



October 20, 2022

LS-2022-0020

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

La Crosse Boiling Water Reactor  
Facility Operating License No. DPR-45  
NRC Docket Nos. 50-409 and 72-046

Subject: Response to October 14, 2022 Request for Additional Information for Class 1  
Excavation and Basement Survey Units

Reference:

- 1) Marlayna Doell, U. S. Nuclear Regulatory Commission, letter to John Sauger, LaCrosseSolutions, "Request for Confirmatory Information Related to the Review of the Class 1 Survey Units for Unrestricted Release Based on Final Status Survey Report and Supporting Information," dated October 12, 2022

As a follow-up action to recent conference calls with the NRC Staff, and in response to a request for confirmatory information in Reference 1, LaCrosseSolutions is providing the attached response and additional information. It is understood this is the final request for information to resolve any remaining questions on the NRC review of the Class 1 final status survey (FSS) area reports for the La Crosse Boiling Water Reactor site.

The response to the Request for Confirmatory Information is provided in the attachment. Also included is a revised Excel spreadsheet for Survey Unit FSS-L1-010-101C for the Waste Treatment Building Subsoil Excavation providing the results of the original samples collected, the results of the direct push samples collected and the Sr-90 sample results.

There are no regulatory commitments made in this submittal. If you should have any questions regarding this submittal, please contact Gerry van Noordennen at (860) 462-9707.

Respectfully,

A handwritten signature in black ink, appearing to be "John Sauger", written over a red digital signature line.

Digitally signed by  
John Sauger  
Date: 2022.10.20  
13:15:39 -04'00'

John Sauger  
President Reactor D&D and Chief Nuclear Officer

NMSS01  
NMSS

LaCrosse*Solutions*, LLC

LS-2022-0020

Page 2 of 2

Attachment: Response to NRC Request for Confirmatory Information and Excel Spreadsheet  
Survey Results for Survey Unit FSS-L1-101C

cc: Marlayna Doell, U.S. NRC Project Manager (letter and attachment)  
Regional Administrator, U.S. NRC, Region III (letter and attachment)  
La Crosse Boiling Water Reactor Service List (letter and attachment)

## La Crosse Boiling Water Reactor Service List

### cc:

Ken Robuck  
President and CEO  
EnergySolutions  
299 South Main Street, Suite 1700  
Salt Lake City, UT 84111

John Sauger  
President and Chief Nuclear Officer  
Reactor D&D  
EnergySolutions  
121 W. Trade Street, Suite 2700  
Charlotte, NC 28202

Joseph Nowak  
Project Manager  
LaCrosseSolutions  
S4601 State Highway 35  
Genoa, WI 54632-8846

Russ Workman  
General Counsel  
EnergySolutions  
299 South Main Street, Suite 1700  
Salt Lake City, UT 84111

Jerome Pedretti, Clerk  
Town of Genoa  
E860 Mundsack Road  
Genoa, WI 54632

Jeffery Kitsembel  
Division of Energy Regulation  
Wisconsin Public Service Commission  
P.O. Box 7854  
Madison, WI 53707-7854

Paul Schmidt, Manager  
Radiation Protection Section  
Bureau of Environmental and Occupational  
Health Division of Public Health  
Wisconsin Department of Health Services  
P.O. Box 2659  
Madison, WI 53701-2659

Brent Ridge  
President and CEO  
Dairyland Power Cooperative  
3200 East Avenue South  
La Crosse, WI 54602-0817

Cheryl Olson, ISFSI Manager  
La Crosse Boiling Water Reactor  
Dairyland Power Cooperative  
S4601 State Highway 35  
P.O. Box 817  
Genoa, WI 54632-8846

John Henkelman  
La Crosse Boiling Water Reactor  
Dairyland Power Cooperative  
S4601 State Highway 35  
Genoa, WI 54632-8846

Andrew J. Parrish  
Wheeler, Van Sickle & Anderson, S.C.  
44 E. Mifflin Street, Suite 1000  
Madison, WI 53703

LaCrosseSolutions  
LC-2022-0020

**ATTACHMENT**

**Response to NRC Request for Confirmatory  
Information and Excel Spreadsheet Survey Results for  
Survey Unit FSS-L1-101C**

**La Crosse Boiling Water Reactor (LACBWR) - Request for Confirmatory Information  
Related to the Remaining LACBWR Class 1 Survey Units**

1. **The LACBWR License Termination Plan (LTP) requirement is to ensure 100 percent scan survey coverage of Class 1 impacted areas and that the sample results meet the statistical test for unrestricted release**

To meet the scan and survey requirements of the LACBWR LTP, the NRC staff needs to understand the RPGPA, CDR, and TDS B survey unit boundary overlap and how the CDR final status survey (FSS) results were or were not impacted by subsequent activities in the adjacent RPGPA and TDS B survey areas.

The staff understands that CDR was backfilled up to a certain elevation in 2017, but needs to confirm controls were in place after the backfill of CDR to prevent recontamination prior to more backfill being put in that area to bring it to final grade when the final survey of the L1-10-101 and L1-10-102 survey units was conducted.

For the part of the CDR that was not overlapped by other survey unit boundaries, the staff seeks confirmation to ensure the survey unit remained clean during the surrounding remediation and FSS activities.

**RCI:** Please confirm that during the remediation of the survey units adjacent to CDR, *EnergySolutions* (ES) followed all their isolation and control procedures until backfill and continued to meet MARSSIM requirements for survey and sampling procedures.

***LaCrosseSolutions* Response:**

Yes, all isolation and control measures were in place and *LaCrosseSolutions* followed all their isolation and control procedures until the units were backfilled. The CDR was the first unit surveyed and backfilled. The RPGPA (TDS-B) was the second unit surveyed and was backfilled prior to the survey. Geoprobe samples were taken through the CDR area, but the final CDR excavation surface was otherwise undisturbed. TDS-A was the final unit surveyed. Portions of the backfill covering the final CDR excavation surface were excavated to slope the TDS-A excavation, but the final CDR excavation surface that was subject to FSS was undisturbed. The excavated backfill soil area overlaying the CDR was subjected to FSS during the surveys and sampling of TDS-A.

**RCI:** Please confirm that the statistical test for L1-SUB-CDR and the number of systematic samples required for the statistical test are still valid given that several of the samples were invalidated due to them being in L1-SUB-TDS A and L1-SUB-TDS B after the original survey unit was divided.

***LaCrosseSolutions* Response:**

*LaCrosseSolutions* confirms that the samples taken during the FSS of the CDR are still valid. An analysis was performed to test the validity of the data if the samples in the area were removed from the overall data set. The number of samples from CDR that could have been impacted is five. These samples are 8, 10, 11, 13, and 14. When removed from the data set, the remaining results pass the Sign test as detailed below:

#	SOF (Ws)	1-Ws	Sign
1	0.0445	0.96	+1
2	0.0305	0.97	+1
3	0.0627	0.94	+1
4	0.0502	0.95	+1
5	0.0673	0.93	+1
6	0.0858	0.91	+1
7	0.0506	0.95	+1
9	0.4594	0.54	+1
12	0.1369	0.86	+1

Number of positive differences (S+) 9

Critical Value 7

Survey Unit Meets the Acceptance Criteria

A retrospective calculation was then performed to determine the number of samples needed using Equation 5-2 of MARSSIM:

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(\text{Sign } p - 0.5)^2}$$

Where,

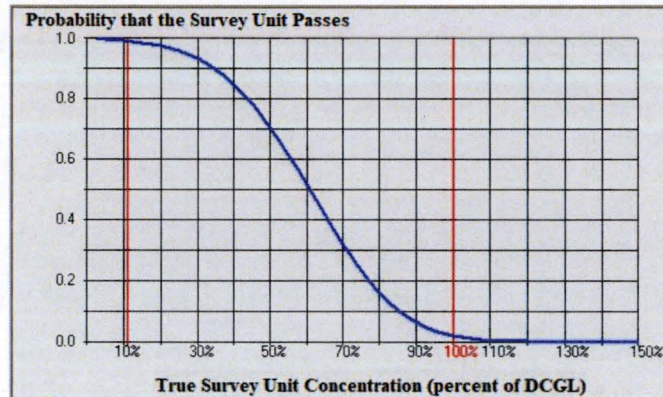
$$Z_{1-\alpha} = 1.645 (0.05)$$

$$Z_{1-\beta} = 1.282 (0.1)$$

$$\text{Sign } p = 0.998645 (\Delta/\sigma > 3)$$

The result of the calculation is 8.61, resulting in nine samples. LACBWR typically used 0.05 as the value of  $Z_{1-\beta}$  but is allowed to increase the value in accordance with Section 5.6.4.1.1 of the LTP. The value was not increased by 20% since the calculation was performed retrospectively.

A retrospective power curve was then created using the data set using an alpha value of 0.05, beta value of 0.10, sigma of 0.1347 and a LBGR of 0.11. The power curve is displayed below:



This confirms that the number of systematic samples required for the statistical test is valid even if the samples are removed from the CDR data set.

**2. Requirement is to investigate elevated areas per the approved LACBWR LTP**

- 2a.** The staff needs to be able to evaluate the investigation and background radiation assumptions in CDR, and provide a basis for why there were several areas (28 if the median is assumed for background radiation) not investigated that should have been, but that this failure to investigate elevated areas does not negate the FSS result.

The licensee's CDR scan results demonstrate that investigations should have been performed in multiple areas of the survey unit but were not conducted due to incorrect instrument alarm set points. ES stated that if the instruments had appropriately accounted for background radiation, 28 investigations would still need to be performed, but the method for estimating background is not a standard method.

The high background rate could be due to the shine from the reactor building, but there is no justification for statements about the level of shine present during the CDR FSS.

**RCI:** Please confirm if the reactor building shine was contributing to the background radiation levels in the CDR survey unit at the time of FSS scan.

**LaCrosseSolutions Response:**

Yes, the shine impacting the CDR survey unit was originating from the Reactor Building. All other structures had been removed on that side of the LACBWR facility when the survey was performed. These were the WGTV structure to an elevation of three feet below grade, and the entirety of the Stack and Pipe Tunnel. The vast majority of buildings on the other side of the Reactor Building had also been demolished, including the Turbine Building, Diesel Generator Building and Eat Shack. Additionally, during the FSS of L1-SUB-DRS from 02/27/18 to 03/02/18, shielding was placed in between the unit and the Reactor Building. L1-SUB-DRS is located northwest of the Reactor Building.

- 2b. In the RPGPA, the survey unit did not receive FSS before it was backfilled due to water intrusion. This led to the RPGPA needing GeoProbe samples be taken to fulfill FSS requirements. During these activities, an elevated area was identified and labeled as sample B04; ES did an analysis to try to narrow down the size of the elevated area and demonstrate compliance with the LTP and the unrestricted release criteria.

**RCI:** Please confirm that none of the maximum activity readings were from the bottom stratum of the GeoProbe samples in the RPGPA.

**LaCrosseSolutions Response:**

LaCrosseSolutions confirms that not all the maximum activity readings were from the bottom stratum of the GeoProbe samples in the RPGPA. Table 7-1 of the L1-SUB-TDS B Release Record provides the highest activity sample from each location. The location designator of the sample nomenclature will either be blank, or have an "A," "B" or "C" at the end to designate the depth. Samples without an end designator are from the 624'-627' stratum, "A" is from the 621'-624' stratum, "B" is from the 618'-621' stratum, and "C" is from the 615'-618' stratum. For example, L1-SUB-TDS-FSGS-B01-SB is from the 624'-627' stratum. Sample L1-SUB-TDS-FSGS-B01A-SB is from the 621'-624' stratum. Sample L1-SUB-TDS-FSGS-B01B-SB is from the 618'-621' stratum. Sample L1-SUB-TDS-FSGS-B01C-SB is from the 615'-618' stratum.

The following provides a summary of the type of sample and the number of highest Cs-137 sample results from each stratum:

Sample Type	615'-618' Stratum	618'-621' Stratum	621'-624' Stratum	624'-627' Stratum
Systematic	3	6	5	14
Judgmental	0	0	2	6
Characterization	0	0	2	5

- 2c. In order to support the statement that the WTB judgmental sample 16 Cs-137 result is a typo, an additional discussion or analysis of why the MDA of the scan instruments, or the prior FSS scan readings, support the indication that the result is a typo and not an actual elevated area of the survey unit would be beneficial. Absent that, an updated record that removes the erroneous sample result would improve documentation for this survey unit.

**RCI:** Please confirm that an updated spreadsheet for the WTB sample results with an N/A or something similar for sample 16 instead of the typo result will be submitted.

**LaCrosseSolutions Response:**

LaCrosseSolutions provides herewith an updated spreadsheet that has been revised to place "N/A" in the cell for the Cs-137 result of sample location 16.



FSS Unit: LI-010-101C

Description: Waste Treatment Building Subsoil Excavation

Type: Subsurface Soil

Classification: 1

Original FSS Samples Collected 9/12/17 - 9/14/2017

Sample ID	ROC	MDA (pCi/g)	Highest Activity (pCi/g)	Sample ID	ROC	MDA (pCi/g)	Highest Activity (pCi/g)
LI-010-101-FS-GS-C01-SB (500ml)	Co-60	5.39E-02	5.39E-02	LI-010-101-FS-GS-C13-SB (500ml)	Co-60	5.62E-02	8.30E-02
	Cs-137	6.03E-02	3.87E-01		Cs-137	5.78E-02	4.17E-01
	Eu-152	1.07E-01	0.00E+00		Eu-152	9.99E-02	0.00E-00
	Eu-154	7.52E-02	0.00E+00		Eu-154	7.01E-02	0.00E-00
LI-010-101-FS-GS-C02-SB (500ml)	Co-60	8.44E-02	6.80E-02	LI-010-101-FS-GS-C14-SB (500ml)	Co-60	4.94E-02	5.34E-02
	Cs-137	4.86E-01	6.53E-02		Cs-137	5.29E-02	2.50E-01
	Eu-152	1.14E-01	0.00E+00		Eu-152	9.63E-02	0.00E-00
	Eu-154	8.12E-02	0.00E+00		Eu-154	6.78E-02	5.58E-03
LI-010-101-FS-GS-C03-SB (500ml)	Co-60	5.39E-02	6.26E-02	LI-010-101-FS-GS-C15-SB (500ml)	Co-60	5.76E-02	5.33E-02
	Cs-137	5.72E-02	1.15E-01		Cs-137	5.28E-02	2.81E-01
	Eu-152	9.80E-02	0.00E+00		Eu-152	1.06E-01	3.69E-02
	Eu-154	6.90E-02	0.00E+00		Eu-154	7.51E-02	3.71E-02
LI-010-101-FS-GS-C04-SB (500ml)	Co-60	4.92E-02	2.52E-01	LI-010-101-FJ-GS-C16-SB (500ml)	Co-60	6.07E-02	9.30E-02
	Cs-137	6.71E-02	3.55E+00		Cs-137	5.96E-02	N/A
	Eu-152	1.38E-01	2.91E-02		Eu-152	1.14E-01	0.00E-00
	Eu-154	9.67E-02	4.13E-02		Eu-154	8.11E-02	9.16E-03
LI-010-101-FS-GS-C05-SB (500ml)	Co-60	6.02E-02	5.03E-02	LI-010-101-FJ-GS-C17-SB (500ml)	Co-60	5.75E-02	8.16E-02
	Cs-137	6.00E-02	2.44E-01		Cs-137	5.13E-02	3.97E-01
	Eu-152	1.01E-01	0.00E+00		Eu-152	9.60E-02	0.00E-00
	Eu-154	6.99E-02	0.00E+00		Eu-154	6.77E-02	1.71E-02
LI-010-101-FS-GS-C06-SB (500ml)	Co-60	6.59E-02	1.48E-01	LI-010-101-FJ-GS-C18-SB (500ml)	Co-60	5.94E-02	6.80E-02
	Cs-137	5.37E-02	6.42E-01		Cs-137	5.47E-02	4.55E-01
	Eu-152	1.05E-01	0.00E+00		Eu-152	9.97E-02	0.00E-00
	Eu-154	7.35E-02	0.00E+00		Eu-154	6.95E-02	0.00E-00
LI-010-101-FS-GS-C07-SB (500ml)	Co-60	6.07E-02	7.43E-02	LI-010-101-QJ-GS-C18-SB (500ml)	Co-60	5.85E-02	8.01E-02
	Cs-137	5.53E-02	3.31E-01		Cs-137	5.93E-02	4.52E-01
	Eu-152	1.02E-01	0.00E+00		Eu-152	1.02E-01	0.00E-00
	Eu-154	7.20E-02	3.89E-02		Eu-154	7.22E-02	4.20E-02
LI-010-101-FS-GS-C08-SB (500ml)	Co-60	5.47E-02	3.61E-02	LI-010-101-FJ-GS-C19-SB (500ml)	Co-60	3.80E-02	6.85E-02
	Cs-137	5.87E-02	1.17E-01		Cs-137	5.50E-02	3.83E-01
	Eu-152	1.04E-01	9.65E-03		Eu-152	1.01E-01	1.49E-02
	Eu-154	7.28E-02	0.00E+00		Eu-154	7.11E-02	1.81E-02
LI-010-101-QS-GS-C08-SB (500ml)	Co-60	6.20E-02	1.00E-01	LI-010-101-FJ-GS-C20-SB (500ml)	Co-60	6.03E-02	4.50E-02
	Cs-137	5.19E-02	2.21E-01		Cs-137	5.62E-02	3.56E-01
	Eu-152	9.73E-02	0.00E+00		Eu-152	1.02E-01	0.00E-00
	Eu-154	6.74E-02	0.00E+00		Eu-154	7.12E-02	0.00E+00
LI-010-101-FS-GS-C09-SB (500ml)	Co-60	6.27E-02	6.45E-02	LI-010-101-FR-GS-C01-SB (1500ml composite down to 1m)	Co-60	1.06E-02	3.73E-02
	Cs-137	5.45E-02	2.42E-01		Cs-137	1.12E-02	2.30E-01
	Eu-152	9.67E-02	2.08E-02		Eu-152	-	-
	Eu-154	6.79E-02	0.00E+00		Eu-154	3.35E-02	0.00E-00
LI-010-101-FS-GS-C10-SB (500ml)	Co-60	5.54E-02	7.14E-02	LI-010-101-FR-GS-C02-SB (1500ml composite down to 1m)	Co-60	1.41E-02	1.02E-02
	Cs-137	5.71E-02	5.94E-01		Cs-137	1.10E-02	6.54E-02
	Eu-152	9.96E-02	0.00E+00		Eu-152	-	-
	Eu-154	7.05E-02	0.00E+00		Eu-154	3.17E-02	0.00E-00
LI-010-101-FS-GS-C11-SB (500ml)	Co-60	5.91E-02	8.68E-02	LI-010-101-FR-GS-C03-SB (1500ml composite down to 1m)	Co-60	9.61E-03	2.38E-02
	Cs-137	5.87E-02	6.91E-01		Cs-137	9.52E-03	1.21E-01
	Eu-152	1.01E-01	0.00E+00		Eu-152	-	-
	Eu-154	7.16E-02	1.53E-03		Eu-154	3.27E-02	0.00E-00
LI-010-101-FS-GS-C12-SB (500ml)	Co-60	6.10E-02	9.72E-02	NRC #4 (1500ml - counted on site for Dr. Lee)	Co-60	1.57E-01	2.25E-01
	Cs-137	5.14E-02	2.23E-01		Cs-137	3.56E-01	2.10E-02
	Eu-152	9.79E-02	0.00E+00		Eu-152	-	-
	Eu-154	6.85E-02	0.00E+00		Eu-154	3.96E-01	7.45E-01

sample that  
lead to  
needing  
direct push  
samples  
performed

FSS Unit: L1-010-101C

Description: Waste Treatment Building Subsoil Excavation

Type: Subsurface Soil

Classification: 1

Direct Push FSS Samples Collected 10/16/17 - 10/18/2017

Sample ID	ROC	MDA (pCi/g)	Highest Activity (pCi/g)	Sample ID	ROC	MDA (pCi/g)	Highest Activity (pCi/g)
L1-010-101-FS-GS-C01-SB (500ml)	Co-60	5.62E-02	5.70E-02	L1-010-101-FS-GS-C08-SB (500ml)	Co-60	5.31E-02	4.74E-02
	Cs-137	5.87E-02	7.11E-02		Cs-137	5.86E-02	6.37E-02
	Eu-152	1.09E-01	0.00E+00		Eu-152	1.13E-01	0.00E+00
	Eu-154	7.70E-02	0.00E+00		Eu-154	7.98E-02	0.00E+00
L1-010-101-FS-GS-C02-SB (500ml)	Co-60	5.14E-02	4.72E-02	L1-010-101-FS-GS-C09-SB (500ml)	Co-60	4.64E-02	3.34E-02
	Cs-137	4.40E-02	8.02E-02		Cs-137	5.20E-02	3.13E-01
	Eu-152	8.75E-02	0.00E+00		Eu-152	9.35E-02	0.00E+00
	Eu-154	6.19E-02	0.00E+00		Eu-154	6.52E-02	0.00E+00
L1-010-101-FS-GS-C03-SB (500ml)	Co-60	6.46E-02	6.30E-02	L1-010-101-FS-GS-C10-SB (500ml)	Co-60	6.48E-02	7.18E-02
	Cs-137	5.76E-02	9.30E-02		Cs-137	6.52E-02	2.21E-01
	Eu-152	1.08E-01	0.00E+00		Eu-152	1.15E-01	4.97E-02
	Eu-154	7.66E-02	9.86E-03		Eu-154	8.18E-02	3.50E-02
L1-010-101-QR-GS-C03-SB (500ml)	Co-60	6.83E-02	7.09E-02	L1-010-101-FS-GS-C11-SB (500ml)	Co-60	5.80E-02	3.46E-02
	Cs-137	5.56E-02	4.61E-02		Cs-137	6.19E-02	2.78E-01
	Eu-152	1.09E-01	8.40E-03		Eu-152	1.06E-01	0.00E+00
	Eu-154	7.67E-02	0.00E+00		Eu-154	7.49E-02	0.00E+00
L1-010-101-FS-GS-C04-SB (500ml)	Co-60	6.22E-02	3.56E-03	L1-010-101-FS-GS-C12-SB (500ml)	Co-60	6.57E-02	6.76E-02
	Cs-137	6.41E-02	1.03E-01		Cs-137	6.20E-02	1.56E-01
	Eu-152	1.11E-01	0.00E+00		Eu-152	1.14E-01	0.00E+00
	Eu-154	7.77E-02	0.00E+00		Eu-154	8.18E-02	1.18E-03
L1-010-101-FS-GS-C05-SB (500ml)	Co-60	4.94E-02	4.08E-02	L1-010-101-FS-GS-C13-SB (500ml)	Co-60	5.69E-02	6.38E-02
	Cs-137	4.77E-02	7.66E-02		Cs-137	5.30E-02	3.56E-01
	Eu-152	8.82E-02	0.00E+00		Eu-152	9.43E-02	0.00E+00
	Eu-154	6.25E-02	0.00E+00		Eu-154	6.65E-02	1.10E-02
L1-010-101-FS-GS-C06-SB (500ml)	Co-60	5.66E-02	7.08E-02	L1-010-101-FS-GS-C14-SB (500ml)	Co-60	3.70E-02	4.23E-02
	Cs-137	5.58E-02	4.43E-01		Cs-137	6.27E-02	1.41E+02
	Eu-152	1.03E-01	0.00E+00		Eu-152	1.19E-01	0.00E+00
	Eu-154	7.27E-02	0.00E+00		Eu-154	8.44E-02	6.73E-02
L1-010-101-FS-GS-C07-SB (500ml)	Co-60	5.32E-02	6.47E-02	L1-010-101-FS-GS-C15-SB (500ml)	Co-60	6.20E-02	9.39E-02
	Cs-137	5.26E-02	9.30E-02		Cs-137	5.93E-02	2.43E-01
	Eu-152	1.04E-01	0.00E+00		Eu-152	1.15E-01	0.00E+00
	Eu-154	7.28E-02	0.00E+00		Eu-154	8.09E-02	0.00E+00

**FSS Unit:** L1-010-101C

**Description:** Waste Treatment Building Subsoil Excavation

**Type:** Subsurface Soil

**Classification:** 1

*Samples sent to Gel for Sr-90 Analysis*

Sample ID	ROC	MDA (pCi/g)	Highest Activity (pCi/g)
<i>L1-010-101-FS-GS-C06-SB (500ml)</i>	Sr-90	3.08E-01	1.49E-01
<i>L1-010-101-FS-GS-C14-SB (500ml)</i>	Sr-90	3.37E-01	-9.77E-02