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems in February 2006, the inspectors questioned the licensee's evaluation of water that existed in the vacuum breaker valve vaults and the lack of radiological measurements of that water. In response to these questions, the licensee then identified standing water in 5 of the 6 vaults with tritium concentrations from 1,000 picocuries per liter to 80,000 picocuries per liter. Based on these sample results, the licensee installed ground water monitoring wells near the six vacuum breaker valve vaults along the station's discharge pipe to allow further sampling for tritium. Wells beside four of the six vaults showed no detectable levels of tritium. Test wells beside the other two showed low levels of tritium. One showed a concentration of about 3800 picocuries per liter, the other about 450 picocuries per liter. The licensee's radiological environmental monitoring program (Rev. 2, 2002) included waterborne sampling/analyses from wells located 0.7 miles, 1.0 miles, and 1.8 miles from the plant site and in the general area of the blowdown line. The licensee's results from these wells as well as the 6 newly installed wells did not identify any detectable tritium migration beyond the licensee's property.

Although the licensee recognized in July 2005 that water was apparently leaking from the valve and recognized the potential that leakage from a blowdown line vacuum breaker could represent an unevaluated condition, the licensee did not take actions necessary to evaluate the radiological hazards associated with leakage. Furthermore, the corrective action evaluation performed by the licensee in August 2005 did not address or modify plant procedures or work order packages for inspection of vacuum breakers to prevent further pumping water from the vaults to ground with sampling.

Analysis: The failure to evaluate the potential radiological hazard associated with the leakage of water from the vacuum breaker valves and the subsequent discharge of that water to the ground represents a performance deficiency as defined in NRC Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening." The inspectors determined that the issue was associated with the Program/Process attribute of the Public Radiation Safety Cornerstone and affected the cornerstone objective to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. Therefore, the issue was more than minor and represented a finding which was evaluated using the Significance Determination Process (SDP).

Since the finding involved the ability to assess dose from radioactive effluents and maintain radiation doses to a member of the public within Appendix I design objectives, the inspectors utilized IMC 0609, Appendix D, "Public Radiation Safety SDP," to assess its significance. The inspectors determined that the finding did not involve Radioactive Material Control. Since the release did not migrate off the licensee's property, the

inspectors utilized the Effluent Release Program branch of the SDP. Although the licensee analyzed the surrounding soil for the release of gamma emitting radionuclides, tritium was not included in the analysis because the liquid content was no longer available after pumping the vault. Tritium is the most predominant radionuclide in a typical liquid radioactive waste release. Therefore, this limitation impaired the licensee's ability to assess dose. The licensee's current sampling and evaluation did not indicate any measurable release of radioactive material beyond the licensee's property. These results indicated that the assessment of off site dose was not warranted; therefore, the licensee did not fail to assess dose to the public. Consequently, the inspectors concluded that the SDP assessment for this finding was of very low safety significance (Green).

As described above, the licensee's August 2005 evaluation was limited to the water that was pumped out of vault No. 6 on July 7, 2005. The inspectors identified that the evaluation did not review or change the practice of pumping water directly from the vault at any other vacuum breaker. Consequently, this deficiency has a cross cutting aspect for Problem Identification and Resolution. Specifically, the corrective action evaluation performed by the licensee in August 2005 did not address or modify plant procedures or work order packages for inspection of vacuum breakers to prevent pumping water from the vaults to ground with sampling.

Enforcement: 10 CFR 20.1501 requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present.

Pursuant to 10 CFR 20.1003, *survey* means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

Contrary to the above, as of February 8, 2006, the licensee did not make adequate surveys to assure compliance with 10 CFR 20.1301, which limits radiation exposure to a member of the public to 0.1 rem. Specifically, the conditions found at valve 0CW276 (vault No. 6) on July 7, 2005, were outside the parameters of the licensee's original assessment, and the licensee did not evaluate the change of conditions for the potential radiological hazards. A review of historical records indicated other occurrences of pumping water from the vacuum breaker vaults to the ground without performing a survey.

Corrective actions taken by the licensee for this finding included performing surveys of the soil surrounding the vacuum breaker vault, establishing additional groundwater monitoring wells, sealing the vacuum breaker vaults, and installing an automated leak detection system. Since the licensee documented this issue in its corrective action program (AR 350931 and subsequent Apparent Cause Evaluation No. 478372) and because the violation is of very low safety significance, it is being treated as a Non-Cited Violation (NCV 05000454/2006004-03; 05000455/2006004-03). The associated URI is closed.



## 2PS2 Radioactive Material Processing and Transportation (71122.02)

### .1 Radioactive Waste System Inspection Planning

#### a. Inspection Scope

The inspectors reviewed the liquid and solid radioactive waste system description in the UFSAR for information on the types and amounts of radioactive waste (radwaste) generated and disposed. The inspectors reviewed the scope of the licensee's audit program with regard to radioactive material processing and transportation programs to verify that it met the requirements of 10 CFR 20.1101©). This review represented one sample.

#### b. Findings

No findings of significance were identified.

### .2 Walkdown of Radioactive Waste Systems

#### a. Inspection Scope

The inspectors reviewed the liquid and solid radioactive waste system description in the UFSAR and the most recent information regarding the types and amounts of radioactive waste generated and disposed. The inspectors performed walkdowns of the liquid and solid radwaste processing systems to verify that the systems agreed with the descriptions in the Updated Safety Analysis Report and the Process Control Program and to assess the material condition and operability of the systems. The inspectors reviewed changes to the waste processing system to verify the changes were reviewed and documented in accordance with 10 CFR 50.59 and to assess the impact of the changes on radiation dose to members of the public.

The inspectors reviewed the current processes for transferring waste resins into transportation containers to determine if appropriate waste stream mixing and/or sampling procedures were utilized. The inspectors also reviewed the methodologies for waste concentration averaging to determine if representative samples of the waste product were provided for the purposes of waste classification in accordance with 10 CFR 61.55. During this inspection, the licensee was not conducting waste processing. This review represented one sample.

#### b. Findings

No findings of significance were identified.

### .3 Waste Characterization and Classification

#### a. Inspection Scope

The inspectors reviewed the licensee's radiochemical sample analysis results for each of the licensee's waste streams, including dry active waste, resins, and filters. The

inspectors also reviewed the licensee's use of scaling factors to quantify difficult-to-measure radionuclides (e.g., pure alpha or beta emitting radionuclides). The reviews were conducted to verify that the licensee's program assured compliance with 10 CFR 61.55 and 10 CFR 61.56, as required by Appendix G of 10 CFR Part 20. The inspectors also reviewed the licensee's waste characterization and classification program to ensure that the waste stream composition data accounted for changing operational parameters and thus remained valid between the annual sample analysis updates. This review represented one sample.

b. Findings

No findings of significance were identified.

.4 Shipment Preparation

a. Inspection Scope

The inspectors reviewed shipment packaging, surveying, labeling, marking, placarding, vehicle checks, emergency instructions, disposal manifest, shipping papers provided to the driver, and licensee verification of shipment readiness for a dry active waste shipment. The inspectors verified that the receiving licensee was authorized to receive the shipment packages. The inspectors reviewed the licensee's procedures for loading and closure. The inspectors observed radiation worker practices to verify that the workers had adequate skills to accomplish each task and to determine if the shippers were knowledgeable of the shipping regulations and whether shipping personnel demonstrated adequate skills to accomplish the package preparation requirements for public transport with respect to NRC Bulletin 79-19 and 49 CFR Part 172 Subpart H. The inspectors reviewed the training provided to personnel responsible for the conduct of radioactive waste processing and radioactive shipment preparation activities. The review was conducted to verify that the licensee's training program provided training consistent with NRC and Department of Transportation (DOT) requirements. This review represented one sample.

b. Findings

No findings of significance were identified.

.5 Shipping Records

a. Inspection Scope

The inspectors reviewed ten non-excepted package shipment manifests completed in years 2005 and 2006 to verify compliance with USNRC and Department of Transportation requirements (i.e., 10 CFR Parts 20 and 71 and 49 CFR Parts 172 and 173). The inspector reviewed current package preparation or shipping underway during the inspection. This review represented one sample.

b. Findings

No findings of significance were identified.

.6 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed condition reports, audits, and self-assessments that addressed radioactive waste and radioactive materials shipping program deficiencies since the last inspection, to verify that the licensee had effectively implemented the corrective action program and that problems were identified, characterized, prioritized and corrected. The inspectors also verified that the licensee's self-assessment program was capable of identifying repetitive deficiencies or significant individual deficiencies in problem identification and resolution.

The inspectors also reviewed corrective action reports from the radioactive material and shipping programs since the previous inspection, interviewed staff and reviewed documents to determine if the following activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk:

- 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 corrective action system(s); and
- Implementation/consideration of risk significant operational experience feedback.

This review represented one sample.

b. Findings

No findings of significance were identified.

2PS3 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program (71122.03)

.1 Reviews of Radiological Environmental Monitoring Reports, Data and Quality Control

a. Inspection Scope

The NRC performed a number of confirmatory measurements of water samples to evaluate the licensee's proficiency in collecting and in analyzing water samples for tritium and other radioactive isotopes. The samples were collected independently by the inspectors and/or by licensee personnel and sent to the NRC's contract laboratory for the analysis of tritium. The NRC and licensee obtained these samples from surface water and groundwater sampling points identified in the licensee's Radiological Environmental Monitoring Program and from onsite and offsite groundwater monitoring

wells. In particular, samples were obtained as part of the licensee's environmental study of tritium and potential groundwater contamination (ADAMS ML062750384) and as part of an evaluation of leakage from the circulating water blowdown line that is documented in Section 2PS1 of this report. While tritium was the primary radionuclide of concern, selected samples were also analyzed for gamma emitting radionuclides and for strontium. The inspectors performed these reviews to assess the licensee's analytical detection capabilities for radio-analysis of environmental samples and its ability to accurately quantify radionuclides to an acceptable level of sensitivity. The criteria used to compare the sample results is provided in Attachment 2, and the results of the comparisons between the NRC and licensee results is provided in Attachment 3.

The inspectors considered the following activities in evaluating the cause of any comparisons that did not result in an agreement:

- re-analysis by licensee or NRC's contract laboratory;
- review of licensee's interlaboratory cross check program results; and
- review of data for any apparent statistical biases.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

40A1 Performance Indicator Verification (71151)

**Cornerstone: Mitigating Systems and Barrier Integrity**

a. Inspection Scope

The inspectors sampled the licensee's submitted materials for performance indicators (PIs) and periods listed below. The inspectors used PI definitions and guidance contained in Revision 4 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline" to verify the accuracy of the PI data. The inspectors reviewed selected applicable condition reports and data from logs, licensee event reports, and work orders for each PI area specified below. The following PIs for Unit 1 and Unit 2 (4 samples) were reviewed:

- Unit 1 Reactor Coolant System Leakage (June 2004 to June 2006)
- Unit 2 Reactor Coolant System Leakage (June 2004 to June 2006)
- Unit 1 Safety System Functional Failure (October 2004 to June 2006)
- Unit 2 Safety System Functional Failure (October 2004 to June 2006)

The documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

## Cornerstones: Occupational and Public Radiation Safety

### .1 Radiation Safety Strategic Area

#### a. Inspection Scope

The inspectors sampled the licensee's Performance Indicator (PI) submittals for the periods listed below. The inspectors used PI definitions and guidance contained in Revision 3 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," to verify the accuracy of the PI data. The following PIs were reviewed:

- Occupational Exposure Control Effectiveness: Units 1 and 2

The inspectors reviewed the licensee's assessment of the PI for occupational radiation safety to determine if indicator related data was adequately assessed and reported during the previous four quarters. The inspectors compared the licensee's PI data with the condition report database, reviewed radiological restricted area exit electronic dosimetry transaction records, and conducted walkdowns of accessible locked high radiation area entrances to verify the adequacy of controls in place for these areas. Data collection and analysis methods for PIs were discussed with licensee representatives to determine if there were any unaccounted for occurrences in the Occupational Radiation Safety PI, as defined in Revision 3 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline." This review represented one sample.

- Radiological Environmental Technical Specification/Offsite Dose Calculation Manual (RETS/ODCM) Radiological Effluent Occurrences: Units 1 and 2

The inspectors reviewed data associated with the RETS/ODCM PI to determine if the indicator was accurately assessed and reported. This review included the licensee's condition report database for the previous four quarters to identify any potential occurrences such as unmonitored, uncontrolled or improperly calculated effluent releases that may have impacted offsite dose. The inspectors also selectively reviewed gaseous and liquid effluent release data and the results of associated offsite dose calculations and quarterly PI verification records generated over the previous four quarters. Data collection and analyses methods for PIs were discussed with licensee representatives to determine if the process was implemented consistent with industry guidance in Revision 3 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline." This review represented one sample.

#### b. Findings

No findings of significance were identified. However, the inspectors reviewed the adequacy of the licensee's evaluation of abnormal radiological restricted area exit electronic dosimetry transaction records. Specifically, the records for a condition identified as "Digi Reset" were reviewed. Based on the licensee's understanding, this "Digi Reset" condition represented an event that indicates the dosimeter was not functioning for some period of time while the dosimeter was in use. While the

dosimeter was not functioning, dose that was received by the worker would not be recorded by the dosimeter. Therefore, this condition could represent an occurrence in the Occupational Radiation Safety PI as defined in Revision 3 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline." At the time of this inspection, the licensee had not determined the extent of the issue nor the impact of the condition on the workers dose records. The licensee planned to perform additional investigations to quantify the duration the dosimeter was not functioning, the amount of dose that was missed during this time, and an evaluation of compliance with the requirements specified in Technical Specification 5.7 "Administrative Controls for High Radiation Areas." Therefore, this issue remains unresolved pending NRC review of the licensee's evaluations, and therefore the issue is categorized as an Unresolved Item (URI), (05000454/2006004-04;05000455/2006004-04).

#### 40A2 Identification and Resolution of Problems (71152)

##### .1 Review of Items Entered into the Corrective Action Program:

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 screening of all items entered into the licensee's corrective action program. This was accomplished by reviewing the description of each new Issue Report and attending selected daily management review committee meetings. Documents reviewed are listed in the attachment.

#### 40A3 Event Follow-Up (71153)

Two samples were performed for this inspection module.

##### .1 Operator Response to Numerous Equipment Failure During Severe Thunderstorm/Lightning Strike

###### a. Inspection Scope

The inspectors observed and evaluated control room and equipment operator responses to the numerous equipment failure during a severe thunderstorm/lightning strike on July 20, 2006. The inspectors evaluated crew performance in the areas of:

- prioritization, interpretation and verification of alarms;
- procedure use;
- control board manipulations;
- supervisor's command and control;
- management oversight; and
- group dynamics.

Crew performance in these areas was compared to licensee management expectations and procedures. Additional documents reviewed during this inspection are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.2 Fire Brigade Response to an Auxiliary Building Alarm

a. Inspection Scope

On August 28, 2006, the inspectors responded to the control room and the auxiliary building after hearing a plant announcement of a fire in the auxiliary building. Control room personnel had received a fire alarm at 11:38 a.m. for the Auxiliary Building Elevator. The presence of smoke was reported at the 451' level of the auxiliary building and the fire brigade was dispatched. Offsite fire department assistance was requested and received.

The fire brigade reported smoke in the area but no fire was observed. The fire brigade found that the elevator brake shaft was very hot so power to the elevator was removed. Smoke was subsequently cleared and atmospheric testing verified the air was safe to breath. The event was then terminated and no Emergency Action Level was declared. The inspectors assessed licensee performance during the event, damage assessment activities following the event, and the prompt investigation efforts.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 (Closed) Unresolved Item (URI) 050000454/2006002-02;050000455/2006002-02: Licensee Unable to Verify Pipe Integrity

Industry experience had shown that the failure of circulating water blow-down line vacuum breakers resulted in the release of contaminated water into the offsite environment resulting in groundwater contamination. On February 2, 2006, the licensee could not demonstrate the integrity of circulating water blowdown line vacuum breakers. Leakage of water from the blow-down line could result in the release of radioactive material into the environment via a release path that was undefined in the ODCM and had no offsite dose estimates.

The licensee conducted additional inspections and analysis of the area surrounding the vacuum breaker vaults. These investigations were evaluated in Section 2PS1.1 of this report and resulted in a Non-Cited Violation, and the URI is closed.

.2 (Closed) Unresolved Item (URI) 05000454/2006002-04: Quantification of Containment Isolation Valve leakage

On January 23, 2006, the licensee identified that the Unit 1 Pressurizer liquid sample inboard and outboard containment isolation valves were leaking by. This condition was not communicated to the shift manager until two days later. The shift manager

subsequently declared both containment isolation valves inoperable and entered the appropriate limiting condition for operations in accordance with Technical Specifications 3.6.3. Since the condition was discovered two days before, the required TS action completion time of one hour would have been exceeded. However, a TS violation exists only if the leakage through the containment isolation valves exceeded 0.6 times the maximum allowable containment leakage rate. The licensee were not able to quantify the leakage due to existing plant configuration until September, 2006 when Unit 1 shutdown for refueling.

In September 2006, the licensee performed a local leak rate test and determined that the containment isolation valve leakage did not exceed 0.6 times the maximum allowable containment leakage rate. Therefore, the two containment isolation valves were operable at the time and no violation of TS existed. This URI is closed.

.3 Pressurized Water Reactor Containment Sump Blockage (TI 2515/166)

a. Inspection Scope

The purpose of this Temporary Instruction was to support Nuclear Regulatory Commission review of licensee's activities in response to NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors (PWRs)." This TI required NRC inspectors to verify actions implemented in response to NRC Generic Letter were complete and where applicable were programmatically controlled.

The inspectors performed a review in accordance with TI 2515/166 of the licensee's response to GL 2004-02 for Unit 1. The inspectors also reviewed changes to the licensee's facility and verified they were evaluated in accordance with 10 CFR Part 50.59. The licensee had received permission to deviate from the schedule in GL 2004-02 for Unit 1 regarding the downstream effects portion of their modifications. This portion of the licensee's response to the GL was not modified in the Unit 1 Refueling Outage. As such, TI 2515/166 for Unit 1 remains open.

The inspectors reviewed the licensee's modification packages, attended planning meetings, observed training activities in a recirculation sump mockup, and reviewed regulatory submittals as part of their preparation activities before the Unit 1 refueling outage. During the refueling outage the inspectors periodically observed work activities focusing on the critical attributes selected by the inspectors. For example, the inspectors compared trash racks, sump screens, and supports to installation drawings. In addition, the inspectors closely observed Foreign Material Exclusion programs and practices to ensure FME was not left inside of the new sump screens.

b. Evaluation of Inspection Requirements

The TI requested the inspectors to include answers to the following questions in this inspection report.

1. Did the licensee implement the plant modifications and procedure changes committed to in their GL 2004-02 responses?



With the exception of the downstream effects portion of their response the licensee did implement the plant modifications and procedure changes committed to in their GL 2004-02 responses.

2. Has the licensee updated its licensing bases to reflect the corrective actions taken in response to GL 2004-02?

The inspectors reviewed the completed 10 CFR Part 50.59 assessments performed by the licensee and verified that the documents contained updates to the UFSAR to be submitted to the NRC at the next regular update. This is with the exception of the downstream effects portion of the GL 2004-02 response.

The TI for Unit 1 is not complete. Further inspection is required, specifically, the downstream effects aspects of the ECCS sumps.

c. Findings

No findings of significance were identified.

4OA6 Meetings

- .1 On October 3, 2006, the resident inspectors presented the inspection results to Mr. D. Hoots and his staff, who acknowledged the findings. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

- .2 Interim Exit Meetings

Interim exits were conducted for:

- Occupational Radiation Safety Program for radiation monitoring instrumentation and protective equipment and aspects of the effluent monitoring program with Mr. D. Hoots on July 21, 2006;
- Public Radiation Safety Program for radioactive material processing and transportation program and Performance Indicator Verification with Mr. D. Hoots on August 25, 2006;
- Occupational Radiation Safety Program for access control to radiologically significant areas and ALARA programs with Mr. D. Hoots on September 15, 2006;
- Occupational Radiation Safety Program Green finding and associated violations of NRC requirements post and control access to High Radiation Areas with Ms. M. Snow on October 5, 2006; and
- Public Radiation Safety with Mr. S. Kerr on October 12, 2006.

4OA7 Licensee Identified Violations

The following violations of very low significance were identified by the licensee and were violations of NRC requirements which met the criteria of Section VI of the NRC Enforcement Manual, NUREG-1600, for being dispositioned as NCVs.

## **Cornerstone: Initiating Events and Barrier Integrity**

Byron Station's Operating License Condition 2.C.(6) states, in part, that "The licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in the SER." Section 9.5.1 of the UFSAR states that "The design bases, system descriptions, safety evaluation, inspection and testing requirements, personnel qualification, and training are described in Reference 1 [the Fire Protection Report]." Section 3.5.a.5 of the Fire Protection Report states, in part, that access protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors or should have fire doors that are kept closed and electrically supervised at a continuously manned location. Contrary to the above, the licensee failed to have electrically supervised fire door between the diesel generator rooms and their associated ventilation rooms as the diesel generator rooms were protected by automatic total flooding carbon dioxide gas suppression systems.

This violation is of very low safety significance because the violation is of low degradation that it only affected suppression, not detection or ignition, and the suppression system performance and reliability was minimally impacted by the lack of electrically supervised fire door. This issue was entered into the licensee's corrective action program as IR 513527.

Technical Specification 3.6.7, Spray Additive System, Condition A states that with the spray additive system inoperable, the required action is to restore the system to operable status within seven days. Contrary to the above, the licensee failed to repair a pressure boundary leak in the spray additive system within the seven-day allowable outage time. Specifically, the licensee identified a pressure boundary weld leak in a ASME Class II pipe of the spray additive system on August 11, 2006. However, they failed to recognize until September 11, 2006, that the leak rendered the spray additive system inoperable. The licensee declared the system inoperable and repaired the leak.

This violation is of very low safety significance because the system does not affect core damage frequently and has no impact on Large Early Release Frequency (LERF). This issue was entered into the licensee's corrective action program as IR 519173 and 526745.

ATTACHMENT: SUPPLEMENTAL INFORMATION

### **SUPPLEMENTAL INFORMATION**

#### **KEY POINTS OF CONTACT**

##### Licensee

D. Hoots, Site Vice President  
M. Snow, Plant Manager  
B. Adams, Work Control Director  
B. Barton, Radiation Engineering Superintendent  
L. Doyle, Programs Coordinator  
A. Giancattarino, Engineering Director

C. Gregory, RP Instrumentation Coordinator  
 S. Swanson, Maintenance Director  
 D. Palmer, Radiation Protection Manager,  
 W. Grundmann, Regulatory Assurance Manager  
 W. Kouba, Nuclear Oversight Manager  
 M. Prospero, Operations Manager  
 D. Thompson, Technical Support Superintendent

Nuclear Regulatory Commission

R. Skokowski, Chief, Branch 3, Division of Reactor Projects

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

050000454/2006004-04 050000455/2006004-04	URI	Impact of nonfunctional dosimeters on dose tracking and Technical Specification compliance (Section 4OA1.1)
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Opened and Closed

05000454/2006004-01; 05000455/2006004-01	NCV	Failure to Maintain Fire Barriers in Accordance with Fire Protection Program (Section 1R05)
05000454/2006004-02 05000455/2006004-02	NCV	The failure to post and control a High Radiation Area (Section 2OS1.1)
05000454/2006004-03 05000455/2006004-03	NCV	The failure to evaluate the potential radiological hazard associated with the leakage of water from the vacuum breaker valve vault (Section 2PS1.1)

Closed

05000454/2006002-02 05000455/2006002-02	URI	Licensee Unable to Verify Pipe Integrity (Section 4OA5)
05000454/2006002-04	URI	Quantification of Containment Isolation Valve leakage (Section 4OA5)

Discussed

None



## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of 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

1BOSR 7.5.1-2; 1B Train Auxiliary Feedwater Monthly Lineup Surveillance, Revision 2  
2BOSR 5.2.2-1; Unit 2 ECCS Venting and Valve Alignment Monthly Surveillance,  
Revision 17  
Drawing M-37; Diagram of Auxiliary Feedwater, Revision AV  
IR 398716; 2B CV Pump Seal Leak, November 14, 2005  
BOP AP-97; "Bus 131X Outage While in Mode 6"; Revision 3  
UFSAR; Chapter 9.1.3, "Spent Fuel Pool Cooling and Cleanup System"; Revision 8,  
December 2000  
M-63; "Diagram of Fuel Pool Cooling and Clean-up"; Sheets 1A, 1B, and 1C;  
December 26, 1997  
BOP DG-1; "Diesel Generator Alignment to Standby Condition"; Revision 10  
BOP DG-M1; "Diesel Generator System Valve Lineup"; Revision 17  
BOP DG-E2A; "System Lineup Sheet"; Revision 2  
BOP DG-1; "Diesel Generator Alignment to Standby Condition"; Revision 10

### Corrective Action Documents as a Result of NRC Inspection

IR 533297; Housekeeping and Material Condition Questions, September 18, 2006 (NRC Identified)  
IR 534198; Protected Equipment List Questions, September 21, 2006 (NRC Identified)

### 1R05 Fire Protection

IR 513527; Deviation From Regulatory Guidance in Fire Protection Report, July 26, 2006  
Byron/Braidwood Fire Protection Report, Figure 2.3-8, Sheet 2 of 4 and Sheet 4 of 4  
Pre-Fire Plans, Revision 0, Turbine Building Elevation 451' -0", Zone 8.6-0  
Pre-Fire Plans, Auxiliary Building - 393' Elevation - General Area - West, Revision 4  
Pre-Fire Plans, Auxiliary Building - 401' Elevation - General Area - West, Revision 4  
Pre-Fire Plans, Circulating Water Pump House, Revision 3  
Pre-Fire Plans, Containment Pipe Penetration Area, Auxiliary Building Zone 11.3-1  
Pre-Fire Plans, Auxiliary Building - 401' Elevation - General Area - North, Revision 5  
Fire Drill Scenario No. 36; Fire in NSWP Contractor Building, June 19, 2006  
OP-AA-201-003; Fire Drill Performance, Revision 7  
OP-AA-201-005; Fire Brigade Qualification, Revision 5  
OP-AA-201-008; Pre-Fire Plans, Revision 1  
SA-AA-122; Handling and Storage of Compressed Gas Cylinders/Portable Tanks and  
Cryogenic Containers/Dewars, Revision 3  
2.3.11.41; Auxiliary Building Elevation 401' 0" (Fire Zone 11.5-0)

Drawing 6E-0-36-A; Electrical Floor and Wall Seal Tabulation Notes, Sheet 2,  
Revision B

Corrective Action Documents as a Result of NRC Inspection

IR 513527; Deviation From Regulatory Guidance in Fire Protection Report, July 26, 2006 (NRC Identified)  
IR 522505; Door 0DSD237 Not Closing Properly, August 22, 2006 (NRC Identified)  
IR 530966; NRC Identified N2 Cylinders in Auxiliary Building Not Secured Properly, September 14, 2006 (NRC Identified)  
IR 531067; NRC Identified LL Lighting Panel Issue, September 14, 2006 (NRC Identified)  
IR 531098; NRC Auxiliary Building Walkdown Issues, September 14, 2006 (NRC Identified)  
IR 534389; Fire Door May Not Be Closing Properly, September 21, 2006 (NRC Identified)  
IR 512975; 0BVS R 3.10.B.12-1, Preconditioning Concern, July 24, 2006 (NRC Identified)  
IR 526548; Pre-Fire Plan Errors, September 01, 2006 (NRC Identified)  
IR 530148; More Discrepancies in Fire Protection Report, September 12, 2006 (NRC Identified)  
IR 534809; NRC Identified Fire Protection Plan, Report & Field Locale Inconsistencies, September 22, 2006 (NRC Identified)  
IR 535866; NRC Walkdown in Area 5, September 25, 2006 (NRC Identified)  
IR 535887; More NRC Discrepancies with Fire Protection Report, Plan & What's in the Field, September 25, 2006 (NRC Identified)

1R11 Licensed Operator Regualification Program (Quarterly)

Cycle 06-5 Out of the Box Evaluated Scenario, #06-5-1, Revision 0  
LORT Cycle 06-5, Practice Static,

1R12 Maintenance Effectiveness

EC 0000362663, Revision 0, Evaluation of Impact on Fire Protection Safe Shutdown Analysis for breaker 1AP23E-E3 and 1AP92E-A4 Testing Failures  
Westinghouse Technical Bulletin TB-04-13, Replacement Solutions for Obsolete Classic Molded Case Circuit Breakers, UL Testing Issues, Breaker Design Life and Trip Band Adjustment  
Westinghouse Technical Bulletin TB-06-2, Aging Issues and Subsequent Operating Issues for Breakers That are at Their 20 Year Design/Qualified Lives; UL Certification/Testing Issues Update  
Drawing 6E-1-4007D, Revision N, Byron Unit 1 Key Diagram 480V ESF Substation Bus 132X  
IR 531766; Breaker Tripped Out of Tolerance High, 132X4-L3  
IR 531898; Out of Tolerance HFB Breaker 132X1 1AP23E D2  
IR 531909; Out of Tolerance HFB Breaker 132X1 1AP23E D4  
IR 532016; Molded Case Breaker 1AP92E-A4 Failed to Trip  
IR 532974; Aggregate Impact of Breaker Testing Failures

IR534855; B1R14 LL Molded Case Circuit Breaker Testing

1R13 Maintenance Risk Assessments and Emergent Work Control

WC-AA-101; Online Work Control Process, Revision 12  
WC-AA-101-1002; Online Scheduling Process, Revision 5  
Protected Equipment Log, July 06, 2006  
Protected Equipment Log, August 31, 2006  
Protected Equipment Log, September 20, 2006  
Unit 1 Risk Configurations, Week of July 03, 2006  
Unit 1 Risk Configurations, Week of August 28, 2006  
Shutdown Safety Approval, B1R14 Schedule Change, September 13, 2006

1R15 Operability Evaluations

IR B2000-02395; Copious Amounts of Water Draining from 1B EDG Intake Manifolds, August 30, 2000  
IR 510241; Unit 1 Loose Parts Monitoring System Sensor Failure, July 17, 2006  
IR 510242; Unit 1 Loose Parts Monitoring System Failure, July 17, 2006  
IR 510243; Thunderstorms Affect Plant Operation, July 17, 2006  
IR 510244; Unit 1 Loose Parts Monitoring System Failure, July 17, 2006  
IR 512583; Used SX Fan Blade Testing Results, July 21, 2006  
IR 519173; Caustic Leak From 1CS043A, August 11, 2006  
IR 522587; Byron Review of Braidwood RH Pressure Anomaly IR, August 21, 2006  
IR 533298; Gas Void Discovered in Main RWST Discharge Piping  
IR 533468; Disagree with Not Immediately Checking Unit 2 RWST Line  
IR 533911; Discovery of Gas Void in RWST Discharge Line  
IR 534770; ECCS Technical Specification Venting Surveillance May Not Be Comprehensive, September 22, 2006  
IR 535238; Pressurizer Level Control in Manual On Unit Shut Down, September 21, 2006  
EC 360921 002; Operations Evaluation 06-004, Evaluation of SX Fan Blade Degradation; July 31, 2006  
IR 526745; Unplanned LCOAR Entry for 1A Containment Spray Add System - Quick Human Performance Investigation Report, September 01, 2006  
Quick Human Performance Investigation Report; Unplanned LCOAR Entry For 1A Containment Spray Add System, September 01, 2006  
Drawing SI-14, Revision 17, Safety Injection Large Bore Isometric  
IR 521636; Slinger Ring Not Rotating; August 19, 2006  
2A and 2B SX PP Motor Bearing Temperature Trends 9/12/06 to 9/14/06  
IR 496723; 1B AF PP Head Tank Went Water Solid During PP Run; June 5, 2006  
IR 506073; 2B AF PP Head Tank Went Water Solid During Pump Run; July 3, 2006  
IR 516933; 2B AUX Feed Pump Diesel Engine Jacket Water; August 4, 2006  
IR 517147; Trapped Air Found In The 2B AF Diesel Jacket Water System; August 5, 2006  
BAP 1100-3A3, Pre-Evaluated Plant Barrier Matrix, Revision 18  
Technical Guidance 9900; Operable/Operability; October 31, 1991  
BOP AF-12; Filling/Draining The AF Diesel Jacket Water System; Revision 1  
IR 363257; 2B AF Diesel Engine Jacket Water Expansion Tank Overflowed;

August 15, 2005 (Braidwood IR)  
IR 510200; 2B AF Pump JW Head Tank Overflowed During Pump Run; July 17, 2006  
(Braidwood IR)

#### 1R19 Post Maintenance Testing

WO 726136 04; Operations PMT Functional Run Pump, August 31, 2006  
WO 731529 03; Operations Post Maintenance Test - Cycle DC Bus 111 AF2 Breaker,  
September 23, 2006  
WO 770715 01, MOV Actuator Rebuild/Inspection/Re-Grease, July 18, 2006  
WO 770715 04, Position Indication Test for 1SI8807A/B, July 19, 2006  
WO 789563 01; 111 "A" Train 125V Battery Bank Service Test, September 23, 2006  
WO 824497 02; 0B SX Make-Up Pump - Start Engine, Verify No Leaks, August 31, 2006  
WO 847730 02; Operations PMT - VIS and Functional Run of the 0B SX Make-Up Pump  
Diesel Engine, August 31, 2006  
WO 911695 02; Operations PMT Task Inspect the SS Tubing on Trip Switches 0B SX,  
August 31, 2006  
WO 914850 01, Safety Injection System Valve Stroke Test "A" Train, July 19, 2006  
WO 919018 03; Operations PMT Vis/Functional - Start/Run Engine, Verify Pressure, No  
Leaks, August 31, 2006  
WO 920737 04; Operations PMT Start and Run 0B SX Make-Up Pump, Adjust/Restart  
Per PED, August 31, 2006  
IR 525783; 0B SX Make-Up Pump Lessons Learned, August 31, 2006  
IR 534901; 1CV01PB Pump PMT For Leakage Is SAT, September 22, 2006  
MM Outage Tasks, September 10, 2006  
0BVSR 5.5.8.SX.5-1b; 0SX01PB Group B IST Requirements for Essential Service Water  
Makeup Pump, August 31, 2006

#### 1R20 Refueling and Outage Activities

IR 529302; Clearance Order on Containment Spray System Hung Early,  
September 11, 2006  
IR 530094; RCS Vessel Level Not Accurate During Drain, September 12, 2006  
IR 537543; Outage Extension of Greater Than 24 Hours Due to PWOL,  
September 28, 2006  
B1R14 Work Orders Removed to Date, September 24, 2006  
Quick Human Performance Investigation Report; Connection of HEPA to Reactor Head  
Vent Path Causes Reactor Level Perturbations, September 12, 2006  
B1R14 OCC Turnover; September 11 - September 30, 2006  
B1R14 Shutdown Risk Profile; September 11 - September 30, 2006  
B1R14 Outage News; September 11 - September 30, 2006  
Outage Status, September 28, 2006  
PORC Agenda Tuesday, August 29, 2006, B1R14 Shutdown Risk Plan

#### Corrective Action Documents As A Result of NRC Inspection

IR 529334; Unit Status Incorrect in Outage News, September 11, 2006 (NRC Identified)  
IR 529428; NRC Unit 1 Shutdown-Mode 3 Containment Walkdown Issues List,  
September 10, 2006 (NRC Identified)



IR 529470; Items Found on NRC Containment Walkdown With NRC Division Director of Reactor Projects, September 11, 2006 (NRC Identified)  
IR 529554; Additional Containment Leaks and Insulation Issues, September 11, 2006 (NRC Identified)  
IR 530240; Boric Acid Packing Leak on 1SI8878B, September 13, 2006 (NRC Identified)  
IR 530242; Boric Acid Packing Leak on 1RC8036C, September 13, 2006 (NRC Identified)  
IR 530243; Boric Acid Packing Leak on 1RH8702A, September 13, 2006 (NRC Identified)  
IR 530249; Boric Acid Residue on Sight Glasses, September 13, 2006 (NRC Identified)  
IR 530764; Boric Acid Leak Downstream of 1PS9352C at Fitting, September 14, 2006 (NRC Identified)  
IR 530770; NRC Issue Support Loose Retaining Clip IR 529470, Item 1, September 14, 2006 (NRC Identified)  
IR 530777; NRC Issue Oil On Grating IR 529470, Item 4, September 14, 2006 (NRC Identified)  
IR 531451; Missing Ground Strap, September 14, 2006 (NRC Identified)  
IR 533787; Lack of Fall Protection, September 20, 2006 (NRC Identified)  
IR 533755; Worker on RCP Asked If Working Safely By Observers, September 20, 2006 (NRC Identified)  
IR 536175; Boric Acid Body to Bonnet Leak, September 25, 2006 (NRC Identified)  
IR 536200; Boric Acid Packing Leak on 1CS058B, September 25, 2006 (NRC Identified)  
IR 536203; Boric Acid Packing Leak on 1RH028A, September 25, 2006 (NRC Identified)  
IR 536208; Boric Acid Packing Leak on 1CV8369A, September 25, 2006 (NRC Identified)  
IR 536211; Boric Acid Packing Leak on 1CV8369D, September 25, 2006 (NRC Identified)  
IR 536222; Boric Acid Leakage on 1Fit-CV045 Flow Element, September 25, 2006 (NRC Identified)  
IR 537605; NRC Identified Issues During Unit 1 Containment Pre-Mode 4 Walkdown, September 28, 2006 (NRC Identified)  
IR 537997; Polar Crane 120 Outlet Cover is Being Held On With Tape, September 28, 2006 (NRC Identified)  
Issue 529428; NRC Unit 1 Shutdown Mode 3 Containment Walkdown Issues List, September 10, 2006 (NRC Identified)  
Issue 529470; Items Found on NRC Containment Walkdown with NRC Division Director of Reactor Projects, September 11, 2006 (NRC Identified)  
Issue 529554; Additional NRC Identified Containment Leaks & Insulation Issue, September 11, 2006 (NRC Identified)  
Issue 530764; Boric Acid Leak downstream of 1PS9352C at Fitting, September 14, 2006 (NRC Identified)  
Issue 530770; NRC Issue Support Loose Retaining Clip IR 529470, Item 1, September 11, 2006 (NRC Identified)

## 1R22 Surveillance Testing

IR 516871; 2BOSR 3.1.5-2 Could Not Be Performed as Written, August 04, 2006  
IR 516979; Red First Out For RX Trip/Turbine Trip During 2B SSPS Testing, August 04, 2006

IR 534470; Pump Start Times Required - B1R14 Surveillance, September 21, 2006  
1BOSR 6.6.2-1; Reactor Containment Fan Cooler Monthly Surveillance, July 12, 2006  
2BOSR 3.1.5-2; Train B Solid State Protection System Bi-Monthly Surveillance,  
August 04, 2006 and August 05, 2006  
2BOSR 8.1.2-1; 2A DG Operability Monthly and Semi-Annual Surveillance,  
July 26, 2006  
Work Order 786235 01; Simultaneous Start of Both Auxiliary Feedwater Pumps With  
Flow to the Steam Generator, September 08, 2006  
WO 794150; 1B Diesel Generator Sequencer Test, September 19, 2006  
Quick Human Performance Investigation Report; Red First Out for RX Trip/Turbine Trip  
Received During Performance of 2BOSR 3.1.5-2, Unit 2 Train B SSPS Bi-Monthly  
Surveillance, August 04, 2006

Corrective Action Documents As A Result of NRC Inspection

IR 528887; Frayed Battery Cable West Side of the 1B AF Pump, September 08, 2006  
(NRC Identified)

2OS1 Access Control to Radiologically Significant Areas; and  
2OS2 ALARA Planning And Controls

Byron Station Site ALARA Committee (SAC) Meeting Minutes; ECCS Sump Mod;  
August 15, 2006  
Byron Station SAC Meeting Minutes; Scaffolding; dated July 26, 2006  
Byron Station SAC Meeting Minutes; B1R14 Reactor Services (RXS); dated  
July 19, 2006  
Byron Station SAC Meeting Minutes; Valves; dated August 15, 2006  
B1R14 Forced Oxidation ALARA Guidelines; no date provided  
IR 530768; B1R14 Dose Rates Higher than Expected After Forced Oxidation; dated  
September 14, 2006  
IR 529788; B1R14 Outage PCE Negative Trend Identified; dated September 12, 2006  
RP-AA-460; Controls for High and Very High Radiation Areas; Revision 11  
RP-AA-460-1001; Additional High Radiation Exposure Control; Revision 1  
RP-AA-460-1003; Radiation Worker Pocket RWP Data Sheets; Revision 2  
RP-AA-19; High Radiation Area Program Description; Revision 1  
RP-AA-376; Radiological Postings, Labeling and Markings; Revision 1  
RP-BY-500-1003; Radiological Controls for Handling Items and Hanging Activated Parts  
in the Spent Fuel Pool; Revision 1  
RP-AA-401; Operational ALARA Planning and Controls; Revision 6  
RP-AA-210; Dosimetry Issue, Usage, and Control; Revision 7  
AT No. 431083-10; Check-in Functional Area Self Assessment; Access Control to  
Radiologically Significant Areas; dated January 10, 2006

Corrective Action Documents As A Result of NRC Inspection

IR 531013; B1R14 LL- 383' HRA Controls During Forced Oxidation; dated  
September 12, 2006; (NRC Identified)  
IR 531077; B1R14 Lessons Learned RADS Software; dated September 14, 2006; (NRC  
Identified)

IR 530916; B1R14 RP Lessons Learned; dated September 14, 2006; (NRC Identified)  
IR 530972; B1R14 LL - Byron Specific Procedure Knowledge; dated  
September 13, 2006; (NRC Identified)

### 2OS3 Radiation Monitoring Instrumentation and Protective Equipment

International Safety Instruments Viking Digital SCBA with Digital Indicators Users Manual; 2001  
RP-BY-825-1000; Maintenance Care and Inspection of the Viking Self-Contained Breathing Apparatus; Revision 2  
BRP 5510-15; Charging of Air Cylinders for Self-Contained Breathing Apparatus; Revision 8  
Exelon Power Labs; Certificate of Calibration for Eberline Radiation Detection Device Model ASP-1/AC3-7; Serial No. 652/724197; tested July 7, 2006  
Exelon Power Labs; Certificate of Calibration for Eberline Radiation Detection Device Model E-530; Serial No. 1337; tested February 22, 2006  
Exelon Power Labs; Certificate of Calibration for Eberline Radiation Detection Device Model RM-14; Serial No. 7528; tested May 4, 2006  
RP-AA-700; Controls for Radiation Protection Instrumentation; Revision 1  
Exelon Power Labs; Certificate of Calibration for Eberline Radiation Detection Device Model RM-14; Serial No. 7382; tested May 4, 2006  
BRP 5822-11; Calibration of Nuclear Enterprises Small Articles Monitor (SAM); Revision 13  
IR 511075; Alpha Meter Calibration Records from Power Labs Incomplete; dated July 19, 2006  
Work Order 564380; Calibration of Auxiliary Building Ventilation Stack Wide Range Gas Radiation Monitor; dated November 15, 2004  
IR 431084; Instrument Assessment; dated April 14, 2006  
Work Order 700789; Check Calibration of 2PR30J; dated April 11, 2005  
Worker Order 621854; Perform Detector Calibration of 1RE-AR020; dated March 12, 2005  
Work Order 602196; Perform High Range Containment Radiation Loop of 1AR-021; dated February 24, 2005  
Work Order 678217; Perform High Range Containment Radiation Monitor Loop of 2AR-021; dated September 7, 2005  
Work Order 678273; Perform High Range Containment Radiation Monitor Loop 2AR-20; dated August 26, 2005

### 2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring

IR 454276; Tritium in CW blowdown vacuum breakers; dated February 15, 2006  
IR 478372; Station receive violation notice from IEPA; dated April 12, 2006  
IR 350931, Leakage of 0CW276 B/D vacuum breaker; dated July 7, 2005  
IR 474364, Sampling wells near CW vault 3 and 4 found low level tritium  
Work Order 828555; Inspect/repair pump out of CW B/D vault; date February 17, 2006  
File No. 2.12.1518; 10CFR50.75(g)(1) Documentation on CWBD Line Vault Leaks, not dated  
Plant Issue Resolution Documentation; SER No. 2006-05; dated March 24, 2006  
Plant Issue Resolution Documentation; SER No. 2006-07; dated April 10, 2006

BOP-CW-12; Circulating Water Blowdown System Startup; Operation; and Shutdown;  
Revision 30  
Engineering Change 360806, Install level switches and alarms in the CW blowdown  
vaults, Approved; dated June 16, 2006  
Hydrogeologic Investigation Report, Ref No. 045136(13); dated June 2006  
Radiological Environmental Monitoring Program; Revision 2; dated January, 2002

## 2PS2 Radioactive Material Processing and Transportation

Updated Final Safety Analysis Report; Chapter 11; Revision 9  
AT No. 431086-03; Functional Area Self Assessment; Radioactive material Shipping;  
dated July 16, 2006  
IR 437597; NS Audit; NOSA-BYR-06-04; Chemistry, Radwaste, Effluent and  
Environmental Monitoring Program Audit Report; dated April 5, 2006  
RW-AA-100; Process Control Program for Radioactive Wastes; Revision 3  
IR 490283; NOS/NSRB Id'd Issues in Rad Waste; dated May 15, 2005  
IR 319575; Semi Drivers Qualification; dated March 31, 2006  
IR 343900; NOD ID: RP Ineffective Corrective Actions; dated June 14, 2005  
IR 361876; Seavan 2-meter Dose Rate Greater than 10 mR/hr; dated August, 10, 2005  
IR 352279; Late Notification of Radioactive Shipment; dated July 12, 2005  
IR.370734; Unit-Tech Laundry Trailer has Expire License Plates; dated  
September 6, 2005  
IR 383843; Holes in Seavan No. 10; dated October 9, 2005  
IR 453820; Vendor did not Receive Rad Shipment of Blowdown H3 Samples; dated  
February 14, 2006  
IR 465509; Rad Shipment Receipt Survey not Performed Withing 3 Hours; dated  
March 13, 2006  
IR 469817; NOSID:(RP) Inconsistent Application of Scaling Factor Determination; dated  
March 23, 2006  
RP-AP-605; Attachment 2; Waste Stream Results Review; dated December 6, 2005  
RP-AP-605; Attachment 2; Waste Stream Results Review; dated April 22, 2005  
RMS06-077; Radioactive Material Shipment; shipped; dated August 18, 2006  
RMS06-019; Radioactive Material Shipment; shipped March 10, 2006  
RMS05-142; Radioactive Material Shipment; shipped October 14, 2005  
RMS05-143; Radioactive Material Shipment; shipped October 18, 2005  
RMS05-123; Radioactive Material Shipment; shipped September 23, 2005  
RMS05-095; Radioactive Material Shipment; shipped July 11, 2005  
RWS05-006; Radioactive Waste Shipment; shipped April 23, 2005  
RWS05-008; Radioactive Waste Shipment; shipped June 21, 2005  
RWS06-005; Radioactive Waste Shipment; shipped March 14, 2006  
RWS06-009; Radioactive Waste Shipment; shipped June 28, 2006

### Corrective Action Documents As A Result of NRC Inspection

IR 253345; 49CFR172.704 Training for Fuel Handlers; dated September 15, 2004 (NRC  
Identified)

## 4OA1 Performance Indicator Verification

Monthly Data Elements for NRC Reactor Coolant System (RCS) Leakage, June 2004 to June 2006;  
Byron's Archival Operations Narrative Logs, Unit 2, October 01, 2005 to October 31, 2005;  
Byron's Archival Operations Narrative Logs, Unit 2, August 01, 2004 to August 31, 2004;  
Byron's Archival Operations Narrative Logs, Unit 1, March 01, 2005 to March 31, 2005;  
Byron's Archival Operations Narrative Logs, Unit 1, August 01, 2005 to August 31, 2005;  
LS-AA-2140; Monthly Data Elements for NRC Occupational Exposure Control Effectiveness; dated July 2005 through June 2006  
LS-AA-2150; Monthly Data Elements for RETS/ODCM Radiological Effluent Occurrences; dated July 2005 through June 2006

#### Corrective Action Documents as a Result of NRC Inspection

IR 521377; Safety System Functional Failure Reporting Error, August 18, 2006 (NRC Identified)  
IR 535846; Signed Copy of LS-AA-2080 Unavailable, September 25, 2006 (NRC Identified)  
AR No.523523; PI Source Documentation does not Corroborate Data Elements; dated August 24, 2006; (NRC Identified)  
AR No.523038; Electronic Dosimeter Resets; dated August 23, 2006; (NRC Identified)

#### 40A3 Event Follow-up

IR 524623; Aux Bldg Elevator Brakes Overheated; August 28, 2006  
IR 511695; Lessons Learn With Byron BTB 4-5 Auto Reclosure Feature; July 21, 2006;  
IR 511202; Thunderstorm Impacts Plant OPS; July 20, 2006;

#### 40A5 Other Activities

Work Order 894949-01; As Found LLRT for P-70 - 1PS9355A and 1PS9355B; September 19, 2006;  
IR 532626; 1PS9355A Failed LLRT; September 18, 2006;  
Letter from NRC to Exelon dated August 19, 2005, "Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2 - Response to Bulletin 2003-01 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors""  
Letter from Exelon to NRC dated September 1, 2005, "Exelon/AmerGen Response to NRC Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors""  
Letter from Exelon to NRC dated May 31, 2006, "Supplement to Exelon Response to NRC Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors""  
Letter from NRC to Exelon, Dated July 21, 2006, "Byron Station, Unit No. 1, and Braidwood Station Unit No. 2 - Requested Extension of Completion Schedule for NRC Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors" TAC Nos. MC4669 and MC4668""  
Letter from Exelon to NRC dated July 27, 2006, Response to Request for Additional

Information Regarding NRC Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors"

Fire Protection Change Regulatory Review, dated September 8, 2006 as part of Engineering Change 356569 and FDRP 22-049

Design Analysis Minor Revision for Analysis BYR02-057 for the Byron Post Fire Safe Shutdown Analysis Database

B1R14 Foreign Material Exclusion Plan Replacement of the ECCS Containment Sump Screens Related to GSI-191

PORC Agenda for Meeting 06-029, September 14, 2006, ECCS Sump Modification

PORC Agenda for Meeting 06-032, September 20, 2006, ECCS Sump Modification  
Drawing S-1065A, Sheet 1, Revision 0, Plan, Sections & Details Containment Building Recirculating Sump Screens,

Work Order 00890987, Task 19, Install New Strainer and Frame Assembly, Train A

Work Order 00890987, Task 21, Install New Strainer and Frame Assembly, Train B

Drawing S-1065A, Sheet 2, Revision 0, Plan, Sections & Details Containment Building Recirculating Sump Screens,

IR 532087; 1B ECCS Sump Pipe Extension Interface Gap Exceeded,  
September 16, 2006

IR 533208; ECCS 8" Strut Support Fabrication Not Possible

IR 536557; Final ECCS Sump Inspection Results

IR 537224; Tank Curve Change Required Due to ECCS Sump Mod

#### Corrective Action Documents As A Result of NRC Inspection

IR 531853; ECCS Sump Mod Poor Housekeeping, September 16, 2006 (NRC Identified)

IR 532754; NRC Questions From Unit 1 ECCS Sump Inspection, September 18, 2006 (NRC Identified)

IR 534430; NRC Identified Items on Walkdown of ECCS Sump Modification,  
September 21, 2006 (NRC Identified)

IR 536663; Handling of Foreign Material in ECCS Sump, September 27, 2006 (NRC Identified)

## LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
AFW	Auxiliary Feedwater
ALARA	As Low As Reasonably Dose Equivalent
ANS	Alert and Notification System
ASME	American Society of Mechanical Engineers
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
DG	Diesel Generator
DRP	Division of Reactor Projects; Region RIII
DRS	Division of Reactor Safety
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EP	Emergency Preparedness
FC	Fuel Pool Cooling & Cleanup
GL	Generic Letter
HEPA	High Efficiency Particulate Air
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
LCOAR	Limiting Condition for Operation Action Requirement
LER	Licensee Event Report
LORT	Licensed Operator Requalification Training
NCV	Non-Cited Violation
NRC	United States Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSWP	Nuclear Station Work Permit
ODCM	Offsite Dose Calculation Manual
PARS	Public Availability Records
PED	Protective Equipment Decontamination
PI	Performance Indicator
PWR	Pressurized Water Reactor
RCA	Radiologically Controlled Area
RCS	Reactor Coolant System
REMP	Radioactive Effluent Monitoring Program
RWST	Refueling Water Storage Tank
SCBA	Self Contained Breathing Apparatus
SDP	Significance Determination Process
SG	Steam Generator
SSC	Structures, Systems, & Components
SX	Essential Service Water
TI	Temporary Inspection
TRM	Technical Requirement Manual
UFSAR	Updated Final Safety Analysis Report
VHRA	Very High Radiation Area
WO	Work Order
WR	Work Request

## Attachment 2

### Confirmatory Measurements Comparison Criteria

The NRC applied the comparison criteria contained in NRC Inspection Procedure (IP) 84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring," dated March 15, 1994, to determine if the licensee's measurement results were in statistical agreement with the NRC measurement results. For the purposes of this comparison, the NRC result is divided by its associated uncertainty to obtain the resolution. (Note: For purposes of this process, the uncertainty is defined as the relative standard deviation, one sigma, of the NRC's contract laboratory's analysis.) The licensee's result is then divided by the corresponding NRC result to obtain the ratio (licensee result/NRC). The licensee's measurement is in agreement if the value of the ratio fall within the limits shown in the following table for the corresponding resolution.

<b>Resolution</b>	<b>Acceptance Range (Licensee Result/NRC Result)</b>
<4	Technical Judgement <sup>1</sup>
4.7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.80-1.25
>200	0.85-1.18

For analyses that are below the minimum detectable concentration (either for the licensee or NRC's contract laboratory), the measurements are determined to be in agreement if both are below the minimum detectable concentration or if one has an uncertainty that is within the minimum detectable concentration.

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<sup>1</sup>The inspectors used technical judgement in reviewing results having a relative 1 sigma uncertainty greater than 25 percent (i.e., resolution less than 4). In these cases, the values were typically very close to the laboratory's detection capabilities, and greater variability was expected. Consequently, these sample comparisons were made based on the inspectors' qualitative review of the analytical results.



## Attachment 3

**Tritium Sample Results  
Byron Generating Station**

#	Collection Date	NRC			Licensee			Ratio: Licensee to NRC	Result	
		Sample ID	Tritium pCi/L $\pm$ uncertainty		MDC	Sample ID	Tritium pCi/L $\pm$ uncertainty			
1	02/28/2006	BY-06-1-01	< MDC		200	BYWW-1013	< MDC		n/a	Agreement
2	02/28/2006	BY-06-1-02	< MDC		200	BYWW-1014	< MDC		n/a	Agreement
3	02/28/2006	BY-06-1-03	< MDC		200	BYWW-1016*	< MDC		n/a	Agreement
4	02/28/2006	BY-06-1-04	< MDC		200	BYWW-1015	< MDC		n/a	Agreement
5	02/28/2006	BY-06-1-05	< MDC		200	BYWW-1011	< MDC		n/a	Agreement
6	02/28/2006	BY-06-1-06	< MDC		200	BYWW-1008	< MDC		n/a	Agreement
7	02/28/2006	BY-06-1-07	< MDC		200	BYWW-1012	< MDC		n/a	Agreement
8	02/28/2006	BY-06-1-08	< MDC		200	BYWW-1010*	< MDC		n/a	Agreement
9	02/28/2006	BY-06-1-09	< MDC		200	n/a	n/a		n/a	n/a
10	02/28/2006	BY-06-1-10	< MDC		200	n/a	n/a		n/a	n/a
11	02/28/2006	BY-06-1-11	< MDC		190	n/a	n/a		n/a	n/a
12	02/28/2006	BY-06-1-20	< MDC		190	BYWW-1009*	< MDC		n/a	Agreement
13	02/28/2006	BY-06-1-21	< MDC		190	BYWW-1017	< MDC		n/a	Agreement
14	02/03/2006	BY-06-2-01	40900	1500	400	BYWW-750	40727	552	1.00	Agreement
15	02/03/2006	BY-06-2-02	36200	1300	400	BYWW-751	37895	523	1.05	Agreement
16	02/03/2006	BY-06-2-03	81500	2500	400	BYWW-736	80123	756	0.98	Agreement
17	02/03/2006	BY-06-2-04	1650	310	400	BYWW-737	1843	138	1.12	Agreement
18	02/03/2006	BY-06-2-05	29400	1200	400	BYWW-738	29162	460	0.99	Agreement
19	02/03/2006	BY-06-2-06	< MDC		400	BYWW-752	< MDC		n/a	Agreement
20	02/16/2006	BY-06-2-07	< MDC		200	BYWW-816	< MDC		n/a	Agreement
21	02/16/2006	BY-06-2-08	< MDC		200	BYWW-817	< MDC		n/a	Agreement
22	02/28/2006	BY-06-2-09	< MDC		200	BYWW-1008	< MDC		n/a	Agreement

## Attachment 3

**Tritium Sample Results  
Byron Generating Station**

#	Collection Date	NRC			Licensee			Ratio: Licensee to NRC	Result
		Sample ID	Tritium pCi/L $\pm$ uncertainty	MDC	Sample ID	Tritium pCi/L $\pm$ uncertainty			
23	02/28/2006	BY-06-2-10	< MDC	200	BYWW-1009	< MDC	n/a	Agreement	
24	02/28/2006	BY-06-2-11	< MDC	200	BYWW-1010	< MDC	n/a	Agreement	
25	02/28/2006	BY-06-2-12	< MDC	200	BYWW-1011	< MDC	n/a	Agreement	
26	02/28/2006	BY-06-2-13	< MDC	200	BYWW-1012	< MDC	n/a	Agreement	
27	02/28/2006	BY-06-2-14	< MDC	200	BYWW-1013	< MDC	n/a	Agreement	
28	02/28/2006	BY-06-2-15	< MDC	200	BYWW-1014	< MDC	n/a	Agreement	
29	02/28/2006	BY-06-2-16	< MDC	200	BYWW-1015	< MDC	n/a	Agreement	
30	02/28/2006	BY-06-2-17	< MDC	200	BYWW-1016	< MDC	n/a	Agreement	
31	02/28/2006	BY-06-2-18	< MDC	200	BYWW-1017	< MDC	n/a	Agreement	
32	03/08/2006	BY-06-2-19	< MDC	400	BYWW-1266	< MDC	n/a	Agreement	
33	03/08/2006	BY-06-2-20	< MDC	400	BYWW-1267	< MDC	n/a	Agreement	
34	03/08/2006	BY-06-2-21	< MDC	400	BYWW-1268	< MDC	n/a	Agreement	
35	03/07/2006	BY-06-2-22	< MDC	400	BYWW-1269	< MDC	n/a	Agreement	
36	03/23/2006	BY-06-2-23	< MDC	400	BYWW-1585	< MDC	n/a	Agreement	
37	03/24/2006	BY-06-2-24	< MDC	400	BYWW-1586	< MDC	n/a	Agreement	
38	03/24/2006	BY-06-2-25	< MDC	400	BYWW-1587	< MDC	n/a	Agreement	
39	03/24/2006	BY-06-2-26	< MDC	400	BYWW-1588	< MDC	n/a	Agreement	
40	03/24/2006	BY-06-2-27	< MDC	400	BYWW-1589	< MDC	n/a	Agreement	
41	03/24/2006	BY-06-2-28	< MDC	400	BYWW-1590	< MDC	n/a	Agreement	
42	03/24/2006	BY-06-2-29	< MDC	400	BYWW-1591	< MDC	n/a	Agreement	
43	03/23/2006	BY-06-2-30	< MDC	400	BYWW-1592	< MDC	n/a	Agreement	
44	03/23/2006	BY-06-2-31	< MDC	400	BYWW-1593	< MDC	n/a	Agreement	

## Attachment 3

**Tritium Sample Results  
Byron Generating Station**

#	Collection Date	NRC			Licensee			Ratio: Licensee to NRC	Result	
		Sample ID	Tritium pCi/L $\pm$ uncertainty		MDC	Sample ID	Tritium pCi/L $\pm$ uncertainty			
45	03/29/2006	BY-06-2-32	< MDC		440	BYWW-1754	< MDC		n/a	Agreement
46	03/29/2006	BY-06-2-33	< MDC		440	BYWW-1755	< MDC		n/a	Agreement
47	03/27/2006	BY-06-2-34	< MDC		440	BYWW-1679	< MDC		n/a	Agreement
48	03/29/2006	BY-06-2-35	< MDC		440	BYWW-1752	< MDC		n/a	Agreement
49	03/29/2006	BY-06-2-36	< MDC		440	BYWW-1756	< MDC		n/a	Agreement
50	03/28/2006	BY-06-2-37	3270	400	440	BYWW-1680	3602	195	1.10	Agreement
51	03/29/2006	BY-06-2-38	< MDC		440	BYWW-1757	< MDC		n/a	Agreement
52	03/29/2006	BY-06-2-39	< MDC		440	BYWW-1758	< MDC		n/a	Agreement
53	03/29/2006	BY-06-2-40	< MDC		440	BYWW-1759	< MDC		n/a	Agreement
54	03/29/2006	BY-06-2-41	3350	400	440	BYWW-1753	3817	202	1.14	Agreement
55	04/11/2006	BY-06-3-01	< MDC		200	BY-29*	< MDC		n/a	Agreement
56	04/11/2006	BY-06-3-02	< MDC		200	BY-12*	< MDC		n/a	Agreement
57	04/11/2006	BY-06-3-03	< MDC		200	BY-18*	< MDC		n/a	Agreement
58	04/11/2006	BY-06-3-04	< MDC		200	BY-32*	< MDC		n/a	Agreement
59	04/11/2006	BY-06-3-05	< MDC		200	BY-14-1*	< MDC		n/a	Agreement
60	04/11/2006	BY-06-3-06	< MDC		200	BY-37*	< MDC		n/a	Agreement
61	04/11/2006	BY-06-3-07	< MDC		200	BY-35*	< MDC		n/a	Agreement
62	04/11/2006	BY-06-3-08	< MDC		200	BY-36*	< MDC		n/a	Agreement
63	06/22/2006	BY-06-4-01	500	120	180	AR-2	342	85	0.68	Agreement
64	06/22/2006	BY-06-4-02	3070	190	180	AR-4	2855	157	0.93	Agreement
65	06/22/2006	BY-06-4-03	2030	160	180	AR-11	1732	130	0.85	Agreement
66	07/13/2006	BY-06-5-01	< MDC		180	BY-14-1*	< MDC		n/a	Agreement

## Attachment 3

**Tritium Sample Results  
Byron Generating Station**

#	Collection Date	NRC			Licensee			Ratio: Licensee to NRC	Result	
		Sample ID	Tritium pCi/L $\pm$ uncertainty		MDC	Sample ID	Tritium pCi/L $\pm$ uncertainty			
67	07/13/2006	BY-06-5-02	< MDC		180	BY-18*	< MDC		n/a	Agreement
68	07/13/2006	BY-06-5-03	< MDC		180	BY-36*	< MDC		n/a	Agreement
69	07/13/2006	BY-06-5-04	< MDC		180	BY-37*	< MDC		n/a	Agreement
70	07/13/2006	BY-06-5-05	< MDC		180	BY-35*	< MDC		n/a	Agreement
71	07/13/2006	BY-06-5-06	< MDC		180	BY-32*	< MDC		n/a	Agreement
72	07/20/2006	BY-06-6-01	590	120	200	AR-2	487	96	0.83	Agreement
73	07/20/2006	BY-06-6-02	380	120	200	AR-3	225	85	0.59	Agreement
74	07/20/2006	BY-06-6-03	3120	200	200	AR-4	3127	168	1.00	Agreement

MDC - Minimum Detectable Concentration

\* REMP Sample Locations

Licensee Samples BY-29 and BY-12 are quarterly composites.

Samples BY-06-1-9, -10 & -11 were independent background samples.

Samples BY-06-1-12 through -19 were duplicates of BY-06-1-01 through -08 and not included.

NRC sample uncertainties are based on two sigma counting statistics.