UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

March 16, 2017

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

SUBJECT: LA CROSSE BOILING WATER REACTOR - NRC INSPECTION REPORT 05000409/2016002(DNMS)

Dear Mr. Sauger:

On March 2, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the permanently shutdown 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. The enclosed reports presents the results of this inspection, which were discussed with Mr. Joseph Jacobsen of your staff at the conclusion of the inspection of March 2.

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 and radiological safety. 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 did not identify any violations.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records System (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC's website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

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. 05000409
License No. DPR-45

Enclosure:
IR 05000409/2016002 (DNMS)

cc w/encl: LaCrosse*Solutions* Service List

Letter to John Sauger from Michael Kunowski dated March 16, 2017.

SUBJECT: LA CROSSE BOILING WATER REACTOR - NRC INSPECTION REPORT 05000409/2016002(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No.:	050-00409
License No.:	DPR-45
Report No.:	05000409/2016002(DNMS)
Licensee:	LaCrosse*Solutions*, LLC
Facility:	La Crosse Boiling Water Reactor
Location:	Genoa, Wisconsin
Dates:	September 20, 2016, through March 2, 2017
Inspector:	Peter J. Lee, Reactor (Decom) Inspector, Ph.D., CHP
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 (LACBWR)
NRC Inspection Report 05000409/2016002 (DNMS)

This routine decommissioning inspection covered aspects of facility management and control and radiological safety.

Facility Management and Control

- The inspector determined that the licensee was adequately controlling decommissioning activities and radiological work areas. (Section 1.1)

- The inspector 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)

Radiological Safety

- The inspector determined that the licensee continued to be effective in controlling radiation worker personal exposure. (Section 2.1)

- The inspectors determined that the licensee adequately implemented its effluent monitoring program. (Section 2.2)

- The inspector determined that the licensee had complied with U.S. Nuclear Regulatory Commission (NRC) and Department of Transportation regulations for shipments of radioactive waste. (Section 2.3)

Confirmatory Survey

- The NRC contracted with Oak Ridge Associated Universities (ORAU) to perform confirmatory surveys of non-impacted areas. These surveys were performed in accordance with an NRC-approved survey plan and were in support of a licensee's request dated June 27, 2016, to release these areas from the license (ADAMS Accession No. ML16181A068. These surveys were conducted during this inspection and the preliminary in-field measurements indicated no significant exposure rates above background in non-impacted areas. (Section 3.1)

Report Details

Summary of Plant Activities

During the inspection period, active decommissioning work was ongoing at the site and consisted of demolition of the main plant exhaust stack, decontamination of the reactor building overhead storage tank (OHST), and removal of contaminated piping/components removal from the reactor building (except the forced circulation system), waste treatment building, off-gas storage tank vault, common area of reactor and turbine building, and fuel element storage well. An encapsulation coating was applied to the decontaminated facilities in preparation for open air demolition.

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 inspector toured the plant to assess field conditions and decommissioning activities and 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 and appropriate protective clothing and following established procedures.

c. Conclusions

The inspector 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 licensee's 10 CFR 50.59 safety screening reviews of several facility changes since the last inspection to assess the licensee's conclusions regarding the need for safety evaluations.

b. Observations and Findings

The inspector verified that the safety review process stated in LACBWR Procedure No. LC-RA-PR-001 dated April 18, 2016, was consistent with the requirements of 10 CFR 50.59. The licensee conducted safety screening reviews per LC-RA-PR-001. The activities involved facility changes that require safety evaluations.

c. Conclusions

The inspector determined that the licensee's process for evaluating the safety impacts of facility changes and modifications was in compliance with 10 CFR 50.59.

2.0 Radiological Safety

2.1 Occupational Radiation Exposure (IP 83750)

a. Inspection Scope

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

b. Observations and Findings

The radiological planning of the health physics staff pre-job meetings provided adequate radiation protection coverage, and the ALARA reviews were effective in minimizing unnecessary doses. 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.

Since August 2016, 24 workers had received total external exposure of 4464 mrem. The highest dose received by any one individual was 831 mem.

A review by the inspector of a licensee characterization survey for removable contamination indicated the presence of significant alpha contamination of Pu-238 (15%), Pu-239 (14%), and Am-241 (71%) due to the fuel failure during previous reactor operation. Alpha contamination could result in a significant internal exposure without an adequate engineering control. The inspector verified that workers wore controlled air purifying respirator with a HEPA filter hood as required by the RWP, and HEPA ventilation was placed in the work area. Based on the review of air sampling results and respirator protection factor (PF) of 1000, the inspector concluded that the workers received insignificant internal exposures. Since August 2016, 24 workers had received total dose of 63 DAC-hours. The highest dose received by one individual was 9.7 DAC-hours.

During the licensee's decontamination of the OHST, licensee air sampling results indicated that the highest concentration of Pu-238, Pu-239, and Am-241 was about 3000 Derived Air Concentration (DAC). Based on the PF of 1000 and 90 minutes duration, the workers could have received a dose of 4.5 DAC-hours, equivalent to 112.5 millirem (mrem) bone surface dose and 3.4 mrem whole body dose. The licensee collected the urine samples of the individuals to verify the above doses. The

urine samples were collected 10 days post-potential intake and no positive results were identified. Based on the minimum detection activities of the sample analyses and the intake retention fractions (IRFs) of Am-241, Pu-238, and Pu-239 in the urine, the minimum detectable doses (MDDs) were about 5000 mrem bone surface dose and 150 mrem whole body dose. For trans-uranium, the IRF in the feces is about 80 times the IRF in the urine at 10 days post-intake. If the feces samples had been collected for the bioassay, the MDD would have been reduced by a factor of 80. For trans-uranium, the feces should be the choice of the bioassay to assess the dose. Based on the MDD of the urine bioassay, the inspector concluded that the workers received doses well below 10 CFR Part 20 limits, which demonstrated that the respirators were working properly.

c. Conclusions

The inspector 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, gaseous, and particulate forms to the environment. The inspectors reviewed the licensee's 2016 Annual Radioactive Environmental Monitoring Report and Radioactive Effluent Release Report (ML17048A469, dated February 16, 2017) and the Offsite Dose Calculation Manual (ODCM).

b. Observations and Findings

The inspector verified that the licensee's gaseous effluent monitors and waste water effluent monitor were calibrated and checked for proper operation in accordance with station procedures. The licensee participates in a cross-check program with an offsite laboratory to confirm the quality of its analytical data. Results of a cross-check of licensee laboratory results completed in 2016 indicated agreement in all analytical data.

The ODCM was comprehensive and contained the requirements listed in the licensee's technical specifications. The effluent monitoring data indicated that release concentrations were consistent with limits specified in 10 CFR Part 20, Appendix B, Table 2, and that doses to the general public were in conformance with Appendix I of 10 CFR Part 50. Further, environmental sampling results indicated only background radiation levels with no distinct contribution from the shutdown reactor.

An unresolved item (URI) was identified by the inspector regarding an unintentional discharge of contaminated water to the Mississippi River.

The licensee had been using the East Baker Water Storage Tank as the temporary holding tank for radiologically contaminated liquid waste prior to discharge to the Mississippi River through a filtration system. On February 22, 2017, the licensee pumped non-contaminated melted ice and snow from the winter weather into the berm surrounding the tank. On February 23, the licensee discovered that water was

overflowing the berm and flowing via a yard drain inside the radiological controlled area (RCA) to a storm sewer drain outside the RCA. This storm drain ultimately discharges to the Mississippi River. On further review, the licensee determined that a sump pump-type discharge hose used earlier to pump water from the berm to the tank had been left in the tank and water from the tank was siphoned out of the tank into the berm overnight. The tank had been full to approximately 2 feet from the top with contaminated water largely from the reactor building basement following a large influx of groundwater from a recent period of high river water back pressure. The contaminated water release from the tank into the berm was about 400 gallons with 2.86×10^{-6} µCi/ml (microCuries/milliliter) of Cs-137. The concentration of the release did exceed the 10 CFR Part 20 limit of 1.0×10^{-6} µCi/ml, but did not exceed the reportable limit of greater than 20 times 10 CFR Part 20 limit, as stated in 10 CFR 50.73(a)(2)(viii)(B). The licensee performed an assessment of the possible dose to the general public using the ODCM dose methodology. The doses to the organ and whole body were 1.05×10^{-2}, 5.72×10^{-3} mrem, respectively, which were well below the limits stated in Appendix I of 10 CFR Part 50.

On February 24, 2017, the licensee reported the release to the Wisconsin Department of Natural Resources and subsequently to the NRC in event report number 52575 in accordance with 10 CFR 50.72(b)(2)(xi). The spill occurred at the conclusion of an NRC onsite inspection and a URI is being opened to perform additional follow-up inspection on the circumstances surrounding this event (URI 05000409/2016002, Inadvertent Release to Storm Drain).

c. Conclusions

The inspectors determined that the licensee adequately implemented its effluent monitoring program.

2.3 Transportation of Radioactive Materials (IP 86750)

a. Inspection Scope

The inspector reviewed radioactive waste shipping documents for selected shipments and conducted interviews of the responsible individual to verify compliance with NRC and U.S. Department of Transportation (DOT) regulations.

b. Observations and Findings

The licensee shipped the waste generated from demolition of the main plant exhaust stack, the facility structure of the LSA building, start-up transformer yard, and the diesel generator building, and abatement of material containing asbestos, to Clive disposal site in UT. 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 manifest 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 inspector determined that the licensee had complied with NRC and Department of Transportation regulations for shipments of radioactive waste.

3.0 Final Status Surveys

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

a. Inspection Scope

The NRC contracted with Oak Ridge Associated Universities (ORAU) to perform confirmatory surveys of non-impacted areas as a part of the NRC's independent review of a licensee's request dated June 27, 2016, to release these areas from the license (ADAMS Accession No. ML16181A068). During the current inspection, ORAU personnel conducted confirmatory surveys of several of these areas. The inspector also toured several of the non-impacted areas during these surveys.

b. Observations and Findings

The final results of the surveys, which were conducted in accordance with an NRC-approved survey plan, will be discussed as part of separate NRC correspondence in response to the licensee's request.

c. Conclusions

Preliminary in-field measurements indicated no significant exposure rates above background in non-impacted areas.

4.0 Exit Meeting

The inspector presented the inspection results to the licensee's Radiation Protection Manager at the conclusion of the inspection on March 2, 2017. 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, Site General Manager
* J. Jacobsen, Radiation Protection Manager
J. Werner, QA Manager
C. Cummin, Waste Manager

* Present at the exit meeting on March 2, 2017

INSPECTION PROCEDURES USED

IP 37801	Safety Reviews, Design Changes and Modifications
IP 71801	Decommissioning Performance and Status Review
IP 83750	Occupational Radiation Exposure
IP 84750	Effluent and Environmental Monitoring
IP 86750	Transportation of Radioactive Materials
IP 83801	Final Status Surveys at Permanently Shutdown Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened	URI 05000409/2016002, inadvertent release to Storm Drain
Closed	None
Discussed	None

INITIALISMS AND ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Is Reasonably Achievable
CFR	Code of Federal Regulations
DAC	Derived Air Concentration
DOT	Department of Transportation
DNMS	Division of Nuclear Materials Safety
HEPA	High Efficiency Particulate Air
LACBWR	La Crosse Boiling Water Reactor
LSA	Low Specific Activity
MDD	Minimum Detectable Dose
NRC	U. S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
ORAU	Oak Ridge Associated Universities
PF	Protection Factor
RWP	Radiation Work Permit
URI	Unresolved Item