May 01, 2006

Mr. Christopher M. Crane
President and CNO
Exelon Nuclear
Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

SUBJECT: LIMERICK GENERATING STATION - NRC INTEGRATED INSPECTION REPORT 05000352/2006002 AND 05000353/2006002

Dear Mr. Crane:

On March 31, 2006, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Limerick Generating Station Units 1 and 2. The enclosed integrated report documents the inspection results which were discussed on April 11, 2006, with Mr. R. DeGregorio and other members of your staff.

This 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 self-revealing finding of very low safety significance (Green). This finding was determined to involve a violation of an NRC requirement. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance, and because it is entered into your corrective action program, the NRC is treating this finding as a non-cited violations (NCV), in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you contest the 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, D.C. 20555-0001; with copies to the Regional Administrator Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Limerick facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the

NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

James M. Trapp, Chief
Projects Branch 4
Division of Reactor Projects

Docket Nos: 50-352; 50-353
License Nos: NPF-39; NPF-85

Enclosure: Inspection Report 05000352/2006002 and 05000353/2006002
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION 1

Docket Nos: 50-352, 50-353

License Nos: NPF-39, NPF-85

Report No: 05000352/2006002 and 05000353/2006002

Licensee: Exelon Generation Company, LLC

Facility: Limerick Generating Station, Units 1 & 2

Location: Evergreen and Sanatoga Roads
Sanatoga, PA 19464

Dates: January 1, 2006 through March 31, 2006

Inspectors: S. Hansell, Senior Resident Inspector
C. Bickett, Resident Inspector
T. Moslak, Health Physicist
J. Krafty, Reactor Inspector
M. Snell, Reactor Inspector

Approved by: James M. Trapp, Chief
Projects Branch 4
Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000352/2006-002, 05000353/2006-002; 01/01/2006 - 03/31/2006; Limerick Generating Station, Units 1 and 2; Operator Performance During Non-Routine Plant Evolutions and Events.

The report covered a 3-month period of inspection by resident inspectors and announced inspections by a regional health physicist inspector and a reactor inspector. The inspectors identified one Green non-cited violation (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

Reactor Safety

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Initiating Events

Green. A self-revealing NCV was identified for the licensee's failure to comply with Technical Specification (TS) 3.9.2, "Instrumentation." Plant operations staff inappropriately started core alterations after the loss of all Unit 2 source range monitor audible alarms. Core alterations were stopped when Exelon management was informed of the problem. The source range monitor audible alarm was fixed prior to moving fuel in the reactor and this issue was entered into Exelon's corrective action program.

This finding is greater than minor because it affected the Initiating Events cornerstone objective of limiting the likelihood of those events that challenge critical safety functions during shutdown conditions. This finding is of very low safety significance because it did not increase the likelihood of a loss of reactor coolant system inventory, it did not degrade the ability to terminate a leak or add inventory to the reactor coolant system, and it did not degrade the ability to recover decay heat removal capability if lost. (Section 1R14)

B. Licensee-Identified Violations

Violations of very low safety significance, which were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. One licensee identified violation and associated corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 began this inspection period at full rated thermal power and operated at full power until January 13, 2006, when operators decreased power to approximately 70 percent for power suppression testing. Unit 1 returned to full power on January 17. On February 7, 2006, Unit 1 entered reactor power end-of-cycle coastdown. On March 6, operators shutdown Unit 1 for a planned refueling and maintenance outage (1R11). The reactor achieved criticality on March 23, and following repairs to the 1C reactor feed pump, Unit 1 returned to full rated thermal power on March 28, 2006.

Unit 2 began this inspection period at full rated thermal power. Unit 2 shut down on February 23, 2006 for a planned maintenance outage to replace three safety relief valves (SRVs.) Unit 2 returned to full rated thermal power on February 26, 2006 and operated at or near full rated thermal power for the rest of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 - 1 sample)

a. Inspection Scope

Since snow storms were forecasted in the vicinity of the facility for early February 2006, the inspectors reviewed Exelon's overall preparations and protection for the expected weather conditions. The inspectors walked down portions of procedure SE-14, "Snow," including applicable portions of the emergency diesel generators and the condensate storage tank system. The inspectors also reviewed various related issue reports (IRs) and action requests (ARs). This inspection satisfied one inspection sample for overall preparations and protection for expected adverse weather conditions. Documents reviewed for each applicable section of this report are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdown (71111.04Q - 3 samples)

a. Inspection Scope

The inspectors performed a partial walkdown of the following three systems to verify the operability of redundant or diverse trains and components when safety equipment was inoperable. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors

reviewed applicable operating procedures, walked down control systems components, and verified that selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that Exelon had properly identified and resolved equipment mitigation problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program.

- Unit 2 Reactor Core Isolation Cooling (RCIC) System During High Risk High Pressure Coolant Injection (HPCI) System Testing
- D12, D13, and D14 Emergency Diesel Generators (EDGs) During D11 EDG Planned Maintenance
- Unit 1 Reactor Recirculation System Following Refueling Outage

.2 Complete System Walkdown (71111.04S - 1 sample)

a. Inspection Scope

The inspectors conducted one complete walkdown of the Unit 2 residual heat removal (RHR) system to verify the functional capability of the system. The inspectors used Exelon procedures and other documents listed in the Attachment to verify proper system alignment. The inspectors also verified electrical power requirements, operator workarounds, hangers and support installation, and associated support systems status. The walkdown also included evaluation of the system piping and supports against the following considerations:

- Piping and supports did not show evidence of water hammer
- Oil reservoirs appeared normal
- Snubbers did not appear to be leaking hydraulic fluid
- Hangers were functional
- Component foundations were not degraded

The inspectors performed a review of outstanding issue reports, action requests, and work orders to ensure that the deficiencies did not affect RHR design function and to verify that Exelon was appropriately identifying and resolving any equipment alignment problems.

c. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Fire Protection - Tours (71111.05Q - 9 samples)

a. Inspection Scope

The inspectors conducted a tour of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that combustibles and ignition sources were controlled in accordance with Exelon's administrative procedures, fire detection and suppression equipment was available for use, and that 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 in accordance with Exelon's fire plan.

- Unit 1 Refuel Floor During New Reactor Fuel Inspections
- Unit 1 Elevation 253' During Refuel Outage Preparations
- D11 EDG Room During Maintenance Overhaul
- Unit 1 Elevation 269' During Refuel Outage Preparations
- Unit 2 Elevation 269' During Unit 1 Refuel Outage Preparations
- Unit 1 Refuel Floor During Reactor Vessel Head Removal
- Unit 1 Main Condenser During Refuel Outage
- Unit 2 Elevations 177' and 201' During Unit 1 Refuel Outage
- Unit 2 Elevations 217' and 253' During Unit 1 Refuel Outage

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07A - 1 sample)

a. Inspection Scope

The inspectors observed portions of Exelon's "1A" residual heat removal (RHR) heat exchanger transfer test to ensure the heat exchanger could perform its design function. The inspectors observed the heat transfer test from the main control room and locally in the Reactor Building. The inspectors reviewed Exelon's final heat exchanger test data to ensure the as-found heat transfer values were within design limits. The inspectors also walked down the "1A" RHR heat exchanger to assess its material condition.

- RT-2-012-390-1, "1A Residual Heat Removal Heat Exchanger Transfer Test"

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection Activities (71111.08 - 1 sample)

a. Inspection Scope

Inspectors selected a sample of non-destructive examination (NDE) activities for review from the Unit 1 refueling outage (RFO) 11 examination plan to assess the effectiveness of the inservice inspection (ISI) program for monitoring degradation of containment, the reactor coolant system (RCS), and risk-significant piping system pressure boundaries. The inspection consisted of interviews with plant personnel, observations of nondestructive examinations and calibrations of nondestructive equipment, and review of procedures, examination results, calibration documentation, and qualification certifications. The inspector verified that Exelon performed these activities in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code requirements.

The inspector reviewed the modification package for the replacement of the 16 inch 'B' loop RHR containment spray outboard isolation valve to verify that the design basis and performance of the valve was not degraded as a result of the modification. The inspector verified that Exelon performed the radiography of the pipe to elbow weld FW 1301, the pipe to valve weld FW 5, and the pipe to valve weld SW 6 in accordance with the ASME Boiler and Pressure Vessel Code and that the welds met the ASME Code acceptance criteria. The inspector verified the welding procedure and the welder qualifications met the requirements of the ASME Code.

The inspector observed and reviewed several visual examinations associated with the in-vessel visual inspection (IVVI) including jet pump set screw tack welds, wedge wear, restrainer bracket adjustment screw gap measurement, riser pipe to riser brace circumferential weld, and core spray 'A' loop shroud pipe to collar weld, P8aC. The inspector verified the camera calibration and examination met the ASME requirements for VT-1 visual examinations.

The inspector observed portions of the magnetic particle inspection of the reactor vessel skirt weld in order to evaluate examiner skill and examination technique. The inspector verified the calibration of the AC electromagnetic yoke, that the examiner was properly qualified, and that the examination procedure was followed. Examination results were reviewed for recordable indications.

The inspector observed a portion of the ultrasonic examination of 4 inch RCIC welds DBA-107-1FW54 (RC012) and DBA-107-1FW4 (RC013) in order to evaluate examiner skill, test equipment performance, and examination environment (condition of weld surface). The inspector verified the calibration and examination were performed in accordance with approved procedures and that the examiners were properly qualified. The inspector reviewed the exam reports for recordable indications.

The inspector verified the scope of the ultrasonic examination of the core shroud welds was in accordance with the guidance from the Electric Power Research Institute (EPRI) Boiling Water Reactor Vessel Inspection Program 76 (BWRVIP-76). The data from the

ultrasonic examination of the horizontal welds H-3, H-4, H-5 and vertical welds V-15, V-16, V-17, and V-18 of the core shroud was reviewed for recordable indications.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11 - 1 sample)

Resident Inspector Quarterly Review

a. Inspection Scope

On January 30, 2006, the inspectors observed a medium pipe break loss of coolant accident (LOCA) simulator scenario to assess licensed operator performance and the evaluator's critique. The simulator evaluation was performed during the licensed operator annual examination. The inspectors discussed the results with operators, operations management, and training instructors.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12 - 2 samples)

a. Inspection Scope

The inspectors reviewed the two samples listed below for items such as: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the maintenance rule (MR); (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65 (a)(1) or (a)(2); and (8) appropriateness of performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1). Items reviewed included the following:

- Unit 1 and 2 Safety Relief Valve Leakage
- Emergency Core Cooling System (ECCS) Room Cooler Failures due to Silting in the Emergency Service Water (ESW) System

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 - 7 samples)

a. Inspection Scope

The inspectors reviewed the following seven activities to verify that Exelon performed the appropriate risk assessments prior to removing equipment for work. The inspectors verified that Exelon performed accurate and complete risk assessments as required by 10 CFR 50.65 (a)(4). When the station performed emergent work, the inspectors verified that the plant risk was promptly reassessed and managed in accordance with Exelon's risk assessment tool and risk categories.

- 101 Transformer Tap Changer Failed to Tap Following Modification
- Unit 1 Reactor Core Isolation Cooling (RCIC) System High Turbine Oil Level
- Unit 1 Risk During D11 EDG Planned Maintenance Concurrent with Maintenance on HPCI/RCIC Full-Flow Test Valve
- Unit 1 'A' and 'B' Outboard MSIVs Exceeded Max Close Stroke Time (A1554743)
- Unit 1 RCIC Turbine Oil Contained Bearing Material (IR 463640)
- HV-049-1F007 Failed to Close (A1554514)
- High Unit 1 Reactor Conductivity and Chlorides During Start-Up from 1R11 Refueling Outage

b. Findings

No findings of significance were identified.

1R14 Operator Performance During Non-Routine Evolutions and Events (71111.14 - 2 samples)

a. Inspection Scope

For the non-routine events described below, the inspectors reviewed operator logs, plant computer data, and other documentation to determine what occurred and how the operators responded, and to determine if the response was in accordance with plant procedures.

- On March 12, 2005, the inspectors reviewed operator and station response to the loss of an alarm horn supplying audible indication for a number of Unit 2 main control room (MCR) alarms. The inspectors reviewed the applicable Technical Specification (TS) requirements, off-normal operating procedures, and Limerick's Emergency Plan. The inspectors also conducted interviews with operators and supervisors. An NRC followup review of this issue was performed prior to final documentation.

- On February 22, 2006, the inspectors observed a reactor shutdown on Unit 2 in preparation for a short-duration maintenance outage to replace three leaking safety relief valves (SRVs). The inspectors observed operator actions in the control room,

reviewed logs and outage work schedules, and monitored portions of the subsequent start-up and return to full power.

b. Findings

Introduction. A Green self-revealing non-cited violation (NCV) was identified of TS 3.9.2, "Instrumentation," because Limerick started core alterations after the loss of all Unit 2 source range monitor (SRM) audible alarms.

Description. On the morning of March 12, 2005, while performing an annunciator check in the MCR, the horn for several MCR panels sounded continuously and could not be reset. At the time, Limerick Unit 2 was shutdown for a planned refueling outage. The control room operators entered procedure ON-122, "Loss of Main Control Room Annunciators," and removed power to the alarming horn. The disabled horn provided the audible alarms for the SRMs, among others. As a compensatory measure, a dedicated operator was stationed in the MCR to monitor the panels without audible alarms.

Limerick TS 3.9.2 requires that at least two SRM channels be operable and inserted to the normal operating level with audible alarm indication available for at least one SRM. If these conditions are not met, TS 3.9.2 requires that core alterations be suspended. At the time the alarm function of the SRMs was lost, fuel bundle movement in the reactor core was not in progress at Unit 2. However, at 12:11 p.m. on March 12, following consultation with the Outage Control Center (OCC), Limerick shift management authorized fuel movements to commence. While corrective actions for the failed alarm function were being planned, the horn was still inoperable at that time.

Fuel movement continued until 8:58 p.m., when a supervisor on the night shift recognized that a violation of TS 3.9.2 may have occurred. The Shift Manager ordered fuel movements to be suspended and informed the OCC and Limerick senior management. The Shift Manager, Shift Operations Superintendent, and Control Room Supervisor then made the decision that the compensatory measures in place for the inoperable horn were adequate to meet the intent of the TS, and at 9:11 p.m., the station recommenced fuel movement. Operations did not coordinate this decision through the OCC. When the OCC learned that fuel movement had been resumed without the audible SRM alarm function, they notified the Operations Director, and he ordered fuel movements stopped at 9:39 p.m. Station personnel repaired the SRM audible alarm prior to moving additional fuel bundles.

Analysis. The inspectors determined that Exelon's non-compliance with the requirements of TS 3.9.2 is a performance deficiency. Additionally, once the non-compliance was identified, Limerick operations staff incorrectly determined that compensatory measures could be used to meet the TS 3.9.2 requirements, and subsequently recommenced fuel moves. Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function, and was not the result of any willful violation of NRC requirements or Exelon procedures.

This finding is greater than minor because it was associated with the Configuration Control attribute of shutdown equipment alignment, and affected the Initiating Events Cornerstone objective of limiting the likelihood of events challenging critical safety functions during shutdown operations. Inspectors assessed this finding using Phase 1 of the Shutdown Operations Significance Determination Process. Inspectors determined this finding to be of very low safety significance (Green), because while the finding represented a non-compliance with a core alteration TS, it did not increase the likelihood of a loss of reactor coolant system (RCS) inventory, it did not degrade the ability to terminate a leak or add inventory to the RCS, and it did not degrade the ability to recover decay heat removal capability if lost.

Enforcement. TS 3.9.2, "Instrumentation," requires that at least two SRM channels be operable and that at least one has an audible indication in the MCR. If this condition is not met, TS 3.9.2 requires that core alterations be immediately suspended. Contrary to the above, on March 12, 2005, Limerick Unit 2 operators continued to perform core alterations for over nine hours following the loss of all Unit 2 SRM audible annunciators. Because this issue is of very low safety significance and has been entered into Exelon's corrective action program (IR 312046), this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000353/2006002-01, Unit 2 Core Alterations Without Audible Source Range Monitor Alarms.**

1R15 Operability Evaluations (71111.15 - 6 samples)

a. Inspection Scope

For the six operability evaluations listed below, the inspectors evaluated the technical adequacy of the evaluations to ensure that Exelon properly justified Technical Specification operability and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) to verify that the system or component remained available to perform its intended function. In addition, the inspectors reviewed compensatory measures implemented to verify that the compensatory measures worked as stated and that Exelon adequately controlled these measures. The inspectors also reviewed a sampling of issue reports to verify that Exelon identified and corrected any deficiencies associated with operability evaluations.

- Unit 1 RCIC High Turbine Oil Level (IR 436635)
- HV-51-148B (RHR Heat Exchanger Bypass) Did Not Close (IR 437503)
- HV-011-201H Failed Stroke Time (IR 442139)
- Unit 1 RCIC Steam Admission Valve (HV-50-1F045) Operability due to Wiring Issue (IR 442831)
- TE-041-213B Fluctuating (2B SRV) (IR 439845)
- 20 Station Auxiliary Bus Voltage Outside Normal Band (IR 450906)

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17 - 1 sample)

a. Inspection Scope

The inspectors reviewed the engineering documentation for the Unit 1 residual heat removal (RHR) shutdown cooling check valve modification. In addition, the inspectors performed a walkdown of the modification in the drywell during initial component installation and after station personnel completed the pipe and valve work. Exelon performed the modification to eliminate intermittent check valve motion with the plant at full power operation. The check valve motion has led to valve damage and degraded internal leakage in the past.

- Unit 1 Residual Heat Removal Shutdown Cooling Check Valve Modification, ECR LG-05-00621

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19 - 6 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed Exelon's test procedures to verify that the procedures adequately tested the safety function(s) that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with 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 the test data to verify that the results adequately demonstrated restoration of the affected safety function(s).

- D11 EDG Initial Start and Parallel to the Electrical Grid After a Major Overhaul, RT-6-092-315-1
- Diesel Driven Fire Pump Flow Test, ST-6-022-252-0, after Control Switch Replacement
- ADS Drywell Pressure Bypass Timer Calibration/Functional Test, ST-2-042-661, Following Relay Replacement
- Unit 2 'B' Safety Relief Valve Test Following Valve Replacement, ER-AA-330-001 and ST-4-041-470-2
- D13 Diesel Generator 4KV Safeguard Loss of Power and Outage Test after Bus Work, ST-6-092-117-1

- Testing Following Repairs on Unit 1 'D' Residual Heat Removal Pump Minimum Flow Valve

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors reviewed the outage plan for the Unit 1 refueling outage (1R11), conducted March 6 - 24, 2006, to confirm that Exelon had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below.

- Configuration management, including maintenance of defense-in-depth commensurate with the outage plan for key safety functions and compliance with the applicable Technical Specifications when taking equipment out-of-service.
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting.
- Controls over the status and configuration of electrical systems and switchyard activities to ensure that Technical Specifications were met.
- Monitoring of decay heat removal processes.
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system.
- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory addition, and controls to prevent inventory loss.
- Controls over activities that could affect reactivity.
- Maintenance of secondary containment as required by Technical Specifications.
- Refueling activities, including fuel handling and sipping to detect fuel assembly leakage.
- Startup and ascension to full power operation, tracking of startup prerequisites, and walkdown of the drywell (primary containment) to verify that debris had not been left which could block emergency core cooling system suction strainers.
- Identification and resolution of problems related to refueling outage activities.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22 - 6 samples)

a. Inspection Scope

The inspectors witnessed six surveillance tests and/or reviewed test data of selected risk significant structures, systems, or components (SSCs) to assess, as appropriate, whether the SSCs met the requirements of the Technical Specifications and the UFSAR. The inspectors also determined whether the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions.

- ST-6-012-231-0, 'A' Loop RHRSW Pump, Valve, and Flow Test
- ST-6-051-233-2, 'C' RHR Pump, Valve, and Flow Test
- ST-2-042-933-2, RPS and NSSSS Rx Vessel Water Level Low, Level 3, Channel 'B' Response Time Test
- RT-2-056-404-2, Unit 2 HPCI Turbine Exhaust Pressure High Calibration / Functional Test
- ST-6-051-231-2, 'A' RHR Pump, Valve, and Flow Test
- ST-6-041-202-1, MSIV Cold Shutdown Valve Test

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23 - 1 sample)

a. Inspection Scope

The inspectors reviewed the temporary modification listed below, the associated 10 CFR 50.59 screening, and compared each against the UFSAR and Technical Specifications to verify that the modification did not affect operability or availability of the affected system. The inspectors ensured that each modification was in accordance with the modification documents and reviewed post-installation and removal testing to verify that Exelon adequately verified the actual impact on permanent systems by the tests.

- S51.7.B, "Defeating the RHR Shutdown Cooling Auto Isolation"

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01 - 21 samples)

a. Scope

During the periods of January 9 - 13, 2006, and March 13 - 17, 2006, the inspector conducted the following activities to verify that Exelon implemented physical, administrative, and engineering controls for access to locked high radiation areas and other radiologically controlled areas, and that workers were adhering to these controls when working in these areas during power operations and during the Unit 1 refueling outage (1R11). The inspector reviewed implementation of these controls against the criteria contained in 10 CFR 20, applicable industry standards, and Exelon procedures. Completion of ten samples during the January 9 - 13 inspection period and 11 samples during the March 13 - 17 inspection period completes the annual inspection requirement of 21 samples for inspection procedure 71121.01.

Plant Walkdowns and Radiation Work Permit (RWP) Reviews

The inspector identified exposure significant work areas in Units 1 and 2, including areas of the Reactor Buildings, Control Structure, Radwaste Building, and Turbine Building. The inspector reviewed survey maps and RWPs for these areas to determine if the associated controls were acceptable.

The inspector toured accessible radiological controlled areas in both Units, and with the assistance of a radiation protection technician performed independent radiation surveys of selected areas to confirm the accuracy of survey maps and the adequacy of postings.

In evaluating the RWPs, the inspector reviewed electronic dosimeter (ED) dose/dose rate alarm set points to determine if the set points were consistent with the survey indications and plant policy. The inspector verified that workers were knowledgeable of the actions to be taken when the ED alarms or malfunctions for tasks being conducted under selected RWPs. Work activities reviewed included radiographic examinations performed in the Unit 1 reactor building, Unit 2 reactor feed pump turbine exhaust expansion joint inspections, control room chiller maintenance, and preparing/repairing control rod drive equipment in the Unit 2 control rod drive rebuild room. Work activities reviewed during 1R11 included removal of spent filters from the suppression pool, repair of the regenerative heat exchanger end bell, installation of permanent drywell shielding, and installation of the RHR shutdown cooling check valve differential pressure modification. Additionally, the inspector reviewed dose and dose rate alarm reports to determine if the set points were appropriate for the radiological conditions experienced by the worker, and that Exelon entered the alarms into their corrective action program for further evaluation.

The inspector examined the airborne monitoring instrumentation, air sampling results, respiratory protection evaluations, and engineering controls for potential airborne radioactivity areas. Through review of relevant documentation, the inspector confirmed that no worker received an internal dose in excess of 50 mrem due to airborne radioactivity for 2005, including during the Unit 1 refueling outage and the Unit 2 maintenance (2M36) outage.

The inspector examined the physical and programmatic controls for highly activated/contaminated components stored in the spent fuel pools. The inspector verified that stored materials were properly secured.

Identification and Resolution of Problems

The inspector reviewed elements of Exelon's corrective action program related to controlling access to radiologically controlled areas and evaluating dose and dose rate alarms, completed since the last inspection of this area, to determine if problems were being entered into the program for resolution. Details of this review are contained in Section 4OA2 of this report.

Jobs-In-Progress Review

The inspector observed aspects of various maintenance activities being performed during the inspection periods to verify that radiological controls, such as required surveys, area postings, job coverage, locked high radiation area controls, and pre-job RWP briefings were implemented; personnel dosimetry was properly worn; and that workers were knowledgeable of work area radiological conditions. Tasks observed included control room chiller maintenance and radiographic examinations. Tasks observed during 1R11 included regenerative heat exchanger repairs, removal of suppression pool cleanup filters, and installation of permanent drywell shielding.

During the January 9 - 13 inspection period, the inspector attended pre-job briefings for radiographic examinations that station personnel performed on various components located in the Unit 1 reactor building, and a Chemistry Department planning meeting regarding preparations for conducting power suppression testing. During 1R11, the inspector attended pre-job briefings for regenerative heat exchanger repairs and for removal of suppression pool filters. The inspector assessed the adequacy of information presented during these briefings and the interdepartmental coordination required in completing these tasks.

High Risk Significant, High Dose Rate HRA, and VHRA Controls

The inspector and the Radiation Protection Supervisor discussed High Dose Rate (HDR) areas and Very High Radiation Area (VHRA) controls and procedures. The inspector verified that any changes made to relevant Exelon procedures did not substantially reduce the effectiveness and level of worker protection. Controls of significant high risk areas reviewed during the inspection periods included the Unit 1 and Unit 2 drywells and Traversing Incore Probe (TIP) rooms.

Keys to Unit 1 and Unit 2 locked high radiation areas (LHRA) and very high radiation areas (designated A and B keys) were inventoried and 172 LHRAs were verified to be properly secured and posted during plant tours. In addition, selected Unit 1 LHRAs were verified to be properly secured and posted during plant tours during 1R11.

Radiation Worker/Radiation Protection Technician Performance

During both inspection periods, the inspector assessed radiation worker and radiation protection technician performance by attending a pre-job briefing for radiographic examinations and observing control point activities. Through interviews and task observations, the inspector evaluated job preparations, the degree of technician coverage for work performed in LHRAs, and the knowledge level of the technicians for specific tasks.

The inspector also reviewed issue reports related to radiation worker and radiation protection technician errors to determine if an observable pattern traceable to a similar cause was evident.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls (71121.02 - 6 samples)

a. Inspection Scope

During the period March 13 - 17, 2006, the inspector conducted the following activities to verify that Exelon properly implemented operational, engineering, and administrative controls to maintain personnel exposure as low as is reasonably achievable (ALARA) for tasks conducted during the Unit 1 refueling outage (1R11), and during the Unit 2 maintenance outage (2M36), which occurred February 23 - 26, 2006.

This inspection represents the completion of six (6) samples for IP 71121.02, partially completing the biennial inspection requirement of fifteen (15) samples.

Radiological Work Planning

The inspector reviewed pertinent information regarding cumulative exposure history, current exposure trends, and ongoing activities to assess current performance and outage exposure challenges. The inspector determined the site's three-year rolling collective average exposure.

The inspector reviewed the Unit 1 refueling outage work scheduled during the inspection period and the associated work activity dose estimates. Scheduled work reviewed included regenerative heat exchanger repairs, installation of permanent shielding in the drywell, and removal/transfer of spent suppression pool filters.

The inspector reviewed procedures associated with maintaining worker dose ALARA and with estimating and tracking work activity specific exposures. The inspector reviewed the assumptions used in estimating outage dose, and radiation protection management briefed the inspector on recent upgrades to the access control program, in which work orders will be electronically tracked with RWPs to improve dose forecasting. The inspector compared the person-hour estimates provided by maintenance planning and other work groups with actual work activity time requirements and evaluated the accuracy of these estimates. Specific jobs reviewed included installation and removal of scaffolding and shielding in the drywell, regenerative heat exchanger repairs, and main steam relief valve removal/installation.

The inspector reviewed the dose summary reports, detailing worker estimated and actual exposures, through March 16, 2006, for jobs performed during the 1R11 refueling outage and for the Unit 2 maintenance outage (2M36).

The inspector evaluated the exposure mitigation requirements specified in RWPs and ALARA Plans (AP), and compared actual worker cumulative exposure to estimated dose for tasks associated with these activities. The inspector reviewed in detail those work activities whose actual cumulative exposure approached the estimated dose, which resulted in a subsequent Work-In-Progress ALARA Review. Jobs reviewed included Install/Remove Drywell Shielding in support of 1R11, Install/Remove Drywell Scaffolding in support of 1R11, and Install/Remove Main Steam Relief Valves (MSRV) for 1R11.

The inspector evaluated the departmental interfaces between radiation protection, engineering, maintenance crafts, and operations to identify missing ALARA program elements and interface problems. The inspector accomplished the evaluation by interviewing the Radiological Engineering Manager and Radiation Protection Manager, reviewing station ALARA Committee meeting minutes, and attending pre-job briefings for jobs-in-progress (suppression pool spent filter removal and regenerative heat exchanger repairs).

The inspector determined if work activity planning included the use of temporary shielding, system flushes, hydrolazing of piping, and operational considerations to further to minimize worker exposure. The inspector examined the effectiveness of temporary and permanent shielding installed in the drywell, and pre/post dose rate data for the reactor vessel nozzle flushes.

Verification of Dose Estimates and Exposure Tracking Systems

The inspector reviewed the assumptions and basis for the annual site collective exposure estimate and the Unit 1 refueling outage dose projection. The inspector reviewed personnel contamination reports and evaluated the need for internal dose assessments.

The inspector reviewed Exelon's method for adjusting exposure estimates, and re-planning work, when emergent work was encountered. The inspector reviewed the

Work-In-Progress ALARA reviews, ALARA Plans, and actions of the station ALARA Committee in monitoring and controlling dose allocations.

The inspector reviewed Exelon's exposure tracking system to determine whether the level of detail, exposure report timeliness and dissemination was sufficient to support the control of collective exposures. The inspector included departmental dose compilations, highest personnel exposures to date, and individual exposure records in this review.

Job Site Inspection and ALARA Control

The inspector observed the maintenance and operational activities being performed for drywell demobilization, regenerative heat exchanger repair, and removal of spent suppression pool filters to verify that Exelon implemented radiological controls, such as required surveys, job coverage, and contamination controls; personnel dosimetry was properly worn; and that workers were knowledgeable of work area radiological conditions.

The inspector reviewed the exposure of individuals in selected work groups, including mechanical maintenance, radiation protection, and outage services to determine if supervisors were making efforts to equalize doses among the workers.

Source Term Reduction and Control

Through data review and telephone discussions held on March 28, 2006, with the Radiation Protection Manager, the inspector evaluated the status and historical trends for the Unit 1 source term.

Declared Pregnant Workers

The inspector reviewed the radiological controls and dosimetry records for four declared pregnant workers performing outage related tasks to determine if Exelon met regulatory requirements in controlling their exposure.

Identification and Resolution of Problems

The inspector reviewed elements of Exelon's corrective action program related to implementing radiological controls to determine if station personnel were entering problems into the program for resolution. Details of this review are contained in section 4OA2 of this report.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program

As required by inspection procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a screening of all items entered into Exelon's corrective action program. Inspectors assessed each new issue report to verify whether Exelon adequately identified the full extent of various issues, performed appropriate evaluations, and identified reasonable corrective actions.

.2 Annual Sample: Review of Unit 2 Residual Heat Removal (RHR) Discharge High Pressure Alarms (71152 - 1 sample)

a. Inspection Scope

In January 2006, the inspectors reviewed station actions in response to multiple occurrences of higher than normal pressure in the Unit 2 RHR system discharge piping in 2005 and 2006. The inspectors reviewed various issue reports, operator logs, action requests, and procedures as well as performed walkdowns and interviews to determine if Exelon adequately resolved the issue. The inspectors evaluated Exelon's actions against the requirements of the corrective action program.

b. Findings and Observations

No findings of significance were identified.

Exelon evaluated the potential leak-by past the Low Pressure Coolant Injection (LPCI) valve (2F017), and, based on rate of pressurization, procedural guidance, and evaluation of design basis documents, correctly determined that the leak-by did not affect the ability of the LPCI system to perform its design function, and did not exceed the requirements for leakage past a primary containment isolation valve.

In response to each of these high pressure events, operators depressurized the RHR system in accordance with procedure S51.4.A, "Manual Depressurization of RHR." The normal RHR discharge pressure is 150 psig. The procedure directs depressurization of the system anytime the affected RHR loop is not in operation and loop pressure is greater than a nominal 275 psig. At the time, this procedure directed cracking open and then closing the 18-inch RHR full-flow test motor operated valve to depressurize the RHR system. Though depressurization of this system through the full-flow test valve can be accomplished from the control room, this may not be the most optimal method. Using a large valve to depressurize the system could result in a rapid drop in system pressure which could cause low pressure alarms and challenge the keep-fill systems. Additionally, if the valve were to fail open for any reason during depressurization, the

potential exists for the affected loop to be drained to the suppression pool. This would result in a loss of the LPCI function.

Alternate means, which included procedures that already existed, were available to depressurize the RHR system through smaller lines, such as the one inch high point vent valves and RHR heat exchanger sample lines. On February 23, 2006, station personnel developed a temporary procedure change to S51.4.A to direct depressurization using the smaller manual valves. Exelon authorized and implemented this temporary procedure change on April 2, 2006.

The inspectors reviewed the changes that Exelon made to procedure S51.4.A and found the changes to be acceptable.

.3 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope

The inspector reviewed 20 issue reports, recent Station ALARA Committee meeting minutes, eight Nuclear Oversight Objective Evidence Reports, and eight Nuclear Oversight Field Observation summaries, relating to controlling work activities in Unit 1 radiologically controlled areas, to evaluate Exelon's threshold for identifying, evaluating, and resolving occupational radiation safety problems. The review included a check of possible repetitive issues such as radiation worker and radiation protection technician errors.

The review was conducted against the criteria contained in 10 CFR 20, Technical Specifications, and Exelon procedures.

b. Findings and Observations

No findings of significance were identified.

.4 ISI Finding Dispositions (71111.08)

a. Inspection Scope

The inspector reviewed a sample of ISI related issues to verify that Exelon identified the issues at the appropriate threshold and entered them into the corrective action program. The inspector conducted interviews with plant personnel and reviewed issue reports and GE notification reports generated from IVVI and the core shroud inspection. The inspector verified that Exelon entered deficiencies into the corrective action program and evaluated and appropriately resolved these deficiencies within the corrective action program.

b. Findings and Observations

No findings of significance were identified.

4OA3 Event Followup (71153 - 3 samples)

.1 (Closed) LER 05000353/02-05-001, Core Alterations Performed With Source Range Monitor Alarm Horn Inoperable

On March 12, 2005, Unit 2 source range monitors (SRMs) became inoperable due to a loss of the SRM audible alarm function which resulted from an equipment problem that caused a continuous audible alarm in the main control room. Operators removed power fuses to silence the horn which in turn removed audible annunciator indication on 13 alarm panels. Exelon assigned a dedicated individual to monitor the alarm panels and alert the duty reactor operator in the event of a visual alarm on the affected panels. Core alterations were in progress during this event. Operators did not recognize that Technical Specifications (TS) requires the SRM audible alarm function to be operable anytime core alterations are in progress, resulting in operation in a condition prohibited by TS. The NRC is issuing a green non-cited violation regarding this issue in this report (Section 1R14). The inspectors did not identify any additional findings associated with this LER. Exelon documented this issue, along with completed and planned corrective actions, in IR 312046. This LER is closed.

.2 (Closed) LER 05000352/01-05-004, Minimum Critical Power Ratio Limiting Condition for Operation Non-compliance

On September 20, 2005, a General Electric Part 21 report determined that Limerick Unit 1 exceeded the Technical Specification (TS) 3.2.3, “Minimum Critical Power Ratio,” (MCPR) limit on May 29, 2004, and on September 11, 2004. On May 29, 2004, the MCPR TS limit of 1.0 was exceeded for six hours and reached a maximum value of 1.03. On September 11, 2004, the MCPR limit was exceeded for seven hours and reached a maximum value of 1.002. There was no impact on the reactor fuel because no plant transients occurred during the periods when the MCPR ratio exceeded the TS limit of 1.0. The non-compliance was due to an error in GE’s fuel test performance and final data. Exelon corrective actions included a review of Limerick Units 1 and 2 during the past two year operating cycle to determine the extent of condition and the installation of a new computer data bank on the core process computer for both units. The new computer data bank has been installed at Unit 1 and will be installed at Unit 2 prior to reaching a condition where the MCPR limit would present a concern.

This finding is more than minor because it had a credible impact on safety, in that a minimum critical power ratio (MCPR) value greater than the TS limit could result in fuel cladding degradation. The finding affects the Barrier Integrity Cornerstone and was considered to have very low safety significance (Green) using Appendix A of the Significance Determination Process (SDP) because no plant transients occurred during the periods when the MCPR ratio exceeded the TS limit and there was no fuel degradation. This licensee-identified finding involved a violation of TS 3.2.3, “Minimum Critical Power Ratio”. The enforcement aspects of the violation are discussed in Section 4OA7. This LER is closed.

.3 (Closed) LER 05000353/02-05-004, Reactor Scram Due to EHC Malfunction

On October 12, 2005, Unit 2 reactor scrammed from 100% reactor power due to problems with the main turbine electrohydraulic control (EHC) system. The plant responded as designed with the exception of the main turbine EHC malfunction. The EHC failure was due to faulty electrical circuit cards. Exelon replaced four EHC circuit cards and tested the cards satisfactorily. The inspectors reviewed this LER and identified no findings of significance and no violation of NRC requirements. Exelon documented this issue, along with completed and planned corrective actions, in IR 385399. This LER is closed.

4OA6 Meetings, Including Exit

Exit Meetings

On April 11, 2006, the resident inspectors presented the inspection results to Mr. DeGregorio and other members of his staff, who acknowledged the findings. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

- Technical Specification (TS) 3.2.3, “Minimum Critical Power Ratio” (MCPR) requires that the MCPR value remain less than one. Contrary to this, Limerick Unit 1 exceeded the MCPR limit on May 29, 2004, and on September 11, 2004. On May 29, 2004, the MCPR TS limit of 1.0 was exceeded for six hours and reached a maximum value of 1.03. On September 11, 2004, the MCPR limit was exceeded for seven hours and reached a maximum value of 1.002. This finding is of very low safety significance because no plant transients occurred during the periods when the MCPR ratio exceeded the TS limit and there was no fuel degradation. Exelon documented this issue, along with completed and planned corrective actions, in IR 352899.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Exelon Generation Company

R. DeGregorio, Site Vice President
C. Mudrick, Plant Manager
P. Orphanos, Director, Operations
P. Chase, Shift Operations Superintendent
E. Kelly, Engineering Programs Manager
W. Astbury, ESW System Manager
J. George, RHR System Manager
W. Tracey, SRV System Manager
F. Burzynski, Station Fire Marshall
M. Kowalski, Maintenance Rule Coordinator
P. Tarpinian, PRA Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000353/2006002-01	NCV	Unit 2 Core Alterations Without Audible Source Range Monitor Alarms

Closed

05000353/02-05-001	LER	Core Alterations Performed With Source Range Monitor Alarm Horn Inoperable
05000352/01-05-004	LER	Minimum Critical Power Ratio Limiting Condition for Operation Non-compliance
05000353/02-05-004	LER	Reactor Scram Due to EHC Malfunction

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Issue Reports and Action Requests
IR 431810, “Heat Trace Alarm”
IR 432034, “10-C183 Heat Trace Panel Trouble”
A1450182, “U/1 CST Inlet Line Heat Trace Alarm”

A1496183, “CST Overflow Heat Trace”
A1499354, “Intermittent Alarm for U/1 CST Heat Trace Trouble”
A1535411, “CB 104 Tripped Free”
A1543249, “Heat Trace Alarm”

Section 1R04: Equipment Alignment

Relief Request 51-VRR-2 Related to Inservice Testing Program, Limerick Generating Station, Units 1 and 2, dated September 27, 1993
System Health Overview Report, Residual Heat Removal System, December 2005
IR 146519, “ST-2-051-802-2 Has Failed Last 3 Performances”
IR 300346, “Unclear Min Flow Indication for ‘1B’ RHR Pump”
IR 300937, “1B RHR Min Flow Requirements”
IR 346796, “Reduce RHR Minimum Flow Rate Requirement”
IR 445317, “Unexpected Alarm”
IR 446940, “A Loop ESW Pinhole Leak in U2 RHR A/C Room 201'”
A0789304, “LTR From NRC: Relief Request 51-VRR-2 Related to IST Program”
A1406036, “ST-2-051-802-2 Has Exceeded Limits Past 3 Performances”
P & ID 8031-M-51, Sheet 5, “Residual Heat Removal, Unit 2,” Revision 24

Section 1R05: Fire Protection

Updated Final Safety Analysis Report, Section 9A
F-T-543, “Turbine Operating Floor, Rooms 543, 544, 549-551, 558, 565-567 (El. 269') Fire Area 114,” Revision 7
2F-R-179, “Unit 2 RCIC Pump Room 179 (El. 177'), Fire Area 56,” Revision 5
2F-R-180, “Unit 2 HPCI Pump Room 180 (El. 177'), Fire Area 57,” Revision 5
2F-R-182, “Unit 2 Corridor Room 182 (El. 177'), Fire Area 63,” Revision 3
2F-R-284, “Unit 2 Reactor Enclosure Chill Water Heat Exchanger Area Rooms 284 and 286 (El. 201'), Fire Area 64,” Revision 4
2F-R-173, “Unit 2 A and C RHR Heat Exchanger and Pump Rooms 173 and 280 (El. 177' and 201'), Fire Area 54,” Revision 4
2F-R-174, “Unit 2 B and D RHR Heat Exchanger and Pump Rooms 174 and 281 (El. 177' and 201'), Fire Area 55,” Revision 3
2F-R-370, “Unit 2 Safeguard System Access Area Room 370 (El. 217'), Fire Area 67,” Revision 7
2F-R-475, “Unit 2 CRD Equipment and Neutron Monitoring Area Rooms 475, 476, 477, and 479 (El. 253'), Fire Area 68,” Revision 11

Section 1R07: Heat Sink Performance

RT-2-011-392-2, “2CV210 RHR Room Cooler Air to Water Heat Transfer Test,” Revision 3
IR 394578, “Could Not Perform Pre-Clean Heat Transfer Test”
Maintenance Procedure M-200-037, “Q Listed HVAC Heating and Cooling Coil Clean/Flush”
Work Order No. R0943632, “2CV210 RHR Room Cooler Clean and Inspect”

Section 1R08: Inservice Inspection (ISI)

Issue Reports and Action Requests

AR 00463982	AR 00463988	AR 00465496
IR 464045	IR 465167	IR 465350
IR 465355	IR 465361	IR 46549456

Procedures

GE-PDI-UT-10, "PDI Generic Procedure for the Ultrasonic Examination of Dissimilar Metal Welds," Revision 1
GE-MT-100, "Procedure for Magnetic Particle Examination," Revision 6

Indication Notification Reports

LiR11 IVVI-06-10	Jet Pump 13-14 RS-9 Weld
LiR11 IVVI-06-14	Core Spray Piping P8aC Weld

Ultrasonic Calibration and Examination Record

FW 1301	FW 5
RC 012	RC 013

Radiography Reader Sheets

FW 1301	FW 5
SW 6	

Magnetic Particle Examination Report

Li1/FR RPV Weld Build-UP Integral Welded Attachment
Li1/CG Skirt Knuckle to RPV Weld

Other Documents

LG 04-00360 001, "Replacement and Margin Improvement - HV-051-2F016B"
Welding Procedure Specification (WPS) for the HV-051-1F016B Replacement
Procedure Qualification Reports (PQRs) for the HV-051-1F016B Replacement
Welder Performance Qualifications (WPQs) for the HV-051-1F016B Replacement

Section 1R12: Maintenance Effectiveness

Issue Reports and Action Requests

A0971931, "Maintenance Rule Improvement Plan for System 041"
A1415414, "'1L' SRV Has Elevated Tail Pipe Temperature"
IR 305782, "Mike SRV Is Above 205 Degrees"
IR 305790, "Lima SRV Is Above 205 Degrees"
IR 201983, "Unplanned LCO on Core Spray - Engineering Weaknesses"
IR 199961, "Unplanned LCO on Core Spray"

Miscellaneous
Limerick 2M36 SRV Summary
Limerick Maintenance Rule Database, System 41A, Nuclear Boiler (SRVs)
Maintenance Rule Expert Panel Meeting Minutes, Panel Meeting 0004 (05/18/2000)
Maintenance Rule Expert Panel Meeting Minutes, Panel Meeting 0212 (11/21/2002)
Maintenance Rule Expert Panel Meeting Minutes, Panel Meeting 0402 (04/28/2004)
PEP I0012314, "2N SRV Inadvertently Lifted and Remained Open During S/D"
N-00E-273-00011, "Target Rock Documentation Regarding Compliance with 1968 Ed. ASME B &PV Code, Section III, N-911.2(5) Requirement for TR Valve Model 9867F"
System Health Overview Report, MSIV/Nuclear Boiler, December 2005
ST-6-011-201-0, "ESW Increased Frequency Valve Test," Revision 12, dated 07/30/2005
ST-6-011-201-0, "ESW Increased Frequency Valve Test," Revision 15
RT-2-011-253-0, "ESW Loop 'A' D/P and Flow Data Collection," Revision 15
RT-2-011-253-0, "EWS Loop 'A' Flow Verification," Revision 13, dated 07/29/2005 and 08/03/2005
RT-6-011-603-0, "'A' Loop ESW Unit Cooler Throttle Valve Flush," Revision 4, dated 07/27/2005
Operator Logs dated July 26, 2005 to August 2, 2005

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Issue Reports and Action Requests
IR 108585, "Elevated Oil Level on Unit 2 RCIC"
IR 112696, "Failure to Obtain Oil Sample from U2 RCIC"
IR 394327, "Limerick Offsite Voltage Regulation Study Calc 6300E.20"
IR 436635, "RCIC Turbine Oil Level High"
IR 437018, "Less than Adequate Detail in 101 Safeguard Transformer LTC PMT"
IR 437575, "Unit 1 RCIC Turbine Has High Oil Level"
A1545532, "Unit 1 RCIC Turbine Has High Oil Level"
A1554743, "HV-041-1F028A Failed Stroke Time"
A1554742, "HV-041-1F028B Failed Stroke Time"
A1554514, "HV-049-1F007 Failed to Close"
IR 463640, "Unit 1 RCIC Turbine Oil Contains Babbitt Material"
IR 462541, "HV-041-1F028A Failed Stroke Time"
IR 462548, "HV-041-1F028B Failed Stroke Time"
IR 462370, "HV-049-1F007 Failed to Close"

Work Orders
C0215888, C0216931, R0895693, R0895650

Miscellaneous
Limerick Generating Station Updated Final Safety Analysis Report, Section 5.4.5
P&ID 8031-E-1, Sheet 1, "Single Line Station Diagram," Revision 24
P&ID 8031-M-49, Sheet 1, "Reactor Core Isolation Cooling Unit 1," Revision 51
P&ID 8031-M-50, Sheet 1, "RCIC Pump Turbine Unit 1," Revision 35
P&ID 8031-M-50, Sheet 3, "RCIC Pump Turbine Unit 1 Lube Oil and Control System," Revision 1

Operator Logs, dated 12/27/05 through 12/29/05
IC-11-02011, "Testing and Calibration of the Automatic Static Controls on the Safeguard Transformers," Revision 2, completed on 12/27/05
ST-6-107-590-1, "Daily Surveillance Log / OPCONS 1,2,3," Revision 136
Limerick Generating Station Technical Evaluation for Voltage Regulation Study Calculation 6300E.20, R11, Revision 2
ECR LG 05-00546, "10, 20,101, and 201 Transformer Load Tap Changer Time Delay Changes"
Failure Mode Causal Table for Troubleshooting of High Oil Level on Unit 1 RCIC Turbine
Operator Logs, dated 12/30/05 through 01/08/06
S41.1.B, "MSIV Closure Time Set Up Procedure," Revision 4
ST-6-041-202-1, "MSIV Cold Shutdown Valve Test," Revision 20
GP-12, "Water Chemistry Control Action Plan," Revision 16
ON-116, "High Reactor Water Conductivity - Bases," Revision 10

Section 1R14: Personnel Performance During Non-Routine Plant Evolutions

Procedures
ON-122, "Loss of Main Control Room Annunciators," Revisions 11, 12, and 13
GP-2, "Normal Plant Startup," Revision 117
GP-3, "Normal Plant Shutdown," Revision 116

Issue Reports and Action Requests
IR 312046, "Unit 2 Core Alterations with SRM Audible Alarm Inoperable"

Miscellaneous
Prompt Investigation Report for Core Alterations Without SRM Audible Alarm Available
Technical Specification (TS) 3.9.2, "Instrumentation"
Operator logs dated February 23, 2006 through February 26, 2006

Section 1R15: Operability Evaluations

Issue Reports and Action Requests
A1445282, "HV-011-201H Did Not Stroke Full Open"
A1496086, "HV-011-201H Failed Stroke Time"
A1545363, "HS-51-148B Did Not Close HV-51-1F048B on First Two Attempts"
IR 191594, "Vendor Data Found to be Inconsistent with Plant Data"
IR 286554, "HV-C-051-2F048B (2B RHR HTX Bypass) Indicates 95% Open"
IR 437503, "HS-51-148B Did Not Close HV-51-1F048B on First Two Attempts"
IR 442139, "HV-011-201H Failed to Fully Open"

Miscellaneous
UFSAR Section 9.2
P&ID 8031-M-11, Sheet 5, "Emergency Service Water," Revision 44
Calculation LM-296, "Evaluate Required ESW Flow Rates to Core Spray, HPCI, and RCIC Unit Coolers at Design Conditions," Revision 2
RT-6-011-604-0, "'B' Loop ESW Unit Cooler Throttle Valve Flush," Revision 6
RT-2-011-254-0, "ESW Loop 'B' Flow Verification," Revision 15

Operator Logs dated January 3, 2006

Section 1R17: Permanent Plant Modifications

Engineering Change Request, ECR LG-05-00621, Unit 1 Residual Heat Removal Shutdown Cooling Check Valve Modification
P&ID 1-M-51, Sheet 3, "Residual Heat Removal"
P&ID 1-M-43, Sheet 1, "Reactor Recirculation"
IR 469387, "Flexible Conduits Broken On HV-051-1F050A"
IR 469482, "HV-051-1F050A Is Indicating Open With No Flow"

Section 1R19: Post Maintenance Testing

ST-2-042-661-1, "ECCS - ADS Drywell Pressure Bypass Timer Division 1 Calibration/Functional Test (B21C-K37A)," Revision 10, completed 02/08/2006
ST-2-042-661-1, "ECCS - ADS Drywell Pressure Bypass Timer Division 1 Calibration/Functional Test (B21C-K37A)," Revision 10, completed 02/09/2006
ST-6-022-252-0, "Diesel Driven Fire Pump Flow Test," Revision 23
ST-6-051-234-1, "D RHR Pump, Valve, and Flow Test," Revision 51, performed 03/13/2006 and 03/15/2006

Issue Reports and Action Requests
IR 451249, "ST-2-042-661-1 Failed"
IR 465531, "HV-051-1F007D Not Opening When Needed"
A1550641, "ADS High Drywell Pressure and RPV Low Level Logic"
A1556438, "HV-051-1F007D Not Opening When Needed"
A1278751, "HV-051-1F007B, '1B' RHR Pump Min Flow Valve Failed to Open"

Work Orders
C0216538, M1556438

Section 1R20: Refueling and Other Outage Activities

Procedures
GP-6.2, "Shutdown Operations - Shutdown Condition Tech Spec Actions," Revision 38
ST-6-107-641-1, "Reactor Vessel Temperature and Pressure Monitoring With No RHR Shutdown Cooling Loops in Operation," Revision 25
S52.5.B, "Core Spray Header Flush and Vessel Flood-up," Revision 23
S51.7.B, "Defeating the RHR Shutdown Cooling Auto Isolation," Revision 06
ON-121, "Loss of Shutdown Cooling," Revision 23
ON-121, "Loss of Shutdown Cooling - Bases," Revision 21
OU-AA-101, "Refuel Outage Management," Revision 10
OU-LG-104, "Limerick Generating Station Shutdown Safety Management Program," Revision 4
S51.4.A, "Manual Depressurization of RHR," Revision 8
S43.1.A, "Startup of Recirculation System," Revision 56
ARC-MCR-113 I3, "1C RHR Pump Discharge Hi/Lo Pressure," Revision 1
ARC-MCR-113 I4, "Div 3 LPCI Injection Valve Delta P Permissive"

Issue Reports and Action Requests
IR 468249, “Indications of Cracks on Steam Dryer Upper Support Ring”
IR 467982, “Failed ST-2-001-806-1, EOC-RPT Response Time”
IR 466345, “ESW Pump Running Problems During LOCA LOOP Test”
IR 468824, “1R11 HPCI Alignment Issues”
A1558353, “‘1B’ MG Set Trip”
A1558170, “‘1B’ RPS Half Scram Received for No Apparent Reason”
IR 465146-03, “1B RHR Tagging Clearance Prompt Investigation Report”

Miscellaneous
Operator Logs dated March 6, 2006 to March 25, 2006
Start-Up Plant Operations Review Committee Package, dated March 17, 2006
NRC Safety Evaluation Report Related to Amendment Nos. 97 and 61
NRC Safety Evaluation Report Related to Amendment Nos. 119 and 82
“1B” RHR Master Tagging Clearance No. 05001887
Limerick Generating Station Unit 1 Refuel Outage ORAM-Sentinel Risk Profile
Prompt Investigation for Reactor Coolant Conductivity Increased Above Action Levels

Section 1R22: Surveillance Testing
S12.1.A, “RHR Service Water System Start-up,” Revision 43
Limerick Generating Station Unit 1 Technical Specifications
P&ID 8031-M-51, Sheet 5, “Residual Heat Removal (Unit 2),” Revision 24
P&ID 8031-M-51, Sheet 6, “Residual Heat Removal (Unit 2),” Revision 22
P&ID 8031-M-51, Sheet 7, “Residual Heat Removal (Unit 2),” Revision 16
P&ID 8031-M-51, Sheet 8, “Residual Heat Removal (Unit 2),” Revision 22
Operator Logs dated January 11, 2006

Issue Reports and Action Requests
IR 113287, “RHR Operability During Performance of PV&F”
IR 380572, “RHR P,V,F ST Closes Gage Root Valve Before Required Reading”
IR 396980, “Alarms Received During RHR PV&F Test Not Identified in ST”

Section 2OS1: Access Control to Radiologically Significant Areas

Procedures
RP-AA-460, “Controls for High and Very High Radiation Areas,” Revision 10
RP-LG-460-1016, “Radiation Protection Controlled Keys,” Revision 3
RT-0-100-460-0, “High Radiation and Locked High Radiation Door Preventative Maintenance Inspection,” Revision 1

ALARA Work-In-Progress Reviews
Plan No. 2006-43 Install/Remove Drywell Scaffolding in support of 1R11
Plan No. 2006-46 Install/Remove Drywell Shielding in support of 1R11
Plan No. 2006-47 Install/Remove MSRV’s in support of 1R11

Nuclear Oversight Objective Evidence Reports
Dated: 01/19/06, 01/26/06, 01/09/06, 01/06/06, 02/06/06, 02/17/06, 02/0306, 01/09/06

Section 2OS2: ALARA Planning and Controls

Procedures
RP-AA-210, "Dosimetry Issue, Usage, and Control," Revision 6
RP-AA-220, "Bioassay Program," Revision 3
RP-AA-222, "Methods for Estimating Internal Exposure from the In-Vivo and In-Vitrol Bioassay Data," Revision 1
RP-AA-250, "External Dose Assessments from Contamination," Revision 4
RP-LG-300-102, "Removing Items from the Spent Fuel Pool, Reactor Cavity, Equipment Pit, or Cask Pit," Revision 0
RP-AA-350, "Personnel Contamination Monitoring, Decontamination, and Reporting," Revision 4
RP-AA-376, "Radiological Postings, Labeling, and Markings," Revision 1
RP-AA-400, "ALARA Program," Revision 3
RP-LG-400-1003, "Emergent Dose Control and Authorization," Revision 1
RP-LG-700-1001, "Radiation Protection Instrumentation Operations Guidelines," Revision 2
RP-AA-401, "Operational ALARA Planning and Controls," Revision 5
RP-AA-403, "Administration of the Radiation Work Permit Program," Revision 1
RP-AA-460-1002, "High Radiation Area (HRA) and Locked High Radiation Area (LHRA) Briefing Form," Revision 1
RP-AA-460-1003, "Radiation Worker Pocket RWP Data Sheets," Revision 1

Issue Reports
452485, 462320, 463328, 464224, 464313, 464317, 465141, 465373, 465307, 443125, 444411, 449723, 454081, 454332, 460341, 460616, 463305, 463336, 463817, 464968

ALARA Plans

No. 2006-58	RHR 50DP Mod, U1 Drywell 1R11
No. 2006-01	1R11 Suppression Pool Diving - Sludge Removal & Liner/Coating Inspection
No. 2006-46	Temporary & Permanent Shielding, Unit-1 Drywell, in support of 1R11
No. 2006-52	Replace HV-51-1FO50A, Unit-1 DW 270 Az
No. 2006-43	Installation/Removal of Scaffolding, Unit-1 Drywell 1R11
No. 2006-27	Refuel Floor Outage Middle Activities
No. 2006-64	Rx Services Under Vessel Support for 1R11
No. 2006-31	1R11 Refuel Floor-Reactor Cavity Work Platform Activities

Station ALARA Committee Meeting Minutes
Meeting Nos. 2006-01, 2006-002

Section 4OA2: Other

Issue Reports and Action Requests
IR 284057, "Potential Leakby of HV-051-2F017B, System is Slowly Pressing Up"
A0818900, "HV-051-1F010B - Op Limitorque Inspection and Diagnostics"
A0993302, "1D RHR System Piping Change to Impose Leakage Vent System"

A1322734, “Possible Leakby From HV-051-2F017B”
A1469989, “HV-51-2F017B Rework if LLRT ST-4-LLR-461-2 Fails”
PEP I0005349, “1D RHR Hi/Lo Pressure Alarm Response not Consistent with ARC”
PEP I0007980, “1A CS Loop Declared Inop When 15A Valve Tripped on Thermals”

Procedures
ARC-MCR-213 F3, “2A RHR Pump Disch Hi/Lo Press,” Revision 1
ARC-MCR-213 G2, “Loop A RHR Line High Point Vent Lo Level,” Revision 2
S51.2.C, “RHR Venting,” Revision 2
S51.4.A, “Manual Depressurization of RHR,” Revision 8
TC 1-06-237-0 to S51.4.A, “Manual Depressurization of RHR,” Revision 8
LS-AA-125, “Corrective Action Program (CAP) Procedure,” Revision 9

Miscellaneous
ST-2-107-370-2, “Low Pressure ECCS Keep Fill System High Point Venting (LSL-51-210B, LSL-51-210D),” completed 01/01/06 and 01/06/06
ST-6-107-590-2, “Daily Surveillance Log/OPCONS 1, 2, 3,” Revision 102
Operator Logs, dated September 9, 2005 and September 23, 2005

Drawings
P & ID 8031-M-51, Sheet 5, “Residual Heat Removal, Unit 2,” Revision 24

Section 4OA3: Event Followup

Issue Reports and Action Requests
IR 312046, “U2 Core Alterations With SRM Audible Alarm Inoperable”
IR 385399, “GP-18 Review - Unit 2 Scram October 12, 2005"

Miscellaneous
Unit 2 Reactor Scram GP-18, “Scram/ATWS Event Review,” Revision 45
Licensed Operator Training Lesson Plan 0590, “EHC System Logic”
Operator Logs dated October 12, 2005 through October 19, 2005

LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
ADS	Alternate Depressurization System
AP	ALARA Plan
AR	Action Request
ASME	American Society of Mechanical Engineers
BWRVIP	Boiling Water Reactor Vessel Inspection Program
CFR	Code of Federal Regulations
ECCS	Emergency Core Cooling System
ED	Electronic Dosimeter
EDG	Emergency Diesel Generator
EHC	Electrohydraulic Control
EPRI	Electric Power Research Institute
ESW	Emergency Service Water
GE	General Electric
HDR	High Dose Rate
HPCI	High Pressure Coolant Injection
HRA	High Radiation Area
IMC	[NRC] Inspection Manual Chapter
IR	Issue Report
ISI	In-Service Inspection
IVVI	In-Vessel Visual Inspection
LER	Licensee Event Report
LHRA	Locked High Radiation Area
LPCI	Low Pressure Coolant Injection
MCPR	Minimum Critical Power Ratio
MCR	Main Control Room
MSIV	Main Steam Isolation Valve
MSRV	Main Steam Relief Valve
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
NSSSS	Nuclear Steam Supply Shutoff System
OCC	Outage Control Center
psig	pounds per square inch gauge
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RFO	Refueling Outage
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
RWP	Radiation Work Permit
SDP	Significance Determination Process
SRM	Source Range Monitor
SRV	Safety Relief Valve
SSC	Structure, System, or Component

TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
VHRA	Very High Radiation Area