UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

November 3, 2010

Mr. Michael J. Pacilio
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Road
Warrenville IL 60555

SUBJECT: BYRON STATION, UNITS 1 AND 2, INTEGRATED INSPECTION REPORT 05000454/2010004; 05000455/2010004; 07200068/2010001

Dear Mr. Pacillo:

On September 30, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Byron Station, Units 1 and 2. The enclosed report documents the results of this inspection, which were discussed on October 8, 2010, with the Mr. Brad Adams, and other members of your staff.

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

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation occurred and one NRC-identified finding of very low safety significance was identified. Both of these involved violations of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as non-cited violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the subject or severity of the NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Byron Station. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at the Byron Station. The information that you provide will be considered in accordance with Inspection Manual Chapter 0305.

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

Sincerely,

/RA/

Eric R. Duncan, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 50-454; 50-455; 72-068
License Nos. NPF-37; NPF-66

Enclosure: Inspection Report 05000454/2010004; 05000455/2010004; 07200068/2010001
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	05000454; 05000455; 07200068
License Nos:	NPF-37; NPF-66
Report No:	05000454/2010004; 05000455/2010004; 07200068/2010001
Licensee:	Exelon Generation Company, LLC
Facility:	Byron Station, Units 1 and 2
Location:	Byron, IL
Dates:	July 01, 2010 through September 30, 2010
Inspectors:	B. Bartlett, Senior Resident Inspector J. Robbins, Resident Inspector R. Ng, Project Engineer M. Learn, Reactor Engineer J. Cassidy, Senior Health Physicist R. Jickling, Senior Emergency Preparedness Inspector C. Thompson, Resident Inspector, Illinois Department of Emergency Management
Approved by:	E. Duncan, Chief Branch 3 Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

IR 05000454/2010004, 05000455/2010004, 07200068/2010001; 07/01/10 – 09/30/10; Byron Station, Units 1 & 2; Routine Integrated Inspection Report; Other Activities

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. One SL IV and one green finding were identified by the inspectors. The findings were considered Non-Cited Violations (NCVs) of NRC regulations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Barrier Integrity

Green. A finding of very low safety significance and an associated Non-Cited Violation (NCV) of Title 10 Code of Federal Regulations (CFR), Part 50, Appendix B, Criterion III, "Design Control" was identified by the inspectors for the licensee's failure to perform adequate evaluations to upgrade the single failure proof crane. Specifically, the inspectors identified six examples where the licensee failed to perform adequate evaluations in accordance with American Society of Mechanical Engineers (ASME) requirements. The licensee documented the conditions in Issue Report (IR) 1099897, and IR 1100062 and initiated actions for calculation revisions and field modifications.

The Fuel Handling Building (FHB) crane was designed to Seismic Category I requirements and the licensee used compliance with ASME NOG-1-2004, "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)", 2004, as the design basis for their crane upgrade to a single failure proof crane. The inspectors determined that the failure to perform adequate evaluations was contrary to ASME NOG-1-2004 requirements and was a performance deficiency. The finding was more than minor as it was associated with the Barrier Integrity cornerstone and attribute of design control because a fuel handling building crane heavy load drop can damage the Spent Fuel Pool (SFP) Cooling System or spent fuel cladding. The inspectors evaluated the finding using Inspection Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," and based on a "No" answer to all of the questions in the Barrier Integrity column of Table 4a, determined the finding to be of very low safety significance (Green). This finding has a cross-cutting aspect in the area of Human Performance, Resources (H.2(c)) because the licensee did not provide adequate oversight of work activities, including contractors, such that design documentation was accurate to support nuclear safety. (Section 4OA5)

Miscellaneous Matters

Severity Level IV. A violation of very low safety significance of 10 CFR 72.212 (b)(2)(i)(B), “Conditions of a General License Issued under 72.210,” was identified by the inspectors for the failure to perform adequate evaluations of the Independent Spent Fuel Storage Installation (ISFSI) pad. Specifically, the inspectors identified four examples where the licensee failed to design the ISFSI pad to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction (SSI). The licensee documented the conditions in IR 957945 and IR 1102835. As an interim corrective action, the licensee provided a technical paper providing justification for partial loading of the pad with 10 casks.

Because this violation was related to an ISFSI license, it was dispositioned using the traditional enforcement process using Section 6.5.d.1 of the Enforcement Policy. The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, “Power Reactor Inspection Reports,” Appendix B, “Issue Dispositioning Screening,” because if left uncorrected, a failure of the ISFSI pad could lead to a more significant safety concern. This violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation screened as having very low safety significance (Severity Level IV). (Section 4OA5)

B. Licensee-Identified Violations

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

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near full power during this inspection period with one exception. On September 22, 2010, the unit was operating at full power with one main feedwater pump out-of-service for maintenance when the "A" main feedwater pump tripped. Power was reduced to approximately 50 percent to maintain steam generator water levels. Following repairs to the main feedwater pump oil system the pump was restarted and the unit returned to full power the following day.

Unit 2 operated at or near full power during this inspection period with no major problems.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 2 Train B Residual Heat Removal (RH) while the Unit 2 Train B RH was out of service for scheduled maintenance;
- Portions of both Unit 1 Auxiliary Feedwater (AF) trains within the normally inaccessible AF Pipe Tunnel;
- Unit 2 Train B Containment Spray during emergent work on valve 2SI8811A; and
- Essential Service Water Make-Up Pumps and Discharge Lines during licensee surveillance.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), Technical Specification (TS) requirements, outstanding work orders (WOs), issue reports (IRs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program (CAP) with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

These activities constituted four partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings of significance were identified.

.2 Semi-Annual Complete System Walkdown

a. Inspection Scope

On August 10, 2010, the inspectors performed a complete system alignment inspection of the Unit 1 Component Cooling while the Unit 0 Component Cooling was aligned, to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment line ups, electrical power availability, system pressure and temperature indications, as appropriate, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding WOs was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved. Documents reviewed are listed in the Attachment to this report.

These activities constituted one complete system walkdown sample as defined in IP 71111.04-05.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours

a. Inspection Scope

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

- Fire Zone 9.2-1 & 9.3-1, 1A Diesel Generator & Day Tank Room;
- Fire Zone 11.5, Auxiliary Building 401' Elevation, General Area; and
- Fire Zone 11.3, Auxiliary Building 364' Elevation, General Area.

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

These activities constituted three quarterly fire protection inspection samples as defined in IP 71111.05-05.

b. Findings

No findings of significance were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

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

This annual heat sink performance inspection constituted one sample as defined in IP 71111.07-05.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On July 27, 2010, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification examinations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

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

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

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- Pressurizer Breaker Tripped;
- Unit 1 Essential Service Water (SX) Valve Leakby; and
- Unit 1 Component Cooling Water System Cross Unit Leakage.

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

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

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

This inspection constituted three quarterly maintenance effectiveness samples as defined in IP 71111.12-05.

b. Findings

No findings of significance were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

- Unit 1 Component Cooling Water System Cross Tie Valve Leakby;
- Trip of Unit 1A Main Feedwater Pump and down power to 50 percent;
- Pressurizer Code Safety Valve 2A Seat Leakage; and
- Unit 1 and Unit 2 Solid State Protection System Emergent Testing Due to Operating Experience from another Unit.

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

These maintenance risk assessments and emergent work control activities constituted four samples as defined in IP 71111.13-05.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Unit 1 Train B Diesel Generator Fuel Oil Storage Tank Level Measurement Uncertainty Issues;
- Potential Design Vulnerability for Auxiliary Feedwater;
- Unit 1 Train B Safety Related Relay K611 Contacts 13-14 High Resistance; and
- Unit 2 Train A RH Room Cooler Fan Motor Bearing to Shaft Clearance May be Beyond Standard Clearance.

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

This operability inspection constituted four samples as defined in IP 71111.15-05.

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

.1 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed the following temporary modification:

- Temporary Pump in Unit 1 SX Room Sump

The inspectors compared the temporary configuration changes and associated 10 CFR 50.59 screening and evaluation information against the design basis, the UFSAR, and the TS, as applicable, to verify that the modification did not affect the operability or availability of the affected system. The inspectors also compared the licensee's information to operating experience information to ensure that lessons learned from other utilities had been incorporated into the licensee's decision to implement the temporary modification. The inspectors, as applicable, performed field verifications to ensure that the modification was installed as directed; the modification operated as expected; modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modification did not impact the operability of any interfacing systems. Lastly, the inspectors discussed the temporary modification with operations, engineering, and training personnel to ensure that the individuals were aware of how extended operation with the temporary modification in place could impact overall plant performance. Documents reviewed in the course of this inspection are listed in the Attachment to this report.

This inspection constituted one temporary modification sample as defined in IP 71111.18-05.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- Unit 0 Train B SX Makeup Pump Battery Charge Control Circuit Card Replacement;
- Unit 1 Diesel Generator Fuel Oil Level Switch Replacement;
- Unit 2 Train A Emergency Core Cooling System Sump Suction Isolation Valve 2SI8811A; and
- AF Valve 2AF0006A Leaking By and Will Not Move.

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

This inspection constituted four post-maintenance testing samples as defined in IP 71111.19-05.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

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

- 0BOSR IS-SA-1 Security DG Semi-Annual Test (Routine);
- Set up a 480V MCC Bucket for use in Cubicle B4 of Safety-Related MCC 231X3 (Routine);
- Stroke Time Test of Unit 1 SX System Valves (In-Service Test);
- Monthly Test of Unit 2 Reactor Containment Fan Coolers (Routine);
- Stroke Time Test of Chilled Water Isolation Valves (In-Service Test); and
- Monthly Operability Test of 0A SX Make Up Pump (Routine).

The inspectors observed in-plant activities and reviewed procedures and associated records to determine the following:

- did preconditioning occur;
- were the effects of the testing adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- were acceptance criteria clearly stated, demonstrated operational readiness, and consistent with the system design basis;
- was plant equipment calibration correct, accurate, and properly documented;
- were as-left setpoints within required ranges; and the calibration frequencies in accordance with TSs, the UFSAR, procedures, and applicable commitments;
- was measuring and test equipment calibration current;
- was test equipment within the required range and accuracy; and were applicable prerequisites described in the test procedures satisfied;
- did test frequencies meet TS requirements to demonstrate operability and reliability; were tests performed in accordance with the test procedures and other applicable procedures; were jumpers and lifted leads controlled and restored where used;
- were test data and results accurate, complete, within limits, and valid;

- was test equipment removed after testing;
- was testing, where applicable for inservice testing activities, performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and were reference values consistent with the system design basis;
- were test results not meeting acceptance criteria addressed with an adequate operability evaluation or the system or component was declared inoperable;
- were reference setting data, where applicable for safety-related instrument control surveillance tests, accurately incorporated in the test procedure;
- were actual conditions encountering high resistance electrical contacts such that the intended safety function could still be accomplished;
- did prior procedure changes provide an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- was equipment returned to a position or status required to support the performance of its safety functions; and
- were all problems identified during the testing appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report.

This inspection constituted four routine surveillance testing samples and two inservice testing samples as defined in IP 71111.22, Sections -02 and -05.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP2 Alert and Notification System Evaluation (71114.02)

.1 Alert and Notification System Evaluation

a. Inspection Scope

The inspectors reviewed documents and conducted discussions with Emergency Preparedness (EP) staff and management regarding the operation, maintenance, and periodic testing of the Alert and Notification System (ANS) in the Byron Station's plume pathway Emergency Planning Zone. The inspectors reviewed monthly trend reports and the daily and monthly operability records from May 2008 through June 2010. Information gathered during document reviews and interviews was used to determine whether the ANS equipment was maintained and tested in accordance with Emergency Plan commitments and procedures. Documents reviewed are listed in the Attachment to this report.

This alert and notification system inspection constituted one sample as defined in IP 71114.02-05.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization Augmentation Testing (71114.03)

.1 Emergency Response Organization Augmentation Testing

a. Inspection Scope

The inspectors reviewed and discussed with plant Emergency Preparedness (EP) management and staff the emergency plan commitments and procedures that addressed the primary and alternate methods of initiating an Emergency Response Organization (ERO) activation to augment the on shift ERO as well as the provisions for maintaining the station's ERO qualification and team lists. The inspectors reviewed reports and a sample of corrective action program records of unannounced off-hour augmentation tests and pager tests, which were conducted between December 2008 and May 2010, to determine the adequacy of the drill critiques and associated corrective actions. The inspectors also reviewed a sample of the EP training records of approximately 24 ERO personnel, who were assigned to key and support positions, to determine the status of their training as it related to their assigned ERO positions. Documents reviewed are listed in the Attachment to this report.

This emergency response organization augmentation testing inspection constituted one sample as defined in IP 71114.03-05.

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness Weaknesses and Deficiencies (71114.05)

.1 Correction of Emergency Preparedness Weaknesses and Deficiencies

a. Inspection Scope

The inspectors reviewed a sample of Nuclear Oversight (NOS) staff's 2009 and 2010 audits of the Byron Station's emergency preparedness program to determine whether the independent assessments met the requirements of 10 CFR 50.54(t). The inspectors also reviewed samples of corrective action program records associated with the 2009 biennial exercise, as well as various EP drills conducted in 2009 and 2010, in order to determine whether the licensee fulfilled drill commitments and to evaluate the licensee's efforts to identify and resolve identified issues. The inspectors reviewed a sample of EP items and corrective actions related to the facility's EP program and activities to determine whether corrective actions were completed in accordance with the site's corrective action program. Documents reviewed are listed in the Attachment to this report.

This correction of emergency preparedness weaknesses and deficiencies inspection constituted one sample as defined in IP 71114.05-05.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on September 22, 2010, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Simulator/Control Room and Technical Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment to this report.

This emergency preparedness drill inspection constituted one sample as defined in IP 71114.06-05.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstones: Occupational and Public Radiation Safety

2RS5 Radiation Monitoring Instrumentation (71124.05)

This inspection constituted a partial sample as defined in IP 71124.05-5.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the plant UFSAR to identify radiation instruments associated with monitoring area radiological conditions including airborne radioactivity, process streams, effluents, materials/articles, and workers. Additionally, the inspectors reviewed the instrumentation and the associated Technical Specification requirements for post-accident monitoring instrumentation including instruments used for remote emergency assessment.

The inspectors reviewed a listing of in-service survey instrumentation including air samplers and small article monitors (SAMs), along with instruments used to detect and analyze workers' external contamination. The inspectors also reviewed personnel contamination monitors (PCMs) and a portal monitor including whole-body counters (WBCs) to detect workers' internal contamination. From a review of the list, the inspectors evaluated whether the licensee had an adequate number and type of instruments to support plant operations.

The inspectors reviewed selected independent evaluation reports of the radiation monitoring program since the last inspection. This review included audits of the licensee's onsite calibration facility.

b. Findings

No findings of significance were identified.

.2 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors performed walked downs of following effluent radiation monitoring systems (liquid and airborne system):

- High Range Containment Monitor;
- Liquid Effluent Radiation Monitors;
- Gaseous Effluent Radiation Monitors; and
- Auxiliary Building Vent Stack Effluent Monitors.

The inspectors also evaluated the flow measurement devices and all accessible point-of-discharge liquid and gaseous effluent monitors of the selected systems. The inspectors also assessed whether effluent/process monitor configurations aligned with ODCM descriptions and whether any monitors were out of service or degraded.

The inspectors selected several portable survey instruments during the inspection to verify calibration and source check stickers and to assess instrument material condition and operability. The inspectors observed licensee staff demonstrate source checks for various types of portable survey instruments and determined that the source checks were performed at the appropriate scales (low and high range). The inspectors walked down multiple ARMs and continuous air monitors (CAMs) to determine whether they were appropriately positioned to the areas they were intended to monitor. Selectively, the inspectors compared monitor response via local or remote control room indications with actual area conditions for consistency.

The inspectors selected several PCMs, portal monitors, and SAMs and evaluated whether the periodic source checks were performed in accordance with the manufacturer's recommendations and licensee procedures.

b. Findings

No findings of significance were identified.

.3 Calibration and Testing Program (02.03)

Process and Effluent Monitors

a. Inspection Scope

The inspectors selected several effluent monitor instruments (such as gaseous and liquid) and assessed whether channel calibration and functional tests were performed consistent with radiological effluent Technical Specifications (RETS)/ODCM. The inspectors evaluated whether: (a) the licensee calibrated its monitors with National Institute of Standards and Technology (NIST) traceable sources; (b) the primary calibrations adequately represented the plant nuclide mix; (c) when secondary calibration sources were used, the sources were verified by the primary calibration; and (d) the licensee's channel calibrations encompassed the instrument's alarm setpoints. The inspectors also assessed whether effluent monitor alarm setpoints were established as provided in the ODCM and station procedures and any changes to effluent monitor setpoints were evaluated.

b. Findings

No findings of significance were identified.

Laboratory Instrumentation

a. Inspection Scope

The inspectors reviewed daily performance checks and calibration data for selected laboratory analytical instruments to assess whether the frequency of the calibrations was adequate and for other indications of degraded instrument performance. The selected laboratory analytical instruments were used for radiological analysis such as gross alpha, gross beta using proportional counters and gamma spectroscopy using high purity germanium and low energy beta analysis using liquid scintillation counters.

b. Findings

No findings of significance were identified.

Whole Body Counter (WBC)

a. Inspection Scope

The inspectors assessed whether the methods and sources used to perform WBC functional checks before daily use of the instrument were appropriate and aligned with the plant's isotopic mix. The inspectors also reviewed WBC calibration records and evaluated whether calibration sources were representative of the plant source term and that appropriate calibration phantoms were used. The inspectors reviewed this data for any anomalous results or other indications of instrument performance problems.

b. Findings

No findings of significance were identified.

Post-Accident Monitoring Instrumentation

a. Inspection Scope

The inspectors selected two high-range effluent monitors, relied on by the licensee in its emergency operating procedures as a basis for triggering emergency action levels and subsequent emergency classifications, or to make protective action recommendations during an accident. The inspectors reviewed calibration documentation since the last inspection for selected containment high-range monitors assessing whether an electronic calibration was completed for all range decades above 10 rem/hour and that at least one decade at or below 10 rem/hour was calibrated using an appropriate radiation source. In addition, the inspectors reviewed the licensee's capability to collect high-range, post-accident iodine effluent samples.

b. Findings

No findings of significance were identified.

Portal Monitors, Personnel Contamination Monitors (PCMs), and Small Article Monitors (SAMs)

a. Inspection Scope

Inspectors selected each type of these instruments used on site, and assessed whether the alarm setpoint values were reasonable under the circumstances to ensure that licensed materials were not released from the site. The inspectors also reviewed the calibration documentation for selected instruments and discussed the calibration methods with the licensee's instrument calibration staff to assess consistency with the manufacturer's recommendations.

b. Findings

No findings of significance were identified.

Portable Survey Instruments, Area Radiation Monitors, Electronic Dosimeters, and Air Samplers/CAMs

a. Inspection Scope

The inspectors reviewed calibration documentation for portable survey instruments and Area Radiation Monitors (ARMs) that included review of the detector measurement geometry and calibration methods. Additionally, inspectors observed the demonstration of the instrument calibrator.

The inspectors assessed whether the licensee had taken appropriate corrective actions for instruments found significantly out of calibration (greater than 50 percent) and evaluated the possible consequences of instrument use since the last successful calibration and source check.

b. Findings

No findings of significance were identified.

Instrument Calibrator

a. Inspection Scope

The inspectors reviewed the current output value (spreadsheets and graphs) for the portable survey and ARM instrument calibrator units. The inspectors assessed whether periodic measurements of calibrator output were made through measurements by ion chamber/electrometer devices over the range of the instruments used. The inspectors evaluated whether this measuring device was calibrated by a facility using NIST traceable sources and that correction factors for these measuring devices were properly applied by the licensee during this output verification.

b. Findings

No findings of significance were identified.

Calibration and Check Sources

a. Inspection Scope

The inspectors reviewed the licensee's 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," source term to assess whether calibration sources used were representative of the types and energies of radiation encountered in the plant.

b. Findings

No findings of significance were identified.

.4 Problem Identification and Resolution (02.04)

a. Inspection Scope

The inspectors reviewed corrective action program reports related to exposure. The inspectors reviewed various corrective action program documents to determine whether problems associated with radiation monitoring instrumentation were being identified by the licensee at an appropriate threshold. Additionally, the inspectors assessed whether the corrective actions for a selected sample of these problems documented by the licensee were adequately evaluated and resolved.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures

a. Inspection Scope

The inspectors sampled licensee submittals for the Unit 1 and Unit 2 Safety System Functional Failures performance indicator (PI) for the period from April 1, 2009 through June 1, 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, and NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73", were used. The inspectors reviewed the licensee's operator narrative logs, operability assessments, maintenance rule records, maintenance WOs, IRs, event reports and NRC Integrated Inspection Reports for the period of April 1, 2009 through

June 1, 2010 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two safety system functional failures samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.2 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the Unit 1 and Unit 2 RCS Leakage PI for the period from July 1, 2009 through June 1, 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, were used. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, IRs, event reports and NRC Integrated Inspection Reports for the period of July 1, 2009 through June 1, 2010, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's IR database to determine if any problems had been identified with the PI data collected or transmitted for this indicator. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two reactor coolant system leakage samples as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

.3 Drill/Exercise Performance

a. Inspection Scope

The inspectors sampled licensee submittals for the Drill/Exercise Performance (DEP) PI for the period from the third quarter 2009 through first quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the DEP indicator in accordance with relevant procedures and the NEI guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the PI; assessments of PI opportunities during pre-designated control room simulator training sessions, performance during the 2009 biennial exercise, and performance during other drills. Documents reviewed are listed in the Attachment to this report.

This inspection constitutes one drill/exercise performance sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.4 Emergency Response Organization Drill Participation

a. Inspection Scope

The inspectors sampled licensee submittals for the Emergency Response Organization (ERO) Drill Participation PI for the period from the third quarter 2009 through first quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the indicator in accordance with relevant procedures and the NEI guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the PI; performance during the 2009 biennial exercise and other drills; and revisions of the roster of personnel assigned to key emergency response organization positions. Documents reviewed are listed in the Attachment to this report.

This inspection constitutes one ERO drill participation sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.5 Alert and Notification System

a. Inspection Scope

The inspectors sampled licensee submittals for the ANS PI for the period from the third quarter 2009 through first quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's records associated with the PI to verify that the licensee accurately reported the indicator in accordance with relevant procedures and the NEI guidance. Specifically, the inspectors reviewed licensee records and processes including procedural guidance on assessing opportunities for the PI and results of periodic ANS operability tests. Documents reviewed are listed in the Attachment to this report.

This inspection constitutes one ANS sample as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Physical Protection

.1 Routine Review of Items Entered into the Corrective Action Program

a. Inspection Scope

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

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

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

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

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

b. Findings

No findings of significance were identified.

.3 Selected Issue Follow-Up Inspection: Diesel Oil Storage Tank Level Indication

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized a corrective action item documenting an unplanned entry into Limiting Condition for Operation Action Requirement; 3.8.3 Condition A. This Limiting Condition for Operation (LCO) is associated with stored diesel fuel requirements for on-site emergency diesel generators.

Following calibration of level instrument gauges, site staff identified that current tank levels were below their administrative limits. The tanks were promptly filled to a point above their administrative limits. Analyses were requested by the Operations group to support a past operability/reportability determination. Engineering Change (EC) 381086 was initiated to address this issue. The EC concluded that the actual fuel level in the tanks exceeded the Technical Specification required value of 44,000 gallons and was sufficient for 7 days of operation. Based on this evaluation the licensee determined that the fuel tanks were operable and the event was not reportable.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings of significance were identified.

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

.1 (Closed) Licensee Event Report 0500455/2009-001-01: Late Entry Into TS Condition Associated with Reactor Coolant System Leakage Characterization Resulting in a Condition Prohibited by TSS

On June 24, 2009, during a routine containment entry at power licensee personnel identified a pinhole leak (one drop every 5 minutes) on a welded connection inside of Unit 1 containment (IR 934800). The welded connection was on line 2PS01BB and the line was 3/8-inch in diameter. This line is a pressurizer liquid sample line and is a non safety-related non-ASME code, Class D pipe. The licensee verified that upstream valve 2PS9350B (between the leak and the RCS pressurizer) was closed and that both downstream containment isolation valves were closed. Based on the upstream valve being closed and in the Shift Manager's opinion being isolated, and with the leakage being not significant, the leak was not considered by licensee personnel to be RCS pressure boundary leakage.

As discussed in NRC Inspection Report 05000454/4552009-004, the inspectors reviewed this Licensee Event Report (LER) and issued NCV 05000454/2009003-01. Subsequently, the licensee had submitted a response which disagreed with the NRC position that this was pressure boundary leakage. NRC personnel followed the applicable procedures for a disputed violation. After discussions with senior licensee management, the licensee stated that they did not disagree with the violation.

The inspectors reviewed the LER and concluded it was completed in accordance with 10 CFR 50.73. Therefore, this LER is closed.

This event follow-up review constituted one sample as defined in IP 71153-05.

4OA5 Other Activities

.1 (Closed) Temporary Instruction 2515/179, "Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System Pursuant to Title 10, Code of Federal Regulations, Part 20.2207 (10 CFR 20.2207)"

a. Inspection Scope

The inspectors confirmed that the licensee has reported the initial inventories of sealed sources pursuant to 10 CFR 20.2207 and verified that the National Source Tracking System database correctly reflected the Category 1 and 2 sealed sources in custody of the licensee. Inspectors interviewed personnel and performed the following:

- Reviewed the licensee's source inventory;
- Verified the presence of any Category 1 or 2 sources;
- Reviewed procedures for and evaluated the effectiveness of storage and handling of sources;
- Reviewed documents involving transactions of sources; and
- Reviewed the adequacy of licensee maintenance, posting, and labeling of nationally tracked sources.

b. Findings

No findings of significance were identified.

2. Preoperational Testing of an Independent Spent Fuel Storage Facility Installation at Operating Plants (60854.1)

b. Inspection Scope

(1) Control of Heavy Loads

The inspectors initiated a review of the licensee's crane and heavy loads program with regards to Independent Spent Fuel Storage Facility Installation (ISFSI) operations in 2009 documented in Byron Station Inspection Report Nos. 05000454/2009004; 05000455/2009004. The inspectors opened two Unresolved Items (URIs): URI 005000454/2009004-04; 05000455/2009004-04 "Use of Friction in Design of Fuel Handling Building (FHB) Crane to Single Failure Proof" and URI 05000454/2009004-05; 05000455/2009004-05 "Unresolved Technical Concerns on Design of Seismic Restraint on FHB Crane Trolley." These URIs were opened by the inspectors to follow up and complete a review of the design documents related to the FHB crane upgrade to single failure proof. Specifically, not all of the licensee's design and modification documents required to complete the inspection were complete at the conclusion of the IR 05000454/2009004; 05000455/2009004 inspection period.

As part of the modifications in preparations to load fuel in the ISFSI, the licensee upgraded the 125 ton capacity overhead crane in the fuel handling building to a single failure proof crane in compliance with the NRC guidance, NUREG 0612, NUREG 0554 and ASME-NOG-1-2004.

During this inspection period, the inspectors have completed their review of documentation associated with the FHB crane. The review included structural evaluations associated with the seismic design of the new trolley, hoist/reeving equipment, miscellaneous components, crane bridge girders, supporting structural steel, modifications affecting the operating plant, floor loading in the spent fuel pool (SFP) and other cask storage areas, and the cask and canister stack up configurations. The associated safety evaluations and screenings were also reviewed.

(2) Dry Run Activities

During this inspection period, the licensee performed the balance of preoperational dry run activities in order to fulfill the Certificate of Compliance (CoC). The NRC's inspection of prior preoperational dry run activities were performed during the first and second quarter of 2009, and were documented in Byron Station Inspection Report Nos. 05000454/2009004; 05000455/2009004. NRC inspectors were onsite to observe dry run activities July 28 through July 30, 2010, August 11 through August 12, 2010, and August 20, 2010. The inspection consisted of observations of dry run activities the licensee performed utilizing the Holtec HI-STORM 100 storage system including multi-purpose canister (MPC) wet operations, transfer of the MPC from the transfer cask (HI-TRAC) to the storage cask (HI-STORM), and document review. The inspectors reviewed loading and unloading procedures not previously reviewed as documented in Inspection Report Nos. 05000454/2009004; 05000455/2009004 to ensure that they contained commitments and requirements specified in the CoC license, the CoC TS, the Holtec Final Safety Analysis Report (FSAR), and 10 CFR Part 72. The inspectors also observed the licensee's pre-job briefings. The inspectors determined whether the licensee conducted these meetings in a professional manner and the necessary items to enhance safety were discussed. The inspectors verified that Radiation Protection staff attended pre-job briefs and provided insights into working conditions and as low as reasonably achievable (ALARA) practices.

The inspectors observed the loading and unloading of dummy fuel bundles into the MPC basket. The licensee demonstrated removal of a dummy fuel assembly from the SFP storage rack, placement of the assembly into the MPC, and retrieval of the fuel assembly from the MPC to the SFP rack. The inspectors observed transfer of the MPC from the HI-TRAC cask to the HI-STORM in a restrained support structure in the FHB and the subsequent movement of the HI-STORM outside of the FHB Building. The inspectors verified that proper controls were in place during the transfer of the canister. The inspectors verified adequate communication and team work between departments and adherence to procedures.

(3) Fuel Selection

The inspectors reviewed the licensee's program associated with fuel characterization and selection for storage. The inspectors reviewed cask fuel selection packages to verify that the licensee was loading fuel in accordance with the CoC TS. The licensee did not plan to load any damaged fuel assemblies during this initial campaign.

(4) Radiation Protection

The inspectors evaluated the licensee's RP Program pertaining to the operation of the ISFSI. The inspectors observed licensee RP technicians simulate dry run activities and interviewed technicians to verify their knowledge regarding the scope of the work and the radiological hazards associated with transfer and storage of spent fuel.

(5) Training

The inspectors reviewed the licensee's training program, which consisted of classroom and on-the-job training to ensure involved staff was adequately trained for the job they were responsible to perform. The inspectors also reviewed training records and qualifications of individuals performing work activities associated with the ISFSI. The inspectors interviewed licensee personnel to verify that they were knowledgeable in the scope of work that was being performed.

c. Findings

(1) Failure to Perform Adequate Evaluation for Crane Upgrade

Introduction

A finding of very low safety significance (Green) and an associated Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control" was identified by the inspectors for failure to perform adequate evaluations to upgrade their single failure proof crane. Specifically, for evaluations of the fuel handling building crane and crane support structure, the licensee failed to comply with American Society of Mechanical Engineers (ASME) NOG-1-2004, "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)", 2004, as previously committed to. The licensee documented the conditions in IR Nos. 1099897 and 1100062 and initiated actions for calculation revisions and field modifications.

Description

The FHB crane was designed to Seismic Category I requirements. The licensee used compliance with NOG-1-2004, as the basis for its upgrade to single failure proof. ASME NOG-1-2004 was endorsed by the NRC per Regulatory Information Summary (RIS) 2005-25, Supplement 1, as an acceptable method for satisfying the guidelines of NUREG-0554 for single failure proof cranes. Inspectors reviewed licensee documents associated with URIs 05000454/2009-004-05; 05000455/2009-004-05 "Unresolved Technical Concerns on Design of Seismic Restraint on FHB Crane Trolley."

During a review of calculations for the crane and crane support structure, the inspectors identified six examples where the licensee failed to meet the requirements in 10 CFR Part 50, Appendix B, Criterion III, "Design Control."

1. Calculation 36272-12, Revision 15 (10/19/09), "Single Failure Proof Trolley Seismic Analysis": The calculation listed partial weights for the trolley. The inspectors identified that when added together, the total weight resulted in only 59,000 pounds compared to the actual trolley weight of 68,000 pounds based on certifications

attached with calculation 36272-35, Revision 3. This error was non-conservative. The licensee documented the discrepancy in IR No. 1099897.

2. Calculation 36272-12, Revision 15 (10/19/09), “Single Failure Proof Trolley Seismic Analysis”: The inspectors identified that the analysis results were significantly different than those in the previous revision (Revision 9, 6/1/09). Upon questioning, the inspectors learned that during the revision the licensee had corrected the boundary conditions in the trolley/bridge analytical model to conform to the ASME NOG-1-2004, Section 4153.6 requirements. This discrepancy was identified during the revision in response to the NRC questions. The licensee documented the discrepancy in IR No. 1099897.

3. Calculation 36272-12, Revision 15 (10/19/09), “Single Failure Proof Trolley Seismic Analysis”: ASME NOG-1-2004, Section 4153.7 requires that two separate loading conditions including “credible critical load on hook” and “no load on hook” shall be analyzed. It also requires that two positions of the loaded hook including “hook up” and “hook down” be analyzed. The licensee trolley analysis did not address the “no load on hook” condition or the loaded “hook down” position. The licensee documented the discrepancy in IR No. 1099897.

4. The inspectors identified a number of errors in calculation 36272-02, Revision 11 (10/19/09), “Exelon Byron and Braidwood Hoist/Reeving Equipment Calculation”: In Section 5.3.7 of the calculation, the subsections a, b, and c, calculated stresses for upper block torque arm parts identified as #9 and #10 were incorrect because of the incorrect definition of variables. The licensee used Mathcad software for computations. The inspectors identified that the variables used to define properties such as the thickness, edge distance, and effective widths for parts 9 and 10 were transposed leading to incorrect computations. Also, in subsection b, a multiplier of 2 was incorrectly applied to a term in the equation denominator resulting in a lower calculated stress. Similar errors were also identified in Section 6.2.7 of the calculation. The licensee documented the discrepancies in IR No. 1099897. The revised calculation (Revision 16, 7/9/10) indicated that the stresses increased in some cases but were found to be within the allowable limits.

5. Calculation 36272-12, Revision 15 (10/19/09), “Single Failure Proof Trolley Seismic Analysis”: ASME NOG-1-2004, Section 4153.5 provides criteria to be met in order to represent the crane as a separate model, decoupled from the crane runway. The inspectors identified that the trolley analysis was based on a bridge / trolley model decoupled from the crane runway but did not demonstrate that the ASME NOG-1-2004 criteria were met. The licensee documented the discrepancy in IR 1099897. The licensee subsequently performed new analyses using a coupled crane/support structure model.

6. As part of the crane upgrade, the licensee installed a new trolley evaluated in calculation 36272-12. However, the licensee did not evaluate the crane bridge girders and the crane support structure for the loads resulting from the new trolley analysis. In response to the NRC questions, the licensee determined that their existing bridge and support structure calculations were not adequate and decided to perform new calculations. The licensee documented the discrepancy in IR No. 1100062. The licensee subsequently performed new analyses for the crane and the support structure. Based on results of the new analyses, modifications were

required to the crane runway rail clips. The results also required significant revisions to the trolley seismic calculations and modification to the bolts supporting the auxiliary hoist frame.

Upon identification by the inspectors, the licensee documented the above examples in IRs 1099897, and 1100062. The crane was not operational as an upgraded single failure proof crane during this period. Resolution of the above items resulted in the licensee performing a number of new calculations and issuing major revisions to the existing calculations demonstrating adequacy of the design after installation of the identified modifications. The crane was converted to single failure proof following additional calculations and modifications.

Analysis

The inspectors determined that the licensee's failure to perform adequate evaluations to upgrade their single failure proof crane was contrary to the design control measures per 10 CFR Part 50 Appendix B requirements and was a performance deficiency.
The finding was determined to be more than minor because the finding was associated with the Barrier Integrity cornerstone attribute of Design Control and affected the cornerstone objective of providing reasonable assurance that a physical design barrier (fuel cladding) protects the public from radionuclide releases caused by accidents or events. Specifically, the failure to perform adequate evaluations of the fuel handling building crane and crane support structure affected the licensee's ability to provide reasonable assurance that the fuel cladding would be maintained if a heavy load was dropped in the FHB which could cause damage to spent fuel.

The inspectors determined the finding could be evaluated using the SDP in accordance with Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," Table 3b and 4a for the Barrier Integrity Cornerstone. The finding was more than minor as it was associated with the Barrier Integrity cornerstone and attribute of design control because a fuel handling building crane heavy load drop can damage the Spent Fuel Pool (SFP) Cooling System or spent fuel cladding. Since the finding was a design qualification deficiency confirmed not to result in a heavy load drop and no damage to spent fuel, it was screened as a Green finding. Therefore, the finding was determined to be of very low safety significance (Green).

The inspectors identified a Human Performance, Resources (H.2.c) cross-cutting aspect associated with this finding. The licensee did not provide adequate personnel and other resources necessary for providing complete and accurate design documentation in order to assure nuclear safety. Specifically, the licensee failed to provide complete and accurate design calculations and documentation for establishing structural adequacy of the crane components and the crane support structure for the crane upgrade to single failure proof.

Enforcement

Title 10 CFR 50, Appendix B, Criterion III, "Design Control" states, in part, that the design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above,

1. On October 19, 2009, in calculation 36272-12, Revision 15, the inspectors determined that the licensee's design control measures failed to verify accuracy of the trolley weight used. Specifically, the trolley weight used was 59,000 pounds while the actual weight based on weighing certification was 68,000 pounds.

2. On June 6, 2009, in calculation 36272-12, Revision 9, the inspectors determined that the licensee's design control measures failed to verify accuracy of the boundary conditions used for the trolley/bridge analytical model. Specifically, the boundary conditions used in the analytical model for the crane trolley / bridge evaluation did not conform to the requirements per Section 4153.6 of ASME NOG-1-2004.

3. On October 19, 2009, in calculation 36272-12, Revision 15 the inspectors determined that the licensee's design control measures failed to verify that all the applicable crane loading conditions were evaluated. Specifically, ASME NOG-1-2004, Section 4153.7 requires that two separate loading conditions including "credible critical load on hook" and "no load on hook" shall be analyzed. It also requires that two positions of the loaded hook including "hook up" and "hook down" be analyzed. The licensee calculation did not evaluate the loading conditions involving "no load on hook" nor the loaded "hook down" position.

4. On October 19, 2009, in calculation 36272-02, Revision 11, the inspectors determined that the licensee's design control measures failed to verify the accuracy of the calculations used to demonstrate structural adequacy of trolley components. Specifically, errors were found in Section 5.3.7 of the calculation, subsections a, b, and c, where the calculated stresses for parts identified as #9 and #10 were incorrect because of the incorrect definition of variables such as the thickness, the edge distance, and effective width. Also, in subsection b, a multiplier of 2 was incorrectly applied to a term in the equation denominator resulting in a lower calculated stress. Similar errors were also identified in Section 6.2.7 of the calculation.

5. On October 19, 2009, in calculation 36272-12, Revision 15 the inspectors determined that the licensee's design control measures failed to verify that use of a crane model decoupled from the crane runway and support structure was justified. Specifically, while using a crane model decoupled from the runway, the licensee evaluation did not demonstrate that the decoupling criteria for the crane runway per ASME NOG-1-2004, Section 4153 were satisfied.

6. On October 19, 2009, in calculation 36272-12, Revision 15, the inspectors determined that the licensee's design control measures failed to verify adequacy of the crane bridge girders and the support structure. Specifically, the bridge girders and FHB crane support structure were not evaluated for loads resulting from the new analysis based on the crane upgrade.

Because this matter was of very low safety-significance (Green), and has been entered into the licensee's corrective action program under IR Nos. 1099897, and 1100062; this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy (NCV 05000454/2010004-01; 05000455/2010004-01).

This NRC identified violation closes URI 05000454/2009004-05; URI 05000455/2009004-05 “Unresolved Technical Concerns on Design of Seismic Restraint on FHB Crane Trolley.”

.3 Methodology Used in the HI-STORM/HI-TRAC Stack-up Evaluation May Be Inadequate

Introduction:

A URI was identified by the inspectors regarding the methodology used to transfer the MPC from the HI-TRAC to the HI-STORM. Specifically, the inspectors identified a number of concerns regarding the overall methodology of the calculation.

Description:

Calculation 2.4.3-BYR08-070, Revision 2 (7/20/09) evaluated adequacy of the transfer configuration used for vertical transfer of the MPC from the HI-TRAC to the HI-STORM. The transfer includes the HI-TRAC placed on top of the HI-STORM with a mating device interposed between the two. All three components are placed on top of a trolley (low profile transporter) that can move along rails on the floor of the FHB. The height of the two casks placed on one another is greater than 30 feet.

A seismic analysis of the configuration was performed by the licensee’s contractor, Holtec International using time history seismic input and Visual Nastran computer code. The analysis model used involved an assemblage of multiple freestanding bodies responding to the input seismic motion with friction at various contact surfaces acting as the resisting forces.

The inspectors identified a number of concerns regarding the overall methodology of relying on friction as a restraining force: the lack of benchmarking of the computer code, no apparent prior evaluation by NRC, the method used for application of seismic input, the coefficient of friction values used, and the assumptions regarding coefficient of restitution and damping, etc. The concerns were discussed with the Division of Spent Fuel Storage and Transportation (DSFST) staff and the licensee. In response, the licensee decided to abandon the plan to use freestanding stack-up configuration and instead provided physical restraints for their current ISFSI campaign. The inspectors did not make a determination on the findings or significance of these concerns by the end of the inspection. The inspectors also identified that other licensees were planning to use a similar stack-up configuration. Due to the complexity of the analysis and the potential safety consequences, a Region III Technical Assistance Request (TAR) was issued to the DSFST Headquarters office. The TAR requested staff’s review of a similar analysis performed by another licensee and also requested additional guidance for the inspectors. The licensee documented the inspectors’ concerns in IR Nos. 1031363 and 1049402.

This issue will be a URI pending further review of the calculation by the inspectors after DSFST completes its review of the TAR and provides the necessary inspection guidance (URI 05000454/2010004-02; 05000455/2010004-02).

(2) Review of 10 CFR 72.212(b) Evaluations at Operating Plants

a. Inspection Scope

The inspectors reviewed the licensee's ISFSI pad evaluations for compliance with requirements discussed in 10 CFR 72.212 (b)(2)(i)(B) during ISFSI inspections in 2009. The inspectors identified that evaluations in calculation 2.4.3-BYR08-27 did not include the effect of partial/sequential loading on concrete design and the soil bearing pressure. URI 07200068/2009001-01 "Pad Structural Evaluation Revisions to Address Partial Sequential Loading" was opened to track the issue.

During review of ISFSI pad calculations at another operating plant, inspectors identified an issue of concern regarding the licensee's evaluation of the ISFSI pad. A similar calculation was used at the Byron Station and the licensee entered the issue into its corrective action program. Unresolved Item 07200068/2009001-02 "Use of Methodology Described in NUREG/CR6865" was opened to track re-evaluation of the licensee's ISFSI pad and subsequent resolution of the issue. This URI is further discussed in Section 4OA7, "Licensee Identified Violations" of this report.

The licensee revised calculations 2.4.3 BYR-08-027 and performed 2.4.3 BYR-10-095, a new calculation, as a result of inspector questioning associated with URI 07200068/2009001-01 and URI 07200068/2009001-02. Region III staff requested assistance through a technical assistance request of the Division of Spent Fuel Storage and Transportation, to review the two revised analyses to determine if the licensee's evaluations met regulatory requirements.

b. Findings

Introduction

The inspectors identified a Severity Level IV NCV of 10 CFR 72.212 (b)(2)(i)(B), "Conditions of a General License Issued under 72.210." Specifically, the inspectors identified four examples where the licensee failed to design the ISFSI pad to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction (SSI).

Description:

The inspectors identified four examples where the licensee failed to meet the requirements of 10 CFR 72.212 (b)(2)(i)(B).

1. The ISFSI must be designed to adequately support the static and dynamic loads considering potential amplification of earthquakes through SSI as required by 10 CFR 72.212. The dynamic analysis presented did not capture 3-D effects, such as torsion, due to a partially loaded pad. An asymmetrically loaded pad will have a torsional dynamic response, and it is anticipated that acceleration in the short direction will be lower for a fully loaded symmetric structure than for the partially loaded non-symmetric structure. The licensee failed to analyze the pad for the worst case cask configuration on the ISFSI pad and thus failed to adequately address increased torsional dynamic responses on the ISFSI pad. This example was

previously documented by URI 07200068/2009001-01 “Pad Structural Evaluation Revisions to Address Partial Sequential Loading."

2. The ISFSI must be designed to adequately support the static and dynamic loads considering potential amplification of earthquakes through SSI as required by 10 CFR 72.212. In the design basis dynamic analysis of the Byron ISFSI pad the methodology used to develop the SSI model and ensuing SSI analyses used best estimate soil properties.

   American Society of Civil Engineers (ASCE) Standard 4-98 (Ref. 6) Section 3.3.1.7 states the following: “The uncertainties in the SSI analysis shall be considered. In lieu of a probabilistic evaluation of uncertainties, an acceptable method to account for uncertainties in SSI analysis is to vary the low strain soil shear modulus. Low strain soil shear modulus shall be varied between the best estimate value times (1+Cv) and the best estimate value divided by (1+Cv), where Cv is a factor that accounts for uncertainty in the SSI analysis and soil properties. If sufficient, adequate soil investigation data are available, the mean and standard deviation of the low strain shear modulus shall be established for every soil layer. The Cv shall be established so that it will cover the mean plus or minus one standard deviation for every layer. The minimum value of Cv shall be 0.5. When insufficient data are available to address uncertainties in soil properties, Cv shall be taken as no less than 1.0.”

   The licensee used, in part, ASCE 4-98 as industry guidance for completion of the SSI. However, the licensee failed to address uncertainties in the soil in accordance with this standard. Discussions with DSFST staff have determined that this omission is non-conservative. The omission will reduce the licensee’s calculated safety factor and should have been included in the licensee’s analysis.

3. The ISFSI must be designed to adequately support the static and dynamic loads considering potential amplification of earthquakes through SSI as required by 10 CFR 72.212.

   In the licensee’s SSI model the bedrock outcrop (which is also the base of the SSI model) was modeled as a fixed mass, and therefore was unable to move and transmit seismic waves. The earthquake control motions were therefore applied as an inertia force time history to each mass: cask center of gravity, pad center of gravity, and soil mass center of gravity. This methodology is non-physical. The inspectors recognized that this non-physical methodology may be theoretically correct for a linear analysis; however, the inspectors had no evidence that this methodology was applicable to a non-linear problem wherein a cask is allowed to slide, tip or lose complete contact with the pad. The inspectors noted that in every known SSI methodology that had been reviewed and approved by the NRC, the control motion was applied at a bedrock outcrop or comparable soil layer. This was physically how the earthquake ground motion arrived at the site. The seismic waves arrive at the bedrock outcrop, were filtered and amplified by the soil layers between the rock outcrop and the ground surface and generated motion to the ISFSI pad.

   The licensee did not provide adequate justification and documentation for use of a new SSI analysis methodology.

4. The ISFSI must be designed to adequately support the static and dynamic loads considering potential amplification of earthquakes through SSI as required by 10 CFR 72.212. In the licensee's analysis, a single set of three dimensional (two horizontal and one vertical) acceleration time-histories were developed to envelop the 5% damped Regulatory Guide 1.60 response spectra to perform the non-linear SSI analysis. The use of a single set of 3-D time-histories was not standard practice for performing a non-linear SSI analysis. ASCE 4-98 Section 3.2.2.3(d) "Nonlinear Analysis" states the following: "In general, more than one set of acceleration time-histories, meeting the requirements of Section 2.3, should be used, and the results of the analyses shall be averaged." NUREG/CR-6865 also discusses this same issue and states the following in Section 4.1: "...the seismic response of a dry cask using one time-history might not always lead to a predictable response. It is increasingly obvious that a suite of earthquake inputs should be examined in order to obtain statistically stable mean and standard variation in the response to form the basis for design decision. This would require multiple runs using several earthquake records." The NUREG further provided evidence that the difference in maximum response among 5 sets of time histories varied by as much as a factor of 6 for the same spectral shape. This showed that the effect of the differences in frequency content and phasing within the 5 sets of time-histories had a significant influence on response. Due to the potentially large differences in response that could result from using different earthquake time-histories as input to a non-linear SSI analysis, the inspectors determined that the licensee's use of only a single set of acceleration time-histories to perform a non-linear SSI analysis may have significantly underestimated the predicted seismic response and thus did not conservatively meet the requirements of 10 CFR 72.212.

As an immediate corrective action and given the need for the licensee to load ISFSI casks and move them onto the pad, the licensee restricted the total load applied to the ISFSI pad by allowing a maximum of ten casks and then only at every other cask location in each direction on the pad, so that for any cask on the pad an open (unused) location would be adjacent to it in both the length and width directions of the pad. Because this restriction on the number of casks and loading pattern significantly reduces the total load distribution on the pad, the licensee concluded that for this reduced loading the concrete pad could adequately support the static and dynamic loads.

Analysis

The inspectors determined that the previously discussed examples were a violation of more than minor significance. The violation was determined to be more than minor because if left uncorrected, a failure of the ISFSI pad could lead to a more significant safety concern. Consistent with the guidance in Section 2.2 of the NRC Enforcement Manual, ISFSIs are not subject to the SDP and, thus, traditional enforcement will be used for these facilities. Consistent with the guidance in Section 2.6.D of the NRC Enforcement Manual, if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) Commensurate with its safety significance; and (2) informed by similar violations addressed in the Violation Examples. The inspectors determined that the violation could be screened using a similar violation example discussed in Section 6.5.d.1 of the NRC enforcement policy. Based on this the violation was determined to be of very low safety significance (Severity Level IV).

Enforcement

Title 10 CFR 72.212 (b)(2)(i)(B) requires, in part, that the licensee perform written evaluations prior to use, that establish that the cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes.

Contrary to the above, the licensee's completed evaluation did not adequately evaluate the cask storage pad to support static and dynamics loads of the stored casks considering potential amplification of earthquakes. This is a violation of 10 CFR 72.212 (b)(2)(i)(B), "Conditions of a General License Issued under 72.210." Because this matter was of very low safety-significance (Severity Level IV), and has been entered into the licensee's corrective action program (IR 957945 and IR 1102835), this violation is being treated as a NCV consistent with the NRC Enforcement Policy. (NCV 07200068/2010001-01). This closes Unresolved Item (URIs 07200068/2009001-01; 05000454/2009009-01; 05000455/2009009-01).

4OA6 Management Meetings

Interim Exit Meetings

Interim exits were conducted for:

- The results of the Emergency Preparedness program inspection with Mr. B. Adams on July 16, 2010.
- Radiation monitoring instrumentation protective equipment and verification inventories of materials tracked in the National Source Tracking System with Mr. B. Adams on July 16, 2010.
- The results of the ISFSI dry run readiness inspections with Mr. B. Adams on August 23, 2010.

The inspectors confirmed that none of the potential report input discussed was considered proprietary.

4OA7 Licensee Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and were violations of the NRC requirements which meets the criteria of Section 2.3.2 of the NRC Enforcement Policy, NUREG 1600, for being dispositioned as NCVs.

1) Title 10 CFR 50, Appendix B, Criterion III, "Design Control" states in part that the design control measures shall provide for verifying and checking adequacy of the design, such as by design review. The FHB crane was designed to Seismic Category I requirements. The licensee used compliance with ASME NOG-1-2004 as the basis for its upgrade to single failure proof. Section 4153.6 of ASME NOG-1-2004 describes the required boundary conditions to be used in the crane analysis.

   Contrary to above, on July 7, 2009, in Calculation 36272-17, Revision 11, the licensee's design control measures failed to verify that the boundary conditions as required by ASME NOG-1-2004 were applied in the evaluation. Specifically, determination of seismic loads based on coefficient of friction was not consistent with the required crane boundary conditions per Section 4153.6 of ASME NOG-1-2004. This violation was of very low safety significance because the crane was not yet in operation as a single failure proof crane. The inspectors reviewed the revised calculation. The licensee entered this issue into its corrective action program (IR 966184). This licensee-identified violation closes URIs 005000454/2009004-04; 05000455/2009004-04.

2) Title 10 CFR 72.212 (b)(2)(i)(B) requires, in part, that the licensee perform written evaluations prior to use, that establish that the cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes. The licensee generated Calculation 2.4.3-BYR08-30 to satisfy the requirements of 10 CFR 72.212 (b)(2)(i)(B).

   Contrary to the above, on September 18, 2009, in Calculation 2.4.3-BYR08-30, in lieu of performing a detailed dynamic analysis to determine seismic response of the cask, the licensee used the methodology described in the NUREG/CR6865, "Parametric Evaluation of Seismic Behavior of Free Standing Spent Fuel Dry Cask Storage System." The licensee determined that the calculation contained a number of assumptions and did not demonstrate the Byron ISFSI pad was bounded by the analyzed pad in NUREG/CR-6865. The licensee revised their calculation and performed a soil structure interaction analysis to address the concern and satisfy the requirements of 10 CFR 72.212 (b)(2)(i)(B). The inspectors reviewed the revised calculation. The licensee entered this issue into its corrective action program (IR 966751). This licensee-identified violation closes URIs 07200068/2009001-02; 05000454/2009009-02; and 05000455/2009009/02.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

B. Adams, Plant Manager
K. Anderson, Radiation Protection
A. Daniels, Nuclear Oversight
D. Drawbaugh, Emergency Preparedness Manager
C. Gayheart, Operations Director
B. Kartheiser, Emergency Preparedness Coordinator
J. Langan, Licensing Engineer
S. Merrill, Corporate Emergency Preparedness
J. Reed, Radiation Protection
D. Spitizer, Regulatory Assurance
D. Enright, Site Vice President
B. Askren, Security Director
D. Gudger, Regulatory Assurance Manager
T. Hulbert, Regulatory assurance NRC Coordinator
P. Johnson, Lead NOS Assessor
S. Kerr, Chemistry Manager
R. Lloyd, Performance Improvement Manager
T. Leaf, Operations SOS
J. Feimster, Maintenance and Technical Training Manager
B. Spahr, Maintenance Director
E. Hernandez, Engineering Director
B. Barton, Radiation Protection Manager

Nuclear Regulatory Commission

E. Duncan, Chief, Reactor Projects Branch 3
R. Skokowski, Chief, Plant Support Branch
J. Robbins, Resident Inspector

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000454/2010004-01 05000455/2010004-01	NCV	Failure to Perform Adequate Evaluation for Crane Upgrade (Section 40A5)
05000454/2010004-02 05000455/2010004-02	URI	Relying on the Use of Friction as a Restraining Force when the HI-TRAC is Placed on top of the HI-STORM (Section 40A5)
07200068/2010001-01	NCV	Failure to Design the ISFSI Pad to Adequately Support the Static and Dynamic Loads of Stored Casks (Section 40A5)

Closed

05000454/2010004-01 05000455/2010004-01	NCV	Failure to Perform Adequate Evaluation for Crane Upgrade (Section 4OA5)
07200068/2010001-01	NCV	Failure to Design the ISFSI Pad to Adequately Support the Static and Dynamic Loads of Stored Casks (Section 4OA5)
05000454/2009004-04 05000455/2009004-04	URI	Use of Friction in Design of FHB Crane to Single Failure Proof (Section 4OA7)
05000454/2009004-05 05000455/2009004-05	URI	Unresolved Technical Concerns on Design of Seismic Restraint on FHB Crane Trolley (Section 4OA5)
05000454/2009009-01 05000455/2009009-01 07200068/2009001-01	URI	Pad Structural Evaluation Revisions to Address Partial Sequential Loading (Section 4OA5)
05000454/2009009-02 05000455/2009009-02 07200068/2009001-02	URI	Use of NUREG/CR6865 Results in Lieu of Dynamic Analysis (Section 4OA7)
05000455/2009-001-01	LER	Late Entry Into TS Condition Associated with Reactor Coolant System Leakage Characterization Resulting in a condition Prohibited by TSS (Section 4OA3)

Discussed

None

LIST OF DOCUMENTS REVIEWED

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

Section 1R04: Equipment Alignment Quarterly

- BOP SX-3; Essential Service Water Make-up Pump Startup, Revision 26
- Drawing M-42; Diagram of Essential Service Water, Sheet 7, Revision AE
- Drawing M-42; Diagram of Essential Service Water, Sheet 6, Revision BA
- Drawing M-37; Diagram of Auxiliary Feedwater, Revision AY
- Drawing M-129; Diagram of Containment Spray, Rev. AK
- Drawing M-137; Diagram of Residual Heat Removal, Rev. BG

Section 1R05: Fire Protection (Quarterly)

- Pre-Fire Plan; FZ11.3-0 North. Auxiliary Building 364'-0" Elevation General Area – North
- Pre-Fire Plan; FZ11.5-0 North, Auxiliary Building 401'-0" Elevation General Area – North

Section 1R07A: Heat Sink Performance (Annual)

- IR 1106306; Move Up GL 89-13 Inspection Date of 1A SI Pump Lube Oil HX, August 26, 2010
- IR 1105710; As Found inspection results of 1B Safety Injection Pump Lube Oil Cooler; August 25, 2010
- WO 01216874; Inspect heat Exchanger 1SI01SB per Generic Letter 89-13

Section 1R11: Licensed Operator Requalification Program

- Cycle 10-4 Out of the Box; Multiple Rod Drops and Loss of All AC Power, Revision 1

Section 1R12: Maintenance Effectiveness (Quarterly)

- IR 0842111; MSPI Low Margin – SX Pumps, November 07, 2008
- IR 1007516; 1SX010 Did Not Fully Stroke During Testing, December 18, 2009
- IR 1008317; 1SX010 MOV Limits Exceeded During Trend Testing, December 21, 2009
- IR 1009038; Adverse Trend in M-Rule for SX-5, December 23, 2009
- IR 1061727; Poor Decision Making, April 26, 2010
- Maintenance Rule Monthly Evaluation for Pressurizer System, June 2010
- Maintenance Rule Monthly Evaluation for Low Voltage System, June 2010
  IR 948139; Annual CCA on Equipment Reliability Issues, July 31, 2009
- IR 963571; NOS ID: Six PZR HTR BKR Trips in Last 3 Months, September 10, 2009
- IR 1081687; Breaker 1RY03EA-A1A Found in Tripped Position, June 17, 2010
- IR 1081695; Breaker 2RY03EA-B3A Found in Tripped Position, June 17, 2010
- IR 1092696; Pressurizer Heater Breaker Found Tripped Open, July 21, 2010
- IR 989693-02; Apparent Cause Evaluation for Pressurizer Heater Breaker Still Tripping, December 30, 2009
- IR 1001629-02; Common Cause Analysis to review Auxiliary Power System of Maintenance Rule Function Failures and Critical Component Failure for Common Failure Modes, January 6, 2010

- SX System Health Report; July 01, 2010 – September 30, 2010
- Unit 1 Component Cooling System Health Reports, 3rd Quarter 2010
- Unit 0 Component Cooling System Health Reports, 3rd Quarter 2010
- IR 928827; Thermal Barrier CC Return Flow Low, June 8, 2009
- IR 951336; How to Fill CC Surge Tanks and Engage Margin Management Too, August 10, 2009
- IR 951684; Unit 1 CC Surge Tank Level Indication / Alarm Spiking, August 10, 2009
- IR 954443: Unit 1 CC Surge Tank Level Indication Still Spiking, August 17, 2009
- IR 962777; Unit 1 CC Surge Tank Level High Alarm not lit with SER Showing Alarm, September 9, 2010
- IR 989561; 1CC053 Tripped and Will Not Reset, November 5, 2010
- IR 1CC9460B Valve Handle Broken, November 16, 2010
- IR 1002196; Adverse Trend on 1CC01PB Differential Pressure, December 7, 2009
- IR 1004884; Unit 1 CC Surge Tank Level Spike, December 13, 2009

Corrective Action Documents As a Result of NRC Inspection

IR 1096173; Discussion Results with NRC Regarding LV/RY Issues, July 30, 2010

Section 1R13: Maintenance Risk Assessments and Emergent Work Control (Quarterly)

- Issue Resolution Documentation Form 2010-10; Determine When Byron Unit 2 Leaking Pressurizer Safety Relief Valve (PSRV) Should Be Replaced, Revision 6
- WC-AA-101; On-Line Work Control Process, Rev. 17
- Draft Risk Assessment for Week of March 01, 2010
- Risk Assessment for Week of September 20, 2010, Rev. 1
- Risk Assessment for Week of September 20, 2010, Rev. 2
- Risk Assessment for Week of September 20, 2010, Rev. 3
- Risk Assessment for Week of September 20, 2010, Rev. 4
- IR 1116288; Remove the Oil Filter Housing for Use in Unit 1 Feedwater Pump, September 22, 2010
- IR 1116305; Runback of Byron Station Unit 1 due to 1A Feedwater Pump Trip, September 22, 2010
- IR 1116458; 1A Feedwater Pump Oil Leak Impact on Adjacent Equipment, September 22, 2010
- IR 1117036; Application of Proper Technical Human Performance Missed Opportunity, September 23, 2010
- IR 1114580; Review of OE 31887 for Applicability at Byron, September 19, 2010
- IR 1115492; Unit 1 Reactor Trip, September 20, 2010
- IR 1115504; B Train Feedwater Injection Signal, September 20, 2010
- IR 1115574; Unit 1 Reactor Trip – Train B SSPS Failure, September 20, 2010
- IR 1064124; Relief Valve in Need of Repair, May 1, 2010
- IR 1079917; Pressurizer Safety Relief Valve Temperature Indicator Reading Higher, June 13, 2010
- IR 1080512; Received Unexpected Pressurizer Safety Relief Discharge Temperature High Alarm, June 15, 2010
- IR 1080965; Pressurizer Safety Relief Discharge Temperature High Alarm Not Working, June 16, 2010
- IR 1081634; 2A Pressurizer Safety Valve Leaking, June 17, 2010
- IR 1085536; 2RY8010A Indicating a Leak-by, June 29, 2010
- IR 1085735; 2A Pressurizer Safety – Emergent Clearance Order C&T Level 4, June 29, 2010

- IR 1115247; 2RY8010A Monitoring Update / Lessons Learned, September 20, 2010
- IR 1117749; Pressurizer Safety 2RY8010A Temperature Spike, September 29, 2010
- IR 1011385; Unit 1 CC Surge Tank Auto Make-Up for 1 Second Only, January 1, 2010

Section 1R15: Operability Evaluations (Quarterly)

- IR 1073466; Buzzing Noise and Abnormal Indication During ESF Start, May 26, 2010
- IR 1093487; Fan Motor Bearing-To-Shaft Fit May Be Beyond STND Tolerance, July 22, 2010
- EC 380260; OP Evaluation 10-002, Train 1B ESF Relay K611 Degraded, June 01, 2010
- EC 380861; OP Evaluation 10-003, ECCS Pump Cubicle Cooler Fan Shaft Bearing Interference Fit out of Tolerance, Modified July 28, 2010
- IR 1088474, Potential Design Vulnerability of Auxiliary Feedwater System, July 7, 2010
- EC 381435, Operability Evaluation of Potential Design Vulnerability of Auxiliary Feedwater System
- 0BOSR 8.3.2-1; Diesel Generator Oil Sample Surveillance, August 18, 2010
- BYR96-126; Design Analysis for Diesel Oil Storage Tank Level Setpoints, Rev. 2B
- ATD-0196; Calculation for Unusable Volume in Diesel Oil Storage Tanks and Day Tanks, Rev. 4

Corrective Action Documents As a Result of NRC Inspection

- NRC Identified Discrepancy in Fire Protection Report, July 15, 2010

Section 1R18: Temporary Modifications

- EC 380139, Install a Temporary Pump in the Unit 1 SX Room Sump, May 14, 2010
- IR 1119037, NRC Inspector identifies WE Piping support brackets not tight, September 28, 2010

Section 1R19: Post Maintenance Testing

- Work Order 1072104-01; Replace Charger Control Card; July 26, 2010
- Work Order 1072104-02; OP PMT – Verify Proper Output Voltage and Float Current, July 27, 2010
- Work Order 1207848-01; Battery Charger 18M Surveillance, July 27, 2010
- Work Order 1351299-01; SX Makeup Pump 0B Monthly Operability Surveillance; July 29, 2010
- 2BOSR 5.2.5-1, ECCS Subsystem Automatic Valve Actuation Test, Revision 5
- 2BOSR 0.5-2.SI.2-2.1, Unit Two 2SI8802A, 2SI8806, 2SI8809A…Stroke Test and Position Verification Test, Revision 11
- IR 1090058, Auxiliary Feedwater Valve 2AF006A leaking by and will not move, July 12, 2010
- WO 1290990; Install Engineering Change 378101 Diesel Oil Storage Tank Level Switches, Rev. 0
- WO 1351433; 1B Diesel Generator Operability Surveillance, June 1, 2010
- WO 1282202; 1B Diesel Generator Operability Surveillance, July 28, 2010
- 1BOSR 8.1.2-2 Unit 1 B Monthly/Quarterly Surveillance, June 30, 2010
- WO 1348744; Install new United Electric J120-453, EC380503, August 6, 2010
- WO 1348746; Install new United Electric J120-453, EC380503, August 6, 2010

Corrective Action Documents As a Result of NRC Inspection

- IR 1095767; NRC Questions Some Work Practices in RSH, July 29, 2010
- IR 1095748; Petcock Valve Bent and Loose, July 29, 2010

Section 1R22: Surveillance Testing (Quarterly)

- 1BOSR 0.5-3.SX.1-2, Unit 1 Test of the 1B Essential Service Water Miscellaneous System Valve, Revision 5
- 2BOSR 0.5-3.AF.1-1, Unit 2 ASME Surveillance Requirements for the A Train Auxiliary Feedwater SX Supply Valves, Revision 9
- 0BOSR 7.9.6-1, Essential Service Water Makeup Pump 0A Monthly Operability Surveillance, Revision 26
- 2BOSR 6.6.2-1, Unit 2 Reactor Containment Fan Cooler Monthly Surveillance, Revision 24
- 2BOSR 6.3.5-2, Unit 2 Chilled Water Containment Isolation Valve Stroke Test, Revision 4

Corrective Action Documents As a Result of NRC Inspection

- IR 1096305; NRC Concern – Gasket Not Seated in Damper Access Door, July 30, 2010
- IR 1096322; NRC Concern – 1DG5152B Thread Engagement, July 30, 2010
- IR 1097538; Security Diesel Fire Dampers Need Cleaning, August 03, 2010
- IR 1097549; NRC Identified Leaks on Discharge Boot on the 0DG01K, August 03, 2010

Section 1EP2: Alert and Notification (ANS) Evaluation

- Offsite Emergency Plan Alert and Notification System Addendum for the Byron Nuclear Power Station; November 2009
- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan Section E; Revision 20
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 4; Revision 26
- Exelon Nuclear Siren Operations Manual; December 14, 2009
- Byron Plant Warning System Annual Maintenance & Operational Reports; June 9, 2010
- Byron Plant Warning System Annual Maintenance & Operational Reports; July 6, 2009
- Byron Siren Daily Operability Reports; January 1, 2009 - June 30, 2010
- Byron Monthly Siren Availability Reports; June 2008 – June 2010
- Exelon Semi Annual Siren Reports; June 30, 2009 and December 31, 2009
- IR 00808612; Bryon Alert Notification System Reached an Outage of 25%; August 19, 2008

Section 1EP3: Emergency Response Organization Augmentation Testing

- EP-AA-1000; Exelon Nuclear Standardized Radiological Emergency Plan, Sections B and N; Revision 20
- EP-AA-1002; Exelon Nuclear Radiological Emergency Plan Annex for Byron Station, Section 2; Revision 26
- EP-AA-112; Emergency Response Organization (ERO)/Emergency Response Facility (ERF) Activation and Operation; Revision 14EP-AA-122-1001; Drill & Exercise Scheduling, Development, and Conduct; Revision 11
- EP-AA-121; Emergency Response Facilities and Equipment Readiness; Revision 9
- 0BOSR CQ-1; Test of the Employee Alarm System; Revision 4
- OP-AA-102-104; On Site Warning System Compensatory Actions; June 11, 2010
- OP-AA-115-101; List of Inaudible Public Address System Locations; June 11, 2010

- TQ-AA-113; ERO Training and Qualification; Revision 16
- Emergency Response Organization Call-Out Roster; July 7, 2010
- Quarterly Unannounced Off-hours Call-In Augmentation Drill Reports; April 9, 2009 – May 18, 2010
- ERO Drive-In Drill Reports; December 12, 2008 and January 7, 2009
- EP Information 2010-07; Byron EP Information Newsletter; July 2010
- 2008 Drill Findings and Assembly and Accountability Report, Revision 1; July 7, 2009
- 2009 Byron Pre-Exercise with Assembly and Accountability Report; June 17, 2009
- IR 1090669; NRC Review of Plant PA and Alarm System; July 14, 2010
- IR 1089102; Plant Page Deficiencies Creating Unsafe Work Environments; July 9, 2010
- IR 1070455; TSC Operations Director Did Not Respond for Call-In Drill; May 18, 2010
- IR 1058355; NRC Concern Regarding Call-In Drills Exclusion of Personnel; April 19, 2010
- IR 1056174; On Site Warning Systems Not Being Maintained as Required; April 13, 2010

Section 1EP5: Correction of Emergency Preparedness Weaknesses and Deficiencies

- NOSA-BYR-10-03; Emergency Preparedness (50.54(t)) Audit Report; April 21, 2010
- NOSA-BYR-10-03; Objective Evidence Report EP Functional Area Audit, P2I-1; April 16, 2010
- NOSA-BYR-09-04; Emergency Preparedness (50.54(t)) Audit Report; May 6, 2009
- NOSA-BYR-09-04; Objective Evidence Report EP Functional Area Audit, P2I-1; May 1, 2009
- CIAR 1005570-02; Byron Emergency Preparedness Program Inspection Readiness Assessment; June 4, 2010
- IR 1089102; Plant Page Deficiencies; July 9, 2010
- IR 1083437; NOS ID Emergency Preparedness Rated Yellow; December 22, 2009
- IR 1075788; TSC Fan Problem; June 1, 2010
- IR 0996594; NOS ID Issues Regarding ACE Cause and Actions; November 20, 2009
- IR 0932440; Preliminary Results for Byron's EP Pre-Exercise; June 17, 2009

Section 2RS5: Radiation Monitoring Instrumentation (71124.05)

- RP-AA-700; Controls for Radiation Protection Instrumentation; Revision 2
- BRP 5820-14; Process Radiation Monitoring System Alert/High Alarm Setpoints; Revision 37
- Calibration of the Canberra FASTSCAN B2 WBC System at the Byron Station; June 12, 2009
- Certificate of Calibration; Certificate No. 0010575067; MGP AMP 100; Asset No. 078646; January 15, 2010
- BRP 5823-39; Operation of the Merlin Gerin AMP-100; Revision 12
- RP-AA-700-1401; Operation and Calibration of Eberline Model Pm-7 Personnel Contamination Monitor; Revision 0
- RP-AA-700-1401; Attachment 3; Calibration Data Sheet; Portal Monitor Instrument No. 180; January 29, 2010
- RP-BY-721; Operation and Calibration of the Canberra Argos-5AB Zeus Personnel Contamination Monitor; Revision 1
- RP-BY-721; Attachment 1; Argos-5 Calibration Data Sheet; Monitor No. 164; April 5, 2010
- Argos and GEM Monitors Operation Manual; Canberra Industries; Revision 00
- BRP-5822-11; Calibration of Nuclear Enterprises Small Articles Monitor (SAM); Revision 16
- BRP-5822-11; Attachment B; SAM Calibration Data Sheet; Monitor Serial Number 427; May 20, 2010
- RP-AA-70-1100; Operation of the Eberline RO-2/2A/20, Bicron RSO 50E; Revision 0
- Certificate of Calibration; Certificate No. 0010572975; Eberline RO-20; Asset No. 078110; January 29, 2010

- Certificate of Calibration; Certificate No. 00105715555; Bicron RSO-50E; Asset No. 077678; June 23,2010
- BRP-5821-4; Operation of the Eberline AMS-3 Beta Air Monitor; Revision 7
- Test Report; Beta Continuous Air Monitor; AMS3; Serial Number 1265; February 25, 2010
- BRP 5825-3; Operation and Use of the J.L. Shepherd Model 89 Gamma Calibrator; Revision 13
- RP-BY-700-1001; Instrument Calibration and Source Check Settings; Revision 30
- Functional Area Self-Assessment; Assignment Number 1006770-03; Radiation Instrumentation per IP 71124.05; June 11, 2010
- Functional Area Self-Assessment; Assignment Number AR 929091-02; Power Labs Instrument Calibration Facility Process; February 25, 2010
- IR 999376; IPM No. 381 Tagged OOS Due to Low Flow – Mylar Tear; November 30, 2009
- AR 1009820; PM-7 No. 373 is Experiencing Many False Alarms; December 28, 2009
- AR 1039346; Vendor Calibration Data Sheets Had Incorrect Data Point; March 05, 2010
- AR 1071645; Annual Out of Tolerance Review for Portable RP Instruments; May 20, 2010
- AR 1083633; Power Labs Cal of Ion Chamber; Not within 10 percent of Standard; June 23, 2010
- BIP 2500-137; Calibration of Steam Jet Air Ejector (SJAE)/Gland Steam Exhaust Radiation Monitor (PR); Revision 7
- Work Order 01079638 01; STM Jet Air Ejector/Gland Steam Exhaust Rad Mon Loop 1PR-027; August 27, 2009
- BISR 11.b,5-200; Surveillance Calibration of Auxiliary Building Vent Stack Effluent (PIGG) Radiation Monitor (PR); Revision 3
- Work Order 01116156 01; Cal of Rad Monitor 1PR28J; May 06, 2009
- BISR 11.a.5-200; Surveillance Calibration of Liquid Effluent Radiation Monitor (PR); Revision 0
- Work Order 01055110 01; Perform Calibration of 0PR01J; March 04, 2009
- BISR 3.3.2-207l Surveillance Calibration of High Range Containment Radiation Monitor (AR); Revision 9
- Work Order 01165961 01; Cal of High Range Containment Radiation Monitor; March 15, 2010
- 862747; Assign 16, Evaluate Revision to EP Demonstration Criteria; March 20, 2009

Corrective Action Documents As a Result of NRC Inspection

- Technical Basis for Main Steamline Area Radiation Monitor, July 16, 2010

Section 4OA1: Performance Indicator Verification

- LS-AA-2110; Monthly Data Elements for NRC ERO Drill Participation; September 2009 - March 2010
- LS-AA-2120; Monthly Data Elements for NRC Drill/Exercise Performance; July 2009 - March 2010
- LS-AA-2130; Monthly Data Elements for NRC Alert and Notification System Reliability; July 2009 – March 2010
- Byron Monthly Siren Availability Reports; July 2009 – March 2010
- IR 1089356; LORT DEP Failure – EP EAL Missed; July 9, 2010
- IR 1056216; Plant Page System Failed Partial Surveillance; April 13, 2010
- IR 1050496; Table Top Drill EAL Call Scenario Problem; March 31, 2010
- IR 0996470; Training-Emergency Planning DEP Failure during LORT; November 20, 2009
- Monthly Data Elements for NRC Reactor Coolant System (RCS) Leakage, July 2009 to June 2010
- Monthly Data Elements for NRC Safety System Functional Failure, April 2009 to June 2010

- Procedure 2BOSR 4.13.1-1; RCS Water Inventory Balance 72 Hour Surveillance, February 16, 2010

Section 4OA2: Problem Identification and Resolution

- IR 1092137; Aluminum Not Incorporated in Chemical Effects Calculation, July 19, 2010
- IR 1093900; Fan Motor Bearing to Shaft Fit Out of Tolerance, July 23, 2010
- IR 1092694; 2VA02CB-M Criteria Not Met for Outboard Shaft Measurements, July 21, 2010
- IR 1093816; Leaking Water Into Unit 1 Penetration Area, July 23, 2010
- IR 1093820; Leaking Water Into Unit 2 Penetration Area, July 23, 2010
- IR 1096574; ESF Cubicle Fan Breaker Off, 2AP22E-A4, July 31, 2010
- IR 1115732; Found Unit 2 AF 13D Piping Very Hot, September 21, 2010
- IR 1098457, Unplanned LCOAR Entry for Unit 1 Diesel Fuel Oil Storage Tanks, August 5, 2010
- Design Analysis Number 19-T-5, Diesel Generator Loading During LOOP/LOCA – Byron Units 1 and 2, Revision 6
- Design Analysis Number DGD09301, Time Dependent Loading and Fuel Consumption for EDGs Following LOOP/LOCA, Revision 6
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- EC 381086, Evaluation to Assist in Determining Reportability of 1B EDG Diesel Oil Storage Tank (DOST) Level Indication Shift In The Non-conservative Direction (IR 1098457)
- Exelon Nuclear Procurement Engineering Standard PES-P-006, Diesel Fuel Oil, Revision 6

Corrective Action Documents As a Result of NRC Inspection

- IR 1092193; Concern with Operating VA Supply/Exhaust Fans, July 19, 2010
- IR 1115427; MCR Door 0DSSD171 Periodically Fails to Automatically Latch, September 20, 2010

Section 4OA5: Other Activities

- NRC Form 748; National Source Tracking Transaction Report; Byron Station; 1/25/2010

ISFSI Inspection

Calculations:

- 2.4.3-BYR08-027; Structural Analysis of the ISFSI Pads at Byron and Braidwood; Revision 3
- 2.4.3-BYR08-070; Dynamic Analysis of HI-STORM / HI-TRAC Stack Up; Revision 2
- 2.4.3-BYR10-095; Seismic Stability of HI-STORM 100 Casks on Byron ISFSI Pad Using Classical Non-Linear Dynamics Model with Soil-Structural Interaction; Revision 1
- 36272-02; Exelon/Byron & Braidwood Hoist/Reeving Equipment Calculation; Revisions 11, 16
- 36272-12; Exelon/Byron & Braidwood Single Failure Proof Trolley Seismic Analysis; Revisions 15, 18
- 36272-13; Exelon/Byron & Braidwood Single Failure Proof Trolley Critical Weld Calculations; Revision 13
- 36272-17; Exelon/Byron & Braidwood Single Failure Proof Trolley Misc. Items Seismic Calculations; Revisions 16, 23
- 4.1.1-BYR10-093; Synthetic Time Histories Consistent With the SSE Response Spectra for Fuel Handling Building Floor Elevation 401’-0”; Revision 0

- 4.1.4-BYR10-070; Fuel Handling building Single Failure Proof Crane – Coupled Building and Crane ANSYS analysis; Revision 0
- 8.1.20-BYR10-074; Fuel Handling building Single Failure Proof Crane – Shear Wall Analysis; Revision 0
- 8.1.2-BYR10-075; Base Mat Analysis Due to Loads From Single Failure Proof Crane; Revision 0
- 8.1.6-BYR10-073; Fuel Handling building Single Failure Proof Crane –Roof Framing Member Analysis; Revision 0
- 8.1.8-BYR10-072; Fuel Handling building Single Failure Proof Crane – Crane column and Roof Column Analysis; Revision 0
- 8.1.8-BYR10-102; Fuel Handling building Single Failure Proof Crane – Structural Member Connection Analysis; Revision 0
- 8.1.9-BYR10-071; Fuel Handling building Single Failure Proof Crane – Crane Girder Analysis; Revision 0
- 8.1.9-BYR10-101; Fuel Handling building Single Failure Proof Crane – Crane Runway Rail clips Design; Revision 0
- BYR08-024; Dry Cask Storage Project – Fire Radiant Heat and Explosion Overpressure Analysis; Revision 0
- BYR08-025; Dry Cask Storage Project – Fire Hazards Analysis Report; Revision 0
- BYR08-126' Byron 1 Cycles 1 to 14 and Byron 2 Cycles 1 to 13 Dry Storage Fuel and component Characterization; Revision 0
- BYR08-127; Byron 1 Cycles 1 to 14 and Byron 2 Cycles 1 to 13 Cask Loader Database Population; Revision 0
- BYR09-056; Tornado Evaluation for Byron, Braidwood, and LaSalle Nuclear Generating Station Dry Cask Storage Projects, Revision 1
- BYR10-076; Structural Evaluations Associated with the Cask Stack-up Restraint System; Revision 1
- HI-992284; Miscellaneous Thermal-Hydraulic Calculations for HI-STAR and HI-STORM; Revision 1
- Holtec Document 1678059; NRC Pad Concerns; August 17, 2010

<u>Issue reports:</u>

- IR 110370; Near Miss – Dry Cask Storage; August 11, 2010
- IR 893490; ISFSI Spacer Dimension for Fuel with No Inserts; February 24, 2010
- IR 897253; Dry Cask Storage Supplier Equipment Problems; March 25, 2009
- IR 897300; TRM 3.9.D Applicability for Cask Loading Area in SFP; March 25, 2009
- IR 957014; Compliance with NOG-1 rules for Single Failure Proof cranes; August 24, 2009
- IR 966184; Compliance with NOG-1 rules for Single Failure Proof cranes; September 1, 2009
- IR 981962; FHB Crane Modification Drawing Error; October 20, 2009
- IR 1004502; Vendor Product review Process Weaknesses; December 11, 2009
- IR 1027260; Engineering Review for Single Failure Proof Crane; February 8, 2010
- IR 1049402; Restraint System Needed for ISFSI Stack-up Configuration; March 29, 2010
- IR 1095194; Question of Need for Seismic Protection on Draindown Tank; July 27, 2010
- IR 1095578; Hoist Upper Travel Interlocks Locks Out SFPBC Hoist; July 29, 2010
- IR 1095887; ISFSI Project May Alarm FHB Area Rad Monitors; July 28, 2010
- IR 1098384; ISFSI Observations During DRY Run; July 30, 2010
- IR 1100062; FHB Crane Bridge and FHB Structure Calcs Need Revision; August 10, 2010
- IR 1105405; ISFSI Seismic Restraint Shoe Adjustment Screw Engineering; August 19, 2010

Corrective Action Documents As a Result of NRC Inspection

- IR 1031363; NRC Questions on Byron Specific Stackup Calculation; February 16, 2010
- IR 1031363; NRC Questions on Byron Specific Stackup Calculations; February 12, 2010
- IR 1099897; NRC Inspectors Identified Errors in FHB Crane Design Analysis; August 10, 2010
- IR 1102835; NRC Concerns with Byron ISFSI pad Structural Qualifications; August 18, 2010
- IR 1106006; NRC Identified Procedure Improvement; August 24, 2010
- IR 1098537; NRC Identified Potential Errors in FHB Crane Analysis; August 5, 2010

Drawings:

- Drawing Number 5490; Dry Cask Storage Project Cask Storage Pad

10 CFR 72.48 Screenings / Evaluations:

- Byron 72.48 Number 1; 72.212 Evaluation Report Change; Revision 0
- Holtec 72.48 Number 890; HI-TRAC 125D Design Change; Revision 0

Procedures:

- BAP 1210-1T1; Byron Station Plant Review Report – TRM Change 09-010; June 26, 2009
- BFP FH-35; Contingency Fuel Handling Building Crane Operations; Revision 0
- BFP FH-64; Transporter Operations; Revision 4
- BFP FH-65; Spent Fuel Cask Site Transportation; Revision 6
- BFP FH-68; HI-TRAC Preparation; Revision 2
- BFP FH-69; HI-TRAC Movement within the Fuel Building; Revision 4
- BFP FH-70; HI-TRAC Loading Operations; Revision 1
- BFP FH-72; HI-STORM Processing; Revision 0
- BFP FH-74; Helium Cool down; Revision 0
- BFP FH-76; Transporter Undocumented Visual Inspection Revision 2
- BFP FH-78; Vacuum Drying System Operation; Revision 2
- BFP Fh-80; Haul Path and ISFSI Dry Run Operations; Revision 0
- BFP FH-84; HI-TRAC Operations within the Fuel Handling Building; Revision 0
- BFP-FH-20; Operation of Fuel Handling Building Crane; Revision 24
- BFP-FH-34; Water Transfer of the Spent Fuel, Wet Cask Pit or Transfer Canal; Revision 6
- LS-BY-105; 72.48 Review Process for Dry Cask Storage; Revision 1
- MMH 36272-41; Exelon Byron FHB Single Proof Trolley Site Acceptance Test Procedure; October 27, 2009
- MMH 36727-16; Exelon Byron FHB Single Failure Proof Trolley Site Acceptance Test Procedure; March 20, 2009
- NF-AA-309; PWR Move Sheet for Dry Cask Movement; July 22, 2010
- NF-AP-622; Fuel Selection and Documentation for Dry Cask Storage; Revision 22
- OU-AP-204; Fuel Movement in the Spent Fuel Pool for Byron and Braidwood; Revision 9
- OU-AP-216; Operation of the Spent Fuel Pool Bridge Crane; Revision 2
- OU-AP-229; Operation of the Spent Fuel Pool Sluice Gates for Byron and Braidwood; Revision 2

Other Documents:

- Byron Nuclear Power Station Unit 1 and 2 10 CFR 72.212 Evaluation Report; Revision 0
- Byron Nuclear Power Station Unit 1 and 2 10 CFR 72.212 Evaluation Report; Revision 1

- Byron Stations Quality Assurance Topical Report
- Fuel Handler Qualification and Training Matrix; April 7, 2010
- MPC Leak Testing Documentation; December 17, 2009
- Spent Fuel Pool Boron Sample Results; July 27, 2010
- WO 1166091; HI-STORM and MPC Pre-Use Inspection; November 19, 2008

LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agencywide Document Access Management System
AF	Auxiliary Feedwater
ALARA	As-Low-As-Is-Reasonably-Achievable
ARM	Area Radiation Monitor
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
CAM	Continuous Air Monitor
CAP	Corrective Action Program
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
DBD	Design Basis Document
DNMS	Division of Nuclear Materials Safety
DG	Diesel Generator
d/p	Differential Pressure
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
DSFST	Division of Spent Fuel Storage and Transportation
ECCS	Emergency Core Cooling System
ED	Electronic Dosimeter
FHB	Fuel Handling Building
FSAR	Final Safety Analysis Report
HPGE	High Purity Germanium
I&C	Instrumentation and Controls
IEEE	Institute of Electrical & Electronic Engineers
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
ISFSI	Independent Spent Fuel Storage Installation
ISI	Inservice Inspection
IV	Independent Verification
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LHRA	Locked High Radiation Area
LLC	Limited Liability Corporation
LOCA	Loss of Coolant Accident
LOOP	Loss of Off-site Power
LPCI	Low Pressure Coolant Injection
MCID	Materials Control ISFSI and Decommissioning
MPC	Multi-Purpose Canister
mrem	Millirem
MRFF	Maintenance Rule Functional Failure
msec	Millisecond
MSIV	Main Steam Isolation Valve
MSL	Mean Sea Level
NCV	Non-Cited Violation

NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NIOSH	National Institute of Safety & Health
NRC	U.S. Nuclear Regulatory Commission
PARS	Publicly Available Records System
PCIS	Primary Containment Isolation System
PI	Performance Indicator
PI&R	Problem Identification and Resolution
PM	Planned or Preventative Maintenance
PMT	Post-Maintenance Testing
psid	Pounds Per Square Inch Differential
psig	Pounds Per Square Inch Gauge
QA	Quality Assurance
RCA	Radiologically Controlled Area
RCIC	Reactor Core Isolation Cooling
RH	Residual Heat Removal
RP	Radiation Protection
RPS	Radiation Protection Specialist
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RWP	Radiation Work Permit
scf	Standard Cubic Feet
SDP	Significance Determination Process
SFP	Spent Fuel Pool
SRV	Safety Relief Valve
SSC	Systems, Structures, and Components
SSI	Soil Structure Interaction
SW	Service Water
TAR	Technical Assistance Request
TLD	Thermoluminescent Dosimeters
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
WBC	Whole Body Count
WO	Work Order

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Sincerely,

/RA/

Eric R. Duncan, Chief
Branch 3
Division of Reactor Projects

Docket Nos. 50-454; 50-455; 72-068
License Nos. NPF-37; NPF-66

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Letter to M. Pacilio from E. Duncan dated November 3, 2010.

SUBJECT: BYRON STATION, UNITS 1 AND 2, INTEGRATED INSPECTION REPORT 05000454/2010004; 05000455/2010004; 07200068/2010001

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