



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

October 9, 2018

Mr. Bryan C. Hanson  
Senior Vice President, Exelon Generation Company, LLC  
President and Chief Nuclear Officer, Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: LIMERICK GENERATING STATION – DESIGN BASES ASSURANCE  
INSPECTION (TEAMS) REPORT 05000352/2018010 AND 05000353/2018010

Dear Mr. Hanson:

On August 2, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed the onsite portion of an inspection at Limerick Generating Station, Units 1 and 2. On August 2, 2018, the NRC inspectors discussed the preliminary results of this inspection with Mr. Frank Sturniolo, Plant Manager, and other members of your staff. After additional review of specific items, the team discussed the final results of this inspection with Mr. Rick Libra, Site Vice President, and other Exelon staff on August 30, 2018. The results of this inspection are documented in the enclosed report.

NRC inspectors did not identify any finding or violation of more than minor significance.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and the NRC's Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

**/RA/**

Mel Gray, Chief  
Engineering Branch 1  
Division of Reactor Safety

Docket Numbers: 50-352 and 50-353  
License Numbers: NPF-39 and NPF-85

Enclosure:  
Inspection Report 05000352/2018010  
and 05000353/2018010

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SUBJECT: LIMERICK GENERATING STATION – DESIGN BASES ASSURANCE  
 INSPECTION (TEAMS) REPORT 05000352/2018010 AND 05000353/2018010  
 DATED OCTOBER 9, 2018

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**U.S. NUCLEAR REGULATORY COMMISSION  
Inspection Report**

Docket Numbers: 50-352 and 50-353

License Numbers: NPF-39 and NPF-85

Report Numbers: 05000352/2018010 and 05000353/2018010

Enterprise Identifier: I-2018-010-0033

Licensee: Exelon Generation Company, LLC

Facility: Limerick Generating Station, Units 1 & 2

Location: Sanatoga, PA 19464

Inspection Dates: July 16, 2018 through August 30, 2018

Inspectors: S. Pindale, Senior Reactor Inspector, Division of Reactor Safety (DRS), Team Leader  
J. Ayala, Allegations/Enforcement Specialist, Office of the Regional Administrator  
E. Burket, Reactor Inspector, DRS  
L. McKown, Resident Inspector (Millstone), Division of Reactor Projects  
S. Kobylarz, NRC Electrical Contractor  
M. Yeminy, NRC Mechanical Contractor

Approved By: Mel Gray, Chief  
Engineering Branch 1  
Division of Reactor Safety

**SUMMARY**

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring Exelon's performance at Limerick Generating Station, Units 1 and 2 by conducting a design bases assurance inspection in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

No findings or more-than-minor violations were identified.

## INSPECTION SCOPES

This inspection was conducted using the appropriate portions of the inspection procedure in effect at the beginning of the inspection unless otherwise noted. Currently approved inspection procedures with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the inspection procedure requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter 2515, "Light-Water Reactor Inspection Program - Operations Phase." The team reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

## REACTOR SAFETY

### 71111.21M - Design Bases Assurance Inspection (Teams)

The team evaluated the following components, permanent modifications, and operating experience during the weeks of July 16, 2018, and July 30, 2018.

For the components, the team reviewed the attributes listed in Inspection Procedure 71111.21M, Appendix A, *Component Review Attributes*, such as those listed below. Specifically, the team evaluated these attributes as per 71111.21M, Appendix B, *Component Design Review Considerations* and 71111.21M, Appendix C, *Component Walkdown Considerations*.

#### Components (4 Samples)

- Unit 2 High Pressure Coolant Injection System (Turbine Controls)
  - Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents/procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Control logic
  - Equipment/environmental controls and qualification
  - Operator actions
  - Design calculations
  - Surveillance testing and recent test results

The team used Appendix B guidance for *Valves, Instrumentation, and Electrical Loads*.

- Unit 2 Division II 125/250 Volt DC Bus, MCC 20D202 and MCC 20D203
  - Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Operating procedures
  - Consistency among design and licensing bases and other documents/procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Design calculations
  - Equipment protection (sealing of cable and conduits)

- Environmental conditions
- Contactor and fuse ratings; Component adequacy for minimum voltage
- Protection coordination; Load in-rush and full load current

The team used Appendix B guidance for *Circuit Breakers and Fuses, Electrical Loads, Motor Control Centers, and As-Built System*.

- D12 Emergency Diesel Generator Mechanical Components
  - Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents/procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Design calculations
  - Surveillance testing and recent test results
  - System and component level performance monitoring
  - Range, accuracy, and setpoint of installed instrumentation
  - Equipment protection from fire, flood, and water intrusion or spray
  - Heat removal cooling water and ventilation
  - Energy sources, fuel and air (e.g., engine start, operation, and control)

The team used Appendix B guidance for *Valves, Pumps, Instrumentation, Electric Loads, and As-Built System*.

- Unit 1 Residual Heat Removal Pump 1BP202
  - Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents/procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Design calculations
  - Surveillance testing and recent test results

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*.

#### Component, Large Early Release Frequency (1 Sample)

- Unit 2 'A' Primary Containment Vacuum Relief Valves (PSV-57-237A-1 and -2)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents/procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Design calculations
  - Surveillance testing and recent test results

The team used Appendix B guidance for *Valves, Instrumentation, and As-Built System*.

### Permanent Modifications (5 Samples)

- EC 622874, Change Trip Setpoint for Unit Auxiliary Transformer Hi Side OC Relay 350/351-X102A(B)(C)
- EC 422309, E/S X-M1-21014 and E/S X-M1-11015 Inverter Replacement
- EC 617493, Reactor Core Isolation Cooling Pump Room Environmental Condition during Station Blackout (calculation)
- EC 620491, Change Motor-Operated Valve HV-011-015A to Manual Valve 011-0124A and Convert Manual Valve 011-0124A to Motor-Operated Valve HV-011-015A
- EC 422109, Component Design Bases Inspection Update, Reactor Core Isolation Cooling System Calculations per 834202 (calculation)

### Operating Experience (2 Samples)

- NRC Information Notice 2010-23, Malfunctions of Emergency Diesel Generator Speed Switch Circuits, dated November 1, 2010
- NRC Information Notice 2012-06, Ineffective Use of Vendor Technical Recommendations, dated April 24, 2012

## **INSPECTION RESULTS**

| Observations and Minor Violations  | 71111.21M |
|--|-----------|
| <p>Problem Identification and Resolution Area Review: The team identified observations/minor violations during their review of the effectiveness of corrective actions taken by Exelon associated with an item from a previous component design bases inspection. In particular, the team reviewed Exelon's actions for non-cited violation (NCV) 05000352 &amp; 05000353/2015-01.</p> <p>The NCV was related to non-conservative values in technical specifications (TSs) associated with the emergency diesel generators (EDGs), both for EDG voltage and frequency. The 2015 report also documented the applicability of NRC Administrative Letter 98-10, "Dispositioning of TSs that are Insufficient to Assure Plant Safety," which discussed short term compensatory measures to be followed by a TS amendment request. Following the prior inspection, Exelon evaluated and confirmed the appropriate voltage and frequency values to be used in EDG surveillance procedures (as compensatory measures). They also developed a corrective action assignment to process a TS amendment to correct the TS values and ensure the voltage and frequency values are consistent with the design and licensing bases and with surveillance procedure acceptance criteria (IR 1402947, Assign #2).</p> <p>WCAP-17308-NP, "Treatment of Diesel Generator Technical Specification Frequency and Voltage Tolerances," was developed to evaluate this issue for several affected nuclear plants and was submitted to the NRC for review. The NRC staff subsequently issued a safety evaluation in a letter dated April 17, 2017, in which the NRC documented general agreement with the methodology prescribed in WCAP-17308-NP.</p> <p>During this inspection, the team reviewed the details and status of Exelon's corrective actions. Relative to EDG voltage, the TSs specified a lower limit of 4160 Vac; however, Exelon's existing analysis determined the lower EDG voltage limit should be 4235 Vac. Exelon determined that this higher voltage value was necessary in order to ensure full EDG operability and qualification when considering a specific criteria (voltage drop during the loading sequence) as per NRC Regulatory Guide 1.9, "Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants." The team determined that there was</p> |           |

not an operability concern because Exelon determined that, although the voltage drop during the starting of the largest electrical load was slightly below the Regulatory Guide 1.9 value, all required loads would, in fact, successfully start and run as designed when started at the 4160 Vac level. Further, the EDG voltage regulators are designed and calibrated to operate the EDGs at 4235 Vac. Notwithstanding, the team identified that the associated EDG surveillance procedures did not contain the higher, administrative limit of 4235 Vac as an acceptance criterion (4160 Vac was specified). The team reviewed this issue using Inspection Manual Chapter 0612, Appendix B, "Issue Screening," and determined that the use of non-conservative acceptance criterion was a minor procedure violation because the EDGs were controlled and operated to maintain voltage at 4235 Vac (and 4160 Vac does not render the EDGs inoperable), and EDG reliability or availability were not adversely affected. Exelon entered this minor violation in their corrective action program as IR 4164579 to document and correct this deficiency.

For EDG frequency, the TSs allowed an acceptance band (58.8 – 61.2 Hertz), which is a range typical of EDG transient loading conditions. However, as described in WCAP-17308-NP, and as determined by Exelon engineering staff, a more narrow band (59.9 – 60.2 Hertz) is the appropriate operating range for steady state EDG operation. Exelon has appropriately maintained the narrow band as the acceptance criteria in the associated EDG surveillance procedures (compensatory action until TSs are revised). However, during this inspection, the team identified that in 2016, Exelon had slightly widened the acceptable band a one-tenth hertz to 59.8 – 60.2 Hertz. Further review by the team identified that this change was not properly evaluated in accordance with Exelon's procedure change process. In particular, the procedure change received a less rigorous review than a 10 CFR 50.59 screen would have provided; and the team concluded that this screen should have been performed. In response, Exelon evaluated past surveillance results and analyzed the lower frequency value of 59.8 Hertz, and determined there to be no adverse consequence at 59.8 Hertz. The team reviewed Exelon's analysis and similarly concluded that there was no adverse safety impact. The team reviewed this issue using Inspection Manual Chapter 0612, Appendix B, "Issue Screening," and determined that the improper procedure change was a minor procedure violation because there were no adverse consequences and EDG reliability or availability were not adversely affected. Exelon entered this minor violation in their corrective action program as IR 4160819 and IR 4161542 to document and correct this deficiency.

At the conclusion of the inspection, Exelon discussed their plans to submit to the NRC the appropriate TS changes associated with EDG voltage and frequency values in accordance with the guidance documented in NRC Administrative Letter 98-10.

## **EXIT MEETINGS AND DEBRIEFS**

The team verified no proprietary information was retained or documented in this report.

- On August 2, 2018, the team presented the Design Bases Assurance Inspection (Teams) preliminary results to Mr. Frank Sturniolo, Plant Manager, and other members of Exelon staff. The team subsequently discussed the final results of this inspection with Mr. Rick Libra, Site Vice President, and other Exelon staff on August 30, 2018.



**DOCUMENTS REVIEWED****71111.21M - Design Bases Assurance Inspection (Teams)**Calculations

092-016-LIM, Evaluation of Stroke Time and Actuator Capability for DC MOVs, Revision 1  
 6380E.07, Diesel Generator Loading, Revision 015-A  
 6900E.15, 125/250Vdc System Fuse Selection and Coordination, Undervoltage Relay Setting, and Safeguards Short Circuit Calculation, Revision 9  
 EC-90-1401, Inadvertent Spray Actuation, Drywell Depressurization Analysis, Revision 11  
 ECR LG03-00295, Analysis of DC MOVs for NRC RIS 2001-15, Revision 0  
 ECR LG08-00146, 111-02282 ARI NLI Inverter, Revision 0  
 LE-0018, Recirculation ASD 1A/2A-G109 and 1B/2B-G109 13.2 kV Input Setting Calculation, Revision 4  
 LE-0069, Class 1E 125Vdc System Voltage Analysis, Revision 170 and 17P  
 LE-0069, Class 1E 125Vdc System Voltage Analysis, Revision 17  
 LE-0104, DC MCC Manual Control Circuit Calculation, Revision 1  
 LE-052, Class 1E Battery Load Duty Cycle Determination, Revision 18  
 LM-0007, Diesel Generator Fuel Oil Consumption, Revision 6  
 LM-0597, RHR NPSHa during FPCA and ADHR Modes, Revision 0  
 LM-0600, Station Blackout Analysis for the RCIC and HPCI Pump Rooms, Revision 2  
 LM-0663, Diesel Generator Day Tank Minimum Level, Revision 2  
 LM-0667, Diesel Generator Fuel Oil Storage Tank Volume, Revision 0  
 LS2004E001, 50.59 Evaluation for ECR LG03-00295 Revision 0, Revision 0  
 M-49-03, RCIC Pump Discharge Pressure Drop, Revision 6  
 M-49-04, RCIC Pump Pressure NPSH Allowable Degradation and Pipe Volumes, Revision 0  
 M-49-08, RCIC Steam Supply Pressure Drop, Revision 5  
 M-49-09, RCIC Turbine Exhaust Modes A – D Pressure Drops, Revision 0  
 M-49-15, RCIC Thermal Modes, Revision 4  
 M-51-08, RHR LPCI and Containment Spray Pressure Drop, Revision 4  
 M-51-11, RHR Mode D Available NPSH, Revision 6  
 M-51-35, RHR Shutdown Cooling Mode (D) Flow Calculation, Revision 3  
 M-51-62, RHR NPSH From Suppression Pool, Revision 6  
 M-55-10, HPCI Pump Performance Curves and Degradation Limits, Revision 6  
 M-55-20, HPCI Pump Discharge Maximum Pressure, Revision 6  
 MEL-0119, WS-3 Drywell Spray Initiation Limit, Revision 3

Corrective Action Documents (\*initiated in response to inspection)

|         |         |         |          |          |
|---------|---------|---------|----------|----------|
| 0834202 | 2492785 | 3748138 | 4080668  | 4155343  |
| 0976165 | 2523623 | 3960107 | 4080689  | 4156363* |
| 1156200 | 2525662 | 3972856 | 4081816  | 4157103* |
| 1207412 | 2530129 | 3988061 | 4081882  | 4159154* |
| 1359061 | 2534799 | 3998656 | 4088017  | 4159914* |
| 1656919 | 2538760 | 4003629 | 4100277  | 4160819* |
| 1681458 | 2548445 | 4005781 | 4105039* | 4161192* |
| 2395541 | 2548571 | 4018891 | 4105177  | 4161542* |
| 2426256 | 2619807 | 4046506 | 4135458  | 4164579* |
| 2485871 | 2623215 | 4056984 | 4149998  | 4169044* |
| 2487741 | 2656682 | 4063568 | 4151872  |          |
| 2489907 | 2728448 | 4074188 | 4154379  |          |

Design and Licensing Basis

Limerick Generating Station Updated Final Safety Analysis Report, Revision 17  
 L-S-01A, Class 1E 125/250 Vdc System, Revision 9  
 L-S-02, Emergency Service Water System, Revision 15  
 L-S-03, High Pressure Coolant Injection System, Rev. 20  
 L-S-07, Diesel Generator and Auxiliary Systems, Revision 15  
 L-S-09, Residual Heat Removal System, Revision 21  
 L-S-25A, Primary Containment Pressure Suppression System, Revision 6  
 L-S-39, Reactor Core Isolation Cooling System, Revision 13  
 Technical Specifications (Amendment 229 – Unit 1; Amendment 192 – Unit 2)

Drawings

8031-E-34, Single Line Diagram Instrumentation AC System Unit 2, Revision 40  
 8031-M-1-H12-P640-C-002, DIV 3 RHR & Core Spray Relay VB Unit 2, Revision 23  
 8031-M-1-H12-P640-E-012, DIV 3 RHR & Core Spray Relay VB Unit 2, Revision 23  
 8031-M-1-H12-P640-E-016, DIV 3 RHR & Core Spray Relay VB Unit 2, Revision 13  
 8031-M-1-H12-P640-E-018, DIV 3 RHR & Core Spray Relay VB Unit 2, Revision 14  
 8031-M-1-H12-P641-C-001, DIV 4 RHR & Core Spray Relay VB, Revision 20  
 8031-M-1-H12-P641-E-003, DIV 4 RHR & Core Spray Relay VB, Revision 33  
 8031-M-1-H12-P641-E-004, DIV 4 RHR & Core Spray Relay VB, Revision 31  
 8031-M-1-H12-P641-E-005, DIV 4 RHR & Core Spray Relay VB, Revision 20  
 8031-M-1-H12-P641-E-006, DIV 4 RHR & Core Spray Relay VB, Revision 32  
 8031-M-50, Sht. 1, RCIC Pump Turbine, Revision 37  
 8031-M-50, Sht. 4, RCIC Pump Turbine Unit 2 Lube Oil and Control System, Revision 2  
 8031-M-51, Sht. 1, Residual Heat Removal, Revision 66  
 8031-M-51, Sht. 2, Residual Heat Removal, Revision 68  
 8031-M-51, Sht. 3, Residual Heat Removal, Revision 69  
 8031-M-51, Sht. 4, Residual Heat Removal, Revision 67  
 8031-M-55, High Pressure Control System (Unit 2), Revision 57  
 8031-M-56, Sht. 2, HPCI Pump/Turbine, Revision 12  
 8031-M-56, Sht. 4, HPCI Pump/Turbine (Lube Oil and Control Systems), Revision 6  
 8031-M-57, Containment Atmospheric Control, Revision 44  
 93-13377, 18 inch 300 pound Carbon Steel Swing Check Valve with Test Lever, Revision N  
 E-1, Sht. 1, Single Line Diagram, Revision 31  
 E21-1040-E-023, Elementary Diagram Core Spray System Unit 2, Revision 11  
 E41-1040-E-020, Sht.4, Elementary Diagram HPCI System, Revision 11  
 M-0012, Emergency Service Water/RHR Service Water Overview, Revision 13  
 M-0020, Sht. 001 through 0014, Diesel Generator and Auxiliary Systems  
 M-1-E41-1030-F-004, Functional Control Diagram High Pressure Control System, Revision 27  
 M-1-E41-1040-C-027, Sht. 6, Elementary Diagram HPCI System, Revision 0  
 M-1-E41-1040-E-020, Elementary Diagram HPCI, Revision 11  
 M-1-E41-1040-E-025, Elementary Diagram HPCI, Revision 11  
 T-101, Reactor Pressure Vessel Control, Revision 25  
 T-102, Primary Containment Control, Revision 27

Functional, Surveillance and Modification Acceptance Testing

RT-2-050-406-1, RCIC Turbine Exhaust Pressure – High Channel 'A' Calibration/Functional Test, performed 6/4/16  
 ST-2-051-423-1, ECCS RHR Injection Valve Differential Pressure – Low (Permissive) Channel D-Calibration Functional Test, performed 6/21/18  
 ST-2-051-611-1, ECCS LPCI Division II Header dP Functional Test (PDISH-51-1N660B, PDSL-51-1N661B), performed 6/19/18

ST-2-051-621-1, ECCS RHR Injection Valve Differential Pressure – Low (Permissive) Channel B Functional Test, performed 5/9/18  
 ST-2-051-624-1, Operational Leakage – High/Low Pressure Interface – Valve Leakage Monitor Functional Test, performed 5/9/18  
 ST-2-060-400-2, Containment Systems, Suppression Chamber/Drywell Vacuum Breaker Setpoint Check and Channel Calibration Test (PSV57-237A through -237D, and ZS-57-237A through -237D), performed 5/3/17 and 4/27/15  
 ST-5-020-810-0, Attachment 1, Diesel Generator Fuel Receipt Analysis, performed 7/20/18, 7/13/18, 6/1/18, 4/27/18, 3/23/18, 3/16/18, 3/2/18, 2/9/18, 1/18/18, and 11/30/17  
 ST-6-092-315-1, D11 Diesel Generator Fast Start Operability Test Run, performed 7/30/17

#### Modifications and Design Changes

EC 422109, Component Design Bases Inspection Update, Reactor Core Isolation Cooling System Calculations per 834202 (calculation), Revision 1  
 EC 422309, E/S X-M1-21014 and E/S X-M1-11015 Inverter Replacement, Revision 0  
 EC 617493, Reactor Core Isolation Cooling Pump Room Environmental Condition during Station Blackout (calculation), Revision 0  
 EC 617696, E/S X-M1-21014 Inverter Replacement, Revision 0  
 EC 620491, Change Motor-Operated Valve HV-011-015A to Manual Valve 011-0124A and Convert Manual Valve 011-0124A to Motor-Operated Valve HV-011-015A, Revision 0  
 EC 622874, Change Trip Setpoint for Unit Auxiliary Transformer Hi Side OC Relay 350/351-X102A(B)(C), Revision 0  
 EC 624360, Fairbanks Morse EDG Maintenance Inspection Program Review, Revision 0  
 ECR LG 09-00471, CDBI Update RCIC Calculations per 834202-22, Revision 1  
 ECR LG 14-00177, Install Isolation Valves Upstream of HV-011-015A/B, Revision 9

#### Procedures

ARC-MCR-222, 2DB-1 250Vdc MCC Undervoltage G2, Revision 0  
 ARC-MCR-222, 2DB-2 250Vdc MCC Undervoltage G3, Revision 0  
 E-1, Attachment 4, Alternate Power Supply for any 4kV Safeguard Bus using any Diesel Generator, Revision 52  
 EN-AA-501-0001, Controlled Material Program Approval and Evaluation Process, Revision 2  
 ER-AA-5400-1001, Raw Water Piping Integrity Management Guide, Revision 11  
 IC-C-11-04067, Testing and/or Replacement of AGASTAT Series GP, TR, and 7000 Series Relays, Revision 12  
 IP-ENG-001, Standard Design Process, Revision 0  
 M-095-002, 250 Vdc Westinghouse MCC Maintenance, Revision 8  
 MA-AA-716-230-1001, Attachment 93, Fairbanks Morse Opposed Piston Diesel Lubricating Oil Monitoring Program, Revision 20  
 MA-LG-716-1017, Control of Bolting/Torqueing/Tensioning, Revision 4  
 PI-AA-115-1003, Processing of Level 3 OPEX Evaluations, Revision 4  
 S51.6.A, Swapping RHR Pumps in RHR-SDC Mode, Revision 18  
 S51.8.A, Suppression Pool Cooling Operation (Startup and Shutdown) and Level Control, Revision 49  
 S51.8.H, Use of Dedicated LPCI Pumps for Shutdown Cooling / Reactor Coolant Circulation Operation, Revision 44  
 S51.8.I, Use of Dedicated LPCI Pumps for Suppression Pool Cooling Operation and Level Control, Revision 41  
 S55.1.A, Normal HPCI Line-Up for Automatic Operation, Revision 37  
 S55.1.D, Appendix 1, Starting HPCI for Pressure Control During a Plant Event, Revision 0  
 S55.2.A, HPCI Shutdown from Automatic or Manual Initiation, Revision 15  
 S92.1.N, Diesel Generator Set Up for Automatic Operation Following Maintenance, Revision 42

ST-2-055-230-2, HPCI Pump, Valve and Flow Test, Revision 80  
 ST-2-055-810-2, HPCI System Response Time Testing, Revision 14  
 T-225, Startup and Shutdown of Suppression Pool and Drywell Spray Operation, Revision 25

Miscellaneous

22A1495AC, GE Design Specification, Revision 2  
 A-C-72, Emergency Diesel Generator Reliability Program, Revision 0  
 Agastat EGP/EML/ETR Series, Nuclear Qualified Control Relays, March 2013  
 GEH-1788L, Time Overcurrent Relays, November 1991  
 Limerick Emergency Diesel Generator Performance Monitoring Plan/Performance Monitoring  
 Maintenance Rule System Basis Document, Diesel Generators and Auxiliaries  
 Maintenance Rule System Basis Document, HPCI  
 NERC-PRC-025-1, Generator Relay Loadability, Revision 0  
 Operations Standing Order 18-05, Check of EDG Lube Oil Heaters Prior to Making a Diesel  
 Generator Inoperable, Revision 0  
 Operations Standing Order 18-05, Diesel Generator Rounds During Diesel Testing, Revision 1  
 PCM Template HPCI Pressure Sensor and Transmitter, Revision 2  
 PCM Template Relays – Control/Timing, Revision 1  
 PCM Template, HPCI Controllers – Electronic (Analog and Digital), Revision 5  
 P-J00, Limerick Generating Station, Environmental Qualification, Revision 5  
 Product Data Sheet, Rosemount 1151 Pressure Transmitter, Revision JB  
 Specification P-300, Piping Class Sheets, Revision 45  
 System Health Report, Diesel Generator / Fuel Oil / EDG HVAC, 2Q18

Vendor Manuals

8031-M-1-E11-C002-J-12.1, Residual Heat Removal Pump Ingersol Rand Head Capacity  
 Curve, 3/3/84  
 8031-M-81-47-10, Operation and Maintenance Manual for Vacuum Relief Valve, Type CV1-L,  
 24-Inch and Auxiliaries, 6/3/93  
 Fairbanks Morris Opposed Piston Diesel Generator and Auxiliary Systems Service Manual

Work Orders

|        |         |         |         |
|--------|---------|---------|---------|
| 244320 | 1129275 | 4293060 | 4733271 |
| 251173 | 1258164 | 4317116 | 4733278 |
| 257009 | 1258165 | 4622888 | 4733280 |
| 257352 | 1307274 | 4714852 | 4744915 |
| 257358 | 4250513 | 4726307 | 4755349 |
| 259170 | 4272955 | 4732758 | 4758950 |
| 259181 | 4283122 | 4732760 | 4763461 |
| 262527 | 4292975 | 4733270 | 4767535 |