



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

January 30, 2018

EA-17-028

Mr. Mark E. Reddemann
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION – NRC SUPPLEMENTAL INSPECTION
REPORT AND ASSESSMENT FOLLOW-UP LETTER; 05000397/2017011

Dear Mr. Reddemann:

On December 1, 2017, the United States Nuclear Regulatory Commission (NRC) completed a supplemental inspection using NRC Inspection Procedure 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs." On December 19, 2017, the NRC inspection team discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC performed this inspection to review your station's actions in response to a White finding in the Public Radiation Safety cornerstone which was documented in NRC Inspection Report 05000397/2016009, dated April 10, 2017, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17100A499), and finalized in a Notice of Violation letter to you from Kriss Kennedy, Regional Administrator, dated July 16, 2017 (ADAMS Accession No. ML17187A364). On September 26, 2017, Mr. W. G. Hettel, Vice President, Operations, informed the NRC that Columbia Generating Station was ready for the supplemental inspection.

The NRC performed this supplemental inspection to determine if (1) the root and contributing causes for the significant issues were understood, (2) the extent of condition and extent of cause for the identified issues were understood, and (3) your completed or planned corrective actions were sufficient to address and preclude repetition of the root and contributing causes.

The NRC determined that the root, contributing, and apparent cause evaluations were conducted to a level of detail commensurate with the significance of the problems and, taken as a whole, reached reasonable conclusions as to the root, contributing, and apparent causes of the event. The NRC also concluded that you identified reasonable and appropriate corrective actions for each root, contributing, and apparent cause and that the corrective actions appeared to be prioritized commensurate with the safety-significance of the issues.

After reviewing Columbia Generating Station's performance in addressing the White finding, the NRC concluded that your actions met the objectives of Inspection Procedure 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs."

Therefore, in accordance with the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," the White finding will only be considered in assessing plant performance for a total of four quarters. Further, the White finding and associated violation will be closed effective January 1, 2018.

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

Sincerely,

/RA/

Heather J. Gepford, Ph.D., CHP
Chief, Plant Support Branch 2
Division of Reactor Safety

Docket No. 50-397
License No. NPF-21

Enclosure:
Inspection Report 05000397/2017011
w/Attachment: Supplemental Information

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COLUMBIA GENERATING STATION – NRC SUPPLEMENTAL AND FOLLOW-UP
INSPECTION REPORT 05000397/2017011 – January 30, 2018

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 By: HGepford Yes No Publicly Available Sensitive NRC-002

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000397
License: NPF-21
Report: 05000397/2017011
Licensee: Energy Northwest
Facility: Columbia Generating Station
Location: North Power Plant Loop
Richland, WA 99354
Dates: November 28 through December 19, 2017
Inspectors: P. Hernandez, Health Physicist
J. O'Donnell, CHP, Health Physicist
Approved By: Heather Gepford, Ph.D., CHP
Chief, Plant Support Branch 2
Division of Reactor Safety

Enclosure

SUMMARY

Inspection Report (IR) 05000397/2017011; 11/28/2017 – 12/19/2017; Columbia Generating Station; Supplemental Inspection – Inspection Procedure 95001

This report covers a one-week announced supplemental inspection of a White finding in the Public Radiation Safety Cornerstone. The inspection was conducted by two health physics inspectors from the NRC Region IV office. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

The NRC staff performed the supplemental inspection in accordance with Inspection Procedure 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs," to assess the licensee's evaluation associated with the failure to ensure that the contents of a radioactive waste container did not exceed the radiation level requirements for shipping. The NRC staff previously characterized this issue as having low to moderate safety significance (White), as documented in NRC IR 05000397/2017009.

During this supplemental inspection, the inspectors determined that, taken as a whole, the licensee performed an adequate evaluation of the causes of the self-revealed failure to comply with the external radiation limits for shipping radioactive materials, which occurred for a shipment of radioactive waste to the US Ecology waste disposal facility. The licensee identified the primary root cause of the issue to be that Columbia Generating Station management did not have the organizational alignment in place that would ensure proper decision-making, effective supervisor oversight, and programmatic validation to assure execution of critical radioactive waste packaging and shipping activities in accordance with regulations. The licensee has taken corrective actions to address the organizational alignment to ensure proper decision-making, effective supervisor oversight, and programmatic validation of radwaste packaging and shipping activities.

Given the licensee's acceptable performance in evaluating the cause of a package exceeding the radiation levels for shipping low specific activity material, the White finding associated with this issue will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program." Inspectors will review the licensee's implementation of corrective actions during a future inspection.

No findings were identified.

REPORT DETAILS

4. OTHER ACTIVITIES

Cornerstone: Public Radiation Safety

40A4 Supplemental Inspection (95001)

.01 Inspection Scope

The NRC staff performed this supplemental inspection in accordance with Inspection Procedure 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs," to assess the licensee's evaluation of one White finding in the Public Radiation Safety Cornerstone. The inspection objectives were to:

- Provide assurance that the root and contributing causes of significant performance issues were understood.
- Provide assurance that the extent of condition and extent of cause of significant performance issues were identified.
- Provide assurance that corrective actions taken to address and preclude repetition of significant performance issues were prompt and effective.
- Provide assurance that corrective plans directed prompt actions to effectively address and preclude repetition of significant performance issues.

Columbia Generating Station entered the Regulatory Response Column (Column 2) of the NRC's Action Matrix in the first quarter of 2017 as a result of a White (low-to-moderate safety significance) finding in the Public Radiation Safety Cornerstone. The finding was associated with the November 9, 2016, shipment of radioactive material as low specific activity (LSA) material that exceeded the LSA external dose rate limit of 1.0 rem/hr at 3 meters from the unshielded material. Specifically, the licensee transported a package as LSA material with an external radiation level of 2.1 rem/hr at a distance of 3 meters from the unshielded material. The finding was characterized as having low to moderate safety significance (White) using the NRC Inspection Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria." This issue was documented in NRC Inspection Reports 05000397/2016009 and 05000397/2017009.

The licensee staff informed the NRC by letter on September 26, 2017, of their readiness for the supplemental inspection. In preparation for this inspection, the licensee performed a root cause evaluation documented in Action Request (AR) 360236, "Radwaste Liner Dose Rate Exceeds 1 rem/hr at 3 meters," to identify weaknesses that existed in various organizations and processes. The licensee indicated that the final version, Revision 7, dated November 16, 2017, documented their conclusions.

The inspectors reviewed several revisions of the root cause evaluation, an apparent cause evaluation (AR 357593), related self-assessments, and supplemental information that the licensee provided. The inspectors reviewed corrective actions that were taken or planned to address the identified causes. The inspectors conducted interviews and

had discussions with licensee personnel to determine if the root cause and contributing causes of the issue were understood, and that corrective actions taken or planned were appropriate to address the causes and preclude repetition. The inspectors also reviewed related issues that had been identified in the past where the corrective actions were not implemented correctly to understand process failures and assure that the proposed corrective actions would be effective.

.02 Evaluation of the Inspection Requirements

02.01 Problem Identification

- a. Determine that the licensee's evaluation documents who identified the issue and the conditions under which the issue was identified.

The root cause evaluation documented that the failure to transport LSA material with external dose rates not exceeding an external radiation level of 10 mSv/hr (1 rem/hr) at 3 meters (10 feet) from the unshielded material was self-revealed on November 9, 2016, as a result of US Ecology, the low-level radwaste disposal facility, validating the manifested dose rates during package receipt. US Ecology personnel removed the liner containing the radioactive material from the shipping cask to conduct radiation survey measurements. US Ecology personnel measured contact dose rates of 30 rem/hr and 90 rem/hr on opposite sides of the liner, in contrast to the documented dose rate of 11.8 rem/hr. The shipment was rejected and returned to Columbia Generating Station (CGS) the same day. The licensee performed radiation surveys at 3 meters from the unshielded material on January 13, 2017, and recorded dose rates of up to 2.1 rem/hr.

The inspectors determined that the self-revealed nature, as well as the conditions under which the issue was identified, were documented in the licensee's evaluation.

- b. Determine that the evaluation documents how long the issue existed and prior opportunities for identification.

The problem statement for the root cause evaluation was defined as the licensee's transport of a radioactive waste container that exceeded the external radiation dose rate limit required by the Department of Transportation. Based on this problem statement, the licensee concluded that the issue existed only during the time that the shipment was in transit on public roads from CGS to US Ecology and back to CGS on November 9, 2016. The inspectors concluded that the licensee's determination accurately documented the duration of the violation of regulatory requirements.

The root cause evaluation discussed prior opportunities for the licensee to correct or prevent the violation. Examples of these include:

- On October 20, 2016, the dose rates measured on the outside of the shipping cask were significantly higher than the regulatory limits for shipping.
- On November 5, 2016, after removing some items, external dose rates on the cask were still above the limit to ship as an open transport, so a decision was made to build a cage around the cask to prevent access to the elevated dose rates.

- On November 8, 2016, Radiation Protection was uneasy with the shipment, but the decision to proceed was based on the high confidence that the shipping specialist had in the shipment meeting all the requirements.
- On November 8, 2016, the vendor shipping summary calculated dose rate of 11.8 rem/hr for the liner was not validated. The shipment left site on November 9, 2016, without a direct survey of the liner.

The inspectors determined that the licensee documented how long the issue existed and prior opportunities to identify it.

- c. Determine that the evaluation documents the plant-specific risk consequences, as applicable, and compliance concerns associated with the issue.

The inspectors determined that this incident had no impact on the core damage frequency or large early release frequency. Therefore, the documentation of the plant-specific risk consequences was not applicable.

The causal evaluation discussed how the noncompliance with regulations led to the White violation (low to moderate safety significance) issued by the NRC for exceeding the radiation limit for this shipment type and categorized the issue as a significant condition adverse to quality. In addition to the NRC violation, the licensee received two violations for noncompliance with the Washington Administrative Code for this shipment. The immediate consequence of these violations was the suspension of the licensee's permit to dispose low-level radioactive waste at the disposal site operated by US Ecology. Additional consequences described were increased radiation exposure risk to the public and decreased NRC and public confidence in the licensee's ability to safely control its radioactive material.

The inspectors concluded that the licensee appropriately documented the risk consequences and compliance concerns associated with the issue.

- d. Findings

No findings were identified.

02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

- a. Determine that the issue was evaluated using a systematic methodology to identify the root and contributing causes.

The licensee used the following systematic methods and tools to complete the root cause analysis AR 360236, Revision 7:

- Event and Causal Factors Chart
- Comparative Timeline
- Human Performance Evaluation Worksheet
- Nuclear Safety Culture Evaluation Worksheet

Predecessor causal evaluations, as reviewed by inspectors, used a variety of systematic methodologies to complete their analyses, including some of the above and the following methods and tools:

- Event Timeline
- Barrier Analysis
- Change Analysis
- WHY Staircase

The inspectors determined that the licensee evaluated the issue using systematic methodologies to identify root and contributing causes.

- b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the issue.

The licensee's final root cause evaluation included a timeline of events and an event and causal factor chart. The licensee's root cause evaluation documented the root cause of the issue to be the station's management did not have the organizational alignment in place to ensure proper decision-making, effective supervisor oversight, and programmatic validation to assure execution of critical rad waste packaging and shipping activities in accordance with regulations. The licensee determined the contributing cause to be that chemistry management did not implement effective corrective actions to address precursor organizational and programmatic issues within the radwaste shipping program that were identified by the station's performance improvement and oversight programs.

The licensee conducted other causal evaluations prior to the final version, Revision 7. These included an apparent cause evaluation (AR 357593, "Radioactive Waste Disposal Container has Higher Dose Rates than Anticipated," Revision 00, dated December 12, 2016) and a prior version of the root cause evaluation (AR 360236, "Incorrect Container for Radioactive Waste Shipment 16-40," Revision 3a, dated April 17, 2017), both of which had problem statements that were different from the final version. The inspectors concluded that the evolution of the problem statement was linked to changes in the licensee's understanding of the issue, beginning with the occurrence of the event and followed by issuance of the special inspection report with the apparent violation and the subsequent issuance of the Notice of Violation. The inspectors noted that the revisions of AR 360236 preceding 3a and 7, respectively, were not substantively different from the revisions reviewed and discussed.

In addition to these causal evaluations, the licensee conducted self-assessments focused on the radioactive waste program and the site's readiness for this inspection. Through these various assessments, causal evaluations, and other corrective action processes, the licensee identified a number of issues with their radioactive waste program, as a whole, and several that led to or contributed to the White violation. These issues included insufficient procedures to implement spent fuel pool cleanup (SFPCU) activities, flawed waste characterization based on inaccurate survey documentation, and lack of formal SFP filter management.

The licensee found that the circumstances that led to the incident were more complex than could be addressed by a single, concise statement or single cause evaluation. The inspectors determined that when these cause evaluations and assessments were considered as an all-inclusive product, a more complete understanding of the causes leading to the incident was achieved.

Based on the extensive work performed for this root cause evaluation and associated with this root cause evaluation, the inspectors concluded that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

- c. Determine that the root cause evaluation included a consideration of prior occurrences of the issue and knowledge of operating experience.

The final root cause evaluation included a brief review of external operating experience. The review of operating experience focused on the key words high dose rates, shipment, and shipping; four events were identified. The licensee determined that these events were not related to poor organizational alignment, therefore were not applicable. The inspectors concluded that the licensee had determined the root cause and then performed the operating experience evaluation, which was contrary to the expectation that the operating experience inform the root cause determination.

The final root cause evaluation stated that applicable internal operating experience was included in the analysis and listed in the references section. There was not a discussion of internal operating experience in the report or attachments, so the inspectors used the references and operating experience information provided in Revision 3a of AR 360236 which included an evaluation of internal as well as external operating experience.

In Revision 3a of AR 360236, the licensee stated that the review of internal operating experience identified a range of weaknesses related to radwaste shipping, handling, and documentation that had been identified in self-assessments and internal audits over the prior 2-year period. The licensee recognized that corrective actions taken to address these issues had not been effective, as evidenced by the continued declining performance culminating in the shipping violation. These radwaste shipping and handling issues represented missed opportunities for the station to restore the program to satisfactory performance. The inspectors noted that some of these items included previous shipments that had been rejected by US Ecology.

The licensee determined that the external operating experience that applied represented missed opportunities due to the similarity of the CGS event. The operating experience referenced a resin shipment that was not fully characterized or surveyed prior to shipment. The review for this operating experience performed by the licensee stated that Columbia had procedures in place that required every waste stream going into a liner to be sampled and used in the characterization and that liners to be shipped are rigorously surveyed prior to shipment. The gap was identified in this situation because the SFPCU waste was previously surveyed and could not be sampled, the waste characterization was performed off-site, and it was an infrequent evolution not performed by or under the oversight of Radiation Protection.

Based on the licensee's detailed evaluation and conclusions, the inspectors determined that the licensee's root cause evaluation included consideration of prior occurrences of the problem and knowledge of operating experience.

- d. Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the issue.

The licensee's evaluation considered the extent of condition associated with an offsite shipment of LSA radioactive material that exceeded the external radiation and dose rate limits for a Type A container required by Department of Transportation (DOT) regulations in 49 CFR 173.427(a)(1). The licensee determined that the underlying issue was not limited to LSA material. Similar activities that could be vulnerable to the same defect included waste shipments where transport limits could be exceeded, waste shipments where other regulations could be challenged, hazardous material shipments, and other non-waste radioactive material shipments. Therefore, the licensee expanded the extent of condition to include all radioactive shipments. The licensee determined that non-radioactive hazardous material shipments should not be included in the extent of condition because hazardous material was transferred to another party onsite who was then responsible for its removal. The licensee concluded that the corrective actions implemented for the violation would effectively address similar shipping errors for all radioactive material shipments.

The licensee's evaluation also considered the extent of cause associated with the organizational alignment to ensure proper decision-making, effective supervisor oversight, and programmatic validation. The licensee stated that they looked at each piece individually and in combination to determine other areas that could result in a future consequential event. The licensee focused on areas with organizational alignment in which a specialized position lacked knowledgeable supervision or faced other programmatic challenges to their decision-making. The licensee reviewed departments including Operations, Engineering, Maintenance, Emergency Preparedness, Quality, and Training. The extent of cause contacted nearly every department to identify circumstances for the vulnerability. Most either did not have the vulnerability or had identified it previously and were addressing it. The one department that had the same potential that had not been addressed was Technical Services Engineering. This has been entered into the corrective action program.

The inspectors concluded that the licensee's root cause evaluation addressed the extent of condition and the extent of cause of the issue.

- e. Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered safety culture traits.

The licensee demonstrated the complexity of the issue through their evaluation of the safety culture traits associated with the event. The safety culture assessment performed for the final root cause evaluation identified four attributes that contributed to the event. Those attributes were:

- Leadership Safety Values and Actions attribute of Resources (LA.1): This related to the failure to select a supervisor with the appropriate skill set to oversee the radwaste shipping activities.

- Decision-Making attribute of Conservative Bias (DM.2): This related to the failures in decision-making to 1) not use a Type B cask, 2) construct a fence around the shipment, and 3) not survey the liner or cask prior to shipment.
- Personal Accountability attribute of Standards (PA.1): This related to the failures of 1) management to ensure organizational alignment for radwaste activities, 2) the chemistry supervisor to meet expectations to monitor and enforce standards of behavior, and 3) the radwaste transportation specialist to be trained, monitored, or coached to the expected behaviors.
- Problem Identification and Resolution attribute of Resolution (PI.3): This related to the failure to take effective and timely corrective actions to correct organizational weaknesses that were identified prior to the event.

The first three safety culture aspects were addressed by the Revision 7 root cause and corrective action to prevent recurrence actions. The fourth safety culture aspect was addressed by the contributing cause and its associated corrective actions. (See Section 02.03a.)

The inspectors determined that the licensee's root cause, extent of condition, and extent of cause evaluations appropriately considered safety culture traits.

f. Findings

No findings were identified.

02.03 Corrective Actions Taken and Planned

a. Determine that appropriate corrective actions are specified for each root and contributing cause.

In the final version of the root cause evaluation, the licensee identified the following root cause: Station management did not have the organizational alignment in place that will ensure proper decision-making, effective supervisor oversight, and programmatic validation to assure execution of critical radwaste packaging and shipping activities in accordance with regulations.

As corrective actions, the licensee realigned the Chemistry/Radiation Protection organization to include oversight positions knowledgeable in radioactive shipments. Specifically, for both the Radiation Protection Manager and the individual responsible for oversight of the Radioactive Waste Transportation Specialist, the requirement for knowledgeable oversight was added to Procedure SWP-RPP-01, "Radiation Protection Program." Position descriptions were modified to include the required knowledge. Procedural requirements to validate dose rates documented on shipping manifests via either direct surveys or shielding calculations were added to applicable procedures. Finally, the lessons learned from this event were added to Manager/Supervisor SOER 10-2 training.

The licensee also identified a contributing cause: Chemistry management did not implement effective corrective actions to address precursor organizational and programmatic issues within the radwaste shipping program.

As a corrective action, the licensee updated performance appraisals for Chemistry/Radiation Protection management and supervision to focus on increasing proficiency in implementing corrective actions. The licensee will also conduct a workshop to align Chemistry/Radiation Protection management on how to implement proper corrective action to address organizational and programmatic issues.

In Revision 3a of the root cause evaluation (AR 360236), the licensee identified the following root cause: Station procedures to implement SFPCU activities and the associated radioactive waste surveys, processing, and shipping activities are not sufficient to ensure compliance with all requirements. The contributing causes were identified to be: (1) Some key decisions made during the SFPCU project lacked rigorous challenge and vetting and were not conservative, and (2) Lack of adequate management/supervisor oversight for SFPCU project and RadWaste processing and shipping program.

As corrective actions, the licensee inventoried and mapped the remaining Tri Nuclear filters in the spent fuel pool, conducted a self-assessment of the radwaste shipping and handling program, began having the Radiation Protection Manager review all radwaste shipments to validate the surveys and characterization, and developed a procedure for spent fuel pool clean-up activities integrated with radwaste shipping and handling

In the apparent cause evaluation (AR 357593), the licensee identified the following apparent cause: Survey documentation was inaccurately recorded and communicated to the characterization vendor which led to errors in the calculated dose rates on the characterization used to ship the radioactive waste disposal container. The contributing causes were identified to be: (1) A formalized process and plan specific to Tri Nuclear filter management, tracking, and disposal was not developed, (2) Radiological conditions on the disposal container were not verified and validated prior to shipment, and (3) Characterization results provided by the vendor based on CGS data were not verified or validated.

As corrective actions following the event and apparent cause evaluation, the licensee suspended radwaste shipping activities, conducted an event investigation, benchmarked another station on Tri Nuclear filter handling and tracking in the spent fuel pool, created a new procedure for spent fuel pool clean-up container loading, revised the procedure for processing of irradiated nonfuel material to include Tri Nuclear filters, labeled filter cans in the spent fuel pool, and evaluated performance gaps for culpability.

The inspectors questioned whether the apparent, root, and contributing causes identified in the various revisions of the cause evaluations were going to continue to be addressed and corrected. The licensee stated that all issues identified in this process would be corrected and that the corrective actions for each of the cause evaluations were being tracked to completion.

The inspectors determined that the corrective actions were appropriate and addressed the root and contributing causes identified in each of the licensee's causal evaluations.

- b. Determine that corrective actions have been prioritized with consideration of risk significance and regulatory compliance.

The licensee categorized AR 360236 as a Severity Level A (high risk) action request, which requires a root cause evaluation. In accordance with Procedure SWP-CAP-01, "Corrective Action Program," Revision 37, the AR received a significant condition adverse to quality (SCAQ) priority. This priority requires the issue to be addressed by a higher level of corrective actions (i.e., corrective actions to preclude repetition known as CAPRs). The procedure stated that CAPRs should be completed within 180 days.

The inspectors determined that the corrective actions were prioritized with the appropriate consideration of significance and regulatory compliance.

- c. Determine that corrective actions taken to address and preclude repetition of significant performance issues are prompt and effective.

The licensee promptly initiated corrective actions as issues were identified throughout the performance of the cause evaluations. The licensee also initiated corrective actions that were identified in the apparent cause evaluation and early root cause evaluation revisions prior to completing the final evaluation and as they identified related issues throughout the process.

The inspectors determined that the corrective actions taken to address and preclude repetition of the performance issues were prompt and should be effective.

- d. Determine that a corrective action plan and schedule has been established for implementing and completing the corrective actions.

The inspectors discussed the corrective action plan with the licensee. Some of the due dates were captured in the final root cause evaluation revision; however, many of the due dates for corrective actions not directly mentioned in the evaluation were spread across other performance improvement tools. Specifically, the licensee used a performance improvement database to track corrective actions. The many facets of the causal evaluation, including previous revisions, assessments, work orders, and actions, are being tracked with the AR 360236 identifier with cross-references to other associated action requests. The licensee's database tracks all the associated actions, due dates, responsible parties, and effectiveness reviews to be performed.

The inspectors determined that a schedule had been established for implementing and completing the corrective actions.

- e. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to preclude repetition.

As documented in the final root cause evaluation, the licensee established measures for determining the effectiveness of the corrective actions. These measures included the following:

- The trained and knowledgeable Radiation Protection Manager will review shipment manifests and paperwork to identify deficiencies. Success is defined as the documents containing less than 5 percent deficiencies.

- A self-assessment of the radwaste shipping and handling program corrective actions will be performed after an acceptable implementation period with a due date of April 30, 2018. Areas of focus include compliance with burial site requirements (i.e., no loss of burial site privileges) and zero regulatory noncompliance issues related to radwaste shipments.

The effectiveness reviews have been added into the corrective action program as corrective action items to ensure they are performed.

The inspectors determined that quantitative and qualitative measures of success had been developed for determining the effectiveness of the corrective actions to preclude repetition.

- f. Determine that the corrective actions planned or taken adequately address a Notice of Violation (NOV) that was the basis for the supplemental inspection.

During this inspection, the inspectors determined that the corrective actions taken and planned to correct the identified causes adequately addressed the NOV.

- g. Findings

No findings were identified.

40A6 Meetings, Including Exit

Exit Meeting Summary

On December 1, 2017, the inspectors conducted a technical debrief for Mr. M. Reddemann, Chief Executive Officer, and other members of the licensee staff. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

On December 19, 2017, the inspectors presented the inspection results to Mr. M. Reddemann, Chief Executive Officer, and other members of the licensee staff. The licensee acknowledged the issues presented.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

S. Brush, Health Physics Planner, Chemistry/Radiation Protection
M. Davis, Manager, Chemistry/Radiation Protection
K. Gillard, Analyst, Chemistry/Radiation Protection
D. Gregoire, Manager, Regulatory Affairs
T. Hedges, Chemistry/Radiation Support Supervisor, Chemistry/Radiation Protection
G. Hettel, Vice President, Operations
J. Houston, Radwaste Transportation Specialist, Chemistry/Radiation Protection
T. McNabb, Health Physics Planner, Chemistry/Radiation Protection
S. Nappi, Assistant to the Vice President, Operations
M. Nolan, Senior Radwaste Transportation Specialist, Chemistry/Radiation Protection
T. Parmalee, Compliance Engineer, Licensing and Regulatory Affairs
M. Reddeman, Chief Executive Officer
R. Sanker, Radiological Support Supervisor, Chemistry/Radiation Protection
M. Shobe, Chemistry Specialist IV, Chemistry/Radiation Protection
J. C. Smith, Radiological Operations Supervisor, Chemistry/Radiation Protection
C. Smoot, Supervisor, Human Performance/Industrial Safety
D. Wolfgramm, Supervisor, Regulatory Compliance

NRC Personnel

G. Kolcum, Senior Resident Inspector
L. Brandt, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

05000397/2016009-01 VIO Shipment of a Type B Quantity of Radioactive Material in a Type A Package (Section 40A4)

LIST OF DOCUMENTS REVIEWED

Section 40A4: Supplemental Inspection (95001)

Procedures

<u>Number</u>	<u>Title</u>	<u>Revisions</u>
SWP-RMP-01	Radioactive Waste Management Program	4
PPM 1.11.15	Control of Radioactive Material	11, 12, 13
PPM 6.1.1	Spent Fuel Pool Inventory	9, 10
PPM 11.2.2.12	Radiological Risk Assessment and Management	8
PPM 11.2.13.1	Radiation and Contamination Surveys	36, 37
PPM 11.2.23.1	Shipping Radioactive Materials and Waste	18, 19
PPM 11.2.23.1	Shipping Radioactive Materials and Waste	19
PPM 11.2.23.2	Computerized Radioactive Waste and Material Characterization	20, 21
PPM 11.2.23.9	Packaging, Transportation and Disposal of Radioactive Waste at the US Ecology, Richland Radioactive Waste Disposal Facility	0, 1
PPM 11.2.23.45	Management of Spent Fuel Pool Filters, Irradiated, and Non-Irradiated Items to Support Packaging, Transportation, and Disposal as Low-Level Radwaste	0
CDM-01	Cause Determination Manual	16
SWP-CAP-01	Corrective Action Program	36, 37
GBP-HR-48	Knowledge Retention	0

Audits and Self-Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
361427	Peer Self-Assessment Report Radioactive Waste Program	February 2, 2017
AU-RP-RW-15	Quality Services Audit Report – Radiation Protection and Process Controls Program	November 5, 2015
AR-SA 305111	Focused Self-Assessment Report – Radioactive Solid Waste Processing, Radioactive Material Handling, Storage, and Transportation	June 19, 2015
AR-SA 337267	Snapshot Self-Assessment Report – Radioactive Waste Management and Transportation	June 28, 2017

Audits and Self-Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
AR-SA 369058	Focused Self-Assessment Report – Rad-waste Shipping 95001 Preparatory Assessment	September 11, 2017
AR-SA 361427	Peer Self-Assessment Report – Radioactive Waste Program	February 2, 2017
SR-17-12	Radwaste Program Assessment Report	April 27, 2017
SR-17-09	Radwaste Processing and Shipping	August 23, 2017

Root Cause Evaluations

<u>AR Number</u>	<u>Title</u>	<u>Revision Date</u>
360326	RadWaste Liner dose rate exceeds 1 Rem/hr at 3 meters	Rev. 7 November 16, 2017
360326	RadWaste Liner dose rate exceeds 1 Rem/hr at 3 meters	Rev. 6 October 30, 2017
360326	Incorrect Container for Radioactive Shipment 16-40	Rev. 3a April 26, 2017

Apparent Cause Evaluations

<u>AR Number</u>	<u>Title</u>	<u>Revision Date</u>
353427	Trend: Radioactive Waste Packing/Shipping Issues	Rev. 1 October 20, 2016
352217	RW Box Sent to Disposal Site with Greater than 15% Voids	September 12, 2016
357593	Radioactive Waste Disposal Container has Higher Dose Rates than Anticipated	December 12, 2016
369215	Liner 17-084-OT Shipped for Disposal with Incorrect Manifest	August 29, 2017

Action Requests (AR)

338421	352217	357593	360148
360572	369215	370193	371583

Work Orders (WOs)

<u>Number</u>	<u>Title</u>	<u>Date</u>
02070690	Spent Fuel Pool Clean Up Project Plan	February 15, 2016

Work Orders (WOs)

<u>Number</u>	<u>Title</u>	<u>Date</u>
02104894	Move SFPCU Liner from Reactor Building Truck Bay to Radwaste	December 29, 2016
02070690	Perform Spent Fuel Pool Cleanup in FY16	February 9, 2016
02095196	Perform Spent Fuel Pool Cleanup in FY17	September 28, 2016

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
	RCE 360326 Roadmap	November 30, 2017
	Chemistry/Radiation Protection Organization Chart	November 28, 2017
WAC 246-249-090	Transfer for Disposal and Manifests	November 9, 2017
	Excellence Model Handbook	2016