



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

July 31, 2009

Mr. Charles G. Pardee
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: THREE MILE ISLAND STATION, UNIT 1 – NRC INTEGRATED
INSPECTION REPORT 5000289/2009003**

Dear Mr. Pardee:

On June 30, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed on July 13, 2009, with Mr. William Noll and other members of your staff.

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

This report documents one self-revealing and one NRC-identified finding of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of the very low safety significance of the violations and because the issues were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Three Mile Island. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Three Mile Island. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

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

We appreciate your cooperation. Please contact me at 610-337-5200 if you have any questions regarding this letter.

Sincerely,

/RA/

Ronald R. Bellamy, Ph.D., Chief
Projects Branch 6
Division of Reactor Projects

Docket No: 50-289
License No: DPR-50

Enclosure: Inspection Report 05000289/2009003
w/Attachment: Supplemental Information

cc w/encl:

C. Crane, President and Chief Operating Officer, Exelon Corporation
M. Pacilio, Chief Operating Officer, Exelon Nuclear
W. Noll, Site Vice President, TMI Unit 1, Exelon Nuclear
T. Dougherty, Plant Manager, TMI, Unit 1, Exelon Nuclear
D. Atherholdt, Regulatory Assurance, TMI, Unit 1, Exelon Nuclear
Senior Vice President, Nuclear Services, Exelon Nuclear
Senior Vice President, Mid-Atlantic Operations, Exelon Nuclear
Senior Vice President, Operations Support, Exelon Nuclear
Vice President, Licensing and Regulatory Affairs, Exelon Nuclear
P. Cowan, Director, Licensing, Exelon Nuclear
D. Helker, Licensing, Exelon Generation
J. Fewell, Esq., Associate General Counsel, Exelon
Correspondence Control Desk, Exelon Nuclear
Chairman, Board of County Commissioners of Dauphin County
Chairman, Board of Supervisors of Londonderry Township
R. Janati, Director, Bureau of Radiation Protection, State of PA
D. Allard, Director, PA DEP
J. Johnsrud, National Energy Committee
E. Epstein, TMI-Alert (TMIA)

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).

We appreciate your cooperation. Please contact me at 610-337-5200 if you have any questions regarding this letter.

Sincerely,

/RA/

Ronald R. Bellamy, Ph.D., Chief
Projects Branch 6
Division of Reactor Projects

Docket No: 50-289
License No: DPR-50

Enclosure: Inspection Report 05000289/2009003
w/Attachment: Supplemental Information

Distribution w/enc: (VIA EMAIL)

S. Collins, RA
M. Dapas, DRA
D. Lew, DRP
J. Clifford, DRP
R. Bellamy, DRP
S. Barber, DRP
C. Newport, DRP
J. Greives, DRP
D. Kern, DRP, SRI
J. Brand, RI

C. LaRegina, DRP, OA
L. Trocine, RI, OEDO
P. Bamford, PM, NRR
E. Miller, NRR, Backup
R. Nelson, NRR
H. Chernoff, NRR
ROPreports@nrc.gov
Region 1 Docket Room (with concurrences)

SUNSI Review Complete: RRB (Reviewer's Initials)

ML092120364

Document Name: G:\DRP\BRANCH6\+++THREE MILE ISLAND\TMI INSPECTION REPORTS\TMI 09-003.DOC

After declaring this document "An Official Agency Record" it **will** be released to the Public.

To receive a copy of this document, indicate in the box: "C"= Copy without attachment/enclosure "E"=Copy with attachment/enclosure, "N"=No copy

OFFICE	RI/DRP			RI/DRP	
NAME	DKern/ DK			RBellamy/RRB	
DATE	07/21 /09			07/31 /09	

OFFICIAL RECORD COPY

U. S. NUCLEAR REGULATORY COMMISSION
REGION 1

Docket No: 50-289

License No: DPR-50

Report No: 05000289/2009003

Licensee: Exelon Generation Company

Facility: Three Mile Island Station, Unit 1

Location: Middletown, PA 17057

Dates: April 1 through June 30, 2009

Inspectors: D. Kern, Senior Resident Inspector
J. Brand, Resident Inspector
C. Newport, Project Engineer
R. Nimitz, Senior Health Physicist
J. Commiskey, Health Physicist

Approved by: R. Bellamy, Ph.D., Chief
Projects Branch 6
Division of Reactor Projects

TABLE OF CONTENTS

SUMMARY OF FINDINGS	3
REPORT DETAILS.....	5
1. REACTOR SAFETY	5
1R01 Adverse Weather Protection	5
1R04 Equipment Alignment	6
1R05 Fire Protection	6
1R06 Flood Protection	7
1R11 Licensed Operator Requalification Program	8
1R12 Maintenance Effectiveness	9
1R13 Maintenance Risk Assessments and Emergent Work Control	10
1R15 Operability Evaluations	12
1R18 Plant Modifications	14
1R19 Post Maintenance Testing	14
1R22 Surveillance Testing	15
2. RADIATION SAFETY	15
20S1 Access Controls	15
20S2 ALARA Planning and Controls	16
20S3 Radiation Monitoring Instrumentation and Protective Equipment.....	17
2PS1 Radiological Environmental Monitoring Program (REMP) and Radioactive Materials Control	18
4. OTHER ACTIVITIES.....	20
4OA2 Identification and Resolution of Problems	20
4OA5 Other Activities	24
4OA6 Meetings, Including Exit.....	24
ATTACHMENT: SUPPLEMENTAL INFORMATION	24
SUPPLEMENTAL INFORMATION	A-1
KEY POINTS OF CONTACT	A-1
LIST OF ITEMS OPENED, CLOSED AND DISCUSSED.....	A-1
LIST OF DOCUMENTS REVIEWED	A-2
LIST OF ACRONYMS	A-5

SUMMARY OF FINDINGS

IR 05000289/2009003; 4/1/2009-6/30/2009; Exelon Generation Company, LLC; Three Mile Island, Unit 1; Maintenance Risk Assessments & Emergent Work Control and Identification & Resolution of Problems.

The report covered a three-month period of baseline inspection conducted by resident inspectors and announced inspections by regional inspectors. Two Green findings which were determined to be non-cited violations (NCVs) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, Significance Determination Process (SDP). Findings for which the SDP does not apply may be assigned a severity level after NRC management review. Cross-cutting aspects associated with findings are determined using IMC 0305, Operating Reactor Assessment Program, dated January 2009. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Rev. 4, dated December 2006.

Cornerstone: Mitigating System

- Green. A self-revealing NCV of Technical Specification (TS) 6.8.1.a was identified for failure to properly plan and coordinate maintenance and operational activities affecting safety related components. Specifically, station personnel did not properly coordinate implementation of work activities which affected the strainer function for all safety related river water pumps. Workers implemented a clearance which isolated backwash flow and deenergized the motorized rotating elements for all strainers almost 2 days before the associated valve repair maintenance activity was scheduled. During this period, the station performed the semi-annual clam kill evolution which involved starting and stopping several river water pumps. Debris from the river accumulated on the idle strainer for operating nuclear river water pump NR-P-1C. This restricted flow and the pump was declared inoperable. Operators promptly realigned the standby nuclear river water pump, exited the TS limiting condition of operation, and entered the issue into the corrective action program (Issue Reports [IRs] 926712 and 927439).

This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone and the associated cornerstone objective of ensuring the availability of systems that respond to initiating events to prevent undesirable consequences. This finding was of very low safety significance because it did not represent an actual loss of safety function of a single train for greater than the TS allowed outage time. This finding had a cross-cutting aspect in the area of Human Performance, Work Control component because station personnel did not properly coordinate work activities and assess the impact of hanging the strainer clearance tags prior to the clamicide evolution such that availability of NR-P-1C was optimized [H.3.b]. (Section 1R13)

Green. The inspectors identified an NCV of 10 Code of Federal Regulations (CFR) 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, for failure to establish and accomplish appropriate work instructions and procedures to inspect underground electrical cables, vaults, and supports for degradation or adverse affects due to long term repetitive submergence in water. Personnel did not enter the cable vaults and procedures did not require actual visual inspection of the cables, supports, or vaults

sufficient to support determination of operability. Actions were not taken to identify or remediate the cause of the repetitive flooding and restore the function of the designed cable vault drain systems. The inspectors observed corroded cable tray supports, damaged galvanized armor protective sleeves on cables, and indications of repetitive long term underground cable submergence in water. Corrective actions included revising electrical vault inspection procedures and entering each safety related and maintenance rule scope electrical vault to perform visual inspections and assessment. Related issues and corrective actions were addressed through the corrective action program (IRs 804151, 845936, 918356, 918427, 920420, 926416, 926420, 927870, 928120, 930739).

This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone and the associated cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. This finding was of very low safety significance because it did not represent an actual loss of safety function or contribute to external event core damage sequences. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, operating experience component, because station personnel did not implement and institutionalize industry operating experience regarding hazards of submerged electrical cables into station processes and procedures [P.2.b]. (Section 4OA2)

REPORT DETAILS

Summary of Plant Status

Three Mile Island, Unit 1 (TMI) operated at approximately 100 percent rated thermal power for the entire inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 2 samples)

.1 Power Grid Reliability: Readiness of Offsite and Alternate AC Power Systems

a. Inspection Scope

The inspectors verified plant features and procedures for continued operation and reliability of the offsite power grid and onsite alternate AC power systems during adverse weather (i.e., thunderstorms and hot weather extremes). Reviews included station procedures affecting operation of onsite electrical generation sources and communication protocols between control room operators and the transmission system operator to verify appropriate information is exchanged when issues arise that could impact the offsite power system. The inspectors reviewed procedures, interviewed station personnel, reviewed equipment maintenance and corrective action program records, and performed in-plant walkdowns to physically verify the material condition, readiness of the offsite electrical transformers and onsite emergency diesel generators. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.2 Dike/Flood Control System

a. Inspection Scope

The inspectors reviewed Exelon's external flooding mitigation strategy including applicable sections of the Updated Final Safety Analysis Report (UFSAR) and historic issue reports. On June 2, the inspectors walked down the flood protection dike which surrounds the entire power plant in accordance with procedure 3301-SA1, Dike Inspection, Rev. 12, to determine the condition of the flood barrier and whether repairs were needed. The inspectors verified that four questionable areas showing indications of minor dike washout were entered into the corrective action process (IR 930400). In addition, the inspectors walked down the intake screen house which houses the fire protection system pumps and safety related cooling water pumps for the decay heat removal system, nuclear service water system, and reactor river water system. The inspectors interviewed the technicians that had performed a similar dike inspection a few weeks earlier and the flood protection system engineer. Documents reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04Q - 3 samples)

a. Inspection Scope

The inspectors performed three partial system walkdown samples on the following systems and components:

- On May 18, the inspectors walked down portions of the 'B' reactor building emergency cooling water system, its support systems, and its associated breaker panels, while the 'A' reactor building emergency cooling water system train was inoperable for intake bay de-silting activities;
- On May 19, the inspectors walked down portions of the 'A' reactor building emergency cooling water system, its support systems, and its associated breaker panels, while the 'B' reactor building emergency cooling water system train was inoperable for intake bay de-silting activities; and
- On June 16, the inspectors walked down portions of the 'B' decay heat river water system, its support systems, and its associated safeguards and breaker panels, while the 'A' decay heat river water pump was inoperable due to scheduled maintenance.

The partial system walkdowns were conducted on the redundant and standby equipment to ensure that trains and equipment relied on to remain operable for accident mitigation were properly aligned.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Annual Drill Observation (71111.05A – 1 sample)

a. Inspection Scope

The inspectors observed an unannounced fire brigade drill on April 15, to evaluate the readiness of station personnel to respond to and fight fires. The drill demonstrated response to a simulated fire located at the 322 foot elevation of the Unit 1 Control Building (fire zone CB-FA-2E – West Inverter Room). The inspectors observed fire brigade member use of protective clothing and appropriate turnout gear, including self-contained breathing apparatus (SCBA), and their approach and methods to combat the fire as well as their interaction with the control room staff. The inspectors observed implementation of fire fighting strategies by the fire brigade, communications among participants throughout the drill, and emergency plan implementation. The inspectors reviewed the drill scenario objectives, determined whether drill scenario objectives were met, and observed the post-drill critique to verify that Exelon identified, discussed, and

entered adverse conditions into the corrective action program. Additional documents reviewed during this inspection are listed in the attachment.

b. Findings

No findings of significance were identified.

.2 Routine Resident Inspector Tours (71111.05Q – 5 samples)

a. Inspection Scope

The inspectors conducted fire protection inspections for several plant fire zones, selected based on the presence of equipment important to safety within their boundaries. The inspectors conducted plant walkdowns and verified the areas were as described in the TMI Fire Hazard Analysis Report, and that fire protection features were properly controlled per surveillance procedure 1038, Administrative Controls-Fire Protection Program, Rev. 73. The plant walkdowns were conducted throughout the inspection period and included assessment of transient combustible material control, fire detection and suppression equipment operability, and compensatory measures established for degraded fire protection equipment in accordance with procedure OP-MA-201-007, Fire Protection System Impairment Control, Rev. 9. In addition, the inspectors verified that applicable clearances between fire doors and floors met the criteria of Attachment 1 of Engineering Technical Evaluation CC-AA-309-101, Engineering Technical Evaluations, Rev. 10. Additional documents reviewed during this inspection are listed in the Attachment. Fire zones and areas inspected included:

- Fire Zone AB-FZ-2A, Auxiliary Building Elevation 281', Makeup and Purification Pump A;
- Fire Zone AB-FZ-2B, Auxiliary Building Elevation 281', Makeup and Purification Pump B;
- Fire Zone AB-FZ-2C, Auxiliary Building Elevation 281', Makeup and Purification Pump C;
- Fire Zone ISPH-FZ-1, Intake Screen Pump House Elevation 308', 1R switchgear and Pump Area; and
- Fire Zone ISPH-FZ-2, Intake Screen Pump House Elevation 308', 1T switchgear and Pump Area.

b. Findings

No findings of significance were identified.

1R06 Flood Protection (71111.06 – 2 samples)

.1 Internal Flooding

a. Inspection Scope

The inspectors performed visual inspections of flood barriers, system boundaries, and water line break sources located in portions of the intermediate building where internal flooding could adversely affect safety related systems needed for safe shutdown of the

plant. The inspectors walked down the emergency feedwater pump rooms and the area enveloped by a circular retaining wall surrounding the reactor containment (commonly known at TMI as the "Alligator Pit"), and interviewed the system engineer. In addition, the inspectors reviewed IR 922196 which evaluated a missing portion of a flood seal in the alligator pit.

b. Findings

No findings of significance were identified.

.2 Flooding of Underground Electrical Manholes (Vaults)

a. Inspection Scope

The inspectors accompanied engineers during portions of the semi-annual electrical vault inspection performed in accordance with MA-TM-153-001, Inspection and Maintenance of TMI-1 Electrical and Telephone Manholes, Rev. 0. The inspectors selected electrical vaults E9S, E9N, E10S, and E10N based on the risk significance of equipment powered by the cables which pass through these vaults. Two safety related medium voltage (e.g., 2000 to 35000 volts) cables, powering reactor river water pump RR-P-1A and the 1R 4KV to 480 volt transformer, pass through these vaults.

The inspectors entered the vaults to verify cables and/or splices were intact, support structures provided appropriate support for the cables and cable trays, cables were not submerged in water, dewatering devices functioned properly, and to verify the as-built configuration matched associated design drawings.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification Program (71111.11Q – 1 sample)

a. Inspection Scope

On June 16, the inspectors observed licensed operator requalification (LOR) training at the control room simulator for the 'B' operator crew. The inspectors observed the operators' simulator drill performance and compared it to the criteria listed in TMI Operational Simulator Scenario No. 48, Generated MW Failure, CW-P-1B Trip, Inadvertent ESAS Actuation, OTSG Tube Leak Leading to Tube Rupture and Loss of SCM, Main Steam Safety Valve Fails to Reseat, Rev. 1.

The inspectors reviewed the operators' ability to correctly evaluate the simulator training scenario and implement the emergency plan. The inspectors observed supervisory oversight, command and control, communication practices, and crew assignments to ensure they were consistent with normal control room activities. The inspectors observed operator response during the simulator drill transients. The inspectors evaluated training instructor effectiveness in recognizing and correcting individual and operating crew errors. The inspectors attended the post-drill critique in order to evaluate the effectiveness of problem identification. The inspectors verified that emergency plan classification and notification training opportunities were tracked and evaluated for success in accordance with criteria established in Nuclear Energy Institute 99-02,

Regulatory Assessment Performance Indicator Guideline, Rev. 5. Additional documents reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q – 4 samples)

a. Inspection Scope

The inspectors evaluated the listed samples for Maintenance Rule (MR) 10 CFR 50.65 implementation by ensuring appropriate MR scoping, characterization of failed structures, systems, and components (SSCs), MR risk categorization of SSCs, SSC performance criteria or goals, and appropriateness of corrective actions. Additionally, extent-of-condition follow-up, operability, and functional failure determinations were reviewed to verify they were appropriate. The inspectors verified that the issues were addressed as required by 10 CFR 50.65, Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants; Nuclear Management and Resources Council 93-01, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Rev. 2; and Exelon procedure ER-AA-310, Implementation of the Maintenance Rule, Rev. 6. The inspectors verified that appropriate corrective actions were initiated and documented in IRs, and that engineers properly categorized failures as maintenance rule functional failures and maintenance preventable functional failures, when applicable.

- On March 23, engineers identified reactor coolant pump RC-P-1C shaft runout had increased to 12.2 mils (IR 901864). Although below the alarm and operability setpoints, this was a notable increase from previous values. On April 22, operators added oil to RC-P-1C but observed no change in indicated oil level (IR 910515). Based on RC-P-1C vibration and temperature monitoring, operators determined the pump remained operable. The inspectors reviewed adverse condition monitoring plan (ACMP) "RC-P-1C Vibration Monitoring" and complex troubleshooting plan for these two issues to more closely assess RC-P-1C performance trends;
- IRs 846541, 860460, 889849, and 922196 describe several degraded fire penetration seals. The inspectors reviewed the system engineer evaluation of these issues from the maintenance rule perspective and verified that the system remained in the a(2) MR rule category since the seal failures did not meet the criteria of a repeat condition monitoring event;
- The inspectors reviewed engineering change request (ECR 06-121), "Install a Mechanical Block on GSC Temperature Control Valve, Rev. 0," which evaluated multiple industry operational experience issues involving a main generator stator cooling three-way control valve. The valve is designed to regulate cooling water flow to the stator heat exchangers; and
- The inspectors reviewed TMI's motor driven emergency feedwater (MDEFW) pumps bearing oil cooling design to ensure that a deficiency identified at another facility was not applicable at TMI. The design deficiency involved the lack of pump motor

bearing oil cooling capability. The deficiency involved the failure to ensure the MDEFW pumps remained operable subsequent to a small high energy line break (HELB). An engineering evaluation of this issue determined that TMI's MDEFW pumps were designed without motor bearing oil cooling capabilities, and initial environmental qualification testing showed that these pumps would remain operable subsequent to a HELB accident.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 samples)

a. Inspection Scope

The inspectors reviewed the scheduling, control, and equipment restoration during the following maintenance activities to evaluate their effect on plant risk. This review was against criteria contained in Exelon Administrative Procedure 1082.1, TMI Risk Management Program, Rev. 8 and WC-AA-101, On-Line Work Control Process, Rev. 16.

- On May 18, the 'A' intake screen house bay was taken out of service for diver desilting/cleanup activities. This condition elevated the online maintenance risk profile to Yellow;
- On May 19, the 'B' intake screen house bay was taken out of service for diver desilting/cleanup activities. This condition elevated the online maintenance risk profile to Yellow;
- On May 27, the 'C' nuclear services closed cooling water pump was removed from service for scheduled maintenance activities. At this same time, the main instrument air compressor (IA-P-4) and one of the reactor building cooling river water discharge valves (RR-V-4C) were unavailable due to emergent equipment problems. The shift manager directed appropriate additional equipment be maintained in a protected status to ensure their continued availability. Online maintenance risk remained Green;
- On June 1-2, operators performed procedure 1104-65, River and Circulating Water System Macrofouling Treatment, Rev. 23F. Prior to this evolution, operators implemented an equipment clearance, for unrelated maintenance, that removed all safety related river water pumps strainers from service. Online maintenance risk remained Green; and
- On June 16, operators removed the decay heat river water pump DR-P-1A from service to repack the pump shaft and retorque the motor bolts. Supplemental measures (e.g., briefings, written instructions, and personnel assignments) were established to ensure the work crew, maintenance supervisor, and auxiliary operators could promptly restore DR-P-1A from any point within the planned work. Online maintenance risk remained Green.

b. FindingsDeficient Coordination of Work Activities Resulted in Nuclear River Water Pump NR-P-1C Becoming Inoperable

Introduction: A self-revealing Green NCV of TS 6.8.1.a was identified for failure to properly plan and coordinate maintenance and operational activities affecting safety related components. Specifically, operators implemented an equipment clearance which isolated all safety related river water pump strainers earlier than necessary for planned work. Subsequent strainer fouling caused nuclear river water pump NR-P-1C to become inoperable.

Description: At 0600 on June 1, operators implemented equipment clearance which isolated backwash flow and deenergized the motorized rotating elements for all river water strainers. Clearance 9500772 was hung in preparation to repack valve SW-V-22A, almost 2 days before the associated valve repair maintenance activity was scheduled. The semi-annual clam kill evolution also required strainer backwash flow to be isolated. However, the strainer rotating elements normally remain energized for this activity. Work coordinators scheduled the two activities in parallel due to operations and maintenance personnel availability. Debris from the river accumulated on the idle strainer for operating nuclear river water pump NR-P-1C. This restricted flow and operators received the NR-P-1C strainer high differential pressure (d/p) alarm at 1025 on June 2. Operators reported to the intake screenhouse, noted the local NR-P-1C strainer d/p gauge read 6.3 pounds per square inch differential (psid), and declared NR-P-1C inoperable in accordance with station procedure OP-TM-PPC L2353 limits. Operators entered a 72-hour TS limiting condition of operation, which was terminated after selecting NR-1P-1B to the 1T 480V bus. Corrective maintenance restored NR-P-1C operability at 1517 on June 2. The issue was entered into the corrective action program (IRs 926712 and 927439).

The inspectors reviewed operator logs and maintenance records and interviewed personnel to assess the event. The inspectors determined clearance 9500772 did not need to be implemented in advance of the clam kill evolution. In addition, a clearance exception process could have been used to maintain power to the strainer rotating elements during the planned maintenance. Although the clearance specified compensatory measures for operators to perform enhanced river water strainer d/p monitoring while the clearance was in place, these measures were not sufficiently detailed to preclude strainer fouling from making river water pumps inoperable. Additionally, the inspectors noted that the control room alarm (set at 5.4 pounds d/p) did not provide sufficient advance notice to allow operators sufficient time to remediate the degrading condition prior to NR-P-1C becoming inoperable (operability limit is 6.0 pounds strainer d/p).

Analysis: Failure to properly plan and coordinate the clamicide and SW-V-22A valve maintenance activities, including development of work instructions appropriate for the circumstances, was a performance deficiency. Consequently, NR-P-1C became inoperable and required additional operator actions to restore river water system capability. This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone and the associated cornerstone objective of ensuring the availability of systems that respond to initiating events to prevent undesirable consequences.

The inspectors evaluated the finding in accordance with IMC 0609.04, Phase 1 – Initial Screening and Characterization of Findings. This finding was of very low safety significance because it represented an actual loss of safety function of a single train of nuclear river water for less than the 72 hour TS allowed outage time and did not contribute to external event core damage sequences. This finding had a cross-cutting aspect in the area of Human Performance, Work Control component because station personnel did not properly coordinate work activities and assess the impact of hanging the strainer clearance tags prior to the clamicide evolution such that availability of NR-P-1C was optimized [H.3.b].

Enforcement: TS 6.8.1.a requires written procedures to be established, implemented, and maintained covering applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Rev. 2, February 1978. Appendix A, Section 9.a. “Procedures for Performing Maintenance”, requires that, “Maintenance that can affect the performance of safety related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances.” Contrary to the above, on June 1, station personnel did not properly pre-plan and perform maintenance affecting the safety related river water strainers, which consequently placed the plant in an unplanned entry into a limiting condition for operation for one inoperable nuclear river water train. Because this violation was of very low safety significance and was entered into the TMI corrective action program (IRs 926712 and 927439), this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2009003-01, Deficient Coordination of Work Activities Resulted in NR-P-1C Becoming Inoperable.**

1R15 Operability Evaluations (71111.15 – 7 samples)

a. Inspection Scope

The inspectors verified that degraded conditions were properly characterized, operability of the affected systems was properly evaluated in relation to TS requirements, applicable extent of condition reviews were performed, and no unrecognized increase in plant risk resulted from the equipment issues. The inspectors referenced NRC IMC Part 9900, Operability Determinations & Functionality Assessments for Resolutions of Degraded or Nonconforming Conditions Adverse to Quality or Safety and Exelon procedure OP-AA-108-115, Operability Determinations, Rev. 8, to determine acceptability of the operability evaluations. Additional documents reviewed during this inspection are listed in the Attachment. The inspectors reviewed operability evaluations for the following degraded equipment issues:

- From May 13 to May 15, engineers inspected underground electrical vault E7-south and found several cables submerged in water. Protective cable armor and outer tape wrap were torn on two non-safety related cables. Two safety related cables were submerged and experienced heavy corrosion of the protective cable armor, but the cable insulation jacket was not damaged. Cable supports were heavily corroded, including some sections of through-wall corrosion. Engineers reviewed electrical cable and structural support schematics, IRs, equipment test results, and inspected the cables. Engineers determined the cables in this vault remained operable and initiated several corrective actions to restore the vault and cable design conditions (IRs 919391 and 920420);

- From May 19 to May 24, instrument air dryer IA-Q-2 performed erratically, resulting in numerous instrument air trouble alarms and an increased air dew point. Operators implemented an adverse condition monitoring program (ACMP) "Monitoring of IA-P-4/IA-Q-2" to enhance monitoring of the instrument air system for indications of further degradation which could challenge system operability. On May 25, instrument air dew point degraded further. Operators secured IA-P-4 (the station's primary use instrument air compressor) and IA-Q-2 as directed by the ACMP, split the instrument air system from the station service air system, and continued enhanced monitoring of both station air and instrument air system parameters to ensure they supported continued operability of various mitigating systems;
- On May 26, technicians identified an unusual noise emanating from reactor building cooling water valve RR-V-4C during post maintenance testing. Operators declared RR-V-4C inoperable for further investigation. Operators determined that the condition did not affect the parallel path cooling water discharge valve (RR-V-4D) and therefore concluded the 'C' train of reactor building cooling water remained operable;
- On June 2, control room operators received the 'C' nuclear river water pump strainer (NR-S-1C) high d/p alarm. Operators inspected the pump locally and found the local d/p value at 6.3 pounds psid. Operators declared the 'C' nuclear river water pump inoperable, entered the applicable TS limiting condition of operation (LCO), and placed the 'B' nuclear river water pump in service to exit the TS LCO. The inspectors reviewed the circumstances associated with the elevated d/p, the condition of the remaining nuclear river water pumps, and calibration of instrumentation to ensure operability was properly supported;
- On June 9, engineers identified an undocumented penetration pathway through the control room pressure boundary. Two exhaust ducts from rest rooms on the 4th floor of the control tower (within the control room pressure boundary) exhaust to ventilation ducting outside of the control room pressure boundary with no isolation dampers shown on system drawings or visible during a physical walkdown. Engineers reviewed ventilation calculations and system test results and concluded that the control room emergency ventilation system including the pressure boundary remained operable. Additional follow-up actions to address this degraded condition were documented in IRs 929503 and 931430;
- On June 22, the inspectors performed a visual inspection of the emergency diesel generator fuel oil tank (DF-T-1) vault. The inspectors reviewed Exelon's assessment of the flange gasket for the abandoned connection for level indicator (DF-LI-152) documented in IR 933960; and
- On June 26, operators observed repetitive cycling of an M5 relay for the 'A' emergency diesel generator (EDG) jacket coolant water heater (EG-H-1A). This condition had the potential to cause excessive wear and premature failure of the relay. An engineering evaluation under IR 935644 determined that the issue involved a degraded temperature indicator and operability of the 'A' EDG was not impacted. The inspectors verified that actions were implemented to ensure contact pyrometer readings are taken to verify proper jacket coolant water temperatures until repairs are complete.

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18 – 1 sample)a. Inspection Scope

The inspectors reviewed the following temporary modification (TM) and associated implementing documents, interviewed the respective system engineer, and walked down the in-plant system to verify the plant design basis and the system or component operability was maintained. Procedures CC-AA-112, Temporary Configuration Changes, Rev. 14, and CC-TM-112-1001, Temporary Configuration Change Implementation, Rev. 5, specified requirements for development and installation of TMs.

- ECR TM-08-946, EG-Y-1A Muffler Tail Pipe Support, Rev. 0 was implemented as a temporary modification to address degradation of the 'A' emergency diesel muffler's carbon steel tail pipe. The added support was installed to keep the tail pipe in its design configuration until muffler replacement is performed later in 2009 (1R18 refueling outage).

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19 – 3 samples)a. Inspection Scope

The inspectors reviewed and/or observed the following post-maintenance test (PMT) activities to ensure: (1) the PMT was appropriate for the scope of the maintenance work completed; (2) the acceptance criteria were clear and demonstrated operability of the component; and (3) the PMT was performed in accordance with procedures.

- On June 16, operators performed work order C2019285-02, DR-P-1A Leak Check, 1410-P-1, Pump Packing Maintenance, Rev. 23, and OP-TM-533-201, Inservice Test of DR-P-1A and Valves, Rev. 12, following maintenance on DR-P-1A;
- On June 29, operators performed procedure 1303-5.15, Fuel Handling Building ESF Air Treatment System Operational Test, (Interim Change IC-25774) following maintenance activities on the 'A' spent fuel ventilation system train;
- On June 30, operators performed procedure OP-TM-411-451, Manual Control of TBVs/ADVs, Rev. 5, following corrective maintenance activities per work order WO # R2098676.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22 – 8 samples)a. Inspection Scope (4 Inservice Testing [IST] Samples and 4 Routine Surveillance Samples)

The inspectors observed and/or reviewed the following operational surveillance tests to verify adequacy of the test to demonstrate the operability of the required system or component safety function. Inspection activities included review of previous surveillance history to identify problems and trends, observation of pre-evolution briefings, and initiation/resolution of related IRs for selected surveillances.

- On May 1, 1301-9.7, Intake Pump House Floor, Silt Accumulation and Inspection, Rev. 24;
- On May 11, 3303-A2, Fire System Main Header Flush and Lube Test IC-26143;
- On May 12, OP-TM-211-206, IST OF MU-P-1B, Rev. 4;
- On May 12, OP-TM-211-208, IST OF MU-P-1C, Rev. 3;
- On May 12, OP-TM-211-213, IST OF MU-V-16C And MU-V-16D, Rev. 0;
- On June 2, U-36, Ventilation Filter DOP and Halide Testing, Rev. 13 on AH-F-3A;
- On June 3, OP-TM-220-252, Primary to Secondary Leak Rate Determination, Rev. 5B; and
- On June 12, inspectors reviewed the March 12 performance of 3303-A3, Fire Pump Capacity Testing, Rev. 14 and OP-TM-811-912, Startup Operation and Shutdown of FS-P-15 When Taking Suction from the River, Rev. 2 to assess applicability of industry operating experience issues identified in IR 906807.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY**Cornerstone: Occupational Radiation Safety and Public Radiation Safety**20S1 Access Controls (71121.01 – 2 samples)a. Inspection Scope (2 Samples)

The inspectors reviewed selected activities and associated documentation in the below listed areas. The evaluation of Exelon's performance in these areas was against criteria contained in 10 CFR 20, applicable TSs, and applicable Exelon procedures.

Plant Walkdowns and Radiation Work Permit (RWP) Reviews

The inspectors walked down selected radiological controlled areas and reviewed housekeeping, material conditions, posting, barricading, and access controls to radiological areas. The inspectors selectively reviewed and discussed ambient radiation levels.

The inspectors reviewed exposure work areas to determine if radiological controls were acceptable. The inspectors selectively reviewed the radiological controls for work activities associated with fuel pool re-racking (RWP 24). The reviews included

evaluation of the adequacy of applied radiological controls including radiation work permits, procedure adherence, radiological surveys, job coverage, airborne radioactivity sampling and controls, and contamination controls.

Problem Identification and Resolution

The inspectors selectively reviewed self-assessments and audits since the previous inspection to determine if identified problems were entered into the corrective action program for resolution. The inspectors evaluated the database for repetitive deficiencies or significant individual deficiencies to determine if self-assessment activities were identifying and addressing the deficiencies.

The review also included a review of problem reports since the last inspection which involved potential radiation worker or radiation protection personnel errors, to determine if there was an observable pattern traceable to a similar cause. The review included an evaluation of corrective actions. (see Section 4OA2)

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls (71121.02 – 3 samples)

a. Inspection Scope

The inspectors conducted the following activities to determine if Exelon was properly implementing operational, engineering, and administrative controls to maintain personnel occupational radiation exposure as low as is reasonably achievable (ALARA). Implementation of these controls was reviewed against the criteria contained in 10 CFR 20, applicable industry standards, and applicable Exelon procedures. Portions of this review included planning and preparation for steam generator replacement.

Inspection Planning, Radiological Work Planning

The inspectors reviewed pertinent information since the previous inspection regarding plant collective exposure history, current exposure trends, and ongoing and planned activities in order to assess current performance and exposure challenges. The inspectors reviewed the plant's current 3-year rolling average collective exposure for the period January 2006 - December 2008. The inspectors evaluated site specific trends in collective exposures (using NUREG-0713 and plant historical data). The inspectors evaluated occupational exposures received for 2009 (year to date), relative to 2009 ALARA goals. The inspectors also discussed occupational radiation exposure estimates for 2009.

The inspectors reviewed and discussed proposed occupational exposure goals for the 2009 refueling outage, including replacement of steam generators.

Problem Identification and Resolution

The inspectors selectively reviewed problem reports in this area since the last inspection to determine if Exelon was including ALARA deficiencies and issues in its corrective action program. (see Section 4OA2.)

The review included self-assessments, audits, and corrective action reports related to the ALARA program since the last inspection to determine if the follow-up activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk.

b. Findings

No findings of significance were identified.

2OS3 Radiation Monitoring Instrumentation and Protective Equipment (71121.03 – 3 samples)

a. Inspection Scope

The inspectors selectively reviewed calibration and checking of radiation monitoring/measurement instrumentation in the below listed areas. The review was against criteria contained in applicable TSs and station procedures.

Verification of Instrument Calibration, Operability, and Alarm Set Point Verification

The inspectors selectively reviewed calibration and operability check records for various radiological survey and monitoring instrumentation. The inspectors also reviewed and discussed station radionuclide profile and use of appropriate radiation sources for calibration of instrumentation. The inspectors selectively reviewed calibration and checking of laboratory instruments including applicable instrument control charts. The inspectors reviewed procedure controls for out-of-tolerance reports for radiation protection instrumentation. The following instrumentation was reviewed:

Air sampling - AMS-4- 6087-22

Electronic dosimeters – 19726, 30393, 38186, 78516, 35783, 36294

Survey/measurement – AMP 100799063, E-140N 1117, RSO-50E 79623, RM-14 74095, SAM 11510

Personnel monitors - PCM1B-710930, PCM 2–610, PM-7 – 482, 321

Area Radiation Monitors – RM-622/623 (Reactor Building High Range), RM-3, RM-6, RM-G9 (Fuel Bridge), RM-11, RM-13, RM-L-1L/H, RM-G3,

Laboratory – Ludlum-710873, SAC 4-711457

SCBA Maintenance and User Training

The inspectors selectively reviewed SCBA fill capabilities.

Problem Identification and Resolution

The inspectors reviewed problem reports in this area since the last inspection to determine if Exelon was including instrument deficiencies and issues in its corrective action program. The review included self-assessments, audits and corrective action reports. (see Section 4OA2)

b. Findings

No findings of significance were identified.

2PS1 Radiological Environmental Monitoring Program (REMP) and Radioactive Materials Control (7112203 – 10 samples)

a. Inspection Scope

- (1) The inspectors reviewed the 2007 and 2008 Annual Radiological Environmental Operating Reports and Exelon assessment results to verify that the REMP was implemented as required by TSs and the Offsite Dose Calculation Manual (ODCM). The review included changes to the ODCM with respect to environmental monitoring commitments in terms of sampling locations, monitoring and measurement frequencies, land use census, inter-laboratory comparison program, and analysis of data. In addition, the inspectors reviewed Exelon self-assessments and audits, event reports, the Final Safety Analysis Report (FSAR) for information regarding the environmental monitoring program and meteorological monitoring instrumentation, and the scope of the audit program to verify that it met the requirements of 10 CFR 20.1101.
- (2) The inspectors walked down environmental air particulate and iodine sampling stations (E1-2, E1-2Q, F1-3, G2-1, H3-1); water sampling stations (A3-2, G15-2, G15-3, J1-2, K1-1, Q9-1); dairy farms (D2-1, E2-2, F4-1, G2-1); thermo-luminescent dosimeter (TLD) monitoring locations (E1-2, E1-2Q, F1-1, F1-3, G1-2, G10-1, G15-1, H1-1, H3-1, J1-1, Met Tower, and North Access Road); and sediment sample locations (J2-1) and determined that they were located as described in the ODCM and applicable equipment material condition was acceptable.
- (3) The inspectors observed the collection and preparation of a variety of environmental samples including air, milk, water, and sediment and verified that environmental sampling was representative of the release pathways as specified in the ODCM and that sampling techniques were in accordance with procedures. The inspectors discussed fish sampling procedures, techniques, and locations with Exelon's vendor, Normandeau Associates. The inspectors reviewed the software applications and inputs used for the dose assessments for environmental and effluent samples for adequacy. (Simplified Effluent Environmental Doses and Liquid & Gas Effluent Reporting)
- (4) Based on direct observation and review of records, the inspectors verified that the meteorological tower instruments were operable, calibrated, and maintained in accordance with guidance contained in the FSAR, NRC Safety Guide 23, and Exelon procedures. The inspectors verified that the meteorological data readout

and recording instruments in the control room and at the tower were operable and comparable.

- (5) The inspectors reviewed each event documented in the Annual Radiological Environmental Monitoring Report which involved a missed sample, inoperable sampler, lost TLD, or anomalous measurement for the cause and corrective actions. The inspectors conducted a review of Exelon's assessment of any positive sample results. The latest two annual radiological effluent release reports were also reviewed to identify that there were no significant changes in reported dose values from previous effluent release reports. These reports were reviewed with respect to the environmental monitoring program.
- (6) The inspectors reviewed any significant changes made by Exelon to the ODCM as the result of changes to the land census or sampler station modifications since the last inspection. The inspectors also reviewed technical justifications for any changed sampling locations and verified that Exelon performed the reviews required to ensure that the changes did not affect its ability to monitor the impacts of radioactive effluent releases on the environment.
- (7) The inspectors reviewed the calibration and maintenance records for air samplers. The inspectors reviewed the results of Exelon's inter-laboratory comparison program to verify the adequacy of environmental sample analyses performed by Exelon, Exelon's quality control evaluation of the inter-laboratory comparison program and the corrective actions for any deficiencies, Exelon's determination of any bias to the data and the overall effect on the REMP, and quality assurance audit results of the program to determine whether Exelon met the TS/ODCM requirements. The inspectors verified that the appropriate detection sensitivities with respect to TS/ODCM are utilized for counting samples and reviewed the results of the quality control program including the interlaboratory comparison program to verify the adequacy of the program.
- (8) The inspectors observed the radioactive material survey and release locations and inspected the methods used for control, survey, and release to include observing the performance of personnel surveying and releasing material for unrestricted use and verifying that the work is performed in accordance with plant procedures.
- (9) The inspectors verified that the radiation monitoring instrumentation used for the release of material from the radiological controlled area was appropriate for the radiation types present and was calibrated with appropriate radiation sources. The inspectors reviewed Exelon's equipment to ensure the radiation detection sensitivities were consistent with the NRC guidance contained in Circular 81-07 and Information Notice 85-92 for surface contamination and Health Physics Position HPPOS-221 for volumetrically contaminated material. Calibration records and source certificates for equipment used for the release of personnel and materials were reviewed for adequacy.
- (10) The inspectors reviewed Exelon's audits and self-assessments related to the REMP since the last inspection to determine if identified problems were entered into the corrective action program. Selected corrective action reports were reviewed since the last inspection to determine if identified problems accurately

characterized the causes, and corrective actions were assigned to each commensurate with their safety significance. Any repetitive deficiencies were also assessed to ensure that Exelon's self-assessment activities were identifying and addressing these deficiencies (see Section 4AO2).

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Issue Reports and Cross-References to Problem Identification and Resolution Issues Reviewed Elsewhere

The inspectors performed a daily screening of items entered into the licensee's corrective action program. This review was accomplished by reviewing a list of daily IRs, reviewing selected IRs, attending daily screening meetings, and accessing the licensee's computerized corrective action program database.

.2 Semi-Annual Review to Identify Trends (1 sample)

a. Inspection Scope

The inspectors performed a semi-annual review of common cause issues in order to identify any unusual trends that might indicate the existence of a more significant safety issue. This review included an evaluation of repetitive issues identified via the corrective action program, self-revealing issues, and issues evaluated using programs supplemental to the formal corrective action program, such as the maintenance rule program and corrective maintenance program. The results of the trending review were compared with the results of normal baseline inspections.

b. Findings

No findings of significance were identified.

The inspectors noted a series of recent inspection insights which indicated station personnel as a whole (e.g., engineers, operators, maintenance craft, work planners, technicians, and managers) did not demonstrate appropriate sensitivity to the importance of the river water strainer function. Examples included DR-S-1A equipment qualification issues, NR-P-1C high strainer d/p during clamicide evolution and screenwash outage window, intake structure stop log non-seismic qualification, deficient protected equipment postings on DR-P-1B during DR-P-1A maintenance outage, and adequacy of NR-P-1C strainer high d/p alarm setpoint which didn't annunciate in time to preclude pump inoperability. The inspectors discussed this observation with station management.

.3 Annual Sample – Inspection and Testing of Underground Electrical Cables (1 sample)

a. Inspection Scope

During license renewal inspections in 2008, the inspectors observed that electrical cables were submerged underwater in electrical vault E7S. TMI personnel promptly dewatered the vault, but did not enter the vault to perform visual inspections of the cables and supports. The license renewal team determined that licensee commitments to implement enhanced inspection and monitoring programs properly addressed the issue with regard to the extended period of operation (after the current 40 year license expires). The resident inspectors observed damage to the galvanized armor protective layer surrounding a cable and corrosion of the cable supports. The inspectors questioned the condition of the underground cables and supports, and whether the underground cables were qualified for submerged operation for the life of the plant (IR 804151). The inspectors reviewed the TMI response to NRC Generic Letter 2007-01, Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients. Additional documents reviewed are listed in the Attachment.

b. Findings

Introduction: The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, which requires in part that activities affecting quality be prescribed by and accomplished in accordance with documented instructions and procedures which include appropriate acceptance criteria. Specifically, station personnel did not properly inspect underground electrical cables, vaults, and supports for degradation or adverse affects due to long term repetitive submergence in water. Underground medium voltage electrical cables, including those which supply reactor river water pump RR-P-1B and safety related 4KV/480 volt transformer 1T, were consistently found submerged and no visual assessment of their condition was performed.

Description: The inspectors reviewed selected maintenance records of underground electrical cable vault inspections and several related IRs for the period January 2004 to July 2008. Procedure ER-AA-3003, Cable Condition Monitoring Program, Rev. 0 states that energizing cables in wet environs accelerates the effects of aging; water permeates cable jackets and insulation; and, if possible, cables should be kept dry. The inspectors noted that several cable vaults (E3, E4, E9, E10) containing either safety related or maintenance rule scope power cables were not consistently included in the inspection scope. Additionally, although some cable vaults were checked for presence of water and dewatered semi-annually, the effects of the water were not properly evaluated. Cables were routinely found submerged in vaults E7, E8, E9, E12, E16, E21, E22, and E24. Personnel did not enter the cable vaults during the inspections. Work instructions did not require actual visual inspection of the cables, supports, or vaults to identify and assess potential indications of cable degradation due to installation defects or prolonged submergence in water. Further, actions were not taken to identify or remediate the cause of the repetitive flooding and restore the function of the designed electrical vault drain systems.

In response to several previous IRs (from 2004-2008) concerning submerged cables, engineers consistently referenced vendor information (engineering qualification document EQ-TI-111) which stated High Temperature Kerite insulated cables could withstand intermittent or continuous immersion in water for years without significant loss of electrical properties. On this basis, engineers had consistently concluded the submerged electrical cables remained operable. The inspectors noted that EQ-TI-111

tests had evaluated submerged cable performance for 400 days and the results were not extrapolated to support a determination of operability for the 40 year plant license period. Engineers could not produce documentation from the vendor which would support cable qualification to operate submerged for the 40 year plant operating license. Evaluations also noted that factors such as immersion in fresh water (versus salt water), being normally energized (versus deenergized), and continuous immersion (versus intermittent immersion) adversely influenced cable degradation. The inspectors determined that each of these factors was present at TMI.

The Electric Power Research Institute report TR-103834-P1-2, Effects of Moisture on the Life of Power Plant Cables, concluded that a number of industry cable failures were associated with underground cables subjected to water intrusion that were damaged during installation (i.e., torn armor layer, tape, and insulation). The inspectors expressed concern that since a visual inspection for signs of cable damage was not performed, the condition of the TMI underground cables, cable trays, and vaults therefore was indeterminate.

In response to the inspectors' concerns, station personnel created procedure MA-TM-153-001, Inspection and Maintenance of TMI-1 Electrical and Telephone Manholes, Rev. 1 and performed a baseline visual inspection of over 40 underground electrical cable vaults, to assess physical condition of cables, supports, the vault structure, and whether the designed drain mechanism was functioning. The inspectors accompanied station personnel while inspecting eight of the vaults. Inspections identified significant corrosion of various cable tray supports, through-wall corrosion of galvanized armor protective sleeves on medium voltage cables, and indication of installation damage to a 480 volt cable. Additionally, the drains for 7 of the first 13 vaults inspected were either never installed or not functional. The vaults were dewatered and inspection frequency for some vaults was increased to quarterly. Engineers initiated work orders to correct all identified discrepancies. Engineers concluded the cables passing through these vaults and their supported components remained operable. Related issues and corrective actions were addressed through the corrective action program (IRs 804151, 845936, 918356, 918927, 920420, 926416, 926420, 927870, 928120, and 930739).

Analysis: Failure to properly establish and perform procedures to verify the condition of underground electrical cables, supports, and vaults (including operational drains) met the operating conditions for which the cable was designed was a performance deficiency. This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone and the associated cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences.

The inspectors evaluated the finding in accordance with IMC 0609.04, Phase 1 – Initial Screening and Characterization of Findings. This finding was of very low safety significance because it did not represent an actual loss of safety function or contribute to external event core damage sequences. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, operating experience component, because station personnel did not implement and institutionalize industry operating experience regarding hazards of submerged electrical cables into station processes and procedures [P.2.b].

Enforcement: 10 CFR 50, Appendix B, Criterion V requires in part that activities affecting quality be prescribed by and accomplished in accordance with documented instructions and procedures which include appropriate acceptance criteria. Procedure ER-AA-3003 states that energizing cables in wet environs accelerates the effects of aging; water permeates cable jackets and insulation; and if possible, control and medium voltage cables should be kept dry. Contrary to the above requirements, from 2004 to 2008, instructions and procedures did not properly prescribe and accomplish inspection activities to verify safety related control and medium voltage cables for safety related systems, including reactor river water, nuclear river water, and decay heat river water would perform satisfactorily in service under design conditions were deficient. Work instructions did not require actual visual inspection of the cables, supports, or vaults to identify and assess potential indications of cable degradation due to installation defects or prolonged submergence in water. Further, actions were not taken to identify or remediate the cause of the repetitive flooding and restore the function of the designed electrical vault drain systems. As a result, station personnel did not properly evaluate and mitigate the effects of long term submergence of electrical power supply cables. Because this violation was of very low safety significance and was entered into the TMI corrective action program (IRs 804151, 845936, 918356, 918427, 919391, 920420, 926416, 926420, 927870, 928120, and 930739), this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2009003-02, Deficient Inspections, Evaluation, and Remediation of Submerged Underground Electrical Cables.**

.4 Problem Identification and Resolution for Occupational Radiation Safety

a. Inspection Scope

The inspectors selectively reviewed problem reports, self-assessments, and audits to determine if identified problems were entered into the corrective action program for resolution. The inspectors selectively reviewed the reports to evaluate Exelon's threshold for identifying, evaluating, and resolving problems. The review included a check of possible repetitive issues, such as worker or technician errors. (IRs. 828072, 828384, 831762, 832529, 837077, 839676, 841311, 846395, 847768, 850122, 851428, 854620, 855225, 858156, 864787, 869952, 977589, 877843, 878480, 891085, 894127, and 900605)

This review was against criteria contained in 10 CFR 20, TSs, and the station procedures.

b. Findings

No findings of significance were identified.

.5 Problem Identification and Resolution for Public Radiation Safety

a. Inspection Scope

The inspectors reviewed 31 corrective action condition reports associated with the REMP that were initiated in 2006 through 2009. The inspectors verified that problems identified by these condition reports were properly characterized in the licensee's event reporting system, and that applicable cause and corrective actions were identified,

commensurate with the safety significance of the radiological occurrences. In cases where there were repetitive issues or issues that were not adequately addressed or corrected, Quality Assurance audits and follow-up assessments identified these and initiated actions to correct the condition. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

Quarterly Resident Inspector Observations of Security Personnel Activities

a. Inspection Scope

During the inspection period, the inspectors conducted the following observations of security force personnel and activities to verify that the activities were consistent with Exelon security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

- Multiple tours of operations within the central and secondary security alarm stations;
- Explosive detector equipment testing;
- Owner controlled area and protected area access control posts; and
- Other security officer posts including the ready room and compensatory posts.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. These observations were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On July 13, 2009, the resident inspectors presented the inspection results to Mr. William Noll and other members of the TMI staff who acknowledged the findings. Dr. Ronald Bellamy, Region I Projects Branch 6, attended the exit meeting. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION
KEY POINTS OF CONTACT

Licensee Personnel

C. Baker	Manager, Chemistry
R. Bleistine	Normandeau Associates
T. Bradley	Normandeau Associates
W. Carsky	Director, Operations
G. Chevalier	Senior Chemist
R. Davis	Radiation Protection Manager
D. DiVitore	Radiological Engineering Manager
T. Dougherty	Plant Manager
D. Etheridge	Radiation Protection Technical Manager
J. Heischman	Director, Maintenance
J. Karkoska	Security Manager
F. Linsenbach	OTSG Replacement Radiation Protection Manager
A. Miller	Regulatory Assurance
J. Murray	Operations Training Manager
D. Neff	Manager, Emergency Preparedness
W. Noll	Site Vice President
T. Roberts	Radiation Protection
J. Schork	Lead LORT Instructor
M. Sweigart	Supervisor, Radwaste/Environmental
D. Trostle	Operations Security Analyst
L. Weber	Senior Chemist
L. Weir	Manager, Nuclear Oversight Services
L. Wen	NOS Manager
C. Wend	Manager, Radiation Protection
H. Yeldell	Work Management

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened/Closed

05000289/2009003-01	NCV	Deficient Coordination of Work Activities Resulted in NR-P-1C Becoming Inoperable (Section 1R13)
05000289/2009003-02	NCV	Deficient Inspections, Evaluation, and Remediation of Submerged Underground Electrical Cables (Section 4OA2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather

Procedures

OP-AA-108-107, Switchyard Control, Rev. 2
OP-AA-108-107-1001, Station Response To Grid Capacity Conditions, Rev. 2
OP-TM-AOP-020, Loss Of Station Power, Rev. 13
OP-TM-AOP-022, Load Rejection, Rev. 4
1107-11, TMI Grid Operations, Rev. 23

Other

TMI-1, Technical Specification 3.7, Unit Electric Power System
IRs 577700, 640019, 660148, 660311, and 749766
UFSAR, Section 2.6.5, Design of Hydraulic Facilities
UFSAR, Figure 2.6-17, Typical Dike Section
Work Order A2199716, Inspection of Dike, completed 9/29/08
TMI Engineering Safety Evaluation 122-002, QCL for Dike/Flood Control System, Rev. 0

Section 1R05: Fire Protection

Procedures

OP-TM-AOP-001, Fire, Rev. 6
OP-TM-AOP-001-C2E, Fire in "B" Inverter Room, Rev. 4
OP-TM-AOP-016, Loss of VBB, Rev. 1

Other

TMI-1 Fire Pre-Plan Strategies and Smoke Removal Plan for Zone CB-FA-2E, Control Building
Elevation 322' West Inverter Room

Section 1R011: Licensed Operator Requalification Program

Procedures

EP-AA-1009, Radiological Emergency Plan Annex for TMI Station, Rev. 13
OP-TM-AOP-046, Inadvertent Engineered Safeguards Actuation System Actuation, Rev. 0
OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset, Rev. 2
OP-TM-EOP-001, Reactor Trip, Rev. 10
OP-TM-EOP-002, Loss of 25F Subcooling Margin, Rev. 7
OP-TM-EOP-005, Once Through Steam Generator Tube Leakage, Rev. 6
OP-TM-EOP-010, Abnormal Transients Rules, Guides, and Graphs, Rev. 10
OS-24, Conduct of Operations During Abnormal and Emergency Events, Rev. 17

Section 1R15: Operability Evaluations

Procedures

1104-19, Control Building Ventilation System, Rev. 74
1104-25, Instrument and Control Air System, Rev. 139
MA-TM-141-100, Control Room 'A' Train Envelope Boundary Differential Pressure Testing
Procedure
MA-TM-141-101, Control Room 'B' Train Envelope Boundary Differential Pressure Testing
Procedure, Rev. 0

Drawings

302-611, Reactor Building Normal & Emergency Cooling Water System, Rev. 12
302-842, Control Building and Machine Shop Ventilation Flow Diagram, Sheet 1, Rev. 57
302-842, Control Building and Machine Shop Ventilation Flow Diagram, Sheet 2, Rev. 8
E-216-022, Electrical Manholes & Underground Ducts Aux Building to Screen House Area, Rev. 17

Other

Calculation CC-TM-209-1001
Calculation C-1101-900-E000-087
Technical Specification 3.3, Emergency Core Cooling, Reactor Building Emergency Cooling, and Reactor Building Spray Systems
IRs 490480, 921312, 923522, 924657, 926712, and 927439
Work Order R2127223 and R2127176

Section 2OS1, 2OS2, 2OS3

Procedures

IC-226, Calibration of SAC 4, Rev. 0
PIC-180, Calibration of the Ludlum Model 2000, Rev. 1
RP-AA-300, Radiological Survey Program, Rev. 4
RP-AA-300-1002, Electron Capture Isotope Control, Rev. 0
RP-AA-301, Radiological Air Sampling Program, Rev. 2
RP-AA-376, Radiological Postings, Labeling, and Markings, Rev. 4
RP-AA-500, Radioactive Material (Control), Rev. 14
RP-AA-503, Unconditional Release Survey Method, Rev. 2
RP-TM-440-004, Recharge of Breathing Air Cylinders Using Ingersoll-Rand Recharging System, Rev. 1
RP-TM-500-1003, TMI Site Radioactive Material Control, Rev. 14
RP-TM-503-1001, Volumetric Material Control, Rev. 0

Documents

2008 4th Quarter Reactor Coolant System Activity Trend Report
Various radiation monitor calibration and operability check data
Various radiological survey records for completed work activities including records
Steam Generator Storage Facility Analysis

2PS1: REMP and Radioactive Materials Control

Procedures

CY-AA-170-000, Radiological Effluent & Environmental Monitoring Programs, Rev. 3
CY-AA-170-100, Radiological Environmental Monitoring Program, Rev. 2
CY-AA-170-1000, Radiological Environmental Monitoring Program & Meteorological Program Implementation, Rev. 5
CY-AA-170-1001, Radiological Environmental Monitoring Program Data Review, Rev. 0
CY-AA-170-1002, Radiological Environmental Monitoring Program TLD Program Data Review, Rev. 0
CY-AA-710-1000, Sample Collection Vendor Evaluation, Rev. 5
CY-TM-170-300, Off-Site Dose Calculation Manual, Rev. 1
ER-TMI-01, Collection of Milk Samples for Radiological Analysis (TMI), Rev. 2
ER-TMI-03, Collection of Aquatic Sediment Samples for Radiological Analysis (TMI), Rev. 2
ER-TMI-06, Collection of Surface/Drinking/Effluent Water/Storm Water Samples for Radiological Analysis (TMI), Rev. 4

ER-TMI-13, Collection of Fish Samples for Radiological Analysis (TMI), Rev. 2
ER-TMI-14, Collection of Air Iodine & Air Particulate Samples (TMI), Rev. 1
RP-AA-500, Radioactive Material Control, Rev. 14
RP-AA-503, Unconditional Release Survey Method, Rev. 1
RP-AA-503-1001, Volumetric Material Controls, Rev. 0
RP-AA-503-1002, Qualitative Isotopic Analysis to Support Unconditional Release, Rev. 0
RP-AA-503-1004, Additional Guidance for Release of Tools & Equipment, Rev. 0
RP-AA-605, 10 CFR 61 Program, Rev. 1
RP-TM-605-1001, TMI Waste Characterization, Rev. 2

Documents

Off-Site Dose Calculation Manual (ODCM), CY-TM-170-300, Rev. 1
Annual Radiological Environmental Operating Reports 2007 and 2008
Annual Radioactive Effluent Release Reports 2007 and 2008
Meteorological Monitoring Program Monthly Reports
Water Sampler Calibration Certificates (ER-TMI-06, Attachment 6)
Air Sampler Orifice and Pressure Gauge Certificates of Calibration
Teledyne Brown Engineering Environmental Services Quality Assurance Report 2008
Teledyne Brown Engineering Quality Control Charts
RCS Activity Trend Reports 2007, 2008, 2009 Quarter 1
NOSA-COMP-08-04 (AR 700361-04)
NOSA-TMI-08-04 (AR 745593)
NOSA-TMI-07-06 (AR 651836)
Calibration Certificates for in-service Monitors (PCM-1B, PCM-2, PM-7, SAM-11)
Detector 3 (RAM) Calibration and Quality Control Charts
Smear Testing of Automated Contamination Monitors (Calc RAF-07-005 & RAF-08-002)
Daily Radioactive Source Response Check Logs
Analytics, Results of Radiochemistry Cross-Check Program 2008
LSA-AA-126-1005, Check-in Self-Assessment Report, dated 04/08/09

Issue Reports

557294, 589089, 609783, 651836, 671717, 700361, 706967, 714196, 730350, 745593
761196, 761385, 761603, 761974, 761432, 761956, 761960, 791258, 795538, 803966
818460, 826676, 832529, 836220, 847641, 854197, 865287, 869670, 906865, 929979,
and 929986

Section 40A2: Identification and Resolution of Problems

Procedures

1107-4, Electrical Distribution Panel Listing, Rev. 216
MA-TM-153-001, Inspection and Maintenance of TMI-1 Electrical and Telephone Manholes,
Rev. 0
MA-AA-723-500, Inspection of Non EQ Cables and Connections for Managing Adverse
Localized Environments, Rev. 2
MA-AA-723-330, Electrical Testing of AC Motors Using Baker Instrument Advanced Winding
Analyzer, Rev. 2

Drawings

E-216-021, Electrical Manholes & Underground Ducts Turbine Building to Circ Water Pump
House Area, Rev. 10
E-216-022, Electrical Manholes & Underground Ducts Aux Building to Screen House Area, Rev.

Other

Exelon Letter RS-07-067, Response to NRC Generic Letter (GL) 2007-01, dated May 7, 2007
 Exelon Letter RS-07-156, Response to NRC Request for Additional Information Regarding NRC
 GL 2007-01 dated December 7, 2007
 NRC GL 2007-01, Inaccessible or Underground Power Cable Failures That Disable Accident
 Mitigation Systems or Cause Plant Transients
 NRC Information Notice (IN) 2002-12, Submerged Safety-Related Electrical Cables
 NRC IN 98-21, Potential Deficiency of Electrical Cable/Connection Systems

Issue Reports

213875, 220530, 253913, 310344, 381672, 712914, and 830669

LIST OF ACRONYMS

ACMP	Adverse Condition Monitoring Report
ADAMS	Agencywide Documents and Management System
ALARA	As Low As is Reasonably Achievable
CFR	Code of Federal Regulations
d/p	differential pressure
DRP	Division of Reactor Projects
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
FSAR	Final Safety Analysis Report
GL	Generic Letter
IMC	Inspection Manual Chapter
IN	Information Notice
IR	Issue Report
IST	Inservice Testing
LCO	Limiting Condition of Operation
LOR	Licensed Operator Requalification
MR	Maintenance Rule
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NRC	Nuclear Regulatory Commission
ODCM	Off-Site Dose Calculation Manual
PADEP	Pennsylvania Department of Environmental Protection
PARS	Publicly Available Records
PMT	Post-Maintenance Test
psid	per square inch differential
REMP	Radiological Environmental Monitoring Program
RWP	Radiation Work Permit
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SSC	Structures, Systems, and Components
TI	Temperature Indicator
TLD	Thermo Luminescent Dosimeter
TM	Temporary Modification
TMI	Three Mile Island, Unit 1
TS	Technical Specifications