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

March 6, 2014

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

SUBJECT: THREE MILE ISLAND NUCLEAR STATION, UNIT 1 - NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000289/2014007

Dear Mr. Pacilio:

On February 18, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed on February 12, 2014, with Mr. Richard Libra, Three Mile Island Nuclear Station, Unit 1, Site Vice President, and other members of your staff during a debrief meeting. Inspection results were further discussed on February 18, 2014, with Mr. Mark Torborg, Three Mile Island Nuclear Station, Unit 1, Engineering Programs Manager during the final exit meeting.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed station personnel. The inspectors also reviewed mitigation strategies for addressing large fires and explosions.

Based on the results of this inspection, no findings were identified.

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

Sincerely,

/RA/
John F. Rogge, Chief
Engineering Branch 3
Division of Reactor Safety

Docket No.: 50-289
License No.: DPR-50
Enclosure: Inspection Report 05000289/2014007
w/Attachment: Supplemental Information
cc w/encl: Distribution via ListServ

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DATE	**03/04/14**	**03/05/14**	**03/05/14**	**03/06/14**	

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	50-289
License No.:	DPR-50
Report Nos.:	05000289/2014007
Licensee:	Exelon Generating Company, LLC
Facility:	Three Mile Island Station, Unit 1
Location:	Middletown, PA 17057
Dates:	January 27, 2014 through February 18, 2014
Inspectors:	K. Young, Senior Reactor Inspector (Team Leader) Division of Reactor Safety (DRS) W. Cook, Senior Reactor Analyst, DRS J. Richmond, Senior Reactor Inspector, DRS J. Patel, Reactor Inspector, DRS S. Galbreath, Reactor Inspector, DRS
Approved by:	John F. Rogge, Chief Engineering Branch 3 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000289/2014007, 01/27/2014 - 02/18/2014; Exelon Generation Company, LLC;
Three Mile Island, Unit 1; Triennial Fire Protection Inspection Report.

This report covered a two week on-site triennial fire protection team inspection by specialist inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, “Reactor Oversight Process,” Revision 4, dated December 2006.

No findings were identified.

REPORT DETAILS

Background

This report presents the results of a triennial fire protection inspection conducted in accordance with the U.S. Nuclear Regulatory Commission (NRC) Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)." The objective of the inspection was to assess whether Exelon Generation Company, LLC had implemented an adequate fire protection program (FPP) and whether post-fire safe shutdown capabilities had been established and were properly maintained at the Three Mile Island (TMI) Station, Unit 1 facility. The following fire areas (FA) and/or fire zones (FZ) were selected for detailed review based on risk insights from the TMI Individual Plant Examination (IPE)/Individual Plant Examination of External Events (IPEEE).

- AB-FZ-7, Auxiliary Building, Decay Heat Removal & Nuclear Services Closed Cycle Cooling Pump Area
- CB-FA-3C, Control Building, Engineered Safeguards Actuation System (ESAS) Cabinet Room
- DG-FA-1, Diesel Generator Building, EG-Y-1A Room & Control Panel Area
- ISPH-FZ-1, Intake Screen Pump House, 1R Switchgear and Pump Area

Inspection of these areas/zones fulfills the inspection procedure requirement to inspect a minimum of three samples.

The inspection team evaluated Exelon's fire protection program (FPP) against applicable requirements which included plant Technical Specifications, Operating License Condition 2.c.(4), NRC Safety Evaluation Reports (SER), 10 CFR 50.48, 10 CFR Part 50, Appendix R, and Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1. The team also reviewed related documents that included the Updated Final Safety Analysis Report (UFSAR), Section 9.9, the fire hazards analysis report (FHAR), and the post-fire safe shutdown analysis.

The team also evaluated two licensee mitigating strategies for addressing large fires and explosions as required by Operating License Condition 2.c.(17) and 10 CFR 50.54 (hh)(2). Inspection of these strategies fulfills the inspection procedure requirement to inspect a minimum of one sample.

Specific documents reviewed by the team are listed in the attachment to this report.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (IP 71111.05T)

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the FHAR, safe shutdown analyses, and supporting drawings and documentation to verify that post-fire safe shutdown capabilities were properly protected. The team ensured that applicable separation requirements of Section III.G of 10 CFR Part 50, Appendix R, and the licensee's design and licensing bases were maintained for the credited safe shutdown equipment and their supporting power, control, and instrumentation cables. This review included an assessment of the adequacy of the selected systems for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring and associated support system functions.

b. Findings

No findings were identified.

.02 Passive Fire Protection

a. Inspection Scope

The team walked down accessible portions of the selected fire areas to evaluate whether the material conditions of the fire area boundaries were adequate for the fire hazards in the area. The team compared the fire area boundaries including walls, ceilings, floors, fire doors, fire dampers, penetration seals, electrical raceway and conduit fire barriers, and redundant equipment fire barriers and radiant energy heat barriers to the design and licensing basis requirements, industry standards, and the TMI FPP, as approved by the NRC, to identify any potential degradation or non-conformances.

The team reviewed selected engineering evaluations and qualification records for a sample of penetration seals to determine whether the fill material was properly installed and whether the as-left configuration satisfied design requirements for the intended fire rating. The team also reviewed similar records for selected fire protection wraps to verify whether the material and configuration was appropriate for the required fire rating and conformed to the engineering design.

The team also reviewed recent inspection and test records for fire dampers and the inspection records for penetration seals and fire barriers to verify whether the inspection and testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

The team evaluated manual and automatic fire suppression and detection systems in the selected fire areas to determine whether they were installed, tested, maintained and operated in accordance with NRC requirements, National Fire Protection Association (NFPA) codes of record and the TMI FPP. The team also assessed whether the suppression systems capabilities were adequate to control and/or extinguish fires associated with the hazards in the selected areas.

The team reviewed the as-built capability of the fire water supply system to verify whether the design and licensing basis and NFPA code of record requirements were satisfied and to assess whether those capabilities were adequate for the hazards involved. The team reviewed the fire water system design to assess the adequacy of the system to supply the largest single hydraulic load on the fire water system plus concurrent fire hose usage with one fire pump out of service. The team evaluated fire pump performance tests to assess the adequacy of the test acceptance criteria for pump minimum discharge pressure at the required flow rate to verify whether the criteria was adequate to ensure that the design basis requirements were satisfied. The team also evaluated the underground fire loop flow tests and flushes to verify whether the combination of the tests and flushes adequately demonstrated that the flow distribution circuits were able to meet design basis requirements. In addition, the team reviewed recent pump and loop flow test results to verify whether the testing was adequately conducted, the acceptance criteria were met and any potential performance degradation was identified.

The team walked down accessible portions of the detection and water suppression systems in the selected areas and major portions of the fire water supply system, including the motor and two diesel driven fire pumps, interviewed system and program engineers, and reviewed selected issue reports (IRs) to independently assess the material condition of the systems and components. In addition, the team reviewed recent test results for the fire detection and suppression systems for the selected fire areas to verify whether the testing was adequately conducted, the acceptance criteria were met and any potential performance degradation was identified.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. The team also reviewed Exelon's firefighting strategies (i.e., pre-fire plans) and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. The team independently inspected the fire brigade equipment, including personnel protective gear (e.g., turnout gear) and smoke removal equipment, to determine operational readiness for firefighting.

In addition, the team reviewed Exelon's fire brigade equipment inventory and inspection procedure and recent inspection and inventory results to verify whether adequate equipment was available, and whether any potential material deficiencies were identified.

b. Findings

No findings were identified.

.04 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The team performed document reviews and plant walkdowns to determine whether redundant trains of systems required for post-fire safe shutdown, located in the same or adjacent fire areas, were subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, the team evaluated whether:

- A fire in one of the selected fire areas would release smoke, heat or hot gases that could cause unintended activation of suppression systems in adjacent fire areas which could potentially damage all redundant safe shutdown trains or
- A fire suppression system rupture, inadvertent actuation or actuation due to a fire, in one of the selected fire areas, could directly damage all redundant trains (e.g. sprinkler caused flooding of other than the locally affected train) and
- Adequate drainage was provided in areas protected by water suppression systems.

b. Findings

No findings were identified.

.05 Post-Fire Safe Shutdown Capability – Normal and Alternative

a. Inspection Scope

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentation drawings (P&ID), electrical drawings, the UFSAR and other supporting documents for the selected fire areas to verify that the licensee had properly identified the systems and components necessary to achieve and maintain post-fire safe shutdown conditions.

The team assessed the adequacy of the selected systems and components for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring and support system functions. This review included verification that alternative post-fire safe shutdown could be performed both with and without the availability of offsite power.

Plant walkdowns were also performed to verify that the plant configuration was consistent with that described in the safe shutdown and fire hazards analyses. The team verified that the systems and components credited for use during shutdown would remain free from fire damage.

The team verified that the training program for licensed and non-licensed operators included alternative shutdown capability. The team also verified that personnel required for safe shutdown using the normal or alternative shutdown systems and procedures are trained and available onsite at all times exclusive of those assigned as fire brigade members.

The team reviewed the adequacy of procedures utilized for post-fire safe shutdown and performed an independent walk through of procedure steps to ensure the implementation and human factors adequacy of the procedures. The team also verified that the operators could be reasonably expected to perform specific actions within the time required to maintain plant parameters within specified limits.

Specific procedures reviewed for normal and alternative post-fire shutdown included the following:

- OP-TM-AOP-001, Fire, Rev. 9
- OP-TM-AOP-001-C3C, Fire in ESAS Room, Rev. 8
- OP-TM-AOP-001-A07, Fire in AB 305' NS and DC Pumps Area, Rev. 3

The team reviewed manual actions to ensure that they had been properly reviewed and approved and that the actions could be implemented in accordance with plant procedures in the time necessary to support the safe shutdown method for each fire area. The team also reviewed the periodic testing of the alternative shutdown transfer capability and instrumentation and control functions to ensure the tests are adequate to ensure the functionality of the alternative shutdown capability.

b. Findings

No findings were identified.

.06 Circuit Analysis

a. Inspection Scope

The team verified that the licensee performed a post-fire safe shutdown analysis for the selected fire areas and the analysis appropriately identified the structures, systems and components important to achieving and maintaining safe shutdown. Additionally, the team verified that Exelon's analysis ensured that necessary electrical circuits were properly protected and that circuits that could adversely impact safe shutdown due to hot shorts or shorts to ground were identified, evaluated and dispositioned to ensure spurious actuations would not prevent safe shutdown.

The team's review considered fire and cable attributes, cable routing, potential undesirable consequences and common power supply/bus concerns. Specific items included the credibility of the fire threat, cable insulation attributes, cable failure modes and actuations resulting in flow diversion or loss of coolant events.

The team also reviewed cable raceway drawings and/or cable routing databases for a sample of components required for post-fire safe shutdown to verify that cables were routed as described in the safe-shutdown analysis. Additionally, the team reviewed equipment important to safe shutdown, but not part of the success path, to verify that the licensee had taken appropriate actions in accordance with the design and licensing basis and NRC Regulatory Guide 1.189, Revision 2.

Cable failure modes were reviewed for the following components:

- MU-V-14B, Make-up Suction Valve from BWST
- MU-V-3, Letdown Block Valve
- G11-02, EDG 'B' Output Breaker
- RC-LT-777, RSP Pressurizer Level Instrument
- FW-LT-776, RSP SG B Level Instrument
- DH-V-4B, DH/LPI Discharge Valve

The team reviewed a sample of circuit breaker coordination studies to ensure equipment needed to conduct post-fire safe shutdown activities would not be impacted due to a lack of coordination that could result in a common power supply or common bus concern.

The team verified that the transfer of control from the control room to the alternative shutdown location(s) would not be affected by fire-induced circuit faults (e.g. by the provision of separate fuses and power supplies for alternative shutdown control circuits).

b. Findings

No findings were identified.

.07 Communications

a. Inspection Scope

The team reviewed safe shutdown procedures, the safe shutdown analysis and associated documents to verify an adequate method of communications would be available to plant operators following a fire. During this review the team considered the effects of ambient noise levels, clarity of reception, reliability and coverage patterns. The team also inspected the designated emergency storage lockers to verify the availability of portable radios for the fire brigade and for plant operators. The team also verified that communications equipment such as repeaters and transmitters would not be affected by a fire.

b. Findings

No findings were identified.

.08 Emergency Lighting

a. Inspection Scope

The team observed the placement and coverage area of eight-hour emergency lights throughout the selected fire areas to evaluate their adequacy for illuminating access and egress pathways and any equipment requiring local operation or instrumentation monitoring for post-fire safe shutdown. The team also verified that the battery power supplies were rated for at least an eight-hour capacity. Preventive maintenance procedures, the vendor manual, completed surveillance tests and battery replacement practices were also reviewed to verify that the emergency lighting was being maintained consistent with the manufacturer's recommendations and in a manner that would ensure reliable operation.

b. Findings

No findings were identified.

.09 Cold Shutdown Repairs

a. Inspection Scope

The team verified that the licensee had dedicated repair procedures, equipment and materials to accomplish repairs of components required for cold shutdown which might be damaged by the fire to ensure cold shutdown could be achieved within the time frames specified in their design and licensing bases. The team verified that the repair equipment, components, tools and materials (e.g. pre-cut cables with prepared attachment lugs) were available and accessible on site.

b. Findings

No findings were identified.

.10 Compensatory Measures

a. Inspection Scope

The team verified compensatory measures were in place for out-of-service, degraded or inoperable fire protection and post-fire safe shutdown equipment, systems or features (e.g., detection and suppression systems and equipment, passive fire barriers, pumps, valves or electrical devices providing safe shutdown functions or capabilities). The team evaluated whether the short term compensatory measures adequately compensated for the degraded function or feature until appropriate corrective action could be taken and if the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings were identified.

.11 Fire Protection Program Changes

a. Inspection Scope

The team reviewed recent changes to the approved fire protection program to verify that the changes did not constitute an adverse effect on the ability to safely shutdown.

b. Findings

No findings were identified.

.12 Control of Transient Combustibles and Ignition Sources

a. Inspection Scope

The team reviewed Exelon's procedures and programs for the control of ignition sources and transient combustibles to assess their effectiveness in preventing fires and in controlling combustible loading within limits established in the FHAR. A sample of hot work and transient combustible control permits were reviewed to assess the adequacy of Exelon's fire protection program administrative controls. The team performed plant walkdowns to independently verify whether transient combustibles and ignition sources were being properly controlled in accordance with the administrative controls.

b. Findings

No findings were identified.

.13 Large Fires and Explosions Mitigation Strategies

a. Inspection Scope

The team reviewed selected mitigation strategies intended to maintain or restore core cooling and spent fuel pool cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions and/or fires. The team assessed whether Exelon continued to meet the requirements of Operating License Condition 2.c.(17) and 10 CFR 50.54(hh)(2). The team reviewed the following mitigation strategies and associated station procedures:

- Manual operation of the turbine-driven feedwater pump, in accordance with OP-TM-424-901, “Emergency Feedwater,” Revision 2; and OP-TM-AOP-009, “Loss of Plant Control Facilities,” Revision 5

- Spent fuel pool make-up, in accordance with ER-TM-TSC-0025, “TMI-1 Extensive Damage Mitigation Guidelines,” Revision 3, and OP-TM-251-901, “High Capacity Fire Service Makeup to Spent Fuel Pool,” Revision 4. The team's review included a detailed assessment of the procedural guidance; a walkdown of the strategy with a trained operator to assess the feasibility of the strategy and operator familiarity;

maintenance and surveillance testing of all designated strategy equipment and an inventory check of strategy equipment to ensure the appropriateness of equipment storage and availability. The team also evaluated the adequacy of corrective actions associated with issues identified during previous inspections in this area.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES [OA]

4OA2 Identification and Resolution of Problems (IP 71152)

.01 Corrective Actions for Fire Protection Deficiencies

a. Inspection Scope

The team reviewed a sample of issue reports associated with the fire protection program, post-fire safe shutdown issues and mitigation strategy issues to determine whether Exelon was appropriately identifying, characterizing, and correcting problems associated with these areas and whether the planned or completed corrective actions were appropriate. The issue reports reviewed are listed in the attachment.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented their preliminary inspection results to Mr. Richard Libra, Three Mile Island Nuclear Station, Site Vice President, and other members of the site staff at a debrief meeting on February 12, 2014. The team further discussed their preliminary inspection results to Mr. Mark Torborg, Three Miles Island Nuclear Station, Engineering Programs Manager, and other members of the site staff an exit meeting on February 18, 2014. No proprietary information was included in this inspection report.

Attachment: Supplemental Information

KEY POINTS OF CONTACT

Licensee Personnel
R. Libra, Site Vice President
M. Newcomer, Plant Manager
D. Atherholt, Manager, Regulatory Assurance
K. Coughlin, Operations SOS
J. Dullinger, Director, Site Engineering
R. Ezzo, Fire Safe Shutdown Engineer
M. Fitzwater, Licensing Engineer
D. Herr, Fire Systems Engineer
S. Miscevich, Reactor Operator
R. Myers, Site Fire Marshall
T. O'Connor, Fire Protection Contractor
C. Pragman, Exelon Cororate Fire Protection
S. Sallade, Initial Licensing Trainer, Lead Instructor
E. Shawalter, Design Engineer
C. Six, Director, Site Operations
M. Taylor, Exelon Corporate Fire Protection
S. Taylor, Fire Protection Engineer
D. Trastle, NOS
M. Torborg, Manager, Engineering Programs
M. Willenbecher, Manager, Operations Support

NRC Personnel
J. Rogge, Chief, Engineering Branch 3, Division of Reactor Safety
D. Werkheiser, Senior Resident Inspector, Three Mile Island Nuclear Station
J. Heinly, Resident Inspector, Three Mile Island Nuclear Station

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened
None

Opened and Closed
None

Closed
None

Discussed
None

LIST OF DOCUMENTS REVIEWED

Fire Protection Licensing Documents

Exemption TMI-1, Fire Protection Exemption, Dated 13/30/86
Exemption, TMI-1, Fire Protection Exemption, Dated 3/24/87
Exemption, TMI-1, 10CFR50, Appendix R Exemption Request, Dated 4/20/99
Exemption, TMI-1, Title 10 of the Code of Federal Regulations Part 50 Appendix R Requirements, Dated 3/30/09
Exemption, TMI-1, Title 10 of the Code of Federal Regulations Part 50 Appendix R Requirements, Dated 6/28/10
Response, TMI-1, 10 CFR 50, Appendix R, Section III.G, Fire Protection of Safe Shutdown Capability, Dated 1/28/09
Response, TMI-1, Post-Fire Safe Shutdown Methodology – Generic Letter 81-12, 10/19/89
Response, TMI-1, 10 CFR 50, Appendix R, Section III.G, Fire Protection of Safe Shutdown Capability, Dated 3/15/10
Request, TMI-1, 10 CFR 50, Appendix R, Section III.G, Fire Protection of Safe Shutdown Capability, Dated 2/4/08
Request, TMI-1, 10 CFR 50, Appendix R, Section III.G, Fire Protection of Safe Shutdown Capability, Dated 3/3/09
SE, Resolution of Various TMI-1 Appendix R Issues, 9/7/88
SER, Fire Protection for TMI-1, Dated 9/19/78
TMI-1 Fire Hazards Analysis Report 990-1745, Volume 1, Rev. 25
TMI-1 Fire Hazards Analysis Report 990-1745, Volume 2, Rev. 25
UFSAR, Section 7.4.6, Remote Shutdown System, Rev. 21
UFSAR, Section 9.9, Plant Fire Protection Program Implementation, Rev. 21
1038, Administrative Controls-Fire Protection Program, Rev. 80

Calculations, Analysis, and Engineering Evaluation

C-1101-911-E420-002, Multiple Spurious Operations (MSO) Scenario Analysis, Rev. 1
OPE-03-025, Fire Water Flow Less Than 3303-A2 Requirements, Rev. 3
PES-P-006, Diesel Fuel Oil Standard, Rev. 10
SQ-T1-4A, Seismic Qualification Report B/A 128108, Rev. 0
TE 817422-12, Time Between Fire Detection & Cable Failure in CB-FA-3D and CB-FA-4B, 7/6/09
TM-PRA-21.06, Fire PRA Summary and Quantification Notebook, Rev. 0
TM 08-01051, Revise FHAR w/ CR Evacuation & Loss of Seal Cooling Strategy, Rev. 0
TM 09-00527, APP R Control Room Evacuation Transient Analysis, Rev. 0
86-9101191, TMI-1 Appendix R Transient Evaluation Summary, Rev. 1
990-3018, Fire Barrier Penetration Seal Evaluation Report, Rev. 0

Engineering Change Requests

ECR TM 02-00068, IEE for Big Beam Emergency Lights, Rev. 0

Fire Protection Evaluations of Modifications and Design Changes

ECP 08-00786, Prevention of Spurious Operation DH-V-6A/6B – CMT 609275, Rev. 1
FPE-T1-418719-001, FS-P-2 Motor Fire Pump Remote Stop Button, Rev. 0

Procedures

M-143, Air Handling Equipment Maintenance, Rev. 24
OP-AA-201-001, Fire Marshal Tours, Rev. 5
OP-AA-201-003, Fire Drill Performance, Rev. 12
OP-AA-201-004, Fire Prevention for Hot Work, Rev. 10
OP-AA-201-005, Fire Brigade Qualification, Rev. 8
OP-AA-201-009, Control of Transient Combustible material, Rev. 12
OP-AA-201-011-1001, Fire Marshall Certification Process, Rev. 1
U-8, Hydrostatic Testing of Hose, Rev. 43A
1104-45L, Portable Fire Fighting Equipment, Rev. 28
1104-45R, Fire Protection System Operations Surveillance, Rev. 57
1104-57, Fuel Oil Storage and Transfer System, Rev. 47A
1107-4, Electrical Distribution Panel Listing, Rev. 215
1107-4.2, Control Panel Fuse Listing, Rev. 18
1301-12.2, Hose Station Inspection, Rev. 19
1301-12.3, Fire System Hose Station Inspection and Functional Test, Rev. 28A
1303-13.3, Remote Shutdown Readiness Checks, Rev. 6
1301-15.1, Appendix “R” Cold Shutdown Repair Material Inventory, Rev.14
1302-14.2, Inspection of Fire Brigade Vehicle Equipment, Rev. 15
1303-12.14, Fire Protection Instrumentation Non-Supervised Circuits Test, Rev. 25
1303-12.17, Fire System Testing - Miscellaneous Deluge Functional Test, Rev. 34
1303-12.18.1, Diesel Generator Cooling Air Intake Deluge Flow Test, Rev. 1
1303-12.18.2, Diesel Generator Combustion Air Intake Deluge Flow Test, Rev. 2
1303-12.23, Fire Damper Inspection, Rev. 30
1303-12.24, Raceway Fire Barrier Inspection, Rev. 17
1303-12.8B, Fire Protection Instrumentation Functional Test, Rev. 24
1303-12.8D, Fire Protection Instrumentation Functional Test (Diesel Generators), Rev. 11
1303-12.8E, Screen House Fire Detection Functional Test, Rev. 14
1303-12.8F, Fire Protection Instrumentation Auxiliary Bldg Functional Test, Rev. 40
1303-12.9, Fire Barrier Seal Inspection, Rev. 43
1303-13.1, Appendix R Portable Emergency Lights Functional Test, Rev. 21
1303-13.3, Remote Shutdown Readiness Checks, Rev. 6
1420-Y-30, Repair of Appendix “R” Cold Shutdown & Remote Shutdown System Circuits, Rev. 16
3303-A1, Fire System Valve Cycling, Rev. 42
3303-A2, Fire System Main Header Flush and Loop Test, Rev. 41B
3303-A3, Fire Pump Capacity Testing, Rev. 19
3303-M1, Fire Pump Periodic Operation, Rev. 45
3303-R1, Fire Pump Start Circuit, Rev. 23

Operations Procedures

HVB-1-10, Heating and Ventilation Panel Annunciator B, Rev. 13
OP-TM-AOP-001, Fire, Rev. 9
OP-TM-AOP-001-A07, Fire in AB 305' NS and DC Pumps Area, Rev. 3
OP-TM-AOP-0011-A07, Fire in AB 305' NS and DC Pumps Area Basis Document, Rev. 4
OP-TM-AOP-001-C3C, Fire in ESAS Room, Rev. 8
OP-TM-AOP-0011-C3C, Fire Area CB-FA-3C Safe Shutdown Basis Document, Rev. 11
OP-TM-AOP-001-IS1, Fire in 1R 480V Switchgear Area, Rev. 2
OP-TM-AOP-0011-IS1, Fire in 1R 480V Switchgear Area Basis Document, Rev. 4
OP-TM-AOP-020, Loss of Station Power, Rev. 17
OP-TM-AOP-0201, Loss of Station Power Basis Document, Rev. 0
OP-TM-AOP-041, Loss of Seal Injection, Rev. 6
OP-TM-AOP-0411, Loss of Seal Injection Basis Document, Rev. 5
OP-TM-EOP-001, Reactor Trip, Rev. 12
OP-TM-EOP-0011, Reactor Trip Basis Document, Rev. 5
OP-TM-EOP-010, Emergency Procedures Rules, Guides and Graphs, Rev. 17
OP-TM-EOP-0101, Emergency Procedures Rules, Guides and Graphs Basis Document, Rev. 9
OP-TM-102-106-1001, Operator Response Time Program at TMI, Rev. 1
OP-TM-211-901, Emergency Injection (HPI/LPI), Rev. 7
OP-TM-220-901, Emergency Power Supply for Pressurizer Heaters, Rev. 5
OP-TM-220-902, Establish Pressurizer Steam Bubble, Rev. 0
OP-TM-226-901, Loss of all RCP Seal Cooling, Rev. 5
OP-TM-424-901, Emergency Feedwater, Rev. 2
OP-TM-861-902, Diesel Generator EG-Y-1B Emergency Operations, Rev. 15
OS-24, Conduct of Operations during Abnormal and Emergency Events, Rev. 24

Large Fires and Explosions Mitigation Strategies Documents

ER-TM-TSC-0025, TMI-1 Extensive Damage Mitigation Guidelines, Rev. 3
OP-TM-AOP-009, Loss of Plant Control Facilities, Rev. 5
OP-TM-251-901, High Capacity Fire Service Makeup to Spent Fuel Pool, Rev. 4
OP-TM-424-901, Emergency Feedwater, Rev. 2

Completed Tests/Surveillances

1303-13.1, Appendix R Portable Emergency Lights Functional Test, Completed 11/17/13
1303-13.1A, D.C. Emergency Lighting Water Level and Function Checks, Aux. Building, 271' & 281' ELEV., Completed 12/2/13
1303-13.1B, D.C. Emergency Lighting Water Level and Function Checks, Aux. Building, 306' & 331' ELEV., Completed 12/11/13
1303-13.1C, D.C. Emergency Lighting Water Level and Function Checks, Intermediate Building, Completed 12/12/13
1303-13.1D, D.C. Emergency Lighting Water Level and Function Checks, Control Building, 306', 322', & 355' ELEV., Completed 12/11/13
1303-13.1E, D.C. Emergency Lighting Water Level and Function Checks, Control Building, 322' ELEV., Completed 12/16/13
1303-13.1F, D.C. Emergency Lighting Water Level and Function Checks, Control Building, 338' ELEV. Diesel Generator Building, Completed 12/19/13

1303-13.1G, D.C. Emergency Lighting Water Level and Function Checks, Turbine, Fuel Handling, Service, and Screen House Buildings, Completed 12/26/13
1303-13.2A, Inspection/Testing/Troubleshooting/Repair of the D.C. Emergency Lighting, Aux. Bldg. 271' & 281' ELEV., Completed 8/8/13
1303-13.2B, Inspection/Testing/Troubleshooting/Repair of the D.C. Emergency Lighting, Aux. Bldg. 305' & 331' ELEV., Completed 8/6/13, 9/5/13, and 10/3/13
1303-13.2C, Inspection/Testing of the D.C. Emergency Lighting, Intermediate Bldg. 295', 305', & 322' ELEV., Completed 9/11/13
1303-13.2D, Inspection/Testing/Troubleshooting/Repair of the D.C. Emergency Lighting, Control BLDG. 306', 322', & 355' ELEV., Completed 12/11/13
1303-13.2E, Inspection/Testing/Troubleshooting/Repair of the D.C. Emergency Lighting, Control BLDG. 322', ELEV., Completed 12/15/13
1303-13.2F, Inspection/Testing/Troubleshooting/Repair of the D.C. Emergency Lighting, Control BLDG. 338' ELEV. & Diesel Generator Building, Completed 7/24/13
1303-13.2G, Inspection/Testing/Troubleshooting/Repair of the D.C. Emergency Lighting, Turbine, Fuel Handling, and Screen House, Completed 7/30/13

Quality Assurance Audits and Self Assessments

NOSA-TMI-11-13, TMI Fire Protection Increased Frequency Audit Report, 10/19/11
NOSA-TMI-12-10, TMI Fire Protection Audit Report, 10/4/12
Three Mile Island Pre-NRC Triennial Fire Protection Inspection Self-Assessment, 9/6/13

System Health Reports

TMI-1, Fire Protection Program SHR, 4th Quarter, 2013
TMI-1, Fire Protection Suppression System SHR, 4th Quarter, 2013
TMI-1, 762-Emergency Lighting System, 1st Quarter, 2013
TMI-1, 762-Emergency Lighting System, 3rd Quarter, 2013

Drawings and Wiring Diagrams

C-210-085, Diesel Generator B Electrical Equip. Cab., Rev. 12
C-1792, Bus Duct Layout - Intake Structure Pump House, Rev. 0
CD-23-1, Sht. 1, Reactor Coolant System Saturation Margin Monitor Channel "B", Rev. 8
CD-24-3, Sht. 1, Reactor Coolant System Saturation Margin Monitor Channel "B", Rev. 6
CD-25-1, Sht. 1, Reactor Coolant System Saturation Margin Monitor Channel "B", Rev. 10
D42-421516, Sht. 1, Wiring Diagram, Rev. 25
E-206-011, One Line & Relay Diagram, Rev. 54
E-206-022, One Line & Relay Diagram 4160V ENGD. Safeguards Switchgear, Rev. 21
E-206-051, One Line Diagram 250/125V DC Sys. & 120V AC Vital Instrumentation, Rev. 36
E-304-737, Fire Service Piping - Control Bldg., Rev. 0
FHA-027, Auxiliary Bldg. Elev. 305 Foot Fire Area Layout, Rev. 10
FHA-035, Control Room Tower Elev. 338 Foot Fire Area Layout, Rev. 13
FHA-037, Control Room Tower Fire Area Layout - Section A-A Detail, Rev. 6
FHA-038, Control Room Tower Fire Area Layout - Section B-B Detail, Rev. 6
FHA-044, Diesel Generator Bldg. Fire Area Layout, Rev. 4
FHA-045, Diesel Generator Bldg. Fire Area Layout, Rev. 2
FHA-046, Intake Screen & Pump House Fire Area Layout, Rev. 8

PW-20, Sht. 1, Reactor Coolant System Saturation Margin Monitor Channel “B”, Rev. 14
SS-209-016, Electrical Elementary Diagram DC & Misc., Rev. 4
1E-710-11-001, 230KV, 6.9KV, 4.16 & 480 SA & SB Schematic, Rev. 9
1E-710-11-002, 4160V & 480V Schematic, Rev. 1
85C-70013, Sht. 107A, Motor Control Center 1B Engineered Safeguards Valves, Rev. 11
201-254, 125/250V DC ENGD SFGDS Distribution Panel 1F, Rev, 21
206-011, Electrical Main One Line & Relay Diagram, Rev. 54
206-021, 6900 V. & 4160 V. Switchgear, Rev. 16
206-022, 4160 V. ENGD. Safeguards Switchgear, Rev. 21
206-032, Screen House, Reactor BLDG. H&V, 480V Switchgear, Rev. 18
206-051, 250/125V D.C. System & 120V A.C. Vital Instrumentation, Rev. 36
208-164, 4160V Switchgear (1E3, G11-02 Diesel Generator 1B Breaker, Rev. 27
208-433, Sht. 2, Electrical Elementary Diag. 480V Cont. Ctr. 1B-ESV – Unit 1C L.P. Injection Valve DH-V-3B, Rev. 3
208-434, Sht. 1, Electrical Elementary Diagram 480V Cont. Ctr. 1A – ESV Unit 3B, Rev. 9
208-434, Sht. 2, Electrical Elementary Diagram 480V Cont. Ctr. 1B – ESV Unit 3B, Rev. 7
208-440, Sht. 2, Electrical Elementary Diag. 480V Cont. Ctr. 1B-ESV Unit 4A BWST Outlet Valve MU-V-14B, Rev. 2
208-753, Remote Shutdown Transfer Switch Panel “B”, Rev. 2
208-754, Remote Shutdown Transfer Switch Panel “B”, Rev. 3
208-759, Electrical Elementary Diag. Remote Shutdown Emergency Diesel Generator B, Rev. 1
209-022, Letdown Block Valve MU-V-3, Rev. 14
209-022, Sht. 1, Electrical Elementary Diag. DC & Misc. Letdown Block Valve MU-V-3, Rev. 14
209-147, Motor Fire Pump FS-P-2 Schematic, Rev. 10
209-149, Diesel Fire Pumps FS-P-1 & FS-P-3 Schematic, Rev. 12
210-007, Main Control Room-Console CC, Rev. 26
210-010, Connection Diagram Electrical Main Control Room Console CR, Rev. 20
210-473, Remote Shutdown Transfer Switch Panel “B”, Rev. 0
210-483, Remote Shutdown Panel “B”, Rear and Side Panel, Rev. 3
210-490, Diesel Generator B Remote Shutdown Panel, Rev. 4
210-830, Electrical Main Control Room Console CR, Rev. 25
210-975, Auxiliary Control System Connection Diagram-Remote Shutdown, Rev. 3
210-1000, Motor Fire Pump Wiring Diagram, Rev. 0
211-007, Sht. S-16, Electrical Splice Box S-16, Rev. 1
211-007, Sht. S-23, Electrical Splice Box S-23, Rev. 1
224-336, Sht. 7, Electrical Instrumentation Ch. “B” Containment Vessel Penetration No. 205E, Rev. 20
623F371, Connection Diagram Unit 1E1, Rev. 8
623F373, Connection Diagram Unit 1E3, Rev. 11

Piping and Instrumentation Diagrams
1-FHA-037, Fire Area Layout Control Tower Section A-A, Rev. 6
301-011, Main Steam, Rev. 76
302-081, Feedwater, Rev. 56
302-082, Emergency Feedwater, Rev. 24
302-101, Condensate, Rev. 66
302-202, Nuclear Services River Water System, Rev. 81
302-231 Sht. 1, Fire Water Yard Header Flow Diagram, Rev. 109
302-231 Sht. 2, Fire Water Flow Diagram, Rev. 17
302-231 Sht. 3, Deluge & Alarm Valve Schematic Details, Rev. 27
302-273, Emergency Feedwater & Main Steam Valve (2 Hour Backup Supply Air), Rev. 24
302-610, Nuclear Services Closed Cycle Cooling Water, Rev. 81
302-640, Decay Heat Removal Flow Diagram, Rev. 84
302-645, Decay Heat, Closed Cycle Cooling Water, Rev. 39
302-650, Reactor Coolant System, Rev. 61
302-660, Makeup & Purification Flow Diagram, Rev. 45
302-661, Make-up & Purification Flow Diagram, Rev. 61
302-711, Core Flooding, Rev. 28
302-712, Reactor Building Spray, Rev. 49

Fire Fighting Strategies (i.e., Pre-Fire Plans)
AB-FZ-7, Auxiliary Bldg. Elev. 305 Foot, Rev. 3
CB-FA-3C, Control Bldg. Elev. 338 Foot ESAS Room, Rev. 3
DG-FA-1, "A" Diesel Generator Room, Rev. 4
ISPH-FZ-1, Intake Screen Pump House, Rev. 2

Fire Brigade Drills and Critiques
Drill No. 4/1/B/12/#2, performed on 10/31/12
Drill No. 2/1/A/13, performed on 4/2/13
Drill No. 2/1/C/13, performed on 4/10/13
Drill No. 2/1/D/13, performed on 4/17/13
Drill No. 2/1/E/13, performed on 5/1/13
Drill No. 2/1/B/13, performed on 5/22/13
Drill No. 2/1/A/13/#2, performed on 6/21/13
Drill No. 3/1/E/13, performed on 8/29/13
Drill No. 3/1/B/13/#2, performed on 9/29/13
Drill No. 1/1/C/14, performed on 1/15/14

Fire Brigade Training
Fire Brigade Leader Qualification Matrix Report, dated 12/12/13
Fire Brigade Member Qualification Matrix Report, dated 12/12/13
LPID 11.4.01.052, Fire Brigade Initial & Refresher Training, Rev. 13
LPID IMS-01, Fire Brigade Incident Management System, Rev. 2

Operator Safe Shutdown Training & Job Performance Measures (JPM)

TQ-TM-104-A01-S013, Abnormal Operations, Fire, Rev. 0
TQ-TM-104-A01-S014, Abnormal Operations, Fire, Rev. 0
TQ-TM-104-E20-S011, Abnormal Operations, Cooldown from Outside of Control Room, Rev. 0
TQ-TM-104-E20-S010, Abnormal Operations, Cooldown from Outside of Control Room, Rev. 4
TQ-TM-105-EOP20-J102, At the Remote Shutdown Panel, Establish, or Make Available, a Protected Supply of Electric Power, Rev. 1
TQ-TM-105-EOP20-J101, Cooldown to Cold Shutdown Conditions from Outside the Control Room (Local Manual Control of Seal Injection), Rev. 0
TQ-TM-105-EOP20-J105, Actions for Spurious Closure of MS-V-2A, Rev. 0
TQ-TM-105-EOP20-J103, Perform a Cooldown Outside the Control Room, Rev. 0
TQ-TM-105-E20-J104, Shutdown Outside Control Room, Rev. 0

Hot Work and Ignition Source Permits

A2334800-00-01
C2028639-30-01
C2029445-05-01
M2336649-01-01

Transient Combustible Permits and Evaluations

TCP 2014-003, Rev. 0
TCP 2014-004, Rev. 0
TCP 2014-005, Rev. 1
TCP 2014-006, Rev. 0
TCP 2014-007, Rev. 0

Corrective Action Program Documents (Issue Reports)

00753441	00795341	00953943	01183948	01205200	01224264
01228701	01229703	01239787	01240433	01241929	01247030
01251616	01257432	01327788	01334869	01349917	01353396
01360216	01415480	01448199	01472371	01479756	01487370
01501500	01514007	01514600	01526362	01533588	01534006
01534147	01535937	01539727	01541303	01541544	01548212
01554648	01554657	01569479	01573165	01577690	01578945
01579919	01584172	01588096	01608632*	01611944	01612183
01613205*	01615370*	01615473*	01615524*	01620202*	01620211*
01620467*	A1700701	A2200993			

* NRC identified during this inspection.

Vendor Documents

VM-TM-0043, Diesel Fire Pump Controller, Rev. 9
VM-TM-2548, Motor Fire Pump Controller LX1200, Rev. 3

Work Orders

R2108246	R2125181	R2135811	R2138082	R2178428	R2185238
R2188032	R2188645	R2188826	R2191960	R2192014	R2192101
R2195320	R2201237	R2201842	R2204045	R2204396	R2210957
R2211151	R2211619	R2215215	R2215280	R2215360	R2215582
R2216040	R2216225	R2217907	R2218533	R2219106	R2221638
R2222322	R2222864	R2223392	R2223812	R2226569	R2229328
R2229435	R2229710	R2229929	R2230211	R2230368	R2230107
R2230108	R2230925	R2230208	R2230284		

Industry Standards

NEI 00-01, Guidance for Post-Fire Safe Shutdown Circuit Analysis, Rev. 2
NFPA 20-1970 and 1999, Centrifugal Fire Pumps

Miscellaneous Documents

EPRI, Big Beam Battery Test Results for L6100S Battery for Emergency Lighting Unit, Rev. 0
NRC IN 2009-29, Potential Failure of Fire Water Supply Pumps to Automatically Start Due to a Fire, 11/24/09
Radio System RF Coverage Test Results, 1/16/14
Radio System RF Test Data – OPS-1, 11/26/12
Radio System RF Test Data – OPS-2, 11/26/12
Radio System RF Test Data – OPS-3, 11/26/12
Radio System RF Test Data – OPS-4, 11/26/12
Radio System RF Test Data – OPS-5, 11/26/12
Radio System RF Test Data – OPS-6, 11/26/12
Radio System RF Test Data – SEC-1, 11/26/12
Radio System RF Test Data – MAINT/RAD, 11/26/12
TMI Fire System Impairment Log, dated 2/16/14 and 2/28/14
5971-2008-192, Design Input for Appendix R Control Room Evac. Transient Analysis, Rev. 2

LIST OF ACRONYMS

AB	Auxiliary Building
AC	Alternating Current
ADAMS	Agencywide Documents Access and Management System
APCSB	Auxiliary and Power Conversion Systems Branch
BTP	Branch Technical Position
BWST	Borated Water Storage Tank
CAP	Corrective Action Program
CFR	Code of Federal Regulations
DC	Direct Current
DH	Decay Heat
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
Elev.	Elevation
ESAS	Engineered Safeguards Actuation System
FA	Fire Area
FHAR	Fire Hazards Analysis Report
FPP	Fire Protection Program
FSSD	Post-Fire Safe Shutdown
FZ	Fire Zone
GL	Generic Letter
HPI	High Pressure Injection
IN	[NRC] Information Notice
IMC	[NRC] Inspection Manual Chapter
IP	[NRC] Inspection Procedure
IPE	Individual Plant Examination
IPEEE	Individual Plant Examination of External Events
IR	Issue Report
IR	[NRC] Inspection Report
JPM	Job Performance Measure
LPI	Low Pressure Injection
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NOS	Nuclear Over-Site
NRC	Nuclear Regulatory Commission
NRR	[NRC] Nuclear Reactor Regulation
PARS	Publicly Available Records System
P&ID	Piping and Instrumentation Drawing
RCP	Reactor Coolant Pump
RG	[NRC] Regulatory Guide
RSP	Remote Shutdown Panel
SE	[NRC] Safety Evaluation
SER	[NRC] Safety Evaluation Report
SG	Steam Generator
TCP	Transient Combustible Permit
TMI	Three Mile Island
UFSAR	Updated Final Safety Analysis Report