UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

August 6, 2013

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

SUBJECT: LIMERICK GENERATING STATION – NRC INTEGRATED INSPECTION REPORT 05000352/2013003 AND 05000353/2013003 AND INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) REPORT 07200065/2013001

Dear Mr. Pacilio:

On June 30, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Limerick Generating Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on July 29, 2013 with Mr. T. Dougherty, Site Vice President, and other members of your staff.

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

This report documents one NRC-identified and two self-revealing findings of very low safety significance (Green). Two of the findings were determined to involve violations of NRC requirements. However, because of the very low safety significance, and because the issues have been entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Limerick Generating Station. In addition, if you disagree with the cross-cutting aspect assigned to 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 I, and the NRC Resident Inspector at Limerick Generating Station.

In accordance with 10 *Code of Federal Regulations* (CFR) 2.390 of the NRCs "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 component of the NRC's document system Agency Wide Documents Access and Management 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/

Mel Gray, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket Nos.: 50-352, 50-353, 72-065
License Nos.: NPF-39, NPF-85

Enclosure: Inspection Report 05000352/2013003 and 05000353/2013003 w/Attachment: Supplemental Information and 072000065/2013001

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Available Records component of the NRC's document system Agency Wide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.:	50-352, 50-353, 72-065
License Nos.:	NPF-39, NPF-85
Report No.:	05000352/2013003, 05000353/2013003 and 072000065/2013001
Licensee:	Exelon Generation Company, LLC
Facility:	Limerick Generating Station, Units 1 & 2
Location:	Sanatoga, PA 19464
Dates:	April 1, 2013 through June 30, 2013
Inspectors:	E. DiPaolo, Senior Resident Inspector J. Hawkins, Resident Inspector J. Ayala, Resident Inspector (Acting) J. Tomlinson, Resident Inspector (Acting) T. Burns, Reactor Inspector R. Nimitz, Senior Health Physicist O. Masnyk Bailey, Health Physicist S. Hammann, Senior Health Physicist
Approved By:	Mel Gray, Chief Reactor Projects Branch 4 Division of Reactor Projects

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SUMMARY OF FINDINGS

Inspection Report 05000352/2013003; 05000353/2013003: 07200065/2013001; 04/01/2013-06/30/2013; Limerick Generating Station, Units 1 and 2; Operability Determinations and Functionality Assessments, Radiological Hazard Assessment and Exposure Controls, and Follow-Up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. Inspectors identified three findings of very low safety significance (Green). Two of the findings involved violations of regulatory requirements and were determined to be non-cited violations (NCVs). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process." The cross-cutting aspects for the findings were determined using IMC 0310, "Components Within Cross-Cutting Areas." Findings for which the "Significance Determination Process" does not apply may be Green, or be assigned a severity level after Nuclear Regulatory Commission (NRC) management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NRC technical report designation NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green NCV of 10 Code of Federal Regulation (CFR) 50, Appendix B, Criterion XVI, "Corrective Action", because Exelon personnel did not identify and correct a condition adverse to quality associated with emergency diesel generator (EDG) D24 lubricating oil pipe fitting supports. This resulted in EDG D24 being in a degraded condition from November 2012 until the condition was corrected in May 2013. Exelon personnel entered this issue into the corrective action program (CAP) as issue reports (IRs) 1507365, 1509125, 1511869, 1512745, 1526780, and 1528088.

  The failure of Exelon personnel to identify and correct the degraded instrument line pipe fitting support and insert on EDG D24's lubricating oil supply pressure sensing line following the failure of a pipe fitting on November 13, 2012 is a performance deficiency that was reasonably within Exelon's ability to foresee and correct. The IR written to document the issue (IR 1439284) was inappropriately classified as not a critical component failure. This resulted in the issue receiving a lower level of investigation (work group evaluation versus an apparent cause or root cause evaluation). This NRC-identified finding was more than minor because it is associated with equipment performance and affected the Mitigating System cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating event to prevent undesirable consequences. The inspectors evaluated the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," to IMC 0609, "Significance Determination Process." Exelon personnel conducted vibration testing which determined that the pipe fitting crack initiation and propagation occurred during engine slow start speed acceleration. This was based vibration data which showed two vibration peaks at speeds during the acceleration. Also, the crack did not propagate during normal speed operation based on the fact that the leak size did not increase during monthly testing on April 27, 2013. The inspectors determined this finding did not represent an actual loss of function of a single train for greater than it Technical Specification Allowed Outage Time. Therefore, the inspectors determined the finding to be of very low safety significance (Green).

This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon personnel did not thoroughly evaluate the cause of the November 13, 2012 lubricating oil system pipe fitting crack such that the resolutions address causes and extent of conditions [P.1(c)]. Specifically, although failure analysis determined that the cause of the pipe fitting failure was due to high cycle fatigue, a thorough investigation into all potential causes (e.g., excessive vibrations, missing pipe support) was not performed. This resulted in EDG D24 being inoperable for greater than the Technical Specification (TS) Allowed Outage Time from November 13, 2012 until the condition was corrected on May 12, 2013. (Section 1R15)

Cornerstone: Occupational Radiation Safety

- Green. The inspectors identified a self-revealing finding of very low safety significance associated with failure to comply with TS 6.8, "Procedures and Programs." Specifically, the inspectors identified Exelon personnel failed to implement radiation protection procedure requirements associated with clearance of personnel from the upper levels of the Unit 2 reactor drywell in preparation for removal and movement of irradiated core component from the Unit 2 reactor vessel. Exelon personnel entered this issue into their CAP as IR 1495585.

  The failure to adhere to TS required radiation protection procedures for personnel exposure control related to irradiated core component movement is a performance deficiency. The performance deficiency was determined to be more than minor because it was related to the Programs and Process attribute of the Occupational Radiation Safety Cornerstone, and adversely affected the cornerstone objective to ensure adequate protection of worker health and safety from exposure to radiation from radioactive material during routine reactor operation. Further, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern if personnel were locked in the area and irradiated hardware dropped above their work location. The finding was not subject to traditional enforcement because it was not associated with a violation that impacted the regulatory process and did not contribute to actual safety consequences. The finding was assessed using IMC 0609, Appendix C, 2 Enclosure "Occupational Radiation Safety SDP," dated August 19, 2008, and was determined to be of very low safety significance (Green) because it was not related to As-Low-As-Is-Reasonably-Achievable (ALARA), did not result in an overexposure or a substantial potential for overexposure, and did not compromise the licensee's ability to assess dose. This finding was associated with the Work Control aspect of the Human Performance cross-cutting component. Specifically, Exelon staff did not effectively coordinate this work activity by incorporating actions to address the impact of the work on different job activities, and the need for work groups to maintain interfaces and communicate, coordinate, and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance (H.3 (b)). (Section 2RS1)

Cornerstone: Initiating Events

- Green. A self-revealing Green finding of TS 6.8, "Procedures and Programs", was identified because Exelon personnel did not implement procedure use and adherence requirements when operators changed the scope of work for surveillance testing of main turbine stop and control valves. This resulted in a reactor protection system automatic scram on April 16, 2013. This issue was identified in the Exelon CAP as IRs 1503749 and 1525552.

The failure of station operators to follow the partial procedure performance process during the performance of two TS required surveillances was a performance deficiency that was reasonably within Exelon's ability to foresee and correct and could have been prevented. The performance deficiency was also contrary to Exelon's procedure use and adherence requirements. This finding was more than minor because, if improper implementation of the partial procedure performance process is left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern such as a more severe plant transient or engineered safeguard system actuation or malfunction. Additionally, this issue is similar to example 4.b in IMC 0612, Appendix E, "Examples of Minor Issues," in that the procedural error resulted in a reactor scram or other transient. The finding was determined to be self-revealing because it was revealed through the receipt of a scram signal during performance of a surveillance test which required no active and deliberate observation by Exelon personnel. The finding was determined to be of very low safety significance (Green) in accordance with Appendix G of IMC 0609, "Shutdown Operations Significance Determination Process," because the finding did not require a quantitative assessment. A quantitative assessment was not required because the finding did not increase the likelihood of a loss of reactor coolant system inventory or degrade the ability to recover decay heat removal if it was lost.

This finding had a cross-cutting aspect in the area of Human Performance, Decision Making, because Exelon did not ensure that personnel made safety-significant or risk-significant decisions using a systematic process to ensure that safety is maintained [H.1(a)]. Specifically, the partial procedure performance process was not properly implemented which resulted in plant conditions that were improper for the next evolution. This resulted in a reactor protection system automatic scram on April 16, 2013. (Section 4OA3.1)

Other Findings

None.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On May 23, operators reduced power to approximately 18 percent to facilitate a planned drywell entry to add oil to the 'B' recirculation pump motor. Planned main turbine valve testing, control rod scram time testing and main condenser water box cleaning was also performed during the down power. Operators returned Unit 1 to 100 percent on May 26. Unit 1 remained at or near 100 percent power for the remainder of the inspection period.

Unit 2 began the inspection period in Operational Condition (OPCON) 5 (Refueling) and in refueling outage 2R12. Following the completion of refueling and maintenance activities, operators commenced a reactor startup on April 17. The main generator was synchronized to the electric grid on April 18 to end the refueling outage. Later that day the main turbine was tripped due to high vibrations caused by turbine thermal distortions and low clearance on main turbine casing steam packing. Following troubleshooting and additional testing, the main turbine was synchronized to the grid on April 19. Full power was achieved on April 22. Operators reduced power to approximately 90 percent on April 27 to facilitate a planned control rod pattern adjustment and restore control rods to service following the completion of maintenance on the control rod drives' hydraulic control unit. Operators restored power to 100 percent on April 28. On May 4, operators performed a planned down power to 60 percent power to place the 'A' steam jet air ejector in service following erratic operation of the steam pressure controller associated with the 'B' steam jet air ejector. Power was restored to 100 percent on May 5. On May 17, operators reduced power to approximately 92 percent to facilitate main turbine valve testing. Power was restored to 100 percent on May 18. Unit 2 remained at or near 100 percent power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 sample)

Summer Readiness of Offsite and Alternating Current (AC) Power Systems

a. Inspection Scope

The inspectors performed a review of plant features and procedures for the operation and continued availability of the offsite and alternate AC power system to evaluate the readiness of the systems prior to seasonal high grid loading. The inspectors reviewed Exelon's procedures affecting these areas and the communications protocols between the transmission system operator and Exelon. This review focused on changes to the established program and material condition of the offsite and alternate AC power equipment. The inspectors assessed whether appropriate procedures and protocols were established and implemented to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system. The inspectors evaluated the material condition of the associated equipment by interviewing the responsible system manager, reviewing IRs and open work orders, and walking down portions of the offsite and AC power systems including the 220 and 500 kilo-volt

(kV) switchyards. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

Partial System Walkdowns (71111.04Q – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- 'A' loop of emergency service water on May 2, 2013
- Unit 1 reactor core isolation cooling system when high pressure coolant injection system was out-of-service for planned maintenance on June 18, 2013
- 'A' control room emergency fresh air system during 'B' control room emergency fresh air system outage window on June 24, 2013

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), TS, work orders, IRs, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted system performance of their intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Exelon staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 6 samples)

a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Exelon personnel controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out of service,

degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Fire Area 86, Unit 2, D24 Diesel Generator and Fuel Oil-Lube Oil Tank Room, Rooms 315D and 316D
- Fire Area 122, Spray Pond Pump Structure, Western Half
- Fire Area 123, Spray Pond pump Structure, Eastern Half
- Fire Area 20, Unit 1 Static Inverter Room
- Fire Area 22, Unit 1 Cable Spreading Room
- Fire Area 16, Unit 2 D24 Emergency 4kV Switch Gear Room

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Annual Review of Cables Located in Underground Bunkers/Manholes (MH)

a. Inspection Scope

The inspectors conducted an inspection of underground bunkers/manholes subject to flooding that contain cables whose failure could disable risk-significant equipment. The inspectors reviewed records for safety-related cables contained in MH 101 and MH 103, which service emergency service water and residual heat removal service water (RHRSW) pumps, to verify that the cables were not submerged in water, that cables and/or splices appeared intact, and to note the condition of cable support structures. When applicable, the inspectors verified proper sump pump operation and verified level alarm circuits were set in accordance with station procedures and calculations to ensure that the cables will not be submerged. The inspectors also ensured that drainage was provided and functioning properly in areas where dewatering devices were not installed.

b. Findings

No findings were identified.

1R08 In-service Inspection (71111.08 - 1 sample)

a. Inspection Scope

From April 1-5, 2013, the inspectors conducted a review of Exelon staff's implementation of in-service inspection program activities for monitoring degradation of the reactor coolant system boundary, risk significant piping and components, and containment systems during the Limerick Unit 2 refuel outage (2R12). The sample selection was based on the inspection procedure objectives and risk priority of those pressure retaining components in systems where degradation would result in a significant increase in risk. The inspectors observed in-process non-destructive examinations (NDE), reviewed documentation, and interviewed Exelon personnel to verify that the NDE activities performed as part of the third interval, third period, of the Limerick in-service inspection program were conducted in accordance with the

requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 2001 Edition with Addenda thru 2003.

Non-destructive Examination and Welding Activities (IMC Section 02.01)

The inspectors performed direct observation of NDE activities in process and reviewed records of nondestructive examinations listed below. Activities inspected included direct observation of penetrate testing and record reviews of manual ultrasonic testing (UT), magnetic particle testing and visual testing.

ASME Code Required Examinations

- The inspectors conducted a direct observation of a penetrate testing of two butt welds connecting piping to the core spray system pump. Surface preparation, application of cleaner, penetrant and developer were observed and evaluated for compliance to the ASME Section XI Code. The inspectors performed a record review of the examination report.

- A record review was performed of a magnetic particle testing of a 3-inch diameter 0.216-inch wall thickness carbon steel pipe repair in the emergency service water system. The repair weld was applied to restore the wall thickness to the design requirements of ASME Section III, Class 3. The completed weld was examined using manual UT methods to determine the appropriate wall thickness had been restored and was in compliance with the ASME Code. The inspectors verified that the examiner, welder and weld procedure were appropriate for this work.

- The inspectors performed a documentation review of a UT of the reactor pressure vessel N2B recirculation nozzle. This volumetric examination was performed using an Electric Power Research Institute Performance Demonstration Initiative Program (PDI) qualified manual phased array UT technique. The inspectors reviewed the test procedure, calibration reports, analysis of test results and noted that no relevant indications were identified during the examination. The inspectors verified the test procedure and the examiners qualifications were in compliance with the requirements of ASME Section XI and met PDI guidance.

- The inspectors reviewed documentation of a reactor pressure vessel UT that was performed on the upper head closure welds (15, 75 and 139-degree locations). The inspectors reviewed the UT procedure and the examination reports produced by Exelon staff of the current UT examination. The examinations were performed from the outside surface in accordance with ASME Section XI and Appendix VIII. The examinations were performed as part of the effort to monitor changes (location, orientation, growth and characterization) of known indications previously recorded during the seventh and eleventh refueling outages. The comparison of these indications to the present examination results indicated no discernible growth.

Industry Initiative Examination

The inspectors sampled records of the remote enhanced in-vessel visual inspection (IVVI) of the reactor vessel internals using procedure GEH-UT-204, Revision 14. The IVVI video records of both previously identified indications and their current appearance during this refueling outage were reviewed. The inspection scope included portions of

the core shroud, steam dryer, steam separator, core spray piping inside the vessel, top guide bars and other structural members. In addition, the applicable parts of the IVVI procedure, observation of a sample of digital video records, the analysis process for the observations, and the documentation of indications were reviewed.

Containment Visual Examination

The inspectors visually examined the condition of the internal primary containment surface from elevations 253' and 277'. The inspectors were able to access approximately 80% of the circumference at each elevation. Supplementary lighting was available and used to aid in the examination activity. Containment surfaces above and below the listed elevations were also observed. The inspectors noted that the condition of the liner coating reflected evidence that the liner had been maintained in serviceable condition with many areas having been locally re-coated to provide base metal protection from corrosion.

Identification and Resolution of Problems

The inspectors reviewed a sample of action reports which identified NDE indications and other deficiencies and nonconforming conditions since the previous refueling outage. The inspectors verified that nonconforming conditions were properly identified, characterized and evaluated for disposition within the corrective action program.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11Q – 2 samples)

1. Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed a licensed operator simulator evaluation for operating crew 'A' on June 10, 2013, which included an inadvertent high pressure coolant injection (HPCI) pump start, failure of a diesel generator to start, and an unisolable HPCI system steam leak which required emergency depressurization. The inspectors evaluated operator performance during the simulated event and verified completion of operator critical tasks and procedure use and adherence. The inspectors assessed the effectiveness of communications and response to alarms and degrading plant conditions. The inspectors also evaluated training department performance during the subsequent critique and the ability of the training staff to assess and document crew performance.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room

a. Inspection Scope

The inspectors observed licensed operator performance in the main control room during the Unit 2 reactor startup, heatup, and power ascension following refueling outage 2R12 and during the Unit 1 planned downpower for drywell entry on May 22, 2013. The inspectors verified operator compliance and use of plant procedures, performance of procedure steps in the proper sequence, alarm response card response and proper TS usage. Pre-job briefs, the use of human error prevention techniques, communications between crew members, and supervision of activities were observed to verify that they were performed consistent with established plant practice.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

a. Inspection Scope

The inspectors reviewed the 'A' loop of RHRSW to assess the effectiveness of maintenance activities on structure, system, or component (SSC) performance and reliability. The inspectors reviewed system health reports, corrective action program documents, maintenance work orders, maintenance rule basis documents, and a maintenance rule (a)(1) evaluation due to exceeding unavailability criteria to ensure that Exelon personnel were identifying and properly evaluating performance problems within the scope of the maintenance rule. For the sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with 10 *Code of Federal Regulations* (CFR) 50.65 and verified that the (a)(2) performance criteria established by Exelon staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2). Additionally, the inspectors ensured that Exelon personnel were identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 4 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Exelon staff performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Exelon personnel performed risk assessments as required by 10 CFR 60.65(a)(4) and that the assessments were accurate and complete. When Exelon staff performed

emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Unit 1 online elevated risk on April 30, 2013 due to 'B' reactor enclosure recirculation fan being unavailable due to the discharge damper failing to open (IR 1507760)
- Unit 1 planned down power and de-inerting the drywell for containment entry on May 24, 2013
- Unit 1 online risk during 'B' emergency service water pump replacement and 'B' Loop of core spray unavailable due to room cooler work on June 3, 2013
- Unit 1 online risk during 'C' residual heat removal pump system outage, 'D' RHRSW spray network cleaning , and 'A' control room emergency fresh air system maintenance on June 11, 2013

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 4 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions:

- IR 1507365, Unit 2 emergency diesel generator, D24 lubricating oil leak
- IR 1512911, Nine spray nozzles on 'A' RHRSW spray network identified as clogged during routine testing
- IR 1520728, Unit 1 control rod drive 26-35 high temperature
- IR 1522475, Unit 2 reactor core isolation coolant (RCIC) full flow test valve thermal overload during pump, valve, and flow test

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether technical specification 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 technical specifications and UFSAR to completed 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.

b. Findings

Introduction. An NRC-identified Green non-cited violation finding of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action", was identified because Exelon personnel did not identify and correct a condition adverse to quality associated with EDG D24 lubricating oil pipe fitting supports. This resulted in EDG D24 being in a degraded condition from November 2012 until the condition was corrected in May 2013.

Description. On April 27, 2013, station operators discovered a 140 drop per minute lubricating oil leak from the threaded area of a ¼ inch (inside diameter) pipe fitting off of the EDG D24 engine main lubricating oil supply header. IR 1507365 was written to document the issue. The fitting was connected to an isolation valve. The line then transitions to copper tubing which is connected to a pressure gage. Operators determined that the leak did not affect D24's operability. On April 30, maintenance personnel performed a review of the leaking fitting and raised the concern that the pipe fitting may have been leaking due to a through-wall crack. This was based on their review of the location of the leak and the fact that the pipe fitting was recently replaced. The fitting was discovered to be leaking during surveillance testing on November 13, 2012 and was documented in IR 1439284. Troubleshooting at that time identified that the fitting was cracked. Based on this history, Exelon personnel performed additional troubleshooting on May 1, 2013, and determined that the fitting was indeed cracked again. Plant operators declared EDG D24 inoperable, performed an extent of condition review and wrote IR 1509125 to document the issue. No other problems were noted on the site's other EDGs. The pipe fitting was replaced and post-maintenance testing was performed. This included taking vibration data on the fitting with the engine running but not under any load. EDG D24 was declared operable on May 1, 2013.

The inspectors questioned the delay in the discovery of cracked pipe fitting. In addition, the inspectors questioned if the crack on the pipe fitting was initiated by the same failure mode that led to the problem that was discovered on November 13, 2012. Exelon personnel wrote IR 1511869 to document the inspector's questions.

Failure analysis determined that the failure mode of the cracked fitting in November 2012 and April 2013 was due to high cycle fatigue. Exelon personnel performed more detailed walkdowns of the site's EDGs. On May 10, 2013, maintenance personnel discovered that the tubing connected to the pipe fitting of concern was not restrained in the same manner as the other 7 site EDGs and documented the condition in IR 1512745. The tubing on the other EDGs is restrained by a band clamp with a rubber insert which captures several copper instrument tubes. The clamp on EDG D24's tubing was in place, however, the rubber insert was not. The missing insert evidently allowed for increased vibrations on the tubing and was the cause of the premature fatigue failure of the EDG D24 pipe fitting. Maintenance workers restored the clamp and insert to the proper configuration on May 12, 2013.

The inspectors performed a review of Exelon's actions following the November 13, 2012 failure as documented in IR 1439284. For that issue, Exelon personnel performed a work group evaluation. This was based on the failure not being considered a critical component failure. Following the investigation assignment as a work group evaluation, the system engineer determined that the degraded pipe fitting did result in a maintenance rule functional failure of EDG D24. This was based on the fact that if the

degraded pipe fitting sheared off, the EDG would only run for a very short time (i.e., approximately 10 minutes).

The inspectors questioned the appropriateness of investing IR 1439284 as a work group evaluation. ER-AA-1200, "Critical Component Failure Clock", Revision 8, defines critical component failures as, in part, "a component properly classified as critical that fails to perform any of its critical functions regardless of plant conditions." The pipe fitting crack discovered on November 13, 2012 appeared to meet this criteria based on EDG D24 being classified as a critical component and the system engineer's maintenance rule functional failure determination. LS-AA-120, "Issue Identification and Screening Process," Revision 14, Step 4.6.3.10.C required an equipment apparent cause evaluation to be performed, unless the Site Engineering Director determined that one is not required, for all critical component failures. Exelon personnel wrote IR 1526780 which documented that IR 1439284 was misclassified as not meeting the requirements as a critical component failure. The inspectors concluded that if the failure was appropriately classified, IR 1439284 would have required either an equipment apparent cause evaluation or a root cause evaluation. The inspectors noted that both of these types of investigations are higher levels of investigation than a work group evaluation and receive more detailed reviews and scrutiny.

The work group evaluation of IR 1439284 concluded that the failure mechanism for the pipe fitting was from high cycle fatigue. Exelon personnel considered that the piping at the location of the crack was subject to high vibration. However, the pipe fitting was short and the instrument root valve is small which would result in low loads at the threaded joint. Exelon personnel concluded that it was therefore unlikely that high cycle fatigue alone would have resulted in the failure of the pipe fitting. Some other mechanism would be needed to initiate a crack. Exelon personnel concluded that the crack was initiated either from a latent defect in the original fitting or a single event impact load during maintenance. Extent of condition reviews were performed on the site's other EDGs. No signs of load impact or leakage were noted on the similar fittings of the other EDGs. No additional investigation (e.g., collection of vibration data at various loads, detailed walkdowns of piping supports, etc.) was performed. The inspectors determined that it was reasonable to conclude that if a higher level of investigation had been conducted for IR 1439284 (e.g., equipment apparent cause evaluation) as required, the degraded instrument line pipe fitting support and insert on EDG D24's lubricating oil supply pressure sensing line would have been discovered prior to its' failure on April 27, 2013.

Analysis. The failure of Exelon personnel to identify and correct the degraded instrument line pipe fitting support and insert on EDG D24's lubricating oil supply pressure sensing line following the failure of the pipe fitting on November 13, 2012 is a performance deficiency that was reasonably within Exelon's ability to foresee and correct. The IR written to document the issue (IR 1439284) was inappropriately classified as not a critical component failure. This resulted in the issue receiving a lower level of investigation (work group evaluation versus an apparent cause or root cause evaluation). This NRC-identified finding was more than minor because it is associated with equipment performance and affected the Mitigating System cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating event to prevent undesirable consequences. The inspectors evaluated the finding using Appendix A, "The Significance Determination Process for Findings At-Power," to IMC 0609, "Significance Determination Process." Exelon personnel conducted vibration

testing which determined that the pipe fitting crack initiation and propagation occurred during engine slow start speed acceleration. This was based vibration data which showed two vibration peaks at speeds during engine acceleration. Also, the crack did not propagate during normal speed operation based on the fact that the leak size did not increase during monthly testing on April 27, 2013. The inspectors determined this finding did not represent an actual loss of function of a single train for greater than it TS Allowed Outage Time. Therefore, the inspectors determined the finding to be of very low safety significance (Green).

This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon personnel did not thoroughly evaluate the cause of the November 13, 2012 lubricating oil system pipe fitting crack such that the resolutions address causes and extent of conditions [P.1(c)]. Specifically, although failure analysis determined that the cause of the pipe fitting failure was due to high cycle fatigue, a thorough investigation into all potential causes (e.g., excessive vibrations, missing pipe support) was not performed. This resulted in EDG D24 being inoperable for greater than the TS allowed outage time from November 13, 2012 until the condition was corrected on May 12, 2013.

Enforcement. 10 CFR 50, Appendix B, "Corrective Action", requires, in part, that "measure shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, defective material and equipment, and non-conformances are promptly identified and corrected." Contrary to these requirements, Exelon personnel failed to identify and correct a degraded instrument line clamp and insert on EDG D24's lubricating oil supply pressure sensing line following the failure of a pipe fitting on November 13, 2012. This condition was corrected on May 12, 2013. Because this issue is of very low safety significance (Green) and Exelon personnel entered this issue into the CAP as IRs 1507365, 1509125, 1511869, 1512745, 1526780, and 1528088, this finding is being treated as an NCV consistent with the NRC Enforcement Policy. **(NCV 05000353/2013002-01, Failure to Identify and Correct a Condition Adverse to Quality Associated with Emergency Diesel Generator D24)**

1R18 Plant Modifications (71111.18 – 1 sample)

a. Inspection Scope

The inspectors reviewed Engineering Change Request 13-00124, Unit 2 Electrohydraulic Control Stop Valve Load Limit Power Supply, to determine whether the modification affected the functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications to verify that the permanent modification did not degrade the design bases, licensing bases, and performance capability of the affected systems.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure was consistent with the information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed test data to verify that the test results adequately demonstrated restoration of the affected safety functions.

- C0247372, Replace reactor water cleanup non-regenerative heat exchange relief valve PSV-044-106A
- R1194703, Preventive maintenance for Unit 2 safeguard battery charger 2BCB2
- Unit 2, EDG D24 lubricating oil system leak
- M1908230, Troubleshoot and repair 'C' channel toxic gas monitor
- R1094629, Perform preventive maintenance on Unit 1 HPCI main steam supply outboard primary containment isolation valve (HV-055-1F003) motor controller

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20 – 1 sample)

a. Inspection Scope

At the beginning of the inspection period, Unit 2 was in OPCON 5 (Refueling with the reactor cavity flooded for refueling outage 2R12. On April 17, Unit 2 entered OPCON 2 (Startup). Operators synchronized the main generator to the electrical grid on April 18 to complete the refueling outage. Full power was achieved on April 22. During the inspection period, the inspectors conducted several containment walkdowns and monitored plant startup, heatup, and power ascension activities. The inspectors reviewed Exelon staff's controls associated with the following outage activities:

- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable TS when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and that equipment was appropriately configured to safely support the associated work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting
- Status and configuration of electrical systems and switchyard activities to ensure that Technical Specifications were met
- Monitoring of decay heat removal operations
- Impact of outage work on the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss
- Activities that could affect reactivity

- Maintenance of secondary containment as required by TS
- Refueling activities, including fuel handling and fuel receipt inspections
- Fatigue management
- Identification and resolution of problems related to refueling outage activities

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 2 Routine, 1 In-Service Test, 1 Isolation Valve)

a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied technical specifications, the UFSAR, and Exelon procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- ST-4-LLR-141-2, 'B' RHR Shutdown Cooling Return Local Leak Rate Test (HV-051-2F050B) (isolation valve test)
- GP-10, Reactor Pressure Vessel Leakage Test performed on Unit 2 during refueling outage 2R12
- ST-6-051-232-1, 'B' RHR Unit 1 Pump, Valve and Flow Test (in-service test)
- ST-6-092-318-2, D24 Diesel Generator Fast Start Operability Test Run

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

During April 1-5, 2013, the inspectors reviewed Exelon's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the criteria in 10 CFR 20, applicable Regulatory Guides, TSs, and applicable Exelon procedures for determining compliance.

a. Inspection Scope

Inspection Planning

The inspectors reviewed the station's performance indicators for the occupational exposure cornerstone. The inspectors reviewed available radiation protection (RP)

program audits and reviewed any reports of operational occurrences related to occupational radiation safety since the last inspection.

Radiological Hazard Assessment

The inspectors determined if there had been changes to plant operations since the last inspection that may have resulted in a significant new radiological hazard for onsite workers or members of the public and whether Exelon assessed the potential impact of these changes and provided enhanced controls, as appropriate.

The inspectors reviewed completed radiological surveys from various outage radiological work areas (e.g., Unit 2 Drywell, Reactor Buildings, Turbine Buildings, Refueling Floors, and the Unit 2 Suppression pool). The inspectors evaluated the thoroughness and frequency of the surveys for the ambient radiological hazard.

The inspectors conducted station walk-downs and made independent radiation measurements in the facility, including accessible radioactive waste processing, storage, and handling areas to evaluate material and radiological conditions.

The inspectors selected various risk-significant work activities that involved exposure to radiation (e.g., Refueling activities, Drywell work activities, and Suppression pool diving). The inspectors assessed pre-work and on-going radiological surveys to identify and quantify the radiological hazard and to establish adequate protective measures.

The inspectors evaluated the radiological survey program to determine if radiological hazards were properly identified (e.g., discrete radioactive hot particles, transuranics and hard to detect nuclides in air samples, transient dose rates and large gradients in radiation dose rates).

The inspectors selectively reviewed work in potential airborne radioactivity areas (e.g., Drywell, Refueling Floor, and Turbine Building) to determine whether the air samples were representative of workers' breathing air zone. The inspectors evaluated use of continuous air monitors. The inspectors determined if air samples were properly evaluated and that a program for monitoring levels of loose surface contamination was in place to limit potential for airborne radioactivity.

Instructions to Workers

The inspectors viewed various containers holding non-exempt licensed radioactive materials that may cause unplanned or inadvertent exposure of workers. The inspectors assessed whether the containers were labeled and controlled in accordance with requirements.

The inspectors selectively reviewed radiation work permits (RWP) used to access high radiation areas (HRA) and evaluated if the specified work control instructions and control barriers for the outage were consistent with TS requirements for HRA. Work areas included Unit 2 Drywell, Refueling Floor, Suppression Pool, and Turbine Building including Condenser Bay. For these RWPs, the inspectors determined the adequacy of exposure control methods. The inspectors evaluated whether electronic personal dosimeter (EPD) alarm set-points were acceptable for expected radiological conditions.

The inspectors reviewed available occurrences where a worker's EPD noticeably malfunctioned or alarmed and whether workers; responded appropriately to the condition; the issue was included in the corrective action program; and dose evaluations were conducted, as appropriate.

For work activities that could suddenly and severely increase radiological conditions, the inspectors assessed the means to control exposure and inform workers of these changes that could significantly impact their occupational dose.

The inspectors interviewed workers to determine their knowledge of ambient conditions and radiological controls.

Contamination and Radioactive Material Control

The inspectors observed various locations where potentially contaminated material was monitored leaving the radiological control area. The inspectors evaluated the methods used for control, survey, and release of these materials from these areas. The inspectors observed the performance of personnel surveying and releasing material for unrestricted use and evaluated whether the work was performed in accordance with plant procedures. The inspectors assessed whether the radiation monitoring instrumentation used for equipment release and personnel contamination surveys had appropriate sensitivity for the type(s) of radiation present.

The inspectors selectively reviewed criteria for the survey and release of potentially contaminated material. The inspectors evaluated whether there was guidance on how to respond to an alarm that indicates the presence of licensed radioactive material.

The inspector reviewed procedures and records to verify that the radiation detection instrumentation was used at its typical sensitivity level based on appropriate counting parameters.

Radiological Hazards Control and Work Coverage

The inspectors evaluated ambient radiological conditions and performed independent radiation measurements during walk-downs of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, RWPs, and associated worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage and contamination controls. The inspectors evaluated use of EPDs in high noise areas that were also HRAs or locked high radiation area.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with procedures and whether the dosimeter was placed in the location of highest expected dose or that an NRC-approved method of determining effective dose equivalent was used. The inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel in high-radiation work areas with significant dose rate gradients.

The inspectors reviewed various work activities for work within potential airborne radioactivity areas and evaluated airborne radioactive controls and monitoring. The inspectors assessed applicable containment barrier integrity and the operation of temporary high-efficiency particulate air ventilation systems.

The inspectors reviewed physical and programmatic controls for highly activated or contaminated materials stored within spent fuel and other storage pools. The inspectors assessed whether appropriate controls were in place to preclude inadvertent removal of these materials from the pool.

The inspectors examined the posting and physical controls for selected HRAs, locked high radiation areas and very high radiation areas (VHRA) to verify conformance with the occupational performance indicator.

Risk-Significant HRA and VHRA Controls

The inspectors discussed with the Radiation Protection Manager the controls and procedures for high-risk HRAs and VHRAs. The inspectors assessed whether any changes to procedures substantially reduce the effectiveness and level of worker protection.

The inspectors discussed with first-line health physics supervisors the controls in place for special areas that have the potential to become VHRAs during certain plant operations. The inspectors assessed whether these plant operations require communication beforehand with the health physics group, so as to allow corresponding timely actions to properly post, control, and monitor the radiation hazards including re-access authorization.

The inspectors evaluated controls for VHRAs and areas with the potential to become a VHRA to ensure that an individual was not able to gain unauthorized access to these VHRAs.

Radiation Worker Performance and RP Technician Proficiency

The inspectors observed the performance of radiation workers and radiation protection technicians with respect to stated RP work requirements. The inspectors assessed whether workers and RP technicians were aware of the radiological conditions in their workplace and the RWP controls/limits in place, and whether their behavior reflected the level of radiological hazards present.

The inspectors reviewed available radiological problem reports since the last inspection that attributed the cause of the event to human performance errors. The inspectors evaluated whether there was an observable pattern traceable to a similar cause. The inspectors assessed whether this perspective matched the corrective action approach taken to resolve the problem.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with radiation monitoring and exposure control were being identified at an appropriate threshold and were properly addressed for resolution. The inspectors assessed the appropriateness of the corrective

actions for a selected sample of problems documented that involved radiation monitoring and exposure controls. The inspectors assessed the process for applying operating experience.

b. Findings

Introduction. A self-revealing finding (Green) of very low safety significance was identified associated with failure to comply with TS 6.8 required procedures. Specifically, the inspectors identified that Exelon staff failed to implement procedural requirements associated with evacuation of personnel from the upper level of the Unit 2 Reactor Drywell in preparation for removal and movement of irradiated core components. Exelon personnel entered this issue into their CAP (IR 1495585).

Description. On March 31, 2013, at about 8:40 pm, two RP technicians, overseeing outage radiological work activities within in the Unit 2 reactor drywell, were instructed to prepare the upper level (313 ft) of the drywell for irradiated core component removal (local power range monitors). The instructions also included a request that the action be completed by 10:00 pm. The RP technicians placed ladder locks over access ladders to the upper elevation of the drywell (313 ft) to preclude unauthorized access. The RP technicians also placed signs on the ladders indicating no access. The RP technicians reported to the Unit 2 drywell RP control point that the actions were completed (9:45 pm). The inspectors noted that during movements of irradiated components (e.g., fuel, in core detectors, etc.) personnel access to the upper level of the drywell is normally restricted to preclude unplanned personnel occupational radiation exposures in the event of an inadvertent drop of an irradiated component on the reactor cavity directly above the upper elevation of drywell. This could result in possibly causing significant elevated radiation dose rates in occupied areas of the upper drywell elevation.

Notwithstanding, the two RP technicians failed to conduct a sweep of the upper elevations of the drywell to ensure no workers remained in the area and evacuate any remaining workers prior to locking access and informing personnel of acceptability for irradiated component moves. Unknown to the RP technicians, four workers remained in the area. Exelon RP procedure, RP-LG-460-103, “Upper Level Drywell Access Control during Irradiated Core Component Movement,” Revision 4, specifically requires, in Step 4.8.2, that the area be evacuated of personnel. This procedure was established and implemented in accordance with TS 6.8 and Regulatory Guide 1.33, 1978 which requires procedures for access control to radiation areas.

Within about 10 minutes (~9:55 pm) after the RP technicians indicated the upper elevation was locked and controlled, one of the four workers slid down the ladder lock at the 313 ft elevation and informed RP personnel, at the Unit 2 drywell step-off pad, that workers remained in the upper level of the drywell and had been locked in the area. This information immediately caused an RP technician to enter the area, sweep the area for personnel, and evacuate the remaining personnel from the upper elevations of the Unit 2 drywell. The RP technician subsequently relocked and posted the area. Exelon personnel placed this issue into its CAP (IR 1495585).

Analysis. Exelon personnel failed to adhere to TS required radiation protection procedures for personnel exposure and access control, for irradiated core component movement as required by TS and procedure RP-LG-460-103, “Upper Level Drywell Access Control During Irradiated Core Component Movement,” Revision 4. The two RP

technicians did not sweep the upper levels of the drywell and evacuate personnel from the area prior to locking the area and authorizing irradiated core component movement. The failure to adhere to TS required procedures is a performance deficiency. The performance deficiency was determined to be more than minor because, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern if personnel were locked in the area and irradiated hardware inadvertently dropped above their work location. Further, the performance deficiency was related to the Programs and Process attribute of the Occupational Radiation Safety Cornerstone, and adversely affected the cornerstone objective to ensure adequate protection of worker health and safety from exposure to radiation from radioactive material during routine reactor operation. Specifically, the two RP technicians failed to implement procedures for exposure and access control to an area (upper elevations of reactor drywell) known to present an elevated radiological risk. The NRC had identified such areas, and highlighted them, in NRC Regulatory Guide 8.38, Control of Access to High and Very High Radiation Areas in Nuclear Power Plants. The regulatory guide identifies this area as a special area that normally does not present a radiological hazard but may exhibit significant elevated radiation levels.

The finding was not subject to traditional enforcement because it was not associated with a violation that impacted the regulatory process and did not contribute to actual safety consequences. The finding was assessed using IMC 0609, Appendix C, 2 Enclosure "Occupational Radiation Safety SDP," dated August 19, 2008, and was determined to be of very low safety significance (Green) because: it was not related to ALARA; did not result in an overexposure or a substantial potential for overexposure; and did not compromise the licensee's ability to assess dose. Exelon staff did not move irradiated components during the time the workers were in the area, the area was not a High Radiation Area, Exelon personnel had instrumented the areas with area radiation monitors with dose rate alarms, and the workers were wearing electronic dosimetry with alarm capability. This finding was associated with a work control aspect of the human performance cross-cutting component. Specifically, Exelon personnel did not effectively coordinate this work activity by incorporating actions to address the impact of the work on different job activities, and the need for work groups to maintain interfaces and communicate, coordinate, and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance (H.3 (b)). The licensee's apparent cause evaluation indicated the RP technicians became distracted due to competing job responsibilities as well as inter-personnel communications issues, including language difficulties.

Enforcement. TS 6.8 requires that Exelon staff establish, implement, and maintain the applicable procedures recommended in Appendix A, of Regulatory Guide 1.33, Revision 2, February 1978. Appendix A, of RG 1.33, recommends that access control to radiation areas be covered by written procedures. RP procedure RP-LG-460-103, "Upper Level Drywell Access Control During Irradiated Core Component Movement," Revision 4, required in Section 4.8.2 that the upper level of the drywell be evacuated before irradiated core component movement. Contrary to this requirement, two RP technicians did not evacuate multiple personnel from the upper level of the Unit 2 Drywell at about 8:40 pm on March 31, 2013, in preparation for irradiated core component movement. Workers remained in the area for a short period of time before it was realized they were in the upper elevation and had not been evacuated. The violation did not have any actual or potential safety consequence since the workers were evacuated before any irradiated core component move. Exelon personnel took action to require procedure

adherence. Exelon personnel removed the qualifications of the involved radiation protection technicians and initiated an apparent cause evaluation. Exelon personnel held a stand-down between all RP technicians and RP Managers to address the human performance gaps and held a stand down between all RP supervisors and the Radiation Protection Manager to address RP supervisor engagement and oversight expectations. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program (IR 1495585). **(NCV 05000353/2013003-02); Failure to Follow Radiation Protection Procedures for Access Control of the Upper Level of the Unit 2 Drywell)**

2RS2 Occupational ALARA Planning and Controls (71124.02)

During April 1-5, 2013, the inspectors assessed performance with respect to maintaining occupational individual and collective radiation exposures ALARA. The inspectors used the requirements in 10 CFR 20, applicable Regulatory Guides, and Exelon's TSs and procedures for determining compliance.

a. Inspection Scope

Inspection Planning

The inspectors compared site-specific trends in collective exposures against industry average values and those values from similar vintage reactors. In addition, the inspectors reviewed any changes in the radioactive source term by reviewing the trend in average contact dose rate with reactor recirculation piping.

The inspectors reviewed site-specific procedures associated with maintaining occupational exposures ALARA, which included a review of processes used to estimate and track exposures from specific work activities.

Radiological Work Planning

The inspectors selected various work activities that had the highest exposure significance (e.g. drywell work including control rod drive removal, refueling floor work, suppression pool diving, and turbine building work).

The inspectors reviewed the ALARA work activity evaluations, exposure estimates, and exposure reduction requirements. The inspectors determined whether work was reasonably grouped into work activities, based on historical precedence, industry norms, and/or special circumstances.

The inspectors compared the available results achieved (dose rate reductions, actual dose) with the intended dose established in ALARA planning for these work activities. The inspectors compared the person-hour estimates provided to the actual person-hours for the work activity, and evaluated the accuracy of these time estimates. The inspectors assessed the reasons for any inconsistencies between intended and actual work activity doses.

Verification of Dose Estimates and Exposure Tracking Systems

The inspectors reviewed the assumptions and basis for the current annual collective dose estimate for accuracy.

The inspectors evaluated whether Exelon personnel had established measures to track, trend, and if necessary, to reduce occupational doses for ongoing work activities.

The inspectors evaluated the licensee's method of adjusting exposure estimates, or re-planning work, when unexpected changes in scope or emergent work were encountered. The inspectors assessed whether adjustments to exposure estimates were based on sound RP and ALARA principles or if they were just adjusted to account for failures to plan/control the work.

Source Term Reduction and Control

The inspectors assessed whether Exelon personnel had made allowances or developed contingency plans for expected changes in the source term as the result of changes in plant fuel performance issues or changes in plant primary chemistry. The inspectors discussed source term clean-up activities.

Radiation Worker and Radiation Protection Performance

The inspectors observed radiation worker and RP technician performance during work activities being performed in radiation areas, airborne radioactivity areas, and HRAs. The inspectors evaluated whether workers demonstrated the ALARA philosophy in practice and whether there were any procedure or RWP compliance issues.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with ALARA planning and controls are being identified by Exelon staff at an appropriate threshold and were properly addressed for resolution in the licensee's corrective action program.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

During April 1-5, 2013, the inspectors verified that various potential in-plant airborne sources were being controlled consistent with ALARA principles and the use of respiratory protection devices, as appropriate. The inspectors used the requirements in 10 CFR 20, the guidance in applicable Regulatory Guides, and Exelon's TSs and procedures for determining compliance.

a. Inspection Scope

Inspection Planning

The inspectors reviewed reported performance indicators to identify any related to unintended dose resulting from intakes of radioactive material.

Engineering Controls

The inspectors reviewed the use of permanent and temporary ventilation to determine whether Exelon personnel used ventilation systems as part of its engineering controls to control airborne radioactivity. The inspectors reviewed procedural guidance for use of installed plant systems to reduce dose and assessed whether the systems are used, to the extent practicable, during high-risk activities.

The inspectors selected various installed ventilation systems used to mitigate the potential for airborne radioactivity. The inspectors evaluated whether the ventilation system operating parameters, were consistent with maintaining concentrations of airborne radioactivity in work areas below the concentrations of an airborne radioactivity area.

The inspectors selected various temporary (portable) ventilation system setups used to support work in contaminated areas. The inspectors evaluated the use of these systems.

The inspectors assessed whether Exelon personnel had established threshold criteria for evaluating levels of airborne beta-emitting, alpha-emitting radionuclides, and other hard-to-detect radionuclides.

Use of Respiratory Protection Devices

The inspectors selected various work activities (e.g., control rod drive removal) where respiratory protection devices were used to limit the intake of radioactive materials, and assessed whether Exelon staff performed an evaluation concluding that further engineering controls were not practical and that the use of respirators was ALARA. The inspectors evaluated means established to determine if the level of protection (protection factor) provided by the respiratory protection devices during use was at least as good as that assumed in the licensee's work controls and dose assessment.

The inspectors assessed whether respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration or had been approved by the NRC. The inspectors selected various work activities where respiratory protection devices were used. The inspectors evaluated whether the devices were used consistent with their National Institute for Occupational Safety and Health/Mine Safety and Health Administration certification or NRC approval.

The inspectors selected various individuals qualified to use respiratory protection devices, and assessed whether they were deemed qualified to use the devices by successfully passing an annual medical examination, respirator fit-test and relevant respiratory protection training.

Self Contained Breathing Apparatus (SCBA) for Emergency Use

The inspectors reviewed the status and operational testing procedures, including procedure changes, for SCBAs staged in-plant for use during emergencies.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were being identified by Exelon personnel at an appropriate threshold, were placed in the corrective action program, and whether the corrective actions were appropriate for a selected sample of problems.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

During April 1-5, 2013, the inspectors evaluated the monitoring, assessment, and reporting of occupational dose. The inspectors used the requirements in 10 CFR 20, the guidance in various Regulatory Guides, and requirements in Exelon's TSs and procedures.

a. Inspection Scope

Inspection Planning

The inspectors reviewed the most recent National Voluntary Laboratory Accreditation Program report on the principal dosimetry used to establish dose of legal record.

The inspectors selectively reviewed procedures associated with dosimetry operations, including issuance/use of external dosimetry, and assessments of external and internal dose for radiological incidents.

External Dosimetry

The inspectors evaluated whether the dosimetry vendor was National Voluntary Laboratory Accreditation Program accredited and if the approved irradiation test categories for each type of personnel dosimeter used were consistent with the types and energies of the radiation present.

The inspectors assessed the use of EPDs to determine the use of a "correction factor" to address the response of the EPD as compared to the dosimeter of legal record for situations when the EPD is used to assign dose and whether the correction factor is based on sound RP principles.

The inspectors reviewed various dosimetry occurrence reports or corrective action program documents for adverse trends related to EPDs. The inspectors assessed whether Exelon had identified any adverse trends and implemented appropriate corrective actions.

The inspectors reviewed available skin dose assessment reports.

Internal Dosimetry

Routine Bioassay (In Vivo)

The inspectors selectively reviewed procedures used to assess the dose from internally deposited radionuclides using whole body count (WBC) equipment.

Internal Dose Assessment – WBC Analyses

The inspectors reviewed several dose assessments performed using the results of WBC analyses. The inspectors determined whether affected personnel were properly monitored with calibrated equipment and that internal exposures were assessed consistent with Exelon personnel procedures.

Special Dosimetric Situations

Declared Pregnant Workers

The inspectors assessed whether Exelon informed workers, as appropriate, of the risks of radiation exposure to the embryo/fetus, the regulatory aspects of declaring a pregnancy, and the specific process to be used for (voluntarily) declaring a pregnancy.

Dosimeter Placement and Assessment of Effective Dose Equivalent for External Exposures

The inspectors reviewed the methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the criteria for determining when alternate monitoring, such as use of multi-badging, is to be implemented.

Shallow Dose Equivalent

The inspectors reviewed dose assessments for shallow dose equivalent for adequacy. The inspectors evaluated the method (e.g., VARSKIN or similar code) for calculating shallow dose equivalent from distributed skin contamination or discrete radioactive particles.

Neutron Dose Assessment

The inspectors selectively evaluated the neutron dosimetry program, including dosimeter types and/or radiation survey instrumentation. The inspectors reviewed applicable neutron exposure data/records.

Problem Identification and Resolution

The inspectors assessed whether problems associated with occupational dose assessment were identified at an appropriate threshold, were placed in the corrective action program, and whether corrective actions, for a selected sample of problems, were appropriate.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05 - 1 sample)

During April 1-5, 2013, the inspectors selectively reviewed the accuracy and operability of radiation monitoring instruments that were used to protect occupational workers. The inspectors used the requirements in 10 CFR 20, the guidance in applicable Regulatory Guides, and Exelon's TSs and procedures for determining compliance.

a. Inspection Scope

Inspection Planning

The inspectors reviewed available third-party evaluation reports of the radiation monitoring program since the last inspection including evaluations of offsite calibration facilities or services, if applicable.

Walk-downs and Observations

The inspectors selected various portable survey instruments in use or available for issuance and assessed calibration and source check stickers for currency, as well as, instrument material condition and operability.

Calibration and Testing Program

Laboratory Instrumentation

The inspectors assessed laboratory analytical instruments used for radiological analyses to determine whether daily performance checks and calibration data indicate that the frequency of the calibrations is adequate and there were no indications of degraded performance.

The inspectors assessed whether appropriate corrective actions were implemented in response to indications of degraded performance.

Whole Body Counter (WBC)

The inspectors reviewed calibration records for the WBC and the methods and sources used to perform functional checks on the WBC before daily use and assessed whether calibration and check sources were appropriate and align with the plant's radionuclide mix and that appropriate calibration phantom(s) were used. The inspectors looked for anomalous results or other indications of instrument performance problems.

Portal Monitors, Personnel Contamination Monitors, and Small Article Monitors

The inspectors selected several of each type of these instruments (e.g., Personnel Contamination Monitor 1-C, Small Article Monitors 12) and verified that the alarm set-point values are reasonable under the circumstances to ensure that licensed material is not released from the site.

Portable Survey Instruments, ARMs, Electronic Dosimetry, and Air Samplers/Continuous Air Monitors

The inspectors selected various portable survey instruments that did not meet acceptance criteria during calibration or source checks to assess whether Exelon personnel had taken appropriate corrective action for instruments found significantly out of calibration. The inspectors evaluated whether Exelon staff had evaluated the possible consequences associated with the use of an instrument that is "out-of calibration" since the last successful calibration or source check.

Instrument Calibrator

The inspectors reviewed the current radiation output values for the licensee's portable survey and area radiation monitor (ARM) instrument calibrator unit(s). The inspectors assessed whether Exelon staff periodically verifies calibrator output over the range of the exposure rates/dose rates using an ion chamber/electrometer.

The inspectors assessed whether the measuring devices had been calibrated by a facility using NIST traceable sources and whether decay corrective factors for these measuring devices were properly applied by Exelon personnel in its output verification

Calibration and Check Sources

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

Problem Identification and Resolution

The inspectors evaluated whether problems associated with radiation monitoring instrumentation were being identified by Exelon personnel at an appropriate threshold, the issues were placed in the corrective action program, and appropriate corrective actions were taken based on a review of selected problems.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures (2 samples)

a. Inspection Scope

The inspectors sampled Exelon's submittals for the Safety System Functional Failures (MS05) performance indicator for both Unit 1 and Unit 2 for the period of April 1, 2011 through March 31, 2012. To determine the accuracy of the performance indicator data reported during those periods, inspectors used definitions and guidance contained in the

Nuclear Energy Institute Document 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 6, and NRC NUREG-1022, “Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73." The inspectors reviewed Exelon’s maintenance rule records, IRs, and licensee event reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index (2 samples)

a. Inspection Scope

The inspectors reviewed Exelon’s submittal of the Mitigating Systems Performance Index for the following systems for the period of April 1, 2011 through March 31, 2012:

- Unit 1 Emergency AC Power System (MS06)
- Unit 2 Emergency AC Power System (MS06)

To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 6. The inspectors also reviewed Exelon’s operator narrative logs, IRs, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 3 samples)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, “Problem Identification and Resolution,” the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Exelon personnel entered issues into the corrective action program at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. 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 corrective action program and periodically attended condition report screening meetings.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

The inspectors performed a semi-annual review of site issues, as required by Inspection Procedure 71152, "Problem Identification and Resolution," to identify trends that might indicate the existence of more significant safety issues. In this review, the inspectors included repetitive or closely-related issues that may have been documented by Exelon staff outside of the CAP, such as trend reports, performance indicators, major equipment problem lists, maintenance rule assessments, and maintenance or CAP backlogs. The inspectors also reviewed Limerick's CAP database for the first and second quarters of 2013 to assess IRs written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRCs daily IR review (Section 4OA2.1).

a. Findings and Observations

No findings were identified.

The review did not reveal any new trends that could indicate a more significant safety issue. The inspectors assessed that Exelon personnel were identifying issues at a low threshold and entering issues into the CAP for resolution. The inspectors performed a follow-up review of a negative trend involving plant issues involving preventive maintenance of plant equipment as discussed in NRC Inspection Report 05000352, 353/2012003 and 05000352, 353/2012005. The results of that inspection are documented below.

.3 Annual Sample: Negative Trend Associated with Plant Issues Related to Preventive Maintenance

a. Inspection Scope

NRC Inspection Reports 05000352, 353/2012003, dated August 1, 2012, and 05000352, 353/2012005, dated February 5, 2013, discussed a negative trend with plant issues over several quarters related to preventive maintenance of plant equipment. The inspectors noted seven findings and a plant event that occurred which involved problems with preventive maintenance. Exelon staff entered the negative trend into the CAP as IR 1395808. The inspector performed a review of the actions taken by Exelon staff to verify that the issue was properly evaluated and corrective actions were implemented.

b. Findings and Observations

No findings were identified.

Exelon personnel verified that each identified issues contributing to the trend was properly entered into the CAP and appropriately addressed. In addition, Exelon personnel had previously performed an apparent cause evaluation and implemented corrective actions related to a licensee-identified issue involving preventive maintenance strategies that were not implemented or were not sufficient to prevent failures of critical components. That issue was entered into the CAP as IR 1368737.

Exelon staff determined that the apparent cause of the issue resulted from engineering staff not revisiting a condition based monitoring preventive maintenance strategy as the

plant aged or as failures occurred more frequently. Corrective actions were implemented to address plant critical component failures and the need for time directed, versus condition based, replacement for critical components. Exelon staff concluded that appropriate actions were in place to address the issues associated with the negative trend. The inspectors concluded that Exelon staff performed a thorough review of the issues and implemented comprehensive corrective actions. The inspectors noted that although there was one NRC finding (FIN 05000352, 353/2013007-05, "Failure to Establish Preventive Maintenance for Safe Shutdown Transfer/Isolation Switches") and some minor issues related to preventive maintenance of plant equipment during the review period, no plant events or transients occurred as a result inadequate preventive maintenance.

.4 Annual Sample: Review of Cross Cutting Theme in Human Performance, Procedure Adherence [H.4(b)]

a. Inspection Scope

The inspectors reviewed Exelon staff's actions for four NRC findings (IRs, IR353276, 1387851, 1437839, and 1453737), with the same NRC cross cutting aspect (H4.b, Human Performance/Work Practices/Procedure Adherence) occurring within a 12 month period. The inspectors also reviewed IR 1450889 and IR 1461065 which tracked the performance of a common cause analysis and root cause analysis to address the underlying issues of the findings. The inspectors reviewed the corrective actions associated with each IR, the common cause analysis and the root cause analysis performed following the fourth event.

The inspectors reviewed Exelon's process to identify and develop adequate corrective actions. The inspectors interviewed station personnel responsible for developing and implementing the corrective actions.

b. Findings and Observations

No findings were identified.

The inspectors concluded that following identification of a theme in the area of Human Performance/ Work Practices/Procedure Adherence, Exelon staff completed a timely and adequate common cause analysis. The common cause analysis verified that corrective actions were implemented for each individual finding and concluded that a root cause analysis was needed to adequately address the theme. The inspectors reviewed the root cause analysis and concluded that Exelon staff used systematic methods to identify the causes of procedure compliance issues. This included the use of barrier causal analysis, reviews of the employee observation systems, station survey of site personnel and a review of IRs in the CAP. Exelon staff identified the root cause of the repetitive events to be a station culture that workers have not internalized the expectation of explicit procedure compliance and the rigorous use of the established process when workers find themselves outside of procedure, parameter or processes. The contributing cause was identified to be that procedure quality weaknesses challenged worker procedure and adherence.

Corrective actions were developed to address the causes identified in the common cause analysis and the root cause analysis. This included training station personnel regarding procedure adherence, communicating station management expectations

pertaining to procedure use and adherence to each worker, re-invigorating the use of the human performance reward and reinforcement plan per HU-AA-101-1004, implementing station metrics for the procedure use and adherence performance at event and precursor levels. Actions were taken to improve management of procedure quality issues including prioritization of the backlog of procedure change requests. Corrective actions to address procedure adherence generated by the common cause analysis were completed by January 17, 2013. Corrective actions to address the expectation of explicit procedure compliance were completed by March 22, 2013 and corrective actions to communicate management expectations pertaining to procedure use and adherence were in the process of being implemented with expected completion date of July 31, 2013. Exelon staff also planned to perform a review of the effectiveness of the corrective actions. The inspectors concluded that Exelon thoroughly investigated the issue and has taken or planned corrective actions to address the causes identified.

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

.1 Plant Events (1 sample)

a. Inspection Scope

For the Unit 2 automatic scram that occurred while in OPCON 4 (Cold Shutdown) on April 16, 2013, the inspectors reviewed and/or observed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant event to appropriate regional personnel, and compared the event details with criteria contained in IMC 0309, “Reactive Inspection Decision Basis for Reactors,” for consideration of potential reactive inspection activities. As applicable, the inspectors verified that Exelon personnel made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR Parts 50.72 and 50.73. The inspectors reviewed follow-up actions related to the events to assure that Exelon staff implemented appropriate corrective actions commensurate with their safety significance.

b. Findings

Introduction. A self-revealing Green finding of Technical Specification 6.8.1, “Administrative Controls-Procedures,” was identified because Exelon personnel did not implement procedure use and adherence requirements when operators changed the scope of work for surveillance testing of main turbine stop and control valves. This resulted in a reactor protection system automatic scram on April 16, 2013.

Description. On Tuesday, April 16, 2013, while in OPCON 4 (Cold Shutdown), Unit 2 operators were performing surveillance tests in support of plant startup. Operators were performing ST-6-01-660-2, “Main Turbine CIV, Stop Valve RPS & EOC-RPT Channel Functional Test,” which simulates a main turbine load greater than 29.5 percent as sensed by turbine first stage pressure. Operators were also preparing to perform ST-6-001-766-2, “Main Turbine Control Valve Exercise & RPS Channel Functional Test, OPCON 3, 4, 5”. Both of these surveillances require similar plant conditions in order to be performed and were scheduled at the same time.

Exelon operators were tasked with coordinating the performance of both surveillance test procedures, and determined that ST-6-001-766-2 could be performed without fully completing procedure ST-6-01-660-2. The dayshift operators discussed the proposed plan and turned it over to the nightshift operators, who discussed the coordination of both surveillances with the Control Room Supervisor and made notes in the ST-6-001-660-2 procedure. When the reactor operator reached section 4.9 in ST-6-01-660-2, the operator continued performing select steps, skipping all steps that would have removed the simulated turbine load of greater than 29.5 percent. The reactor operator reached a step that resulted in the closure of all turbine stop valves. This resulted in an automatic reactor scram and the tripping of both recirculation pumps because the turbine stop valve closure scram signal is not bypassed at turbine loads greater than 29.5 percent.

Exelon reported the reactor protection system actuation via the NRC's Emergency Notification System, removed the operators involved from watchstanding duties, and performed a prompt investigation. Exelon's investigation concluded that the Control Room Supervisor performed an inadequate technical review of the planned performance of the tests because he failed to follow the existing procedure change process. HU-AA-104-101, "Procedure Use and Adherence," Revision 4, contained the requirements to be completed when performing partial performance of a procedure. Step 4.6.1.3 required the supervisor to "ensure the component/system is returned to a condition ready to perform the next evolution or returned to a condition normal/expected for plant conditions at that time." Corrective actions included the issuance of a standing order to: 1) Reinforce the requirements for partial procedure use and temporary procedure changes; 2) Establish expectations for the review and approval of partial procedures and temporary procedures changes, and: 3) Establish expectations for use and performance of technical reviews.

Analysis. The failure of station operators to follow the partial procedure performance process during the performance of two TS required surveillances was a performance deficiency that was reasonably within Exelon's ability to foresee and correct and could have been prevented. The performance deficiency was also contrary to Exelon's procedure use and adherence requirements. Exelon personnel performed a review of the actions taken to address VIO 05000352/2012004-02, "Failure to Immediately Reduce Reactor Power per the Alarm Response Card Procedure" to assess for any gaps in corrective action effectiveness. Exelon personnel concluded that the corrective action taken was a missed opportunity to identify issues with operator knowledge and use of the partial procedure performance process and documented the conclusion in IR 1525552. This finding was more than minor because, if improper implementation of the partial procedure performance process is left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern such as a more severe plant transient or engineered safeguard system actuation or malfunction. Additionally, this issue is similar to example 4.b in IMC 0612, Appendix E, "Examples of Minor Issues," in that the procedural error resulted in a reactor scram or other transient. The finding was determined to be self-revealing because it was revealed through the receipt of a scram signal during performance of a surveillance test which required no active and deliberate observation by Exelon personnel. The finding was determined to be of very low safety significance (Green) in accordance with Appendix G of IMC 0609, "Shutdown Operations Significance Determination Process," because the finding did not require a quantitative assessment. A quantitative assessment was not required because the finding did not increase the likelihood of a loss of reactor coolant system inventory or degrade the ability to recover decay heat removal if it was lost.

This finding had a cross-cutting aspect in the area of Human Performance, Decision Making, because Exelon did not ensure that personnel made safety-significant or risk-significant decisions using a systematic process to ensure that safety is maintained [H.1(a)]. Specifically, the partial procedure performance process was not properly implemented which resulted in plant conditions that were improper for the next evolution. This resulted in a reactor protection system automatic scram on April 16, 2013.

Enforcement. The apparent violation related to this finding is currently under review by the NRC. When that review is completed, the decision relative to any enforcement for the apparent violation will be transmitted to you via separate correspondence. The finding and any future enforcement action for the associated apparent violation, although dispositioned separately, would only count as one input into the plant assessment process. However, the number and characterization of any apparent violation is subject to change pending the NRC's final review. This issue is identified in the Exelon CAP as IRs 1503749 and 1525552. **(FIN 05000353/2013003-03, Failure to Follow Partial Procedure Change Process)**

.2 (Closed) Licensee Event Report (LER) 05000353/2013-001-00: Valid Manual Actuation of the Reactor Protection System During Refuel Outage Testing.

The reactor protection system actuation occurred during the Unit 2 refueling outage with all control rods inserted. The event was initiated by an unplanned automatic closure of the main turbine stop valves with turbine power simulated above 29.5 percent. This event was reviewed and self-revealing performance deficiency was identified and is documented in Section 4OA3.1 of this report. This LER is closed.

.3 (Closed) LER 05000352/2013-003-01: Valid Manual Actuation of the Primary Containment Isolation System Due to Ventilation System Trip.

Revision 01 to the LER was issued on May 21, 2013, to update the cause and corrective actions to align with the final investigation results. The initial investigation did not identify the cause of the non-safety related reactor enclosure ventilation system trip. Additional investigation identified the cause of trip being due to the degraded performance of the system's reactor enclosure equipment compartment exhaust flow transmitter. Revision 00 to the LER was closed in NRC Inspection Report 05000352, 353/2012004. No new issues were identified by Revision 01 to the LER. This LER is closed.

.4 (Closed) LER 05000352/2013-001-01: High Pressure Coolant Injection System Pressure Switch Lubricating Oil Leak.

The Unit 1 HPCI system was discovered to be inoperable during quarterly surveillance testing due to an oil leak from the turbine lubricating oil system. The bellows associated with a system pressure switch failed due to corrosion and cyclic stress fatigue. The inspectors performed a review of the event and Exelon staff's investigation. The investigation concluded that the corrosion was initiated by a system water intrusion event that occurred in April 1999. The actions for the water intrusion event were consistent with the best available industry guidance at the time. A review of the reliability centered maintenance schedule concluded that the pressure switch was appropriately classified. Exelon staff performed an extent of condition review and

planned additional corrective actions. No performance deficiencies were identified during the review. This LER is closed.

4OA5 Other Activities

.1 Followup Inspection for a Notice of Violation (92702)

a. Inspection Scope

The inspectors performed a follow-up inspection for a Green notice of violation discussed in NRC IR 05000352&35388/2012004, dated November 1, 2012 (ML12306A397). The violation involved the failure to follow an alarm response procedure following the receipt of a main control room alarm on Unit 1 on July 11, 2012. The objectives of the inspection were to determine whether Exelon appropriately identified the causes of the violation and developed corrective actions to address the issue, restore compliance and prevent recurrence.

The inspectors reviewed Exelon's response to the notice of violation dated November 30, 2012 (ML12342A271), Exelon's apparent cause evaluations for the issue and notice of violation, focused area self assessments, related condition reports, procedures, and relevant references. The inspectors also interviewed management and staff personnel who were familiar with the violation and participated in the evaluation or corrective actions. Additionally, the inspectors conducted focused observations on Alarm Response Cards compliance during plant operations including the plant shutdown for the Unit 2 refueling outage.

b. Findings and Observations

No findings were identified.

The inspectors concluded that Exelon appropriately evaluated the violation and restored compliance on October 22, 2012 when a series of Operation's Department Standing Orders were issued providing additional guidance. Additional corrective actions included the development of new procedures for development and use of alarm response card, reviewing and updating alarm response cards to ensure appropriate TSs and short term limiting condition for operation action statements are included so the operators can make timely and informed decisions, training program enhancements, site wide and department level communications by senior management. Also, each Senior Reactor Operator license holder read and signed An Affirmation of License Requirements for Procedural Adherence.

A separate IR (1447280) was also written to evaluate why this issue was not entered into the CAP in a timely manner after the NRC identified their concern with the original apparent cause evaluation. Corrective actions included additional training and coaching of personnel. Section 4OA3.1 of this report identified a Green finding associated with the failure to properly implement the partial procedure use process. Exelon personnel concluded that the evaluation for the notice of violation was a missed opportunity to identify issues with operator knowledge and use of the partial procedure performance process and documented their conclusion in IR 1525552.

The inspectors determined that the station adequately assessed the extent of condition and extent of cause of the violations. The inspectors concluded that Exelon's corrective

actions were sufficient to address the identified cause and that the completed and planned corrective actions addressed the causes described in the evaluation. Effectiveness reviews were scheduled to review the effectiveness of the corrective actions. VIO 05000352/2012004-02 is closed.

.2 Operation of an ISFSI at Operating Plants (60855 and 60855.1)

a. Inspection Scope

On June 24 to June 28, 2013, the inspectors observed and evaluated Exelon's staff's loading of a dry shielded canister (DSC) associated with the licensee's current Independent Spent Fuel Storage Installation (ISFSI) dry cask campaign. The inspectors also reviewed Exelon staff activities related to long-term operation and monitoring of their ISFSI. The inspectors verified compliance with the Certificate of Compliance, TS, regulations, and licensee procedures.

The inspectors observed and evaluated Exelon's loading of the third TN-61BTH cask associated with Exelon's current ISFSI dry cask loading campaign for Units 1 and 2, and reviewed documentation and records associated with the first two TN-61BTH loadings. The inspectors observed TN-61BTH loading and processing operations including: loading spent fuel into the cask, decontamination and surveying, cask draining, vacuum drying, and helium backfilling. The inspectors also observed welding operations and performance of the leak tests and dye penetrant tests. During performance of these activities, the inspectors evaluated the licensee's familiarity with procedures, supervisory oversight, and communication and coordination between the personnel involved. The inspectors attended licensee briefings to assess their ability to identify critical steps of the evolution, potential failure scenarios, and human performance tools to prevent errors. The inspectors also reviewed loading and monitoring procedures and evaluated the Exelon staff adherence to these procedures.

The inspectors reviewed Exelon'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 Certificate of Compliance and TS. In addition, the inspectors independently verified the cask loading for cask No. 23 via review of the digital recording. The inspectors confirmed that Exelon staff did not plan to load any damaged fuel assemblies during this campaign.

The inspectors reviewed RP procedures and RWPs associated with the ISFSI loading campaign. The inspectors also reviewed the ALARA goal for the cask loading to determine the adequacy of the radiological controls and to ensure that radiation worker doses were ALARA, and that project dose goals could be achieved. The inspectors reviewed radiological survey records from the current loading campaign to confirm that contamination levels measured on the TN-61BTH casks were within the limits specified by the TS and consistent with values specified in the Final Safety Analysis Report.

The inspectors performed tours of the heavy haul path and ISFSI pad to assess the material condition of the path, pad, and the loaded TN-61BTH casks, and verified that Exelon appropriately performed surveillances in accordance with TS requirements. The inspectors verified that transient combustibles were not being stored on the ISFSI pad or in the vicinity of the loaded casks. Environmental reports were reviewed to verify that areas around the ISFSI site boundary were within the limits specified in 10 CFR Part 20

and 10 CFR 72.104. The inspectors confirmed that vehicle entry onto the ISFSI pad was controlled in accordance with Exelon procedures.

The inspectors reviewed the licensee's 10 CFR 72.48 screenings to verify that Exelon staff had appropriately considered the conditions under which they may make changes without prior NRC approval. The inspectors reviewed revisions to the 10 CFR 72.212 report. The inspectors also reviewed corrective action reports, audit reports, and self-assessments that were generated since the last loading campaign at Limerick to ensure that issues were being properly identified, prioritized, and evaluated commensurate with their safety significance.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On July 29, 2013, the inspectors presented the inspection results to Mr. T. Dougherty, Site Vice President, and other members of the Limerick staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

T. Dougherty, Site Vice President
D. Lewis, Plant Manager
R. Kreider, Director of Operations
D. Doran, Director of Engineering
F. Sturniolo, Director of Maintenance
J. Hunter, Director of Work Management
K. Kemper, Security Manager
R. Dickinson, Manager, Regulatory Assurance
J. Karkoska, Manager, Nuclear Oversight
M. Gillin, Shift Operations Superintendent. Manager, Engineering Systems
M. DiRado, Manager, Engineering Programs
M. Bonifanti, Manager, ECCS Systems
G. Budock, Regulatory Assurance Engineer
D. Molteni, Licensed Operator Requalification Training Supervisor
A. Wasong, Training Director
R. Ruffe, Operations Training Manager
M. DiRado, Manager, Engineering Programs
D. Merchant, Radiation Protection Manager
C. Gerdes, Chemistry Manager
A. Varghese, System Manager, Radiation Instruments
R. Nealis, Radiochemist
T. Kan, License Coordinator
J. Risteter, Radiological Technical Manager
L. Birkmire, Manager, Environmental
S. Gamble, Regulatory Assurance Engineer
K. Rahn, Regulatory Assurance Engineer
K. Nicely, Exelon Corporate Regulatory Assurance
R. Lance, Chemistry Manager
N. Harmon, Senior Technical Specialist
R. Woolverton, System Manager
M. McGill, Senior Engineer
C. Boyle, Instrument Chemist
P. Imm, Radiological Engineering Manager
J. Duskin, Instrument Coordinator

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000353/2013003-01	NCV	Failure to Identify and Correct a Condition Adverse to Quality Associated with Emergency Diesel Generator D24 (Section 1R15)
05000353/2013003-02	NCV	Failure to adhere to radiation protection procedures for evacuation of the Unit 2 upper drywell in preparation for irradiated component moves (Section 2RS1)
05000353/2013003-03	FIN	Failure to Follow Partial Procedure Change Process (Section 4OA3.1)

Closed

05000353/2013-001-00	LER	Valid Manual Actuation of the Reactor Protection System During Refuel Outage Testing (Section 4OA3.2)
05000352/2013-003-01	LER	Valid Manual Actuation of the Primary Containment Isolation System Due to Ventilation System Trip (Section 4OA3.3)
05000352/2013-001-00	LER	High Pressure Coolant Injection System Pressure Switch Lubricating Oil Leak (Section 4OA3.4)
05000352/2012004-02	VIO	Failure to Immediately Reduce Reactor Power per Alarm Response Procedure (Section 4OA5.1)

Discussed

None.

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures
ER-AA-2003, “System Performance Monitoring and Analysis,” Revision 9

Section 1R04: Equipment Alignment

Procedures
OS11.1.A (COL), Equipment Alignment of Emergency Service Water Control Switches, Revision 16
ST-6-107-450-1, ECCS and RCIC Lineup Verification – OPCONs 1, 2, and 3, Revision 27

1S4a.1.A, Valve Alignment to Assure Availability of the RCIC System, Revision 17

Section 1R05: Fire Protection

Procedures
F-S-001, Pre-fire Plan Strategy for Spray Pond Pump Structure Western Half, Revision 12
F-S-002, Pre-fire Plan Strategy for Spray Pond Pump Structure Eastern Half, Revision 10
F-A-430, Pre-fire Plan, Common, Unit 2 D24 Emergency 4kV Switchgear Room 430 (EL 239), Revision 9
F-A-449, Pre-fire Plan, Common, Unit 1 Cable Spread Room (EL 254), Revision 13
F-A-452, Pre-fire Plan, Common, Unit 1 Static Inverter Room (EL 254), Revision 9

Section 1R06: Flood Protection Measures

Miscellaneous
ECR 10-00461, Safety Related Electrical Manhole Drainage System, Revision 2

Section 1R08 In-service Inspection

Procedures:
GEH-VT-204 Version 14 IVVI of BWR 4 RPV Internals
GEH-PDI-UT-1, Generic Procedure for Ultrasonic Examination of Ferritic Pipe Welds, Revision 0
GEH-PDI-UT-10, PDI Generic Procedure for Ultrasonic Examination of Dissimilar Welds, Revision 4
ER-AA-335-002, Liquid Penetrant Examination, ASME B&PV Code, Revision 6
ER-AA-335-003, Magnetic Particle Testing Examination, ASME B&PV Code, Revision 5
ER-AA-335-014, VT-1 Visual Examination, Revision 8
ER-AA-335-016, VT-3 Visual Examination of Component Supports, Attachments and Internals of Reactor Vessels, Revision 8
Electric Power Research Institute-DMW-PA-1, Procedure for Manual Phased Array Ultrasonic Examination of Welds, Revision 4

Indication Notice Reports:
Li 2R12-IVVI-13-01-02, 03, 04, 05, 06, 07, and 09, Indications in Steam Dryer Welds SD HS3c, SDHS4c, SDEB4b 270, SDEB2a 090,SDLRCTW 221.5, tie bar #03, SDEB1d 090 and SDDC3a 190 identified during refuel outage 11 and 12 and confirmed as stable in examination this outage (Refuel Outage 12).

Action Reports (ARs):
AR01494964, 2A RHR Heat Exchanger has loose bolts
AR01493755, Support GBB-218-HO15 was found pinned
AR01242289, Pin Hole Leak found in Emergency Service Water
AR01353319, Degradation of Emergency Service Water Leak in U2 HPCI
AR0000-130-6770 Evaluation and Analysis of UT Indications detected in closure head meridional weld R11

Other:
ER-LG-330-1001 R5 Inspection Program Test Plan (Portions of)

Section 1R12: Maintenance Effectiveness

Issue Reports
1497454

Procedures
ER-AA-310-1005, Maintenance Rule – Dispositioning Between (a)(1) and (a)(2), Revision 6

Section 1R15: Operability Evaluations

Issue Reports
01509125 01491195 01507365 01507365 01511869*

Procedures
RT-6-012-901-0, 'A' Spray Pond Spray Nozzle Test, Revision 0
RT-1-107-851-1, Control Rod Drive High Operating Temperature Evaluation, Revision 1
ST-6-049-230-2, RCIC Pump, Valve, and Flow Test, Revision 72

Miscellaneous
L-S-27, Spray Pond Design Basis Document, Revision 9
L-S-04, Residual Heat Removal Service Water System, Revision 11
Calculation LM-0383, Post LOCA Spray Pond Performance, Revision 7

Section 1R18: Plant Modifications

Issue Reports
1473450

Section 1R19: Post-Maintenance Testing

Issue Reports
1496633 1507365 1526554 1526762

Procedures
M-095-006, Preventive Maintenance for Battery Chargers, Revision 6
ST-2-078-408-0, Toxic Gas Detection System – Control Enclosure Air Intake, Channel 'C', Calibration/Functional Test, Revision 14

Work Orders
C0247778
R1247636

Section 1R20: Refueling and Other Outage Activities

Procedures
GP-2, Normal Plant Startup, Revision 151
GP-2, Appendix 2, Drywell-Suppression Pool Closeout and Inspection, Revision 44
GP-6.1, Unit 2 Shutdown Operations-Refueling, Core Alterations and Core Off-Loading, Revision 30
GP-10, Reactor Pressure Vessel Leakage Test, Revision 66
NF-AA-330-1001, Core Verification Guideline, Revision 8

Section 1R22: Surveillance Testing

Issue Reports
IR 1497810

Procedures
ST-6-051-232-1, 'B' RHR Pump, Valve and Flow Test, Revision 77
ST-6-092-318-2, D24 Diesel Generator Fast Start Operability Test Run, Revision 49

Work Orders
R1246725-01
R1252112-01

Section 2RS01: Access Control to Radiologically Significant Areas

Procedures:
RP-AA-460, Control for High and Locked High Radiation Areas, Revision 23
RP-AA-460-001, Control for Very High Radiation Areas, Revision 4
RP-AA-460-002, Additional High Radiation Area Exposure Control, Revision 1
RP-LG-460-105, Drywell Entries at Power, Revision 9
RP-LG-460-103, Upper Level Drywell Access Control during Irradiated Core Component Moves, Revision 14
RP-AA-461, Radiological Control for Contaminated Water Diving Operations, Revision 3
RP-AA-401-1002, Radiological Risk Management
RP-AA-403, Administration of the Radiation Work Permit Program, Revision 3
RP-AA-460-002, Additional High Radiation Exposure Control, Revision 1

Documents:
Corrective Action Documents (ARs: 1493976, 1494495, 1495209, 1495209, 1495672, 1496126, 1497056, and 1497056)
10 CFR 61 Waste Stream Report - 2012
Dose Records
Contamination Control – Personnel Contamination Data
Dosimetry Performance Testing Data
Performance Indicator Summary Data

Section 2RS02: Occupational ALARA Planning and Controls

Procedures:
RP-AA-400-1006, Outage Exposure Estimating and Tracking, Revision 3
RP-AA-400-1006, Decision Tree to provide Guidance on CRD Uncoupling from Above or Below, Attachment 10
RP-AA-401, Operational ALARA Planning, Revision 15
OU-AA-101, Refuel Outage Management, Revision 20

Documents:
Station Daily Updates (various)
Radiation Protection Outage Checklist
ALARA Contingency Plans
Source Term Control Plans and Actions
Radiological Risk Management Matrix

Station ALARA Committee Minutes
Various ALARA Plans including control rod drive unlatching ALARA plans, estimates and decision analyses
CRUD Burst Response Plan
Work-In-Progress Job Reviews and ALARA Reviews (Drywell snubbers and shielding, Suppression pool)
Corrective Action Documents (ARs: 1403854)

Section 2RS03: In-plant Airborne Radioactivity Control and Mitigation

Procedures:
RP-AA-870, Testing Portable High Efficiency Particulate Air Filter Units, Revision 3
RP-AA-870-1001, Set-up and Operation of Portable Air Filtration Equipment, Revision.3
RP-AA-870-1002, Use of Vacuum Cleaners in Radiological Controlled Areas, Revision 15
RT-0-900-0, One-hour SCBA Cylinder Inspection and Functional Test, Revision 36, 38

Documents:
SCBA parts list
SCBA inspection records (Pack 396, 199)
Air Quality Test Data
National Institute for Occupational Safety and Health Traceability for Scott SCBA Equipment
SCBA Respirator Qualification Records (training, medial certification)
Corrective Action Documents (various)
Airborne Radioactivity Intake Assessments

Section 2RS04: Occupational Dose Assessment

Procedures:
RP-AA-350, Personnel Contamination Monitoring, Decontamination, and Reporting, Revision 10
RP-AA-605, Waste Stream Results Review, Revision 4

Documents:
10 CFR 61 Reports
National Voluntary Laboratory Accreditation Program testing Certification In-light
Exposure Control and Dose Records
General Source Term Data
Personnel Contamination Event Logs
Personnel Intake Investigations
Corrective Action Documents (various)

Section 2RS05: Radiation Monitoring Instrumentation

Procedures:
RP-AA-700, Controls for Radiation Protection Instrumentation, Revision 3
RP-AA-700-1209, Calibration of the Sheperd Box Irradiator, Revision 0
RP-AA-229, Fastscan Abacos Plus Whole Body Counter calibration, Revision 0
RP-AA-226, Calibration of Canberra Accuscan Whole Body Counter, Revision 0
RP-AA-700-1239, Operation and Calibration of the Model Sam 12 Small Articles Monitor, Revision 1

Documents:
General Source Term Data
Radcal Model 2025AC Calibration Certificate
Sheperd Manual
2012 Fastscan calibration data
Whole body counter calibration source certificate of calibration
Air sample data-sand blast booth
Calibration Air Sample Pumps - 33-2316, 211404
Corrective Action Documents (ARs: 1403854, 1497063, 1497076)

Section 4OA1: Performance Indicator Verification

Issue Reports
1511278 1471491

Procedures
LS-AA-2200, Attachment 5, "Emergency AC Power Function," Revision 5
OP-LG-108-104-1000, "ST/RT Status Log (Short Duration Time Clock Log)," Revision 0

Miscellaneous
LER, 2012-007-00
Operator logs

Section 4OA2: Problem Identification and Resolution

Issue Reports
1429761 1437839 1453737 1461065 1387851

Section 4OA3: Followup of Events and Notices of Enforcement Discretion

Issue Reports
1502849 1502852 1502853

Section 4OA5: Other Activities

Issue Reports
01291660 01328137 01395964 01417660 01524097

Design and Licensing Basis Documents
Certificate No. 1004, Certificate of Compliance for Spent Fuel Storage Casks, Amendment 10
Independent Spent Fuel Storage Installation, 10 CFR 72.212 Evaluation, Revision 5
Independent Spent Fuel Storage Installation, 10 CFR 72.212 Evaluation, Revision 6
Updated Final Safety Analysis Report (UFSAR) for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel, Revision 10, February 1, 2008

Engineering Evaluations
72.48 Screening Nos. LGI-2010S011, 2011S006, 2012S001, 2012S015, 2013S001
SRRS#57.104
Analysis No. LISFSI-0009, Limerick 1 Cycle 14 Dry Storage Fuel Characterization, Classification, and Cask Loader Database Update - ISFSI
Analysis No. LISFSI-0010, Fuel Selection Package LIM-0020 for DSC LGS-61BTH-1-C-2-021

Analysis No. LISFSI-0010, Fuel Selection Package LIM-0021 for DSC LGS-61BTH-1-C-2-022
Analysis No. LISFSI-0010, Fuel Selection Package LIM-0022 for DSC LGS-61BTH-1-C-2-023
Analysis No. LISFSI-0010, Fuel Selection Package LIM-0020 for DSC LGS-61BTH-1-C-2-021
Analysis No. LISFSI-0010, Fuel Selection Package LIM-0023 for DSC LGS-61BTH-1-C-2-027
Analysis No. LISFSI-0010, Fuel Selection Package LIM-0024 for DSC LGS-61BTH-1-C-2-028
Analysis No. LISFSI-0015, Alternate Assembly List for FSPs LIM-0020 through LIM-0024
Analysis No. LIFSI -0016, Limerick Cask Model Update for 2013 ISFSI Campaign
Exelon Nuclear Calculation No: LC-008, "Seismic Evaluation of Cask/Canister Stability in the Reactor Building"
TN Calculation 11281-12, "Shielding Evaluation for Transport Cask and Welding Machine Configuration for Limerick Generating Station", Revision 0

Completed Surveillance and Functional Testing
Certificate of Calibration, Certificate #: 0010721270, Vacuum Gauge, Serial #: 9A003F010F3/15797
Certificate of Calibration, Certificate #: 0010721272, Vacuum Gauge, Serial #: 9C0001010F3/15797
NF-AB-624, Revision 1, BWR Fuel Selection and Documentation for NUHOMS Dry Cask Loading
NF-AA-621, Classification of Fuel Assemblies for Dry Storage, Revision 1
NF-AA-622-1000, Fuel Characterization for Dry Storage, Revision 1

Miscellaneous
RP-AA-401, Attachment 2, ALARA Plan for 13-096 ISFSI, Revision 15
RP-AA-401, Attachment 5, ALARA Post-Job Review for AP-12-103, RFF ISFSI, Revision 15
RWP Number 00073, Refuel Floor ISFSI Operations, Revision 1
TN NUHOMS – 61BT Dry Shield Canister Final Document Package
TN Common Book for DSC S/N LGS-61BTH-1-C-2-017 through 024
TN Certificates of Conformance Shipping Releases
TN NCRs & SNEFS
TN-Supplied Materials for DSC S/N LGS-61BTH-1-C-2-017 through 024
Independent Spent Fuel Storage Installation Audit Report, NOSA-LIM-12-11 (AR 142728)

Procedures
AD-AA-101-F-10, Temporary Procedure Change, Site Approval Form, Temporary Change No. 13-0361-0, Revision 1
CC-AA-309-1001, Evaluation of ISFSI Haul Path Inside the Reactor Building, Revision 8
ER-AA-335-002, Liquid Penetrant (PT) Examination, Revision 6
ER-AA-335-003, Magnetic Particle (MT) Examination, Revision 5
ER-AA-335-1008, Code Acceptance & Recordkeeping Criteria for Nondestructive (NDE) Surface Examination, Revision 3
ER-LG-310-1010, Maintenance Rule Implementation, Revision 17
MA-AA-716-008-1008, Reactor Services Refuel Floor FME Plan, Revision 8
NF-AB-624, Revision 1, BWR Fuel Selection and Documentation for NUHOMS Dry Cask Loading
OU-LG-626, Fuel Loading/Unloading of a Dry Shielded Canister, Revision 000
OU-LG-641, Transport and Loading of Transfer Cask and Dry Shielded Canister, Revision 1
OU-LG-643, Transport of Loaded Transfer Cask and Dry Shielded canister to Transfer Trailer to ISFSI and Alignment/Insertion into the Horizontal Storage Module, Revision 0
OU-LG-645, Revision 1, MMC Dry Shielded Canister Welding, Vacuum Drying, and Helium Fill
PCI Energy Services, ASME Section IX Welding Procedure

PCI Energy Services, PI-902608-01, Closure Welding of Dry Shielded Canisters at Limerick, Revision 1
PCI Energy Services, General Quality Procedure GQP-1.0, Project Organization and Documentation, Revision 18
PCI Energy Services, GQP 9.2, High Temperature Liquid Penetrant Examination and Acceptance of Standards for Welds, Base Materials and Cladding (50 -350 degrees), Revision 6
PCI Energy Services, GQP-9.6, Visual Examination of Welds, Revision 13
S114.10.A, Response to ISFSI Alarm Beacon, Revision 2
S97.O.M, Refueling Platform Operation, Revision 0
ST-4-114-360-0, Independent Spent Fuel Storage Installation (ISFSI) Technical Specification Testing, Revision 9
ST-6-107-590-0, Dailey Surveillance LOG/Common Plant – At All Times, Revision 98

Training
Qualifications for the following positions, Welders and NDT personnel

Work Orders

R1211331, Inspect and Lube Rx Enclosure Crane
R1261292, Frequent Inspection of Reactor Crane

LIST OF ACRONYMS

AC	Alternating Current
ADAMS	Agency wide Documents Access and Management System
ALARA	As Low As is Reasonably Achievable
ARM	Area Radiation Monitor
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Plan
CFR	*Code of Federal Regulations*
DSC	Dry Shielded Canister
EDG	Emergency Diesel Generator
EPD	Electronic Personal Dosimeter
HPCI	High Pressure Coolant Injection
HRA	High Radiation Area
IMC	Inspection Manual Chapter
IR	Issue Report
ISFSI	Independent Spent Fuel Storage Installation
IVVI	In-Vessel Visual Inspection
kV	Kilo-Volt
LER	Licensee Event Report
MH	Manhole
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
OPCON	Operational Condition
PDI	Performance Demonstration Initiative
RCIC	Reactor Core Isolation Coolant
RHRSW	Residual Heat Removal Service Water
RP	Radiation Protection
RWP	Radiation Work Permit
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SSC	Structure, System, or Component
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic Testing
VHRA	Very High Radiation Area
WBC	Whole Body Counter