September 8, 2009

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

SUBJECT: OYSTER CREEK GENERATING STATION - NRC INSPECTION REPORT 05000219/2009008 (UNDERGROUND PIPING LEAK)

Dear Mr. Pardee:

On August 14, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Oyster Creek Generating Station. The enclosed report documents the inspection results which were discussed on August 14, 2009, with Mr. M. Massaro and other members of your staff.

The inspection examined activities under your license as they related 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. Specifically, the inspectors reviewed and evaluated the circumstances associated with an April 2009 occurrence of leakage from two buried pipes that resulted in tritium contaminated on-site ground water at the Oyster Creek facility.

The inspection did not identify any radiological public health and safety consequence associated with this occurrence, or violation of NRC requirements or standards. Though tritium contaminated ground water was detected (on-site) in the vicinity of the leak, this condition did not, nor is expected to, result in exceeding any regulatory limit. Plant-related radioactivity, including tritium, has not been detected at any off-site environmental monitoring location. While some performance deficiencies in the early 1990s contributed to the cause of the leakage condition, these matters had minor significance relative to operational and radiological safety. The inspectors concluded that Exelon, upon identification of tritium contaminated ground water, promptly evaluated the operational and radiological conditions relative to public health and safety; initiated appropriate actions to investigate the matter, which led to the determination of two leaking buried pipes as the source of the tritium contamination; appropriately repaired the condition by replacing the affected piping; initiated a comprehensive review to determine causes and corrective measures; and has continued monitoring ground and surface water conditions to assure conformance with regulatory requirements.

On August 25, 2009, following completion of this inspection, Exelon experienced a separate occurrence involving leakage from a condensate transfer pipe located within a turbine building wall penetration sleeve. Though not a buried pipe, this leak resulted in the release of tritium contaminated water into the wall penetration sleeve. Subsequently, the water flowed through the sleeve to the turbine building interior, and to the outside of the penetration sleeve, into the ground. NRC initiated an inspection effort to review this most recent occurrence, and will document its findings in a separate inspection report.

As discussed with Mr. Joseph Grimes, Senior Vice President, Mid-Atlantic Operations, Exelon, on September 2, 2009, Mr. Sam Collins, Regional Administrator, NRC Region I, indicated the agency's interest in the underlying causes and frequency of these types of occurrences at Oyster Creek and other facilities. We recognize that occurrences of this type have not yet resulted in radiological conditions that approached any NRC regulatory limit or jeopardized public health and safety. Notwithstanding, in the future, NRC will sponsor a meeting with your organization to discuss the operating experience at Oyster Creek relative to your perspective and insights on causal factors, corrective measures, inspection techniques, and lessons-learned. This meeting would not be a regulatory or enforcement conference, given the results of this inspection. However, the NRC may use insights gained during the meeting to inform its decisions going forward on a generic regulatory approach that appropriately considers available margins to radiological and operational safety associated with buried and other piping systems. We will contact you in separate correspondence regarding the details of the meeting, which would be conducted by our NRC Program Office, held in the vicinity of NRC Headquarters, and open to the public.

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) 337-5114, if you have any questions regarding this letter.

Sincerely,

/RA/

Darrell Roberts, Director
Division of Reactor Safety

Docket No. 50-219
License No. DPR-16

As discussed with Mr. Joseph Grimes, Senior Vice President, Mid-Atlantic Operations, Exelon, on September 2, 2009, Mr. Sam Collins, Regional Administrator, NRC Region I, indicated the agency's interest in the underlying causes and frequency of these types of occurrences at Oyster Creek and other facilities. We recognize that occurrences of this type have not yet resulted in radiological conditions that approached any NRC regulatory limit or jeopardized public health and safety. Notwithstanding, in the future, NRC will sponsor a meeting with your organization to discuss the operating experience at Oyster Creek relative to your perspective and insights on causal factors, corrective measures, inspection techniques, and lessons-learned. This meeting would not be a regulatory or enforcement conference, given the results of this inspection. However, the NRC may use insights gained during the meeting to inform its decisions going forward on a generic regulatory approach that appropriately considers available margins to radiological and operational safety associated with buried and other piping systems. We will contact you in separate correspondence regarding the details of the meeting, which would be conducted by our NRC Program Office, held in the vicinity of NRC Headquarters, and open to the public.

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We appreciate your cooperation. Please contact me at (610) 337-5114, if you have any questions regarding this letter.

Sincerely,
/RA/

John R. White, Chief
Plant Support Branch 2
Division of Reactor Safety

Docket No. 50-219
License No. DPR-16

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Enclosure: Inspection Report 05000219/2009008
w/Attachment: Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	50-219
License No.:	DPR-16
Report No.:	05000219/2009008
Licensee:	Exelon Energy Company, LLC (Exelon)
Facility:	Oyster Creek Generating Station
Location:	Forked River, New Jersey
Dates:	April 15, 2009 – August 14, 2009
Inspectors:	R. Nimitz, CHP, Senior Health Physicist (Team Leader) M. Ferdas, Senior Resident Inspector H. Gray, Senior Reactor Inspector J. Richmond, Senior Reactor Inspector W. Cook, Senior Reactor Analyst (Part time)
Approved By:	John R. White, Chief Plant Support Branch 2 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000219/2009008; 04/15/09 - 08/14/2009; Oyster Creek Generating Station; NRC Inspection Report (Underground Piping Leak).

This report covers the period April 15, 2009 thru August 14, 2009, and discusses inspection by resident inspectors and regional reactor 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.

Executive Summary

On April 13, 2009, Exelon (Oyster Creek) initiated maintenance activities which involved replacement of the 4160V electrical cable for the 1-2 Emergency Service Water (ESW) pump, an activity that required access to the ESW cable vault. The cable vault is located in the vicinity of the Condensate Storage Tank (CST) and underground piping associated with the condensate system and the condensate transfer system. When the manway access to the vault was opened, about 12" of standing water was observed. The water was sampled and analyzed for radioactivity on April 15. While no gamma emitters were identified, the tritium concentration was reported as 102,000 picocuries per liter (pCi/l).

The water in the cable vault was subsequently pumped into 55 gallon drums for storage and processing. It was estimated that about 3,000 gallons of water were pumped out of the cable vault.

The cable vault was previously opened and inspected in October 2008. At that time, about 2 inches of standing water (which was attributable to normal groundwater intrusion) was observed. Subsequent sampling and analysis, at that time, did not indicate the presence of any radionuclides, including tritium.

Exelon informed the New Jersey Department of Environmental Protection (NJ-DEP), and NRC of this condition and issued a press release on April 16, 2009, to inform the public of the condition.

Exelon initiated efforts to perform additional sampling of other on-site and off-site environmental monitoring locations to assess the extent of the condition and potential public health and safety consequence and investigate the matter to determine the source of the contaminated water. To this end, a sample was collected from ground water monitoring well MW-15K-1A, south of the cable vault. The analysis of the sample indicated a tritium concentration of 4.46 million pCi/l on April 17, 2009. When previously sampled on March 12, 2009, the analysis indicated no detectable radioactive material concentrations.

To investigate this condition and determine the source of the contamination, Exelon performed the following activities: 1) excavated trenches in the vicinity of the CST to uncover and examine the buried piping; 2) performed an internal examination of the CST, using divers, to confirm structural integrity and leak tightness of the tank; 3) installed additional ground water monitoring wells in the immediate vicinity of the CST and associated piping systems to enhance radiological assessment capability; 4) increased the frequency of monitoring ground water and canal surface water at various on-site and off-site locations; and 5) performed bounding dose analysis and assessment to verify that operational and radiological parameters remained in accordance with NRC regulatory requirements and license conditions.

Exelon's investigation determined the following:

1. Two buried pipes (i.e., an 8" diameter carbon steel pipe, referred to as SS-4/CS-25; and a 10" diameter carbon steel pipe, referred to as CS-24) associated with the Condensate System experienced corrosion, resulting in localized through-wall penetration and consequent release of tritium contaminated water into the on-site ground water.

2. The release of the tritium contaminated water resulted in localized on-site ground water contamination that migrated toward the station's intake/discharge canal. Environmental sampling has not identified detectable tritium contaminated ground water at any off-site location, including the outfall from the discharge canal.

3. The ground water concentrations are expected to attenuate naturally, as a result of the existing hydro-geological conditions on-site, and the large dilution flow in the intake/discharge canal. No NRC regulatory dose limits or requirements have been, or are expected to be, exceeded.

4. Internal examination of the CST by visual examination and ultrasonic testing (UT) determined that the structure is not leaking. The examination and measurements of the CST confirmed structural integrity and leak tightness of the tank.

5. Although the two pipes exhibited through-wall leakage, the condition did not affect the function or operability of the Condensate System, or any safety-related plant systems.

6. There were two root causes for the underground pipe leaks. The first was improperly applied coatings on some localized areas of the two pipes during the early 1990s. This allowed moisture to contact the pipe surface which eventually led to localized galvanic corrosion. The second involved an erroneous assumption regarding the material composition of one of the pipes. Specifically, the buried pipe program incorrectly identified one of the affected pipes as being stainless steel when, in fact, it was carbon steel (a material that is less resistant to corrosion). Several contributing causes were also identified.

Upon being notified of this condition on April 15, 2009, NRC closely monitored Exelon's performance and investigative efforts to determine the source of contamination, assess the potential health and safety consequences, and mitigate and resolve the condition. NRC inspectors observed the affected components and resultant repairs, reviewed documentation and records, interviewed Exelon personnel (including contractors), directly observed and inspected Exelon's performance of licensed activities, and independently assessed the circumstances and conditions surrounding this occurrence in accordance with NRC regulatory processes, policies, and standards.

Based on NRC's inspection and assessment activities, the following was determined:

1. Although radioactive material was released to the on-site ground water within the station's Restricted Area, Exelon's bounding dose calculations were appropriate and sufficient for the determination that the release did not result in any potential for significant occupational or public dose. NRC confirmed that projected public doses were well below NRC's "As Low As Is Reasonably Achievable (ALARA)" limits described in 10 CFR 50, Appendix I, "Numerical Guidelines for Design Objectives for Operation to Meet the Criterion As Low As Is Reasonably Achievable For Radioactive Material In Light-Water-Cooled Nuclear Power Plant Reactor Effluents."

2. No radioactivity, attributable to this occurrence, has been detected in publicly accessible areas, including surface and ground water monitoring locations. No on-site or off-site drinking water resources were affected by this leakage.

3. The primary source of the leakage was the SS-4/CS-25 pipe. The leakage from the CS-24 pipe was estimated to be minimal since the line operates at a vacuum. Exelon's non-destructive testing of the CST confirmed the integrity of the tank. The leak sources were promptly repaired.

4. No plant operational or safety issues associated with the occurrence of the leaks were identified.

5. Exelon placed each root and contributing cause into its corrective action program. Corrective actions for this issue include initiation of actions to re-position existing risk significant piping to above ground or more accessible locations to enable enhanced monitoring of pipe conditions.

6. The inspectors determined that Exelon appropriately identified the causes that led to this occurrence, including assessment to identify corrective measures, program weaknesses, and areas for improvement. Based on NRC's independent review and evaluation of the events and circumstances surrounding this matter, and application of NRC's performance-based and risk-informed Reactor Oversight Process, NRC determined that the causes of this occurrence did not constitute performance deficiencies of greater than minor safety significance. Specifically, upon application of NRC's Issue Screening and Significance Determination Processes, the issues identified during this inspection were determined to have minor radiological and operational safety significance. Accordingly, no findings of significance were identified and no enforcement action is warranted.

REPORT DETAILS

4. OTHER ACTIVITIES [OA]

4OA3 Event Follow-up (71153)

0.1 Inspection Scope

The inspectors reviewed the circumstances and Exelon's evaluations with regard to an occurrence involving the identification of tritium contaminated water in the on-site Emergency Service water (ESW) vault on April 15, 2009, at Oyster Creek, and the subsequent identification of an unusually high concentration of tritium contaminated ground water in well MW-15K-1A on April 17, 2009. Exelon corrective action program document, IR 907846, provided a description of the condition, components to be evaluated, status of testing and evaluations, observations, and corrective actions. The inspectors observed and inspected Exelon's performance of licensed activities and independently assessed the circumstances and conditions surrounding this occurrence in accordance with regulatory processes, policies, and standards.

The inspectors reviewed the chronology of the occurrence and reviewed and evaluated Exelon's performance relative to: 1) documentation and reporting of the issue; 2) determination of the pertinent circumstances, events, and details associated with the matter; 3) evaluation of the safety and risk significance of the leak on plant operations, and public health and safety; 4) evaluation of the extent of condition; 5) investigation to determine the source of the leak; 6) determination of mitigation and repair activities; and 7) determination of the potential radiation dose consequences to members of the public and to occupational workers. The inspectors also reviewed the non-destructive examination activities performed to assess structural integrity of the affected piping system(s) and the Condensate Storage Tank (CST), and reviewed records pertaining to previous examinations, historical performance evaluations, and associated actions and evaluations.

The inspectors walked-down and visually inspected locations where water leakage was identified and reviewed potential sources of the tritium contamination. In addition, the inspectors directly examined the as-found conditions in the south excavation area which contained the SS-4/CS-25 (8" pipe) and CS-24 (10" pipe) condensate system pipes and observed Exelon's assessment and repair activities. [Note: SS-4/CS-25 is an 8" diameter carbon steel pipe. This pipe is a Hotwell level control line from the condensate pump discharge header to flow control valve V-2-17. CS-24, is a 10" diameter carbon steel pipe, also used for Hotwell level control. CS-24 is generally under vacuum.]

In addition, the inspectors directly observed the as-found condition in the north excavation area and visually inspected portions of the buried 1" Control Rod Drive (CRD) Minimum flow line (CS-38) when it was initially uncovered. The inspectors also inspected the Condensate Transfer Building (CTB) to assess conditions in that facility.

The inspectors visually inspected sections of SS-4/CS-25 and CS-24 lines after they were removed for replacement. The inspectors also reviewed photographs of the identified pipe leak locations and available test reports from Exelon's laboratory that

conducted the structural analysis to determine the failure mechanism. The inspectors reviewed the refilling of the excavation that contained the newly replaced pipes to evaluate the application of pipe coating applied to the replaced pipe, and the adequacy of protection maintained to ensure that the coatings were not damaged during backfill.

The inspectors also examined ground water well locations; and reviewed hydro-geological reports to assess ground water conditions and movement, including location and flows of potentially affected aquifers.

Documents reviewed for this inspection activity are listed in the Supplemental Information attached to this report.

0.2 Event Description and General Chronology

In the course of work pertaining to ESW pump cable replacement, on April 13, 2009, Exelon (Oyster Creek) initiated maintenance activities which involved replacement of the 4160V electrical cable for the 1-2 ESW pump, an activity that required access to the ESW cable vault. The cable vault, which is partially below grade level, is located in the near vicinity (east) of the intake structure. When the vault access way was opened, about 12" of standing water was observed inside the vault. Consistent with Exelon practices, Exelon sampled the water and analyzed for gamma emitters and tritium. On April 15 the analytical results were completed. The water was determined to have no gamma emitters, but tritium was identified and reported at a concentration of 102,000 pCi/l. After the discovery, Exelon collected and controlled the water by pumping it (about 3,000 gallons) into 55-gallon drums for storage and processing.

As part of its cable inspection program, the ESW cable vault was last opened and inspected in October 2008. At that time, about 2 inches of standing water was observed. The condition was not considered unusual and was attributable to ground water intrusion. Radiological sampling and analysis of the water at that time did not indicate the presence of any radionuclides, including tritium.

In accordance with an agreement with the New Jersey Department of Environmental Protection (NJ-DEP) pertaining to communication of conditions involving a tritium concentration greater than 2000 pCi/l and having potential to affect the environment, Exelon informed the NJ-DEP of this occurrence. Exelon subsequently notified the NRC in accordance with 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors" (relative to notification to other government agencies). Exelon also issued a press release on April 16, 2009, to inform the public of the condition.

Upon the discovery of tritium contaminated water in the cable vault, Exelon initiated efforts to: 1) perform additional sampling of other ground water monitoring wells and the discharge canal, and 2) investigate the condition to determine the source of the tritium contamination. Exelon established an Adverse Condition Monitoring Plan (ACMP) which established a systematic process to sample and analyze ground water monitoring wells in the vicinity of the CST and CTB. Exelon also evaluated potential effects of the water on the various cables in the ESW cable vault.

On April 17, 2009, Exelon received analytical results from monitoring well MW-15K-1A, which indicated a tritium concentration of about 4.46 million pCi/l. MW-15K-1A is located south of the ESW cable vault. According to Exelon, MW-15K-1A was last sampled on March 10, 2009, as one of about 32 wells routinely sampled and analyzed as part of its on-going ground water monitoring program at Oyster Creek. No tritium or other radionuclides, were detected in any wells above minimum detectable activity (MDA) at that time, including well MW-15K-1A. Additionally, on March 25, 2009, Exelon conducted routine sampling of its on-site potable water sources. The results of the sample indicated no tritium or other radionuclides were detected in the potable water above MDA.

Analytical results from all other monitoring wells and environmental sampling locations indicated tritium concentrations less than the site's MDA, (i.e., 2,000 pCi/l). Subsequent analysis of these samples by independent analytical laboratories, having MDA's less than 200 pCi/l, confirmed no detectable activity in any of these other samples. In all cases, Exelon communicated its results to the NJ-DEP and NRC. In order to assess the extent and potential affect of the ground water contamination, Exelon obtained hydrological expertise to assist in the characterization of the ground water conditions.

On April 17, 2009, Exelon issued a second press release that updated the results of its efforts, including the discovery of the elevated tritium concentration in well MW-15K-1A.

As part of its effort to determine the source of the contamination, Exelon initiated efforts to excavate (uncover) buried piping in the vicinity of the CST.

On April 18, during the course of initial excavation, water was observed for a short time, in the south trench near the CTB which contained buried pipes associated with the condensate system. The tritium concentration was determined to be about 1.56 million pCi/l, indicating a potential leak source. Sampling of the soil in the area indicated trace radioactivity concentrations, including Mn-54 which has a relatively short half-life, indicating that the material was of relatively recent origin.

Exelon controlled the excavated soil from the south trench area and initiated bounding dose calculations associated with return of the soil to the excavation, and documented the condition in accordance with the requirements of 10 CFR 50.75, "Reporting and Record Keeping for Decommissioning Planning."

On April 19, 2009, Exelon sampled and analyzed water that was observed seeping from one of the conduits into the ESW cable vault. Analysis indicated that the tritium concentration was about 1.5 million pCi/l. On April 19, 2009, Exelon also initiated nondestructive (guided wave (G-wave)) testing of suspect piping for potential indications.

On April 24, 2009, Exelon initiated additional excavation under the CTB.

On April 25, 2009, due to an occurrence unrelated to the tritium contamination issue (i.e., loss of cooling to the M1A Main Transformer), Exelon performed a reactor shutdown. See NRC Inspection Report 05000219/2009003, dated July 30, 2009 (ML092110491) for additional information on that matter.

On April 26, 2009, Exelon identified a 3/16" hole in SS-4/CS-25 (8" pipe). Exelon initiated temporary repair plans for the pipe and applied a pipe clamp to SS-4/CS-25 pipe to affect a temporary repair and stop the leak.

On April 28, 2009, Exelon initially replaced a 10 foot section of the SS-4/CS-25 which included the identified hole. Exelon also restored the Condensate System to operation. During the restoration, Exelon identified a leak in CS-24 in a section of piping that had not yet been fully excavated.

On April 30, 2009, Exelon issued an additional press release informing the public that leaks had been located and that pipe replacement was in-progress.

On May 2, 2009, Exelon replaced 30' sections of both the SS-4/CS-25 and CS-24 pipes. The replacement was accomplished to ensure all leak locations in the pipes were addressed.

From May 14 to May 20, 2009, Exelon conducted visual and ultrasonic testing (UT) of the CST tank. No leakage was identified, and the integrity of the tank was determined to be sound.

In June 2009, Exelon completed its internal Root Cause Evaluation relative to the piping leaks; and excavated and inspected CS-38, a 1" buried stainless steel CRD line in the north trench area. Inspection of this line did not identify any piping integrity issues.

During its investigation, Exelon installed six additional ground water monitoring wells (MW-50 thru 55) to support characterization of the tritium in the ground water. These wells were predominately to the east of the intake structure. Figure 1 depicts wells MW-50 thru 55. Well MW-15K-1A is also shown.

0.3. Areas of Inspection

0.3.1 Reportability

a. Inspection Scope

The inspectors reviewed Exelon's reporting of the identification of tritium contamination in the ESW vault on April 15, 2009. The review was against reporting requirements contained in 10 CFR 20, "Standards for Protection Against Radiation," 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors," Technical Specifications (TS), the Off-site Dose Calculation Manual (ODCM), and with respect to Exelon procedures developed to implement reporting guidance specified in NEI 07-07, "Industry Ground Water Protection Initiative - Guidance Document."

b. Findings and Observations

No findings of significance were identified.

On April 15, 2009, Exelon received laboratory sample results indicating the presence of tritium in water within the ESW vault. Exelon informed the NJ-DEP of this discovery since the tritium concentration detected was above concentration levels agreed to for purposes of reporting (i.e., a tritium concentration greater than 2,000 pCi/l and having potential to affect the environment). Exelon notified the NRC, in accordance with 10 CFR 50.72, due to notification of another government agency.

Subsequently, on April 17, 2009, Exelon identified tritium ground water contamination, of 4.46 million pCi/l, in monitoring well MW-15K-1A, and provided updated notification to the NJ-DEP.

0.3.2 Operational Aspects

a. Inspection Scope

The inspectors reviewed the operational aspects of the activities to locate, isolate, and repair the source of the tritium discovered in the ground water. The inspectors reviewed process plant computer (PPC) data, control room logs, and interviewed Exelon personnel to understand if the plant experienced any operational effects, and how Exelon monitored for potential buried pipe or CST leaks. The inspectors also reviewed Exelon's operability determination (IR 910538) associated with medium and low voltage cables in the ESW vault. In addition, the inspectors performed plant walk downs and examined and reviewed licensee investigation and work activities in the CTB, ESW vault, and intake areas.

The inspectors also observed the conduct of the Plant On-site Review Committee (PORC) meeting which reviewed corrective action program evaluation IR 907846-11, "Operational Technical Decision Making (OTDM) Document," which evaluated the acceptability of continued operation while Exelon conducted its investigation into potential sources of the tritium contamination. The inspectors reviewed the OTDM to confirm that the licensee's decision-making and evaluation rational were reasonable and in conformance with regulatory requirements; and to ensure that all potential sources of the tritium were appropriately considered and evaluated.

b. Findings and Observations

No findings of significance were identified.

The inspectors determined there was no loss of functionality or operability of systems associated with, or supported by, the piping that was found to be leaking.

The inspectors determined that, based on the information that was available to operations and engineering personnel, there were no discernable indications that a leak existed in the condensate system until discovered in the ESW vault.

The inspectors determined that, based on observations from inside the ESW vault, the safety-related ESW cables were not affected by the water intrusion in the vault since they were located at a higher elevation within the cable vault. Additional information on the ESW vault may be found in NRC Inspection Report 05000219/2009003, dated July 30, 2009 (ML092110491).

0.3.3 Public Exposure Control

a. Inspection Scope

The inspectors reviewed the radiological controls aspects of the pipe leak and subsequent ground water contamination. In particular, the potential dose consequences to members of the public were evaluated. The following items were reviewed:

- radiological measurement (gamma and tritium) results of the water and the leaks, including analytical methodology and its adequacy;
- tritium measurement results for the observation and production well waters;
- radiological measurement results for newly installed monitoring wells;
- sampling for potential hard-to-detect radionuclides;
- evaluation of residual radioactivity;
- evaluation of apparent anomalous sample results;
- control of total radioactivity content of CST;
- assessment of the ground water movement (e.g., mass-flux analysis);
- inter-comparison of estimates of mass of water potentially released to the ground water, and associated radioactivity entering the aquifer based on maximum leakage rate, water balance, and geo-hydrology analyses;
- assessment of the projected radiation doses to members of the public based on possible exposure pathways;
- maintenance of spill records in accordance with 10 CFR 50.75;
- development and implementation of enhanced periodic sampling of aquifers; and
- Exelon's ACMP associated with ground water sampling.

The inspectors also reviewed the current ground water monitoring program sample results relative to Exelon's Industry Ground Water Protection Initiative-Guidance Document (NEI-07-07) and also reviewed routine ground water monitoring results under the Radiological Environmental Monitoring Program.

b. Findings and Observations

No findings of significance were identified.

The inspectors did not identify any significant off-site dose consequences to members of the public associated with the localized tritium contamination in on-site ground water.

Upon discovery, Exelon established an assessment team devoted to: 1) identification of the leak; 2) evaluation and repair of the leak; 3) performance of radiological surveys; 4) selection and installation of additional environmental monitoring locations;

5) performance of radiological analyses of ground water samples in accordance with an ACMP; 6) the performance of geological and hydrological studies to determine the ground water flow characteristics and behavior; 7) estimation of total release of radioactive materials to the environment; 8) implementation of corrective actions; and 9) assessment of the potential of radiological consequences.

Exelon obtained expertise in the area of hydrology; installed additional monitoring wells; and conducted sampling of on-site wells and test locations to identify and evaluate possible ground water contamination. Exelon followed established procedures to perform radiological (e.g., tritium and gamma radionuclides) measurements and conducted a comprehensive radiological environmental assessment effort. No radioactivity was detected in any Unrestricted Area (publicly accessible areas) attributable to the leakage. Exelon validated its analytical measurement results through its laboratory quality assurance and quality control program.

The inspectors noted that Exelon: 1) installed six additional sampling well locations (MW- 50 thru 55) to enhance its ability to characterize ground water conditions in the immediate area; 2) utilized its existing well network to confirm the extent of the ground water contamination; 3) developed projected tritium ground water plume maps, including projected mass flux analyses of plume movement; and 4) developed well MW-55 to be used for pump testing of the aquifer in order to consider possible remediation efforts, as appropriate. Exelon used the monitoring results to characterize subsurface hydrology, including water gradient. Exelon also continued efforts to sample underground vaults to determine the extent of contamination, and detect any new conditions.

The inspectors evaluated Exelon's bounding water mass loss calculations, and associated radioactivity released. The inspectors concluded the calculations and mass volume analyses were based on conservative assumptions and were reasonable. Exelon calculated the estimated water volume loss, based on bounding leakage and water mass loss analysis to be less than 200,000 gallons as a result of the pipe leaks.

The inspectors also reviewed Exelon's bounding public dose projection using parameters specified in its ODCM. The calculations, using conservative estimates of water volume, indicated no off-site release in excess of any regulatory requirement, or any radiological dose consequence to members of the public discernable from normal background. The calculations included age specific consumption and exposure considerations. Maximum projected annual dose for the critical receptor (adult) was determined to be 2.9 E-5 millirem in a year (i.e., 0.000029 millirem). In comparison, NRC's annual total body ALARA dose criterion for liquid effluents is 3 millirem (10 CFR 50, Appendix I); EPA's annual dose equivalent whole body limit is 25 millirem for Uranium Fuel Cycle facilities (40 CFR 190.10); NRC's general regulatory annual limit for individual members of the public is 100 millirem (10 CFR 20.1301); and the typical annual background radiation is about 350 millirem.

Excepting ground water samples collected in the vicinity of the leakage, no detectable radioactivity (i.e., greater than MDA) was found in any other ground and surface water samples collected from on-site and off-site environmental monitoring locations, including locations in publicly accessible areas, and discharge canal surface water at the Route 9 Bridge.

Notwithstanding these analytical results, the inspectors noted the following two anomalous indications of low concentrations of tritium: (1) a single on-site sample of surface water collected from the intake canal; and (2) a single on-site sample from a monitoring well beyond the proximity of the localized leak. In both instances, Exelon immediately re-sampled the locations for verification. Detectable activity was not present in any of the verification samples, and subsequent samples from these locations indicated less than MDA. Exelon documented these anomalies in its corrective action system (IR 931098 and 927310) and concluded the results were not indicative of any new on-going condition, and did not affect the overall radiological assessment.

The inspectors reviewed Exelon's Annual Radiological Environmental Monitoring Report for 2008, dated April 30, 2009, (ML091330704 (report), and ML091330361(letter) to determine if radioactivity was previously identified in the aquatic environment surrounding Oyster Creek. The inspector's review indicated that no radioactivity, attributable to activities at Oyster Creek, was detected in aquatic samples during 2008.

The inspector independently evaluated the licensee's radiological assessment relative to public health and safety. From the data available, the inspector confirmed that the radiological conditions associated with this occurrence did not, nor were expected to, result in any release to the environment in excess of NRC regulatory limits and requirements.

0.3.4 Occupational Exposure Control

a. Inspection Scope

The inspectors reviewed on-site radiological controls for workers involved in and associated with the investigation, inspection, and repair of leakage. Work activities reviewed included ESW work, excavation activities, pipe repair and replacement activities, well drilling, and CST inspection and diving activities. The inspectors performed periodic observation of the work activities.

b. Findings and Observations

No findings of significance were identified.

Exelon implemented its radiological controls program for the radiological work activities. The reviews performed by the inspectors identified that radiological work activities were conducted in accordance with applicable procedures and Radiation Work Permits.

0.3.5 Radioactive Material Controls

a. Inspection Scope

The inspectors reviewed Exelon's controls for radioactive materials (e.g., contaminated water and soils collected during inspection, sampling, and repair activities). The review was with respect to requirements contained in 10 CFR 20, 10 CFR 50.75, and Exelon procedures.

b. Findings and Observations

No findings of significance were identified.

Exelon implemented its radiological controls program for these materials. Exelon collected residual water and collected and controlled soils, as appropriate. Radioactive materials were posted and/or labeled. Exelon initiated actions to document this occurrence and any localized contamination in accordance with 10 CFR 50.75(g), to support eventual decommissioning evaluations and characterization activities.

0.3.6 In-Service Inspection and Non-Destructive Examination Activities

a. Inspection Scope

The inspectors reviewed portions of Exelon's work activities associated with investigation to identify and remediate buried piping leaks and the CST.

The leak detection methods used included: visual examination (VT), ultrasonic testing (UT), pressure testing, and torsional G-Wave ultrasonic testing. The inspectors reviewed the technical basis for G-Wave operation, examined the test equipment, and observed a portion of the test data analysis from the detection methods utilized.

The inspectors reviewed Oyster Creek Topical Report 116, Rev. 3, "Oyster Creek Underground Piping Program Description and Status." This report provided a program description and current status (as of November 2008) of the Oyster Creek underground piping program. The program provided for collection and evaluation of operating experience related to underground piping leaks and input to the corrective action process to track root causes and corrective actions. The buried pipe leak detection activities were also a part of the Oyster Creek site buried pipe program.

Exelon vacuum cleaned the inside base of the CST and used a diver to conduct a VT-2 (visual) inspection and conduct tank bottom thickness measurements by underwater ultrasonic testing (UT). The inspectors reviewed the UT test procedure and work control instructions and observed a calibration test of the UT system. The measured thickness data was reviewed and compared to the CST bottom plate material specification.

The inspectors also reviewed the exterior of the CST to identify any indications of leakage from vertical surfaces and at the sidewall/base joint areas.

b. Findings and Observations

No findings of significance were identified.

Exelon used its Topical Report 116 to identify highest risk ranked piping (from a potential leakage susceptibility perspective) to locate buried piping in the area of the ground water contamination for testing, inspection, and excavation. Subsequently, Exelon identified two leaking buried carbon steel pipes (SS-4/CS-25 and CS-24) associated with the Condensate System. Exelon conducted failure analysis of a section of the SS-4/CS-25 pipe.

Exelon conducted UT bottom thickness measurements at 60 locations on the CST, and sampled each of the tank bottom plate segments to determine if there were material thickness reductions. The UT measurements indicated acceptable plate thicknesses for the locations. The inspectors did not identify any deficiency relative to these measurements or efforts to characterize the condition of the CST tank bottom.

0.3.7 Component Repair and Replacement Activities

a. Inspection Scope

The inspectors reviewed the work packages that documented the work steps to repair the SS-4/CS-25 and CS-24 pipes. The inspectors also visually inspected the pipes in the south excavation after the repair. In addition, the inspectors examined the CS-38 pipe that was uncovered in the north excavation area.

b. Findings and Observations

No findings of significance were identified.

Exelon replaced the leaking pipes with new piping material and welded it in place to structurally sound piping.

The inspectors entered the south excavation area after the repairs of SS-4/CS-25 and CS-24 and noted that external corrosion resistant coating and wrapping were installed on the newly replaced pipes. The inspectors made visual observations in the excavation, with the associated piping systems in operation, and did not identify any apparent continuing leak or new leaks. The inspectors reviewed replacement of soil into the excavation to ensure the replacement efforts did not damage the new pipe coatings. In addition, the inspectors entered the north excavation area and noted that CS-38 pipe appeared to be in acceptable condition with no apparent corrosion noted.

0.3.8 Aging Management Programs

a. Inspection Scope

The inspectors reviewed 10 CFR 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," the Oyster Creek License Renewal Application (LRA), and the NRC Safety Evaluation Report (SER) related to the OC License Renewal (NUREG-1875, ML070890637) to determine what portions of the condensate system and condensate transfer system were within scope of license renewal, the intended in-scope functions of those systems, and their inclusion in Exelon's aging management programs (AMPs).

10 CFR 54.21(a)(3), "Contents of Application - Technical Information," states that for each structure and component within the scope of license renewal, the applicant must demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the pre-license renewal current licensing bases (CLB) for the period of extended operation.

10 CFR 54.4(b), "Scope," states that the intended functions, which must be maintained, for systems, structures, and components are those functions that are the bases for including them within the scope of license renewal, in accordance with 10 CFR 54.21.

The inspectors reviewed the OC LRA and the NRC SER, to determine what system intended functions were within scope of license renewal for the condensate system and the condensate transfer system. During this review, the inspectors noted that not all CLB functions for the condensate system and condensate transfer system were within scope of 10 CFR 54.4(b). Therefore, the inspectors concluded that those system functions which were not in-scope of license renewal did not require aging effects to be managed in order to maintain those functions. The intended system functions, in-scope of license renewal, are described in LRA and SER sections 2.3.4.1 and 2.3.4.2.

The inspectors reviewed Exelon's AMPs associated with the condensate system and condensate transfer system. Specifically, the inspectors reviewed the buried piping inspection program and the above ground outdoor tank program. The inspectors compared Exelon's aging management activities to the activity descriptions in NRC SER section 3.0.3.2.18, "Aboveground Outdoor Tanks," Section 3.0.3.2.22, "Buried Piping Inspection," Section 3.4.2.3.1, “Condensate System,” and Section 3.4.2.3.2, "Condensate Transfer System," to evaluate whether Exelon had appropriately implemented its AMP activities, where applicable.

The inspectors also reviewed Topical Report 116 and piping inspection records and photos, and compared the results to Exelon's established underground piping inspection guidance and criteria. In addition, the inspectors reviewed Exelon's inspection and evaluation of the CST.

The inspectors reviewed Exelon's root cause evaluation and planned corrective actions (discussed in Section 0.3.10) to assess whether the as-found conditions and underlying causes were also being evaluated by Exelon to determine whether any changes were needed in the associated license renewal AMPs.

b. Findings and Observations

No findings of significance were identified.

As noted in Section 0.3.2, of this report, based on the actual leakage rate for the two condensate pipes, there was no loss of functionality or operability of systems supported by the leaking pipes**.** Although Exelon had included the two buried condensate pipes (SS-4/CS-25 and CS-24) within their buried pipe AMP, the inspectors determined that the license renewal functions for the buried condensate piping did not prescribe zero leakage, but rather were intended to ensure that any leakage would have minimal affect on the water inventory of the CST; and would not have the potential to adversely affect any adjacent safety related equipment.

The inspectors noted that Exelon's planned corrective actions included activities intended to evaluate whether changes to the AMPs were needed. Specifically, Exelon initiated the following activities:

- Perform a thorough Topical Report buried pipe program assessment and revise the details, risks, consequences, and recommended inspection frequencies and methods (IR 907846-15)

- Perform an extent of condition review for previous maintenance on buried pipe, performed prior to the Topical Report 116 program (IR 907846-17)

- Review and update the buried pipe database (IR 907846-28 & 29)

Exelon's aboveground outdoor tank AMP activities for the condensate transfer system, in part, included the CST bottom which was ultrasonically examined to evaluate the tank bottom for corrosion in May 2009. Exelon determined that the tank bottom was in acceptable condition.

In summary, the inspectors did not identify any inconsistencies between Exelon's AMP activities and the activity descriptions in the NRC SER for buried piping and aboveground outdoor tank AMPs applicable to the condensate system and condensate transfer system. Additional details on the buried piping AMP and the aboveground outdoor tank AMP can be found in NRC Inspection Report 05000219/2009006, dated May 18, 2009 (ML091380379).

0.3.9 Root and Contributing Causes of the Leak and Corrective Actions

a. Inspection Scope

Exelon's root cause evaluation report (IR 907846) identified the root and contributing causes for the buried pipe corrosion at Oyster Creek that resulted in the leakage of condensate system water containing tritium into the station's ground water. The inspectors reviewed this report, evaluated the root and contributing causes of the leaks, and evaluated Exelon's corrective actions including planned actions.

The review was with respect to criteria contained in 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Oyster Creek Technical Specifications; and applicable Exelon procedures.

b. Findings and Observations

No findings of significance were identified.

Based on independent evaluation, the inspectors concluded that Exelon appropriately identified the root and contributing causes for the pipe leaks and initiated appropriate corrective actions.

Exelon's root cause evaluation identified two root and three contributing causes of the pipe leaks.

NRC's Evaluation of Exelon's Root and Contributing Causes

Root Cause 1:

The first root cause identified that the pipes were improperly coated following replacement in 1991, which allowed moisture to contact the pipes. This allowed intrusion of water into the area which supported localized external corrosion, resulting in subsequent through wall leakage of the pipes.

The inspectors examined the removed pipe segments, and reviewed the documentation for selection of the pipe coating materials and application technique that was used in the early 1991. The inspectors identified that the work control document indicated that the applicable guidance had been followed in application of the evaluated coating (i.e., the work package indicated that the pipe coating material was acceptable, and that the installation instructions were followed). The completed work order also indicated that quality assurance conducted a coating integrity check of the pipes, which passed the test.

The inspectors reviewed all available documentation, including records pertaining to the pipe inspection, repair, and testing activities. Within the scope of this review, the inspection did not reveal any specific non-conformance with the applicable guidance documents, regulatory requirements, or standards relative to the work packages for the pipe coating activities that were performed in 1991. Accordingly, the inspection

determined that the cause of the condition was not reasonably within the licensee's ability to foresee and correct, and should have been prevented. Further, as discussed in Sections 0.3.2 and 0.3.3 of this report, the piping leaks did not result in any operational or public radiological consequences. From application of the issue screening process described in NRC Inspection Manual Chapter 0612, Appendix B, "Issue Screening," a performance deficiency was not identifiable with respect to the application of the pipe coating in 1991.

Root Cause 2:

The buried pipe program basis document was flawed in that the bases document contained an invalid assumption regarding the material in the SS-4/CS-25 pipe.

Topical Report 116 had as an input that SS-4/CS-25 was composed of stainless steel when it was actually carbon steel, a material that is acceptable but typically less resistant to corrosion. This error was attributed to the premature updating of a plant drawing in 1992 to indicate that stainless steel piping was installed, though the actual plant modification that was intended to make this change was not implemented.

The incorrect material designation for SS-4/CS-25 in plant drawings as stainless steel was the result of a performance deficiency. Though a non-safety related component, the licensee failed to adhere to its established plant modification processes relative to the coordination and management of design control activities. The cause of the deficiency was reasonably within the licensee's ability to foresee and correct, and should have been prevented. Notwithstanding, from application of the Issue Screening process described in NRC Inspection Manual Chapter 0612, Appendix B, the significance of the matter was determined to be minor since the issue did not meet any criteria for consideration as a more than minor finding. Such consideration included, but was not limited to, the determination that the lack of design control affecting this particular non-safety related component was not a precursor to a more significant event, and would not have led to a more significant safety concern.

The corrective action for this cause was to revise the underground piping program basis document to correct plant design details, risks, consequences, recommend frequencies, and inspection methods following a thorough program assessment. The corrective actions also included an extent of condition review, including revision and update of Topical Report 116, as applicable.

Contributing Cause 1:

The documentation of the as-found and as-left conditions and conformance with the work instructions for pipe coatings done in 1991 on the SS-4/CS-25 and CS-24 pipe was inadequate.

The inspectors evaluated the adequacy of the work control instructions and noted that they contained limited details, but indicated work activities were conducted at that time in accordance with applicable work guidance.

Contributing Cause 2:

The change management process, prior to implementing the buried pipe program, did not support effectively managing design changes. Specifically, SS-4/CS-25 was considered to be stainless steel for purposes of risk assessment within the buried pipe program. However, the pipe was actually made of carbon steel.

As discussed, this issue was attributed to inadequate design control for this modification. The invalid assumption and leaking pipe did not impact the functionality of systems associated with the leak nor did it have any impact on occupational or public doses.

Contributing Cause 3:

There were limitations to the available technologies used to assess pipe material conditions. Underground piping can not generally be 100% inspected from both non-intrusive and visual inspections.

Based on the inspectors review, Exelon used a variety of inspection methods to validate the integrity of piping. In addition, the inspection frequencies were outlined in its buried pipe program. The inspectors concluded that Exelon used currently available techniques and methods consistent with industry practice.

The inspectors evaluated each of the above contributing causes for related performance deficiencies. The inspectors used the screening criteria contained in NRC Inspection Manual Chapter 0612, Appendix B, to screen the contributing causes for consideration of more than minor characterization as a Finding. The inspectors concluded the significance of these contributing causes was not more than minor since they did not meet any criterion for consideration as more than minor. Such consideration included, but was not limited to, the determination that the pipe leakage did not result in any public radiological safety impact, did not result in any plant operational safety impact, and the contributing causes could not reasonably be viewed as a precursor to a significant event.

The inspectors confirmed that Exelon initiated corrective action for these issues, and documented these matters in its corrective action program. These included consideration of a plan that includes moving direct buried Condensate System piping

either above ground or into monitored trenches. In addition, Exelon initiated actions to conduct an assessment of, and revise the program basis document Topical Report 116 to, among

other actions, correct errors in plant design details, risks, consequences, and recommend inspection frequencies and methods, as needed. Details of these planned actions, including completion dates, were documented in corrective action program IR 907846.

4OA6 Meetings, Including Exit

.1 Exit Meeting

The inspectors presented inspection results to Mr. M. Massaro, and members of his staff on August 14, 2009. Exelon acknowledged the findings presented. Based on discussions with Exelon personnel, none of the information presented at the exit meeting and included in this report was considered proprietary.

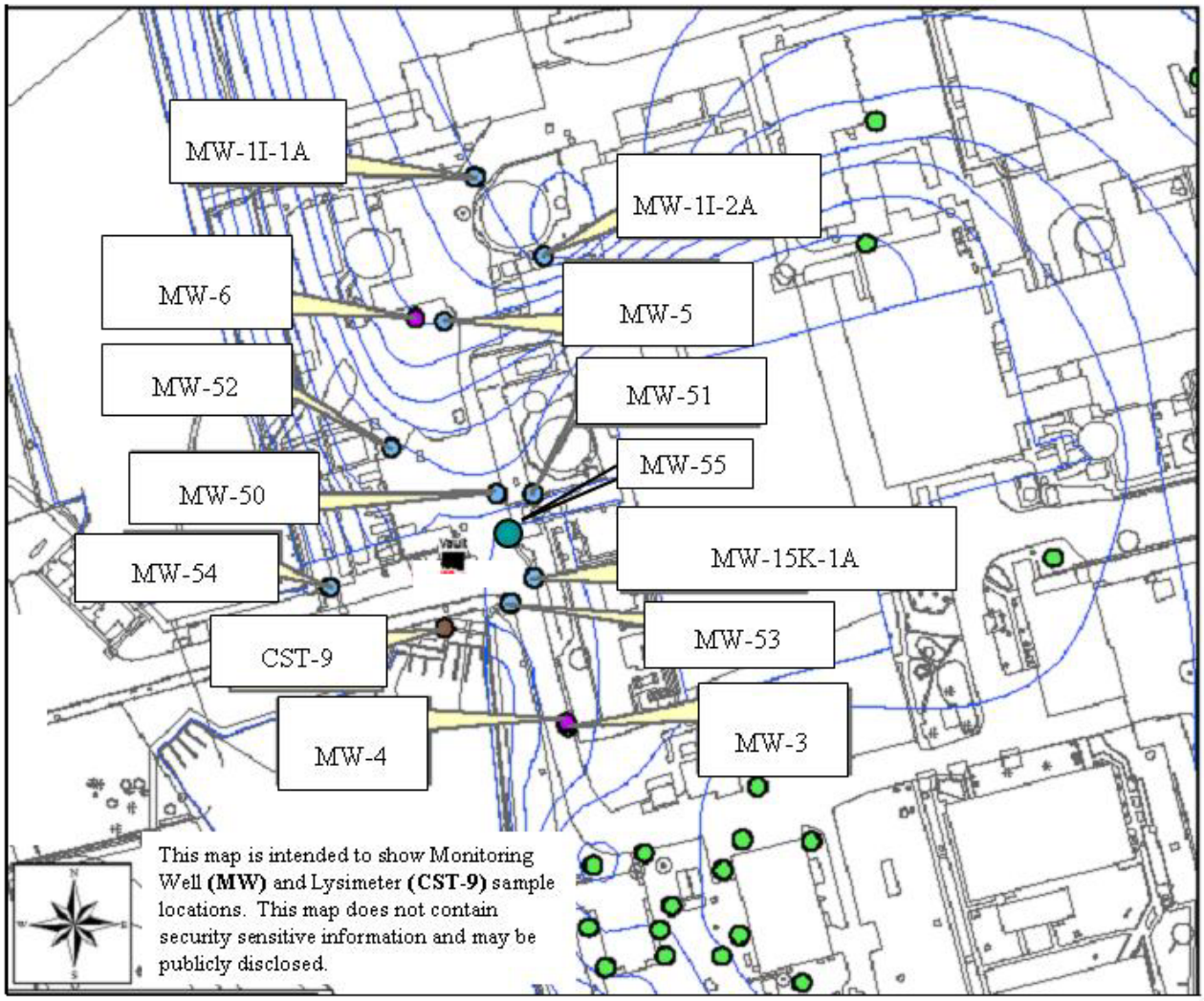
4OA7 Licensee Identified Violations

None

ATTACHMENT: SUPPLEMENTAL INFORMATION

Figure 1

Oyster Creek Well Locations
Associated with Buried Pipe Leak



ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
R. Artz, Senior Chemist
J. Barstow, Manager, Regulatory Assurance
D. Benson, Site Communicator
P. Bloss, Outage Manager
P. Cowan, Licensing Director, Mid-Atlantic
M. Culderra, Program Engineer
S. Dupont, Regulatory Assurance Specialist
J. Elisca, Business Operations
L. Felleppi, Dosimetry Physicist
R. Heffner, Radiation Protection Supervisor
D. Helker, Licensing Manger- Kennett Square
J. Kandasamy, Chemistry/Environmental Manager
J. Kerr, Manager, Corrective Action Program
K. Leonard, Program Owner, Buried Pipe
S. Markos, Branch Manager, Design
M. Massaro, Site Vice-President (Current)
M. McKenna, Operations Superintendent
P. Orphanos, Plant Manager
R. Peak, Director, Engineering
D. Peiffer, Manager, Nuclear Oversight
T. Rausch, Site Vice-President (Former)
H. Ray, Senior Manager, Design Engineering
J. Renda, Manager, Radiation Protection
T. Roddey, Senior Manager, Engineering Programs
T. Ruggiero, Mechanical Design
S. Sklenar, Environmental Manager, Mid-Atlantic
P. Tamburro, Senior Mechanical Engineer
C. Taylor, Licensing Engineer
A. Terlin, Reactor Projects
J. Vouglitois, Senior Radwaste Chemist

Others:
State of New Jersey:
J. Lipoti, State of New Jersey
P. Mulligan, Sate of New Jersey
K. Tuccillo, State of New Jersey
P. Schwartz, State of New Jersey
R. Dalton, Sate of New Jersey
R. Pinney, State of New Jersey
R. Zak, State of New Jersey

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened/Closed

None

Closed

None

LIST OF DOCUMENTS REVIEWED

In addition to the documents identified/discussed in the body of this report, the inspectors reviewed the following documents and records.

Section 4OA3: Event Follow-up

Procedures

- ER-AA-335-004 Rev 3. UT for thickness measurements
- ER-AA-5400, Rev 1. Exelon Buried Piping and Raw Water Corrosion Program
- ER-AA-5400-1001, Rev 0. Exelon Raw Water Corrosion Program Guide
- ER-AA-5400-1002, Rev 1. Exelon Buried Piping Examination Guide
- Topical Report 116, OC Underground Piping Program Description and Status, Rev 3
- 617.4.001, "CRD Pump Operability Test"
- 607.4.017, "Containment Spray and Emergency Service Water Pump system 2 Operability and Quarterly Inservice Test"
- 1000– ADM-1100.07, Rev.0, Abrasive Blasting Safe Work Practices
- 316, "Condensate System"
- LS-AA-125, "Corrective Action Program (CAP) Procedure"
- HR-AA-1001, Rev.0 Stakeholder Communications for Issue Management or Security Threat
- LS-MA-1240, Rev. 9, Reportable Reference Manual
- CY-AA-130-200, Rev. 8, Quality Control
- CY-OC-130-530, Rev.5, Tritium Analysis Liquid Samples
- CY-OC-120-7004, Rev. 2, Attachment 5, Total Outside tank Activity
- CY-AA-170-400, Rev. 3 and 4, Radiological Ground Water Protection Program
- CY-AA-170-4000, Rev. 4, Radiological Groundwater Protection Program Implementation
- CY-OC-170-4160, Rev. 0, RGPP Scheduling and Notification for Oyster Creek Generating Station
- RP-AA-461, Rev. 2, Radiological Controls for Contaminated Water Diving Operations

Corrective Action Program Documents (IRs)

- 00907846, OTDM on evaluation and resolution of buried pipe leaks.
- 00914375 - Guided Wave UT
- 00913439 - 10" pipe leak, condensate transfer pipe
- 00913387 - Leakage, west of TGB

- 00916938 - Monitoring wells
- 00934636 - Mass Flux analysis
- 00914427 - Project to improve Condensate Transfer buried piping
- 00914938 - Review well sample results
- 00907846 - Water leakage from CST piping
- 00686803 - Guided wave inspection in 2007
- 00696852 - A2181188 – Scope Guided wave inspection into 1R22 RFO
- 00936775 - Waterboy Database not functional
- 00907846 - Tritium Identified in ESW Vault
- 00919332 - Condensate Transfer Line Configuration Management Issue
- 00931098 - Anomalies in Tritium Analysis results
- 00927310 - False Positive Tritium from analysis of well water

Correspondence

- Oyster Creek 2008 Annual Radioactive Effluent Release Report, dated April 30, 2009
- Oyster Creek 2008 Annual Radiological Environmental Operating Report, dated April 30, 2009
- Oyster Creek Event Report 44993, dated April 15, 2009, Off-site Notification Due to Potential Release of Tritium
- Oyster Creek Letter to State of New Jersey, RA-09-040, Follow-up Report regarding elevated tritium levels discovered on-site, dated May 15, 2009

License Renewal Program Documents

PBD-AMP-B.1.26, Buried Piping Inspection Program Basis Document

Drawings

LR-BR-2003, sheet 1, Condensate and Feed System, Rev 0
LR-BR-2004, sheet 2, Condensate Transfer System, Rev 0
Excavation Sketch dated 4/29/2009. Area Condensate Transfer Building and Turbine building
DWG 3179, “Miscellaneous Outdoor Facilities”

References

Topical Report 116, Rev 3. “Oyster Creek Underground Piping Program Description and Status”
Guided Wave Ultrasonics Testing Presentation for piping assessment by SAI
NUREG/CR-6876. Risk-Informed Assessment of Degraded Buried Piping Systems in Nuclear Power Plants

Work Orders

C2021075, C0033031, C0032859, C2021105, C2021073, C2021071, C2021083
Mini-Mod OC-MM-323643-001 for replacement of 8” pipe in 1991
A2222268, R2116819

Engineering Evaluations/Evaluations

- CP-2009-002, Exelon Technical Position Paper on Use of Qualitative Pipe Inspection Techniques for Surveying ASME Class 3 Service Water Piping, dated 4/17/2009. (G-Wave applications)
- Form 125-1, File No. 0924-91, Coating Repair on 1", 8" and 10 "CS Underground Condensate Lines
- CRA Report, Estimated Mass Flux of Tritiated Groundwater to the Intake and Discharge Canals, May 2009
- Priority Table for Possible Tritium Underground Leak
- Public Dose Projections
- Water Mass Loss Calculations/Evaluations
- 10 CFR 50.75(g), Analysis

NRC Documents

-NRC Inspection Report 05000219/2009006 (ML091380379), dated 5/18/2009
-NUREG-1875, SER related to LR of OC (ML070890637), dated March 2007
-NUREG/CR-6876, Risk Informed Assessment of Degraded Buried Piping Systems in Nuclear Power Plants

Other Documents

- Root Cause Evaluation Report – Tritium Identified in Emergency Service water (ESW) Vault (IR 907846)
- Adverse Condition Monitoring Plan – Elevated Tritium Concentration Detected On-site
- UT calibration Sheet for report R2119514-05 and thickness data for the CST bottom plates.
- Test Report G3-14#4906 on 10"-CS-24 (10" pipe), tested on 4/29/2009 (G-Wave UT)
- G-Scan Assessment of Various Piping Lines - Report No. PLR-07-441, dated 12/18/07
- Operational Technical Decision Making Document 907846-11, dated April 28, 2009
- PPC Data – Condensate Storage Tank Level, date March 1 – June 30, 2009
- Control Room Narrative Logs, dated April 13 – June 30, 2009
- Results of Radiochemistry Cross-check Program 4th Quarter 2008 (tritium)
- Tritium Efficiency Data Analysis Plots
- Radiation Work Permits, ALARA Plans, Radiological Surveys associated with Excavation and Diving Operations
- RGPP ground water radiological monitoring results; March 2009
- REMP Drinking water and surface water results, - 2008, 2009
- Soil Sample Radiological Analysis Results: April 2009

LIST OF ACRONYMS

ACMP	Adverse Condition Monitoring Plan
ALARA	As Low As Is Reasonably Achievable
AMP	Aging Management Program
ASME	American Society of Mechanical Engineers
CEDE	Committed Effective Dose Equivalent
CLB	Current Licensing Basis
CR	Corrective Action Report
CST	Condensate Storage Tank
ESW	Emergency Service Water
Exelon	Exelon Energy Company, LLC
G-Wave	Torsional guided wave ultrasonic testing
HRA	High Radiation Area
IR	Condition Report
ISI	In-service Inspection
IST	In-Service Test
MDA	Minimum Detectable Activity
MC	Inspection Manual Chapter
NDE	Non-Destructive Examination
LER	License Event Report
LMS	Learning Management System
LR	License Renewal
LRA	License Renewal Application
NCV	Non-Cited Violation
NRC	US Nuclear Regulatory Commission
OC	Oyster Creek Generating Station
OTDM	Operational Technical Decision Making
pCi/L	Picocuries per Liter
PARS	Publicly Available Records
PI	Performance Indicators
PORC	Plant On-Site Review Committee
PPC	Process Plant Computer
RAGEMS	Radioactive Monitoring System Sampling Capabilities
RBCCW	Reactor Building Closed Cooling Water
RCA	Radiological Controlled Area
RGPP	Radiological Groundwater Protection Program
RO	Refuel Outage
RSPS	Risk Significant Planning Standard
SDP	Significance Determination Process
SER	Safety Evaluation Report
SLC	Standby Liquid Control
TR-116	Topical Report 116, Rev. 3, “Oyster Creek Underground Piping Program Description and Status”
TSC	Technical Support Center

UE	Unusual Event
URI	Unresolved Item
UT	Ultrasonic Testing
WO	Work Order