



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
2443 WARRENVILLE ROAD, SUITE 210  
LISLE, ILLINOIS 60532-4352

February 12, 2018

Mr. John Sauger  
Executive VP and Chief Nuclear Officer  
EnergySolutions  
2701 Deborah Avenue  
Zion, IL 60099

SUBJECT: NRC INSPECTION REPORT 05000409/2017001(DNMS) - LA CROSSE BOILING  
WATER REACTOR

Dear Mr. Sauger:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed its inspection activities at the La Crosse Boiling Water Reactor (LACBWR) in Genoa, Wisconsin. The purpose of the inspection was to determine whether decommissioning activities were conducted safely and in accordance with NRC requirements. On January 11, 2018, the inspectors discussed the results of this inspection with Mr. J. Nowak and other members of your staff. The results of this inspection are documented in the enclosed report.

The inspection consisted of an examination of activities at the facility as they relate to safety and compliance with the Commission's rules and regulations. Areas examined during the inspection included facility management and control, radiological safety, and confirmatory surveys. Within these areas, the inspection consisted of a selective examination of procedures and representative records, field observations of activities in progress, and interviews with personnel.

Based on the results of this inspection, the NRC identified three Severity Level IV violations of NRC requirements. However, because of the very low safety significance and because the issues were entered into your Corrective Action Program, the NRC is treating these issues as Non-Cited Violations (NCVs) in accordance with Section 2.3.2 of the NRC's Enforcement Policy.

No response is required for the NCVs. However, if you contest an NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region III; and the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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."

We will gladly discuss any questions you have concerning this inspection. If you have any questions, please contact Dr. Peter Lee of my staff at 630-829-9870.

Sincerely,

**/RA/**

Michael A. Kunowski, Chief  
Materials Control, ISFSI, and  
Decommissioning Branch  
Division of Nuclear Materials Safety

Docket No. 050-00409  
License No. DPR-45

Enclosure:  
IR 05000409/2017001 (DNMS)

cc w/encl: LaCrosse*Solutions* Service List

Letter to John Sauger from Michael Kunowski dated February 12, 2018

SUBJECT: NRC INSPECTION REPORT 05000409/2017001(DNMS) - LA CROSSE BOILING  
WATER REACTOR

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

Docket No.: 50-409

License No.: DPR-45

Report No.: 05000409/2017001(DNMS)

Licensee: LaCrosse*Solutions*, LLC

Facility: La Crosse Boiling Water Reactor

Location: Genoa, Wisconsin

Dates: April 25, 2017, through December 31, 2017

Inspectors: Rhex Edwards, Senior Health Physicist  
Peter J. Lee, Reactor (Decom) Inspector, Ph.D., CHP  
Marlayna Vaaler, Project Manager  
James Beavers, Health Physicist

Approved by: Michael A. Kunowski, Chief  
Materials Control, ISFSI, and  
Decommissioning Branch  
Division of Nuclear Materials Safety

Enclosure

## EXECUTIVE SUMMARY

### La Crosse Boiling Water Reactor NRC Inspection Report 05000409/2017001 (DNMS)

This periodic decommissioning inspection covered aspects of facility management and control, radiological safety, and confirmatory surveys. Active decommissioning was in progress at the La Crosse Boiling Water Reactor (LACBWR) site throughout this inspection period and decommissioning activities are expected to continue through 2018.

#### Facility Management and Control

- The inspectors determined that the licensee was adequately controlling decommissioning activities and radiological work areas. (Section 1.1)
- The licensee's management, contractor oversight, and onsite management and review committees were being conducted and maintained in accordance with the appropriate regulatory requirements as prescribed by the LACBWR Quality Assurance Program (QAP) and Post Shutdown Decommissioning Activities Report (PSDAR). The licensee has established additional oversight and controls for contractor programs to ensure that activities were being conducted in accordance with the applicable regulatory requirements, license conditions, and Quality Assurance Program Document (QAPD) procedures. The inspectors determined that the licensee's process for evaluating the safety impacts of facility changes and modifications was in compliance with the requirements of Title 10 of the *Code of Federal Regulations* (CFR) 50.59. (Section 1.2)
- The inspectors determined that the licensee's corrective actions were adequately implemented in accordance with its Corrective Action Program (CAP). The licensee's auditing and decommissioning safety review programs were being conducted and maintained in accordance with the appropriate regulatory requirements as prescribed by the LACBWR QAPD. (Section 1.3)
- The inspectors identified a Severity Level (SL) IV Non-Cited Violation (NCV) of 10 CFR 50.48(f)(3), "Fire Protection," for the site's failure to evaluate whether eliminating the site's five fire hydrants reduced the effectiveness of the fire protection program (FPP). (Section 1.4)

#### Radiological Safety

- The inspectors determined that the licensee continued to be effective in controlling radiation worker personal exposure. (Section 2.1)
- One SL IV NCV of 10 CFR 50.54(a)(1) was self-revealed for the site's failure to implement the quality assurance program when an inadvertent discharge of contaminated water occurred to the Mississippi River from the East Baker Water Storage Tank. (Section 2.2)
- The inspectors determined that the licensee had complied with U.S. Nuclear Regulatory Commission (NRC) and Department of Transportation (DOT) regulations for shipments of radioactive waste. (Section 2.3)

### Confirmatory Survey

- The inspectors identified one SL IV NCV of 10 CFR 20.1501, "General," for the licensee's failure to perform all of the surveys of the subsurface that may be necessary for the licensee to ensure compliance with 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use." The inspectors determined that the licensee had properly remediated and performed final status surveys (FSSs) of the waste gas tank vault and sub-foundation soils of the pipe tunnel, reactor plant/generator plant common area, stack, and warehouse areas. After additional remediation, the inspectors concluded that the licensee had also properly performed FSSs of the waste treatment building (WTB) area. (Section 3.1)

## **Report Details<sup>1</sup>**

### **Summary of Plant Activities**

During the inspection period, active decommissioning work was ongoing at the site and consisted of demolition of the stack, turbine building, WTB, waste gas tank vault, and the common area of the reactor and turbine buildings. In addition, contaminated piping and internal components were being dismantled and removed from the reactor building.

### **1.0 Facility Management and Control**

#### **1.1 Decommissioning Performance and Status Review at Permanently Shut Down Reactors (Inspection Procedure (IP 71801))**

##### **a. Inspection Scope**

The inspectors conducted plant tours to assess field conditions and decommissioning activities and to ensure that radioactively contaminated areas were being controlled.

##### **b. Observations and Findings**

The licensee maintained the work areas with adequate shielding and enclosures with high efficiency particulate air filter (HEPA) exhaust systems to minimize worker doses. Work areas were observed to be adequately controlled, postings and boundaries were appropriate, and workers were wearing respirators as required. Appropriate protective clothing was being worn and workers followed established procedures.

##### **c. Conclusions**

The inspectors determined that the licensee was adequately controlling decommissioning activities and radiological work areas.

#### **1.2 Safety Reviews, Design Changes and Modifications (IP 37801)**

##### **a. Inspection Scope**

The inspectors reviewed the organization, composition, and controls implemented for each of the LACBWR management review committees to ensure that the licensee was maintaining effective oversight of decommissioning activities. The inspectors also reviewed the minutes of several Health and Safety Excellence Team (HSET) meetings and discussed the Independent Management Assessment (IMA) and management observation programs (MOP) with licensee staff.

The inspectors reviewed the licensee's safety review processes, procedures, and training to verify that the safety review program was effective at contributing to the protection of public health and safety and the environment. Additionally, the inspectors reviewed selected design changes and facility modifications to determine if changes, tests, experiments, and modifications were effectively conducted, managed, and

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<sup>1</sup>NOTE: A list of acronyms used in the report is included at the end of the report.

controlled during plant decommissioning. This inspection verified that decommissioning activities were being implemented in accordance with the requirements of 10 CFR 50.59, 10 CFR 50.71, and 10 CFR Part 50, Appendix B. In addition, the inspectors discussed the implementation and effectiveness of the design control and safety review programs with LACBWR personnel.

b. Observations and Findings

The inspectors noted that the licensee discontinued the Safety Review Committee (SRC) and the Operation Review Committee (ORC) in recognition of the fact that a limited number of important to safety and/or radiological items would require safety reviews at the Independent Spent Fuel Storage Installation (ISFSI) or during the remaining decontamination and dismantlement activities at the LACBWR site. These committees were replaced by the IMA process and the Qualified Technical Reviewer (QTR) process, respectively, changes which were approved by the NRC during its review of the LACBWR QAPD, Revision 2. Specifically, the IMA process continued to meet the requirement in 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criterion II, "Quality Assurance Program," that the licensee regularly review the status and adequacy of the quality assurance program. In addition, the responsibilities of the QTR encompassed the functions previously performed by the ORC and were consistent with the scope of activities at a permanently defueled facility in an advanced stage of decommissioning.

The inspectors reviewed LACBWR Job Aid No. LC-JA-01, "Management Observation Program," Revision 0, which was a program established to prevent incidents and injuries through the monitoring, trending, behavioral management, and identification of error precursors. The MOP provided a process whereby employees at all levels regularly visit work areas, observe work practices and conditions, and discuss job safety and other aspect of the work with other employees. While not directly related to implementation of the quality assurance program because of its applicability to industrial safety practices, use of the MOP allowed for a review of the quality and effectiveness of work preparation, policies, and practices, as well as their implementation. The inspectors also reviewed the agenda and minutes for several HSET meetings. The HSET was a committee established by EnergySolutions to review matters which may have a bearing on industrial, nuclear, or radiological safety during decommissioning and/or waste transportation and storage at any facilities managed by EnergySolutions.

As a result of these reviews, the inspectors concluded that, in general, the licensee was appropriately implementing the various oversight processes outlined by the IMA, QTR, MOP, and/or HSET, and leveraging its oversight of onsite contractors, to ensure that all conditions that could impact the safety or quality of decommissioning activities at LACBWR were being addressed in a manner commensurate with their potential impact on the overall project.

The inspectors reviewed the licensee's 10 CFR 50.59 program, as implemented by Procedure No. LC-RA-PR-001, "Regulatory Reviews," Revision 2. The inspectors compared this procedure with the NRC-endorsed industry method for complying with the provisions of 10 CFR 50.59, Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Implementation," Revision 1, dated November 2000. The inspectors determined that the procedure was adequate to implement the licensee's commitments provided in the QAPD. The inspectors determined that the procedure provided



adequate instructions to assure proper implementation, review, and approval of design changes. The inspectors also verified that when issues were identified during this process the licensee appropriately documented the issues in the LACBWR CAP.

The inspectors reviewed several 10 CFR 50.59 screenings where licensee personnel had determined that a full 50.59 evaluation was not necessary and verified that the conclusions were adequate. Specifically, the regulatory reviews included: (1) revision of the PSDAR due to elimination of systems and components no longer in use; (2) replacing the original liquid waste system with a temporary liquid waste system; (3) revision of mobile liquid waste process system operation procedure; and (4) replacing the original airborne effluent release and monitoring system with the temporary airborne effluent monitoring system. The licensee's 50.59 safety evaluation program also provided effective periodic training for personnel preparing, reviewing, and approving the associated safety evaluations. In addition, the program established an adequate process to assess training effectiveness.

Finally, the inspectors reviewed the licensee's decommissioning work activities, which included demolition activities associated with the reactor containment building and the turbine building foundation. The inspectors confirmed that these activities were completed in accordance with the licensee's safety review processes, even when implemented by contractor personnel.

c. Conclusions

The licensee's management, contractor oversight, and onsite management and review committees were being conducted and maintained in accordance with the appropriate regulatory requirements as prescribed by the LACBWR QAP and PSDAR. The licensee has established additional oversight and controls for contractor programs to ensure that activities were being conducted in accordance with the applicable regulatory requirements, license conditions, and QAPD procedures. The inspectors determined that the licensee's process for evaluating the safety impacts of facility changes and modifications was in compliance with the requirements of 10 CFR 50.59.

1.3 Self-Assessment, Auditing, and Corrective Actions (IP 40801)

a. Inspection Scope

The inspectors reviewed and discussed with licensee management the policies and implementing procedures that govern the CAP to verify compliance with the applicable regulatory requirements and decommissioning documents. Specifically, the inspectors reviewed a sample of Condition Reports (CRs), and verified that the CRs provided adequate documentation and description of conditions adverse to quality, as well as specifying the cause of these conditions and the corrective actions taken. The inspectors also verified that contractor personnel submitted CRs and proposed corrective actions, as applicable, and that the licensee adequately assessed deficiencies identified or reported by contractors and entered them into the CAP.

The inspectors reviewed the LACBWR policies and implementing procedures that govern the implementation of the internal auditing program to verify compliance with the requirements in the QAPD and PSDAR, and to ensure that significant decommissioning activities were independently and effectively reviewed. The inspectors evaluated the effectiveness of licensee controls in identifying, resolving, and preventing issues that

degrade safety or the quality of decommissioning. These controls include self-assessment, audits, corrective actions, and root and apparent cause evaluations. The inspectors reviewed a sample of audit reports and self-assessments to evaluate compliance with the licensee's program and technical requirements. In addition, the inspectors reviewed the disposition of corrective actions to resolve deficiencies identified by audit findings for adequacy and timeliness. Furthermore, the inspectors discussed the implementation and effectiveness of the audit and safety review programs with LACBWR personnel.

b. Observations and Findings

The licensee's corrective actions were appropriately focused in both scope and level of detail. The licensee initiated appropriate corrective actions in a timely manner to resolve findings. Additionally, the inspectors conducted numerous discussions with LACBWR personnel, including licensing engineers, quality assurance personnel, and audit representatives, to verify that licensee and contractor personnel were aware of the corrective action process, recognize when and how to use the process, and understand the outcomes that can result from a CR. The inspectors concluded that all of the LACBWR and contractor personnel interviewed had adequate knowledge of the LACBWR CAP.

The inspectors specifically reviewed the corrective actions for an overflow of the berm around the East Baker Water Storage Tank (ES-LCR-2017-0012) that caused an inadvertent release to a storm drain (Unresolved Item (URI) 05000495/2016). Based on the review of the corrective actions to prevent future unplanned releases from the temporary holding tank, the inspectors did not have a safety concern with the operation of the temporary holding tank for the liquid waste prior to discharge to the Mississippi River through the filtration system (see Section 2.2).

The inspectors also reviewed the action plan (LC-2017-0090) associated with ES-LCR-2017-0073 and discussed with the licensee the extent of condition as it related to remediating the sub-foundation soils of the turbine building. The inspectors determined that since the problems in the WTB remedial excavation work (see Section 3.1), the licensee made significant improvements to prevent subsurface contamination during remedial excavation.

The inspectors reviewed a sample of internal assessments and surveillances to evaluate the implementation of the LACBWR audit program and verified that the licensee had prepared and approved plans, with forms, that identify the assessment scope, focus, and applicable criteria before the initiation of the assessment or surveillance activity. The inspectors confirmed that the assessment reports contained a review of the relevant decommissioning activities and associated documentation. Specifically, the assessment forms were used to verify multiple areas, including the environmental program, procedures, emergency response, external dosimetry, nuclear materials accountability program, and air sampling for occupational workers. For assessments or surveillances that resulted in findings, the inspectors verified that the licensee had established a plan for corrective action, that the Corrective Action Review Board (CARB) had reviewed and approved the corrective action, and then verified its satisfactory completion and proper documentation.

The inspectors verified that the LACBWR QAPD and associated procedures provided guidance for the indoctrination and training of auditors, lead auditors, and survey team

members. The inspectors reviewed a sample of the training and qualification records of the LACBWR auditors, lead auditors, and survey team members and confirmed that auditing personnel had completed all required training and maintained qualification and certification in accordance with the licensee's policies and procedures. The inspectors also verified that audit and survey teams were sufficiently qualified to evaluate areas within the scope of the audit and that members of the CARB had the necessary knowledge and experience in areas important to decommissioning.

Finally, the inspectors noted that as a result of ongoing self-assessments and other oversight activities at the LACBWR site, the licensee implemented Procedure No. LC-QA-PN-001, "Final Status Survey Quality Assurance Project Plan," Revision 1, and Procedure No. LC-FS-PR-002, "Final Status Survey Package Development," Revision 1. These procedures pertained to the decommissioning project activities performed by the licensee and its subcontractors for the duration of the project associated with the development and implementation of the LACBWR License Termination Plan (LTP), including the historical site assessment, site characterization, demonstration of compliance with license termination criteria, and FSS design. These procedures were intended to ensure the adequacy, accuracy, and reproducibility of the data being developed and used during the FSS process. The procedures stated that effective implementation of radiological survey operations would be verified through audit and surveillance activities, including self-assessments, and corrective actions would be prescribed, implemented, and verified in the event any deficiencies were identified.

c. Conclusions

The inspectors determined that the licensee's corrective actions were adequately implemented in accordance with its CAP. The licensee's auditing and decommissioning safety review programs were being conducted and maintained in accordance with the appropriate regulatory requirements as prescribed by the LACBWR QAPD.

1.4 Maintenance and Surveillance (IP 62801)

a. Inspection Scope

The inspectors toured the site as well as reviewed records and procedures to assess the proper operation of the radioactive liquid waste temporary system for discharging to the Mississippi River and the HEPA exhaust system used during reactor building demolition to limit radioactive material released to the atmosphere. Additionally, the inspectors reviewed the site's implementation of the FPP and conducted tours to verify compliance with the program.

b. Observations and Findings

With exception to the issue described in Section 2.2 of this report, the inspectors concluded that the effluent releases from the temporary liquid waste discharge system and HEPA exhaust system, used during reactor building demolition, were properly maintained to satisfy the requirements of the Offsite Dose Calculation Manual (ODCM).

In general, the inspectors found that the site maintained adequate fire protection controls in accordance with the FPP. However, the inspectors identified a SL IV NCV of

10 CFR 50.48(f)(3), "Fire Protection," for the site's failure to evaluate whether eliminating the five site fire hydrants reduced the effectiveness of the FPP.

During the week of October 2, 2017, on a tour of the site, the inspectors became aware that LACBWR's five onsite fire hydrants were no longer available for fire protection purposes and had not been available since June 14, 2017, when a leak occurred on the High Pressure Service Water system. The original issue of the leak was documented in the CAP in June as CR-2017-0036 and the site had implemented compensatory actions in accordance with LC-FP-PN-001, "Fire Protection Program (FPP)", Revision 0, which states in section 4.5.6, "If the operability or capacity of the HPSW system has been affected, notify the Genoa Fire Department of such to ensure that their Tanker Pumper responds in the event of a fire. The Genoa Fire Department has the ability to use the Mississippi River as a water source." As of the October 2017 inspection, the licensee had intended to make the compensatory actions permanent.

To the inspectors, the permanent abandonment of the onsite fire hydrants and the permanent use of the offsite Genoa fire department to use the Mississippi River as the primary water source to fight fires represented a possible reduction in the effectiveness of the fire protection program which the licensee had not evaluated, and consequently was a violation of 10 CFR 50.48(f)(3). The inspectors determined that the violation was of more than minor significance because, if left uncorrected, the deficiency could lead to a more significant safety concern in the event of an actual fire. Additionally, the deficiency affects the 10 CFR 50.48(f)(1)(ii), "Fire Protection," objectives to "rapidly detect, control, and extinguish those fires that do occur and that could result in a radiological hazard."

Consistent with the guidance in Section 1.2.6.D of the NRC Enforcement Manual, if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) commensurate with its safety significance; and (2) informed by similar violations addressed in the Violation Examples. The issue was not found to match any of the Enforcement Policy Violation Examples; however, the issue was screened as having very low safety significance, SL IV, since other equipment was available at the site and the Genoa Fire Department was capable of using the Mississippi River as a water source during this timeframe to extinguish any potential fires.

10 CFR 50.48(f)(3), "Fire Protection," states, in part, that the "licensee may make changes to the fire protection program without NRC approval if these changes do not reduce the effectiveness of the fire protection program." Contrary to the above, from June 14 to October 2, 2017, the licensee made a change to the fire protection program without NRC approval but did not evaluate if these changes reduced the effectiveness of the fire protection program. Specifically, the licensee eliminated the use of five onsite fire hydrants and the High Pressure Service Water system for fighting onsite fires and instead relied on the use of an offsite fire department to pump water from the nearby Mississippi River to fight fires. The licensee placed this issue into the CAP as CR-2018-0004 and approved a fire protection evaluation for the change on October 9, 2017. This violation is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000409/2017001-01, Failure to Evaluate Fire Protection Program Changes)

c. Conclusions

The inspectors identified a SL IV NCV of 10 CFR 50.48(f)(3), "Fire Protection," for the site's failure to evaluate whether eliminating the site's five fire hydrants reduced the effectiveness of the FPP.

**2.0 Radiological Safety**

2.1 Occupational Radiation Exposure (IP 83750)

a. Inspection Scope

The inspectors reviewed work instructions, As Low As Is Reasonably Achievable (ALARA) pre-job reviews, and radiation work permits (RWPs) associated with the decontamination of facilities to meet the contamination verification survey (CVS) limits for future open air demolition. The inspectors reviewed the characterization surveys of contaminated piping and system components conducted prior to removal to determine the need for respirator protection and the adequacy of RWPs. The inspectors reviewed the external exposure records and the air sampling results to evaluate the internal exposures. The inspectors also interviewed various licensee health physics staff and supervisors.

b. Observations and Findings

The radiological planning of the health physics staff pre-job meeting provided adequate radiation protection coverage, and the ALARA reviews were effective in minimizing unnecessary doses. All licensee personnel were knowledgeable about the hazards of the evolutions being performed and the proper radiation protection protocols for any radiological incidents. The personnel exposures were well below 10 CFR Part 20 limits.

During 2017, site radiation workers received a total external exposure of 6422 mrem. The highest annual dose total for any one individual was 461 mem.

Based on the review of air sampling results and a respirator protection factor (PF) of 1000, the inspectors concluded that the workers received insignificant internal exposures.

c. Conclusions

The inspectors determined that the licensee continued to be effective in controlling radiation worker personal exposure.

2.2 Radioactive Waste Treatment, and Effluent and Environmental Monitoring (IP 84750)

a. Inspection Scope

The inspectors evaluated the licensee's activities to effectively control, monitor, and quantify releases of radioactive materials in liquid and particulate forms to the environment. The inspectors observed and reviewed the results of the CVS of the WTB, turbine building, piping and ventilation tunnels, the common area of reactor and turbine buildings, and the waste gas tank vault. The inspectors reviewed the operating

instruction for the reactor containment HEPA ventilation system, and evaluated the HEPA ventilation systems during the demolition of internal components of the reactor building and the representative air sampling of effluent release.

b. Observations and Findings

The licensee set up continuous air sampling stations around the boundary of the radiological controlled area during demolition. The CVS results met the open air demolition limits as stated in the LTP. Based on the review of the air sampling results, the inspector determined that no radionuclides were identified except naturally occurring radionuclides.

The HEPA intakes were located on the eastern wall of the reactor building. There were two HEPA banks, each equipped with four HEPA units, which provided airflow of approximately 16,000 cubic feet per minute. This airflow provided about one air change per hour for the reactor building and the adjoined tent. The HEPA ventilation system had maintained adequate negative pressure during demolition activities in the reactor building and the waste loadout in the tent. During demolition, the licensee performed hourly checks of the HEPA pre-filter differential pressure (DP) and daily checks of the HEPA DP to ensure timely replacement of the filter to reduce the filter loading and maintain the proper flow. Currently, the air sampling of the HEPA exhaust had not shown any detectable licensed material. The minimum detectable concentration sensitivity of the analysis equipment was well below 10 CFR Part 20 limits.

The inspectors also reviewed liquid effluent discharges and the details of URI 05000409/2016002, "Inadvertent Release to Storm Drain." The URI describes the unintentional discharge of contaminated water from the East Baker Water Storage Tank to the Mississippi River that occurred on February 23, 2017. The URI was opened to track the issue as the discharge occurred at the closure of the last inspection period. The inadvertent release was reported to the NRC in Event Number 52575 and is also tracked in the Nuclear Material Events Database as Item Number 170122. As described in the Event Notification, a hose inadvertently left in-place from a previous pumping activity siphoned the contents of the East Baker Water Storage Tank into the berm around the tank which ultimately overflowed onto the ground and into a storm water drain leading to the Mississippi River. Upon further review, one SL IV NCV of 10 CFR 50.54(a)(1) was self-revealed for the site's failure to implement the quality assurance program.

Section 1.1 of Appendix C of the NRC-approved QAPD, Revision 29, states "written procedures shall be established, implemented, and maintained covering the Plant decommissioning activities referenced below and in Section 2.0." Section 1.1.3 lists the Radiation Protection Program implementation and Section 2.2 lists the ODCM. As such the QAPD establishes that the ODCM shall be implemented in accordance with written procedures. At the site, the ODCM was procedure LC-RP-PG-005.

Section 4.2.2e of LC-RP-PG-005, Revision 3, states that "prior to discharge, representative sample(s) will be analyzed after the liquid effluent has been processed through an appropriate filtration and demineralizer system." Failing to sample and analyze the water from the berm of the East Baker Water Storage Tank prior to the inadvertent discharge is contrary to the requirements of the ODCM and subsequently a violation of 10 CFR 50.54(a)(1) for failing to follow the quality assurance program.

The inspectors determined that the violation was more than minor using Inspection Manual Chapter (IMC) 0612, Appendix E, example 6.e. This example was similar in that the water in the East Baker Water Storage Tank, after sampling, had detectable levels of radionuclides above background and was inadvertently released to an uncontrolled area.

Consistent with the guidance in Section 1.2.6.D of the NRC Enforcement Manual, if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) commensurate with its safety significance; and (2) informed by similar violations addressed in the Violation Examples. The inspectors concluded that the significance of the violation was a SL IV as it was similar to Enforcement Policy example 6.7.d.4 in that the licensee failed to perform a required test prior to discharge. The violation was determined to not be of higher significance based on a dose assessment to the general public using the site's ODCM methodology. The doses to the organ and whole body were estimated to be  $1.05 \times 10^{-2}$  and  $5.72 \times 10^{-3}$  mrem, respectively, which were well below the limits stated in Appendix I of 10 CFR Part 50.

10 CFR 50.54(a)(1), "Conditions of License," states, in part, that "each nuclear power plant or fuel reprocessing plant licensee subject to the quality assurance criteria in appendix B of this part shall implement, under §50.34(b)(6)(ii) or §52.79 of this chapter, the quality assurance program described or referenced in the safety analysis report, including changes to that report." Contrary to the above, on February 23, 2017, the licensee failed to implement the quality assurance program requirement to implement the ODCM which requires sampling liquid effluents prior to discharge.

Upon identification that the discharge occurred, the licensee took steps to stop the discharge, including removing the hose that was siphoning the contents of the tank into the berm. The licensee then promptly accessed the storm water drains to collect samples and blocked the drainage pipe to stop any further discharges to the Mississippi River. The remaining water in the storm drain was pumped back to the East Baker Water Storage Tank and the site commenced surveys to quantify the extent of the contamination. The licensee entered this issue into the CAP as CR-2017-0012. Additional corrective actions included relocating the East Baker Water Storage Tank from the vicinity of storm drains and the development of job aids and work instructions to assist in pumping activities. Additionally, the ODCM and the procedures controlling discharges were reviewed to ensure there were no procedural weaknesses. Because this issue was of very low safety significance (SL IV) and was entered into the CAP, this violation is being treated as an NCV, consistent with section 2.3.2 of the Enforcement Policy. URI 05000409/2016002, "Inadvertent Release to Storm Drain," is closed. (NCV 05000409/2017001-02, Inadvertent Release to Storm Drain)

c. Conclusions

One SL IV NCV of 10 CFR 50.54(a)(1) was self-revealed for the site's failure to implement the quality assurance program when an inadvertent discharge of contaminated water occurred to the Mississippi River from the East Baker Water Storage Tank.

## 2.3 Transportation of Radioactive Materials (IP 86750)

### a. Inspection Scope

The inspectors reviewed radioactive waste shipping documents for selected shipments and conducted interviews of the responsible individual to ensure compliance with NRC and U.S. DOT regulations.

### b. Observations and Findings

The licensee shipped the waste generated from demolishing the stack and turbine building, and removed and shipped insulation, metal sheeting, and piping from the reactor building. This material was sent to the disposal site in Clive, Utah. All the wastes were NRC Class A waste and a DOT Type A quantity of Low Specific Activity (LSA)-II material.

The licensee's shipping manifests showed that personnel packaged, labeled, and marked each shipping container according to the DOT and 10 CFR Part 71 transportation requirements. The licensee verified that the results of radiation and removable contamination levels were within applicable limits. The waste manifest included all required information.

### c. Conclusions

The inspectors determined that the licensee had complied with NRC and DOT regulations for shipments of radioactive waste.

## 3.0 **Confirmatory Surveys**

### 3.1 Final Status Surveys at Permanently Shutdown Reactors (IP 83801)

#### a. Inspection Scope

The inspectors observed the licensee conduct FSSs and reviewed the sample results of sub-foundation soils of the WTB, pipe tunnel, reactor plant/generator plant common area, and stack. The inspectors also conducted verification surveys of the waste gas tank vault and warehouse subsoil excavation areas. The inspectors verified the calibration of the on-site germanium-lithium (Ge(Li)) and high purity germanium detectors used to analyze the soil samples.

#### b. Observations and Findings

The licensee conducted 100% walk-over scans and collected biased and systematic soil samples in accordance with the FSS plan. Prior to the verification surveys conducted by the inspectors, the licensee's FSS sample results were well below the operational Derived Concentration Guideline Levels (DCGLs), which were set at 25% of the base DCGLs (55 pCi/g of Cs-137, 12 pCi/g of Co-60) from the LTP.

The inspectors conducted surface scans of the waste gas tank vault and identified only one elevated area near the sump; however, the average concentration of the elevated area was below the DCGL stated in the LTP. The inspectors conducted surface scans



on warehouse 1, 2, and 3 subsoil excavation areas and no readings could be distinguished from background. The scan minimum detectable concentration (MDC) was 12.5% of the DCGL of Cs-137 stated in the LTP, well below the operational DCGL. The inspectors reviewed the sampling results from the licensee's FSS and only naturally occurring radionuclides were identified.

During a verification survey south of the WTB basement foundation cap on September 12, 2017, NRC inspectors identified elevated readings in an area where, after further surveying by the licensee and excavation, unexpected higher levels of residual contamination on soil and concrete debris were identified. During the initial survey by the inspectors, the elevated area, of about 30 square feet, had contact readings that ranged from approximately 10 to 20K (K, thousand) counts per minute (cpm). The background, with a 2"x2" NaI (sodium iodide) detector, was about 10K cpm. A soil sample collected at the 20K cpm location contained 13.3 pCi/g of Cs-137 and 0.16 pCi/g of Co-60. Since the Cs-137 concentration was close to the operational DCGL, the licensee decided to remediate (by removing soil for disposal) the elevated area. As licensee staff removed soil, licensee personnel identified additional hot spots exceeding 20K cpm. Soil removal continued until readings of the excavated area were background. The highest reading among the hot spots subsequently identified by the licensee, following the initial survey by the inspectors, was about 1.4 million cpm and the associated concentrations of Cs-137, Co-60, and Am-241 were about 210, 24, and 2.6 pCi/g, respectively. The licensee eventually excavated some concrete debris and approximately 70 cubic yards of additional soil of which about 4 to 5 cubic yards exceeded the operational DCGL. After completion of the excavation, the licensee performed 100% walk over scans at the excavation area and took 3 one-meter-depth core samples at the boundary of the excavation. The inspectors observed the walk-over scan and verified the results did not exceed the background radiation level. The inspectors also observed the core samplings and verified all samples contained less than 0.2 pCi/g of Cs-137. At this time, the inspectors determined that the licensee had adequately remediated the sub- foundation soil and the licensee proceeded to backfill the excavation areas.

The licensee subsequently concluded, after an inquiry on October 4, 2017, from the NRC inspectors about a delay by the licensee of entering the September 12<sup>th</sup> issue into the site CAP, that the unexpected contaminated soil and concrete debris occurred because an equipment operator inadvertently had not removed all concrete/foundation material during the original demolition of the WTB foundation and this oversight was not noticed because of intermittent radiation protection coverage during the removal of the foundation. After the licensee entered the issue into the CAP and completed its investigation, it took extensive corrective action, including the short-term stoppage of all demolition and FSS activities, revisions of procedures, and discussions with demolition and radiation protection staff. Because the additional excavation on September 12, invalidated some previous soil samples, the licensee also subsequently conducted Geo-probing of 15 new systematic locations for soil samples in the WTB FSS soil excavation area. All the samples collected beneath the excavation areas contained only naturally occurring radionuclides.

Based on these observations, the inspectors identified a violation of 10 CFR 20.1501, "General," for the licensee's failure to perform necessary surveys during the demolition of the WTB foundation that may be necessary for the licensee to ensure compliance with 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use," which requires that the residual radioactivity that is distinguishable from background radiation result in the

Total Effective Dose Equivalent to an average member of the critical group that does not exceed 25 mrem per year and that the residual radioactivity has been reduced to levels that are ALARA. The inspectors determined that the violation of 10 CFR 20.1501 was of more than minor significance because it was similar to IMC 0612, Appendix E, example 6.e, in that, after additional excavation of the survey unit, additional and unexpected hot spots were identified that exceeded background—1.4 million cpm compared to a 10K cpm background. Additionally, had the NRC inspectors not performed verification surveys, it is likely that the area would have been backfilled without further remediation, and the NRC inspectors needed to prompt the licensee to enter the issue into the CAP.

Consistent with the guidance in Section 1.2.6.D of the NRC Enforcement Manual, if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) commensurate with its safety significance; and (2) informed by similar violations addressed in the Violation Examples. The inspectors did not find an example in the NRC's enforcement guidance that was similar to this issue. However, the inspectors concluded that the concern was not of higher significance given that a DCGL was not exceeded; therefore, the issue screened as SL IV.

10 CFR 20.1501, "General," requires, in part, that each licensee make or cause to be made, surveys of areas, including the subsurface that may be necessary for the licensee to comply with the regulations in this part. Survey means an evaluation of the radiological conditions and potential hazards incident to the products, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

Contrary to the above, prior to September 12, 2017, the licensee did not make surveys to assure that the radiological criteria for unrestricted release and ALARA requirements of 10 CFR 20.1402 were met when contaminated soil and concrete was inadvertently left during excavation of the WTB foundation and surveys failed to identify the condition.

The licensee entered this issue into the CAP as CR-2017-073 and created an action plan to improve the remedial excavation works of the turbine building, diesel generator building, and reactor plant/generator plant area sump. Because this issue was of very low safety significance (SL IV) and was entered into the CAP, this violation is being treated as an NCV, consistent with section 2.3.2 of the Enforcement Policy. (NCV 05000409/2017001-03, Inadequate Surveys of WTB Foundation)

c. Conclusions

The inspectors identified one SL IV NCV of 10 CFR 20.1501, "General," for the licensee's failure to perform necessary surveys of the subsurface that may be necessary for the licensee to ensure compliance with 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use." The inspectors determined that the licensee had properly remediated and performed FSSs of the waste gas tank vault and sub-foundation soils of the pipe tunnel, reactor plant/generator plant common area, stack, and warehouse areas. After additional remediation, the inspectors concluded that the licensee had also properly performed FSSs of the WTB area.

#### **4.0 Exit Meeting**

The inspectors presented the inspection results to Mr. J. Nowak on January 11, 2018. The licensee did not identify any of the documents or processes reviewed by the inspector as proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **PARTIAL LIST OF PERSONS CONTACTED**

\*J. Nowak, Director LaCrosseSolutions  
\*J. Ashley, Licensing Engineer  
\*J. Jacobsen, Radiation Protection Manager  
\*C. Olson, ISFSI Manager  
\*G. Peterschmidt, Radiation Safety Supervisor  
J. Spaide, D&D Manager  
G. Tulley, Health and Safety Manager  
J. Webb, FSS Supervisor  
\*J. Werner, QA Manager  
\*S. Zoller, FSS Manager

\* Indicates present at exit meeting

### **INSPECTION PROCEDURES USED**

IP 37801	Safety Reviews, Design Changes and Modifications
IP 40801	Self-Assessment, Auditing, and Corrective Actions
IP 62801	Maintenance and Surveillance
IP 71801	Decommissioning Performance and Status Review
IP 83750	Occupational Radiation Exposure
IP 83801	Final Status Surveys at Permanently Shutdown Reactors
IP 84750	Effluent and Environmental Monitoring
IP 86750	Transportation of Radioactive Materials

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

<u>Opened</u>	<u>Type</u>	<u>Summary</u>
05000409/2017001-01	NCV	Failure to Evaluate Fire Protection Program Changes
05000409/2017001-02	NCV	Inadvertent Release to Storm Drain
05000409/2017001-03	NCV	Inadequate Surveys of WTB Foundation
<u>Closed</u>	<u>Type</u>	<u>Summary</u>
05000409/2017001-01	NCV	Failure to Evaluate Fire Protection Program Changes
05000409/2017001-02	NCV	Inadvertent Release to Storm Drain
05000409/2017001-03	NCV	Inadequate Surveys of WTB Foundation
05000409/2016002	URI	Inadvertent Release to Storm Drain
<u>Discussed</u>		
None		

## PARTIAL LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

- Assessment of the FSS of the Waste Treatment Building Sub-Foundation Excavation; October 12, 2017
- ES-LCR-2017-0011; Radiation Safety Program Violation
- ES-LCR-2017-0012; Baker Tank Containment Berm Overflow and Release
- ES-LCR-CR-2017-0021; Turbine Building Demolition Did Not Occur as Planned
- ES-LCR-CR-2017-0022; Penhall Safety Stand Down
- ES-LCR-CR-2017-0027; LACBWR FSS Package Review and Corrections
- ES-LCR-CR-2017-0031; Some Drawings Provided in LTP to NRC Not Fully Accurate
- ES-LCR-CR-2017-0033; Formal Process Controls Should Be Developed for Modifying the LTP
- ES-LCR-CR-2017-0034; Final Status Survey Administrative Controls Need to be Modified
- ES-LCR-CR-2017-0036; High Pressure Service Water Line Leak
- ES-LCR-CR-2017-0046; Well Water Line Leak
- ES-LCR-CR-2017-0047; ANI Letter - Open Air Demolition at LACBWR
- ES-LCR-CR-2017-0048; DOT Inspection
- ES-LCR-CR-2017-0049; Employee Concerns 2017-02 and 2017-03"
- ES-LCR-CR-2017-0051; Changes Made as Listed in Decommissioning Plan Not Evaluated
- ES-LCR-CR-2017-0073; Survey Unit 010-101-C WTB Subfoundation
- ES-LCR-CR-2018-0004; Failure to Perform a Prompt Evaluation of a Degraded Fire Protection Condition
- GM Memo 2017-01; Summary of LACBWR Suspension of Remediation, Excavation, and Final Status Survey Work; October 14, 2017
- QA Surveillance Report S-16-002; Fire Protection Program; September 14, 2016
- LC-2017-0090; LACBWR Action Plan; October 18, 2017
- LC-FP-PN-001; LACBWR Station Fire Protection Plan; Revision 0
- LC-FP-PR-001; Monthly Fire Prevention Inspection; Revision 0
- LC-FP-PR-002; Fire Extinguisher Inspection; Revision 0
- LC-FP-PR-005; LACBWR Protocol for Genoa Fire Department Response; Revision 0
- LC-AD-PR-004; Corrective Action Program; Revision 1
- LC-RP-PG-005; Offsite Dose Calculation Manual; Revision 3
- La Crosse Boiling Water Reactor Quality Assurance Program Description; Revision 29
- La Crosse Boiling Water Reactor Decommissioning Plan and Post-Shutdown Decommissioning Activities Report; June 2016
- La Crosse Boiling Water Reactor Quality Assurance Program Description; Revision 29
- LC-AD-PR-0004; LACBWR Site Restoration Project Corrective Action Program; Revision 1
- LC-QA-PN-001, LACBWR Site Restoration Project Final Status Survey Quality Assurance Project Plan; Revision 1
- LC-QA-PR-001; LACBWR Site Restoration Project QA Program Implementation; Revision 1
- LC-FS-PR-002; LACBWR Site Restoration Project Work Control Procedure Final Status Survey Package Development; Revision 1
- LC-RA-PR-001; LACBWR Site Restoration Project Work Control Procedure Regulatory Reviews; Revision 2
- LC-QA-PR-002; Quality Assessments; Revision

- QA Audit A-16-01; Implementation of QAPD for ISFSI Subcontractor Role; Revision 1
- QA Surveillance Report S-16-003; Oversight of DPC ISFSI Audit; September 27, 2016
- QA Surveillance Report S-17-007; Project Training Records; June 12, 2017
- QA Surveillance Report S-17-009; Final Status Survey (FSS) and License Termination Program; June 13, 2017
- QA Surveillance Report S-17-011; Selected Decontamination and Demolition Activities; September 12, 2017
- 50.82 Decommissioning Impact Evaluation No. 2016-02; Procedure No. D-Plan/PSDAR – Revision No. June 2016
- 50.59 Screening No. 2016-003; LACBWR Request for Partial Site Release; Revision 0
- 50.59 Screening No. 2016-01; Radioactive Material Identification and Control Process; Revision 0
- Report No. LC-RP-PR-0001; ALARA Review – Reactor Building and Associated Tent Containment Structure; Revision 0
- Job Aid No. LC-JA-01; Management Observation Program; Revision 0
- Health and Safety Excellence Team Agendas dated May 8, 2017, June 12, 2017, June 19, 2017, July 31, 2017, August 7, 2017, and August 14, 201

## INITIALISMS AND ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Is Reasonably Achievable
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CFR	Code of Federal Regulations
cpm	Counts per Minute
CR	Condition Report
CVS	Contamination Verification Survey
DCGL	Derived Concentration Guideline Level
DOT	Department of Transportation
DNMS	Division of Nuclear Materials Safety
DP	Differential Pressure
FPP	Fire Protection Program
FSS	Final Status Survey
HEPA	High Efficiency Particulate Air
HSET	Health and Safety Excellence Team
IMA	Independent Management Assessment
IMC	Inspection Manual Chapter
ISFSI	Independent Spent Fuel Storage Installation
K	Thousand
LACBWR	La Crosse Boiling Water Reactor
LTP	License Termination Plan
LSA	Low Specific Activity
MOP	Management Observation Program
NCV	Non-Cited Violation
NRC	U. S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
ORC	Operation Review Committee
pCi/g	PicoCuries/gram
PSDAR	Post Shutdown Decommissioning Activities Report
QAPD	Quality Assurance Program Document
QTR	Qualified Technical Reviewer
RG	Regulatory Guide
RWP	Radiation Work Permit
SL	Severity Level
SRC	Safety Review Committee
URI	Unresolved Item
WTB	Waste Treatment Building