LACROSSE SOLUTIONS

10 CFR 50.36(a)(2)

February 26, 2020 LC-2020-007

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: La Crosse Boiling Water Reactor (LACBWR) Annual Radiological Environmental Operating Report

In accordance with the Quality Assurance Program Description (QAPD), Appendix C, Section 2.5.1, "Annual Radiological Environmental Monitoring Report," and Section 2.5.2, "Annual Radioactive Effluent Release Report," this letter submits the 2019 reports for Facility Operating License No. DPR-45. The reports are required to be submitted prior to March 1 per the QAPD reporting requirements. The 2019 Annual Radiological Environmental Operating Report, which includes the Radiological Environmental Monitoring Report and the Radioactive Effluent Release Report, is provided as Attachment 1 to this letter.

The Radioactive Effluent Release Report outlines changes to the Process Control Program (PCP) per the requirements of the QAPD, Appendix C, Section 2.1, "Process Control Program." The PCP was revised in 2019; the revision to the PCP is provided as Attachment 2.

The Radioactive Effluent Release Report outlines changes to the Offsite Dose Calculation Manual (ODCM) per the requirements of the QAPD, Appendix C, Section 2.2, "Offsite Dose Calculation Manual." The ODCM was revised three times in 2019; the revisions to the ODCM are provided as Attachments 3, 4, and 5.

There are no new regulatory commitments in this submittal.

If you have any questions about this submittal please contact Mr. Joseph Jacobsen at (608) 689-4259.

IE25
IE48
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Respectfully,

Gerard van Noordennen

Gerard van Noordennen
Senior Vice President Regulatory Affairs

Attachments:

Attachment 1: LACBWR Annual Radiological Environmental Operating Report
Attachment 2: LACBWR Process Control Program, Revision 1
Attachment 3: LACBWR Offsite Dose Calculation Manual, Revision 8
Attachment 4: LACBWR Offsite Dose Calculation Manual, Revision 9
Attachment 5: LACBWR Offsite Dose Calculation Manual, Revision 10

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La Crosse Boiling Water Reactor Service List

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Attachment 1

LACBWR Annual Radiological Environmental Operating Report

LACROSSE SOLUTIONS

THE 2019 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR THE LACROSSE BOILING WATER REACTOR (LACBWR) HAS BEEN APPROVED BY JOE JACOBSEN – LACBWR RPM

Joseph O. Jacobsen DATE: 2/19/2020

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

FOR THE
LA CROSSE BOILING WATER REACTOR (LACBWR)

(January 1 to December 31, 2019)

LACROSSE*SOLUTIONS*
S4601 STATE HIGHWAY 35
GENOA, WI 54632

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SECTION A

RADIOACTIVE EFFLUENT REPORT

INTRODUCTION

The La Crosse Boiling Water Reactor (LACBWR), also known as Genoa Station No. 2, is located on the east bank of the Mississippi River near Genoa, Vernon County, Wisconsin. The plant was designed and constructed by the Allis-Chalmers Manufacturing Company. It was completed in 1967 and had a generation capacity of 50 MW (165 MW $_{(th)}$). The reactor is owned by Dairyland Power Cooperative (DPC).

The reactor went critical in July 1967 and first contributed electricity to the DPC system in April 1968. After completing full power tests in August 1969, the plant operated between 60% and 100% full power, with the exception of plant shutdowns for maintenance and repair until 1987.

In April of 1987 plant operation was ceased. The reactor was defueled and placed in a SAFSTOR mode. In August of 1987 a possession-only license was received. In 2007 the reactor vessel was removed from the site and buried at the Barnwell waste repository. In 2012 all spent fuel was placed in dry storage and placed at the LACBWR Independent Spent Fuel Storage Installation (ISFSI).

In June of 2016 DPC, working with the selected decommissioning contractor LaCrosseSolutions LLC, transferred their NRC License to LaCrosse*Solutions* LLC for the purposes of decommissioning the site to unconditional release criteria, per license termination plan criteria. At the conclusion of CY 2018 all facilities inside the radiological restricted area were deconstructed and removed contents placed into radioactive waste shipping containers. The focus in CY 2019 was to finish minor decommissioning work of the radiologically restricted area of the land areas as needed, complete the final status surveys for the LACBWR site, and demobilize equipment and personnel. As of October 2019, all LACBWR site field decommissioning work was completed including final status surveys and Oak Ridge Associated Universities (ORAU) independent verification of final status surveys at NRC direction.

In accordance with LC-RP-PG-004, "Radiological Environmental Monitoring Program and Preparation of the Annual Radiological Environmental Operating Report," this document provides the Annual Radiological Environmental Operating Report (AREOR) for the Period January 1 through December 31, 2019. All LACBWR site required effluent and environmental monitoring, other than for the LACBWR ISFSI, has been terminated as of October 2019. The termination of environmental monitoring followed completion of both the final status surveys field work and independent verification survey field work by ORAU of the radiological restricted area.

EFFLUENT AND WASTE DISPOSAL REPORT

(Supplemental Information)

FACILITY: La Crosse Boiling Water Reactor LICENSEE: LaCrosse*Solutions*

LICENSE NO. DPR-45

DOCKET NO. 50-409 & 72-046

1.0 REGULATORY LIMITS

1.1 Airborne Effluent Release Limits:

LACBWR airborne particulates, with half-lives greater than 8 days, released to areas beyond the Effluent Release Boundary shall be limited to </= 7.5 mRem to any organ per calendar quarter and </= to 15 mRem to any organ per calendar year(10 CFR 50 Appendix I). The cumulative dose contributions from airborne particulate effluent releases are determined in accordance with the LaCrosse*Solutions*, LLC Offsite Dose Calculation Manual (ODCM) and consideration of 10 CFR 20 Appendix B Table 2 Column 1 concentration values. Additionally, gaseous effluents of beta radiation in the form of tritium, beyond the Effluent Release Boundary, shall be limited to 10 mRad per calendar quarter and 20 mRad per calendar year (10 CFR 50 Appendix I).The annual values for airborne effluent releases are reported in Table 1A and 1B.

Also, in accordance with the provisions of 40 CFR 190, the restrictions for total dose to any member of the public from all LACBWR related sources and dose pathways are evaluated quarterly and on an annual basis.

1.2 Liquid Effluent Release Limits:

LACBWR's liquid effluent release limitations are those concentrations specified in 10 CFR 20 Appendix B, Table 2, Column 2. The values reported in Tables 2A and 2B, Liquid Effluents, are either based on dilution of the effluent with the Genoa Station No. 3 condenser cooling water flow or no condenser cooling water flow prior to discharge

to the Mississippi River. No credit is taken for further dilution in the mixing zone of the Mississippi River.

Also, in accordance with 10 CFR 50, Appendix I, the dose commitment to a member of the public from radioactive materials released in liquid effluents to areas beyond the Effluent Release Boundary are limited to less than 1.5 mRem whole body and 5.0 mRem organ dose per calendar quarter, and less than 3.0 mRem whole body and 10 mRem organ dose per calendar year via the critical ingestion pathway. The cumulative dose contributions from liquid effluent releases are determined in accordance with the LaCrosse*Solutions*, LLC Offsite Dose Calculational Manual.

In accordance with the provisions of 40 CFR 190, the restrictions for total dose to any member of the public from all LACBWR related sources and dose pathways are evaluated quarterly and on an annual basis.

1.3 Solid Radioactive Waste

All solid radioactive wastes are handled in accordance with a Process Control Program as defined by LaCrosse*Solutions*, LLC procedures, in order to assure that all applicable transportation and burial site disposal requirements are met. Table 3 summarizes the annual solid radioactive waste shipment/ disposal statistics for the site.

2.0 EFFLUENT RELEASE CONCENTRATION LIMIT

The Liquid Effluent Release Concentration used to calculate permissible release rates are obtained from 10 CFR 20, Appendix B, Table 2, Column 2.

3.0 AVERAGE ENERGY

The release rate limits for LACBWR are not based on average energy.

4.0 ANALYTICAL METHODS

4.1 Liquid Effluents

Liquid effluent measurements for gross radioactivity are performed by HPGe gamma isotopic analysis of representative samples from each monitor tank or pump down release prior to discharge. In addition, each batch monitor tank or pump down sample is analyzed for tritium activity concentrations using site approved bench top analysis equipment. A composite sample is created by collecting representative aliquots from each tank batch or pump down release discharged during a calendar quarter. This composite is analyzed for: Iron-55, Strontium-90, Nickel-59, Nickel-63, Americium-241, Plutonium-238, Plutonium 239/240, and Plutonium -241 by an off-site contractor on a quarterly basis.

4.2 Airborne Particulates

Airborne particulate releases are determined by HPGe gamma isotopic analysis and gross beta and gross alpha analyses of glass fiber filter paper taken from four low volume air samplers placed either in prevailing downwind locations or in representative sampling locations on HEPA exhaust systems. The filter paper is changed out weekly and analyzed approximately one week later.

5.0 RELEASES

5.1 Airborne

To demonstrate compliance with the limits in Section 1.1 dose contributions have been calculated using a bounding assessment as described in Regulatory Guide 1.21. This analysis is summarized in the current Offsite Dose Calculation Manual. Routine low volume air sampling is in place at four locations outside the RCA in the predominant typical downwind locations, to be used to demonstrate compliance with dose limits in Section 1.1. Any HEPA system exhausting to the outside environment has representative air sampling performed of the exhaust air following passing thru the HEPA system also for the purposes of demonstrating compliance with Section 1.1.

5.2 Liquid

All liquid effluent releases at LACBWR are batch releases or pump down releases as described in the ODCM. The batch/pump down releases are summarized as follows:

(1)	Number of Batch/Pump Down Releases:	78
(2)	Total Time Period for Batch/Pump Down Releases:	374 hours
(3)	Maximum Time Period for a BatchPump Down Release:	21 hours
(4)	Average Time Period for a Batch/Pump Down Release:	4.80 hours
(5)	Minimum Time Period for a Batch/Pump Down Release:	0.25 hours
(6)	Average Stream Flow Rate During Periods of Release of Effluent into a Flowing Stream:	104,500 ft^3/sec

6.0 ABNORMAL RELEASES

There were no abnormal releases of radioactivity in plant effluents which exceeded release limits.

7.0 ESTIMATED TOTAL ANALYTICAL ERROR

The reported analytical results contain the following estimated errors:

Counting Error 95% Confidence Level

Sampling Volume Error ± 5%.

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2019

AIRBORNE PARTCULATE EFFLUENTS – SUMMATION OF ALL RELEASES

		UNIT	QTR 1	QTR 2	QTR 3	QTR 4	TOTAL
A.	**PARTICULATES**						
1.	BETA-GAMMA PARTICULATES WITH HALF-LIVES-LIVES> 8 DAYS	Ci	0.0	0.0	0.0	0.0	0.0
2.	AVERAGE RELEASE RATE FOR PERIOD	µCi/Sec	0.0	0.0	0.0	0.0	0.0
3.	GROSS ALPHA RADIOACTIVITY	Ci	0.0	0.0	0.0	0.0	0.0
4.	TRITIUM	Ci	0	0	0	0.0	0.0
B.	**PERCENTAGE OF ODCM DOSE LIMITS FOR PARTICULATE EFFLUENT RELEASES**						
		%	QTR	QTR	QTR	QTR	YEARLY
1.	ALL RADIONUCLIDES IN PARTICULATE FORM WITH HALF-LIVES GREATER THAN 8 DAYS						
	HIGHEST ORGAN % LIMIT	%	0%	0%	0%	0	0%

NOTE: For tritium airborne releases averaged 0mRad/quarter and overall for the year released a total of 0 mRad.

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2019

AIRBORNE PARTICULATE EFFLUENTS –GROUND LEVEL RELEASE

			CONTINUOUS OR BATCH MODE				
		UNIT	QTR 1	QTR 2	QTR 3	QTR 4	TOTAL
NUCLIDES RELEASED							
	PARTICULATES						
	Fe-55	Ci	0.0	0.0	0.0	0.0	0.0
	Ni-59	Ci	0.0	0.0	0.0	0.0	0.0
	Co-60	Ci	0.0	0.0	0.0	0.0	0.0
	Ni-63	Ci	0.0	0.0	0.0	0.0	0.0
	Sr-90	Ci	0.0	0.0	0.0	0.0	0.0
	Nb-94	Ci	0.0	0.0	0.0	0.0	0.0
	Tc-99	Ci	0.0	0.0	0.0	0.0	0.0
	Cs-137	Ci	0.0	0.0	0.0	0.0	0.0
	Eu-152	Ci	0	0	0	0.0	0.0
	Eu-154	Ci	0.0	0.0	0.0	0.0	0.0
	Eu-155	Ci	0.0	0.0	0.0	0.0	0.0
	Np-237	Ci	0.0	0.0	0.0	0.0	0.0
	Pu-238	Ci	0.0	0.0	0.0	0.0	0.0
	Pu-239/240	Ci	0.0	0.0	0.0	0.0	0.0
	Pu-241	Ci	0.0	0.0	0.0	0.0	0.0
	Am-241	Ci	0.0	0.0	0.0	0.0	0.0
	Am-243	Ci	0.0	0.0	0.0	0.0	0.0
	Cm-243/244	Ci	0.0	0.0	0.0	0.0	0.0
	Tritium-	Ci	0.0	0.0	0.0	.0	0.0
	TOTAL	Ci	0.0	0.0	0.0	.0	0.0

NOTE:

All LACBWR site required environmental monitoring, other than for the LACBWR ISFSI, has been terminated as of October 2019. The termination of environmental monitoring followed completion of both the final status surveys field work and independent verification survey field work by ORAU of the radiological restricted area.

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2019

LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES

		UNIT	QTR 1	QTR 2	QTR 3	QTR 4	TOTAL
A	**FISSION & ACTIVATION PRODUCTS**						
1.	TOTAL RELEASE (NOT INCL. TRITIUM,ALPHA)	Ci	1.39E-03	2.39E-03	3.40E-06	0	3.78E-03
2.	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	1.06E-15	2.61E-15	1.07E-16	0	3.78E-15
B.	**TRITIUM**						
1.	TOTAL RELEASE	Ci	7.43E-02	2.65E-02	3.82E-05	0	1.01E-01
2.	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	5.67E-14	1.72E-14	1.20E-15	0	7.51E-14
C.	**DISSOLVED AND ENTRAINED GASES – no releases - no longer analyzed for.**						
D.	**GROSS ALPHA RADIOACTIVITY**						
1.	TOTAL RELEASE	Ci	5.06E-06	8.91E-06	1.30 E-08	0	1.40E-05
E.	**VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)**	Liters	5.60E+07	2.89E+07	2.70E+04	0	8.49 E+07
F.	**VOLUME OF DILUTION WATER USED DURING PERIOD**	Liters	1.26E+09	1.51E+09	3.18E+07	0	2.80E+09
G.	**PERCENTAGE OF ODCM LIMITS FOR LIQUID RELEASES**						
			QTR	QTR	QTR	QTR	YEARLY
	HIGHEST ORGAN	%	23.40%	16.60%	0.15%	0%	20.07%
	WHOLE BODY	%	49.93%	35.20%	0.30%	0%	42.70%

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2019

LIQUID EFFLUENTS

NUCLIDES RELEASED	UNIT	QTR-1	QTR-2	QTR-3	QTR-4
Fe-55	Ci	4.98E-06	8.78E-06	1.24E-08	0.0
Ni-59	Ci	3.33E-06	5.87E-06	8.29E-09	0.0
Co-60	Ci	5.46E-06	9.62E-04	1.17E-06	0.0
Ni-63	Ci	7.60E-05	1.34E-04	1.89E-07	0.0
Sr-90	Ci	4.35E-05	7.67E-05	2.54E-07	0.0
Cs-137	Ci	6.18E-04	1.09E-03	1.73E-06	0.0
Pu-238	Ci	1.00E-06	1.76E-06	2.49E-09	0.0
Pu-239/240	Ci	8.25E-07	1.45E-06	2.05E-09	0.0
Pu-241	Ci	1.44E-05	2.54E-05	3.59E-08	0.0
Am-241	Ci	3.24E-06	5.70E-06	8.06E-09	0.0
Tritium	Ci	7.43E-02	2.65E-02	3.82E-05	0.0
TOTAL FOR PERIOD (ABOVE)	Ci	7.51E-02	2.88E-02	4.16E-05	0.0

TABLE 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT – 2019

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR DISPOSAL (Not Irradiated Fuel)

1. TYPE OF WASTE	UNIT	1st 6-MONTH PERIOD	2nd 6-MONTH PERIOD	TOTAL
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	0	17.5	17.5
	Ci	0.00	0.42	0.42
b. Dry compressible waste, contaminated equipment, etc.	m^3	820.94	266.30	1087.24
	Ci	34.23	7.66	41.89
c. Irradiated components, control rods, etc.	m^3	0.00	0	0
	Ci	0.00	0.00	0.00
d. Other	m^3	0	0.00	0
	Ci	0.00	0.00	0.00

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY TYPE OF WASTE)	PERCENT OF TOTAL	1st 6-MONTH PERIOD CURIES	2nd 6-MONTH PERIOD CURIES	Estimated Error Values %
Cs-137	41.47%	13.914	3.42	+/- 10
Fe-55	14.90	5.03	1.22	+/- 10
Ni-63	16.38	5.54	1.34	+/- 10
H-3	15.19	5.40	1.18	+/- 10
Pu-241	4.87	1.85	0.34	+/- 10
Co-60	2.93	0.99	0.24	+/- 10
Sr-90	2.63	0.70	0.26	+/- 10
Tc-99	1.00	0.34	0.08	+/- 10
*NOTE: showing all nuclides >1% of total				

3. SOLID WASTE DISPOSITION

NO. OF SHIPMENTS	MODE OF TRANSPORTATION	DESTINATION
88	Truck and Rail	Clive, UT

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

NO OF SHIPMENTS	MODE OF TRANSPORTATION	DESTINATION
NONE		

8.0 OFFSITE DOSE CALCULATIONS SUMMARY AND CONCLUSIONS:

8.1 Particulate/Gaseous Effluent Releases

The maximum quarterly offsite dose to any organ from the release of all radionuclides in particulate form with half-lives greater than 8 days was 0 mRem. The cumulative 2019 annual maximum organ dose from these radionuclides was also 0 mRem. The maximum quarterly offsite dose from gaseous beta emitters in the form of tritium is 0 mRad/quarter and overall for the year released a total of 0 mRad.

All particulate air sample results were </= Minimum Detectable Concentration(MDC) which was kept less than 5% of 10 CFR 20 Appendix B Table 2 Column 1 individual radio- nuclide values for radionuclides of concern at LACBWR.

No monitoring for airborne tritium was required as the Reactor Building facilities, where tritium in air exposures were a concern, were all deconstructed and removed into radioactive waste packaging by the end of CY 2018.

8.2 Liquid Effluent Releases

The maximum quarterly organ dose from liquid releases was approximately 1.17 mRem. The cumulative 2019 annual organ dose was approximately 2.01mRem. The maximum quarterly total body dose for liquid releases was approximately 0.749 mRem, and the cumulative 2019 annual total body dose was approximately 1.28 mRem.

8.3 Conclusion

All calculated offsite doses were below all ODCM limits for airborne and liquids releases for CY 2019.

9.0 OFFSITE DOSE CALCULATION MANUAL (ODCM) REVIEW

List of Changes to the ODCM

In accordance with ODCM Section 4.2.7 the following is a summary of changes made to the ODCM thru the revision process during CY 2019. All proposed changes were verified that the level of radioactive effluent controls will be conservatively maintained as well as not adversely impact the accuracy or reliability of effluent, dose, or set point calculations prior to implementation.

A summarized list of the changes is presented here, along with a complete copy of the affected ODCM revisions.

1. ODCM Revision 8

Page	Section	Change Summary
4	Summary	LACBWR Site added ability to pump out groundwater/rainwater from land areas using sump pump with no dilution-change was technically reviewed with Part 50.59 screening.

Page	Section	Change Summary
12	4.1.3	Added note to define dilution factor when no dilution flow was available
17	4.2.4.A.2	Added to action 1 statement details about how to proceed with an undiluted release
17	4.2.4.A.3	Modified requirements for analytical and radionuclide limits to meet to discharge undiluted groundwater/rainwater releases. Limits remain conservative.

Page	Section	Change Summary
18	4.2.4.B.2	Added details to define when planned undiluted discharges will require dilution flow based on the undiluted release being >/= of 10CFR20 requirements of Appendix B Table 2 Column 2.
19	4,2.4.B.3	Added an additional requirement for daily sampling of pumpdown operations with a sump pump if originally sampled discharge concentrations >10% of Appendix B Table 2 Column 2 of 10CFR20.
20	4.2.4.C.2	Added clarity to section by defining particular pumps to be used in each release application

1. Con't ODCM Revision 8

Page	Section	Change Summary
20	4.2.4.C.3	Discussed reasoning of requiring daily sampling of pumpdown discharges if original samples >10% of Appendix B Table 2 Column 2 10CFR 20. Added quality assurance to methodology of sampling.
36	Table 5.1	Adjusted Table 5.1 data entries to match sampling and release requirements of this procedure.
37	Table 5.2	Added pumpdown releases to the Table Title.

2. ODCM Revision 9

Page #	Section	Description of change
4	Summary	Clarify the ability to do pumpdown operations at any pump flow rate provided the release will be <50% of concentration specified in Appendix B Table 2 Column 2 of 10CFR20 and meet quarterly and annual dose requirements as well.
17	4.2.4.A.2	Added Action step 3 to address the ability to pump down at any flow rate desired if radionuclide concentration <50% of Appendix B Table 2 Column 2 of 10CFR20 and meet quarterly and annual dose requirements as well.
18	4.2.4.B.1	Clarified section on pumpdown operations for in the case of requiring dilution flow

3 ODCM Revision 10

Page #	Section	Description of change
4	Summary	Change made to provide for when sampling and monitoring requirements at LACBWR per ODCM requirements would stop given the end of site (FSS) final status survey work.
5	Scope	Added paragraph to define when ODCM sampling/monitoring requirements would end at LACBWR following completion of all Class 1 area (radiologically restricted area) D&D work and FSS work is completed.

The ODCM Revisions 8, 9, and10 are attached with this report.

10.0 PROCESS CONTROL PROGRAM (PCP) REVIEW

The LaCrosse*Solutions*, LLC PCP was revised in 2019. The changes that were made were to allow for dewatering of spent resin vessels used to assist in processing waste water created during the decommissioning work at LACBWR Site. In particular the changes were summarized in the Summary and Section 3.9 of the revised PCP. A copy of the revised PCP is attached with this report.

11.0 ERRATA DATA

None.

SECTION B

ANNUAL RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

INTRODUCTION:

The Radiological Environmental Monitoring (REM) Program is conducted to comply with the requirements of the ODCM and in accordance with 10 CFR 50 Part 50.36a and 10 CFR 72.104. The REM Program provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which could potentially lead to radiation doses to Members of the Public resulting from plant effluents. Environmental samples were taken within the surrounding areas of the plant and in selected background locations.

The monitoring program at the LACBWR facility includes monitoring of liquid and airborne particulate releases from the plant, as well as collecting environmental samples of surface air, river water, river sediment, and ambient radiation.

The REM program therefore supplements the Radioactive Effluent analyses by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways using the methodology of the Offsite Dose Calculation Manual (ODCM).

An Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental samples are performed.

1.0 SAMPLE COLLECTION

Environmental samples are collected from the area surrounding LACBWR at the frequencies outlined in the ODCM and the Environmental Monitoring Program. A series of figures and tables are included in this report to explain the LACBWR environmental program.

FIGURE 1	This map includes the plant exclusion boundary, roads, other generation plants, and the relationship of the plant to the nearest local community.
FIGURE 2	This map shows the location of the LACBWR RCA Fence Line Area Environmental TLD Locations.
FIGURE 3	These maps show the location of environmental low volume air sampler locations.
FIGURE 4	This map shows the location of ISFSI environmental TLDs.
TABLE 4	This table logs the environmental TLD locations at the ISFSI.
TABLE 5	This table shows the sampling frequency of the various environmental samples and the analyses performed on these samples
TABLE 6	This table shows the environmental air monitoring stations used in LACBWR's environmental program.
TABLE 7	This table logs the LACBWR environmental TLD locations.
TABLE 8	This table shows the number of various samples collected and analyzed during 2019.
TABLE 9	Quarterly Environmental TLD results for LACBWR Area
TABLE 10	Bi-Weekly Gross Beta Env. Air Sample Analysis Results for LACBWR Vicinity

2.0 RESULTS OF THE 2019 ENVIRONMENTAL MONITORING SURVEYS

During 2019, activity levels in the local environment were trending normal, indicating no significant attributed radioactivity due to decommissioning work on site.

2.1 PENETRATING RADIATION

The environmental penetrating radiation dose is measured by environmental TLDs.

2.1.1 LACBWR Plant - These environmental TLDs were changed on a quarterly basis. The results for the LACBWR Plant from 2019 are shown on Table 9.

2.1.2 ISFSI – These environmental TLDs are changed on a quarterly basis. Table 14 results for 2019 are shown.

2.2 AIR PARTICULATE

Air samples were collected continuously from various sites (see Figure 3) around LACBWR. Low volume particulate air samplers were used to collect air samples. The air filter consists of a glass fiber filter with an associated pore size of approximately 0.45 µm. The particulate filters were analyzed bi-weekly for gross beta activity with an internal proportional counter, as well as analyzed by gamma spectroscopy for individual isotopic concentration.

TABLE 10 This table shows the bi- weekly gross beta gamma activity concentration from the air particulate filters.

TABLE 11 This table shows the individual air sample particulate isotopic analysis results.

2.3 RIVER WATER

River water is collected semi-annually. River water samples before the intake structure, at plant outfall, and below the plant outfall are collected and are gamma analyzed for isotopic concentration and tritium analysis. The river water gamma isotopic analysis results are shown in Table 12. The results indicate that there were no significant plant attributable radionuclides in the river water.

2.4 SEDIMENT SAMPLES

Sediment samples are collected semi-annually before the intake structure, at plant outfall, and below the plant outfall. These samples are gamma analyzed and these results appear on Table 13. They indicated that small amounts of plant-attributed radionuclides have accumulated in river sediments near the outfall. The amount of radionuclides in the sediment has declined after plant shutdown. These amounts have remained relatively constant the last few years.

3.0 CONCLUSIONS

All environmental samples collected and analyzed during 2019 exhibited no significant contribution from LACBWR or ISFSI operations. Also, in accordance with 40CFR190 requirements all pathway doses to the environment for LACBWR Site for calendar year 2019 were evaluated and the summary for CY 2019 is:

Whole Body Dose: 1.28mRem which is 5.12% of the annual limit

Organ Dose: 2.01mRem which is 8.00% of the annual limit

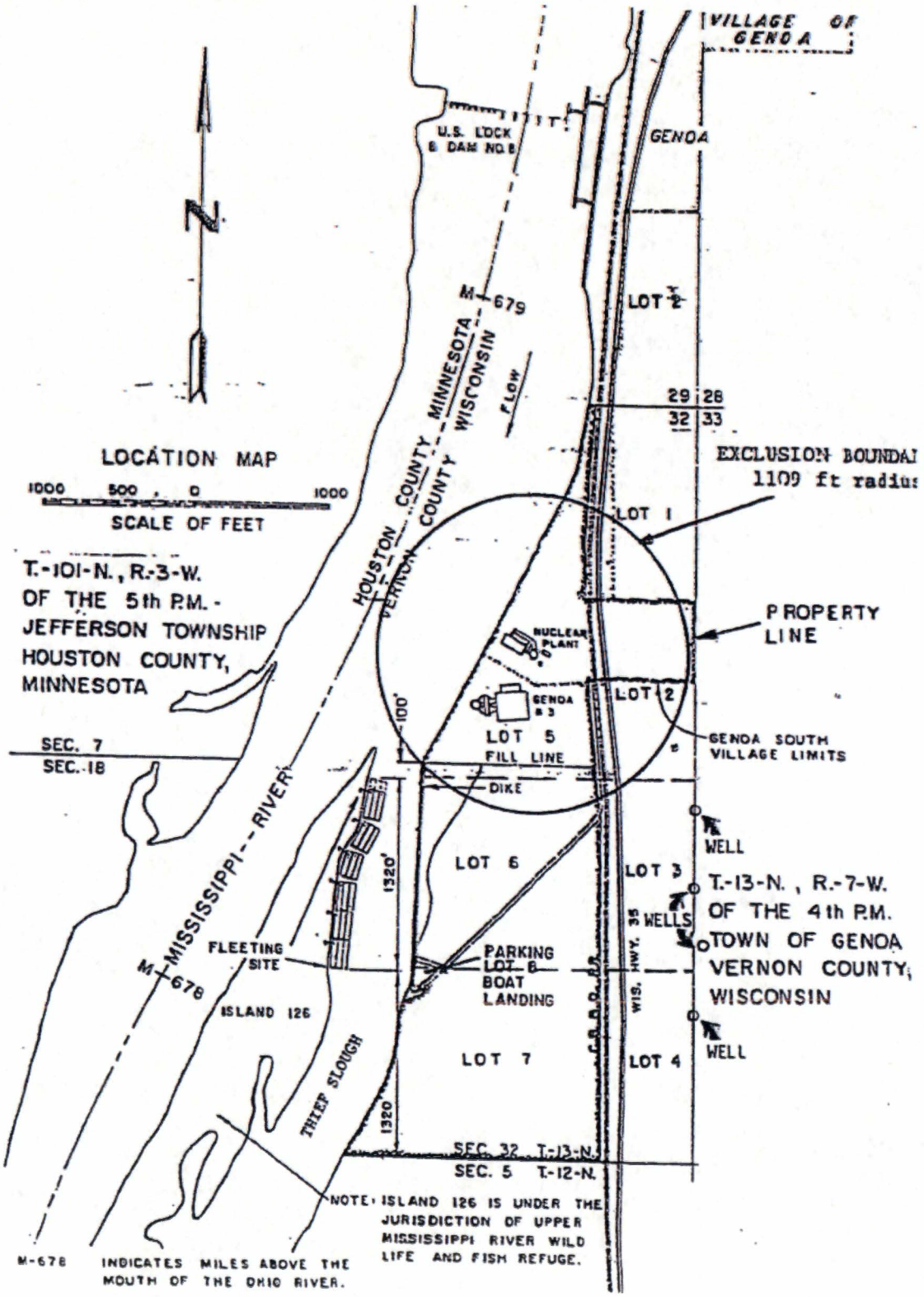
Thyroid Dose: 0mRem

4.0 INTERLABORATORY **COMPARISON PROGRAM RESULTS**

During 2019, interlaboratory comparison samples were obtained from an outside contractor. The equipment used to analyze the environmental samples on site was tested against the contractors' results. The following are the results of these comparisons.

ANALYSIS	LACBWR RESULTS	CONTRACTOR RESULTS	RATIO
GROSS BETA	252 pCi	215 pCi	1.17
GROSS ALPHA	208 pCi	238 pCi	0.87
I-131	94.5 pCi/l	89.9 pCi/l	1.05
Cr-51	230 pCi/l	251 pCi/l	0.92
Cs-134	137 pCi/l	157 pCi/l	0.87
Cs-137	119 pCi/l	114 pCi/l	1.04
Co-58	141 pCi/l	133 pCi/l	1.06
Mn-54	128 pCi/l	117 pCi/l	1.09
Fe-59	132 pCi/l	112 pCi/l	1.17
Zn-65	250 pCi/l	222 pCi/l	1.13
Co-60	172 pCi/l	160 pCi/l	1.08
H-3	17700 pCi/l	14000 pCi/l	1.26

FIGURE 1 - LACBWR PROPERTY MAP



RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT – (cont'd)

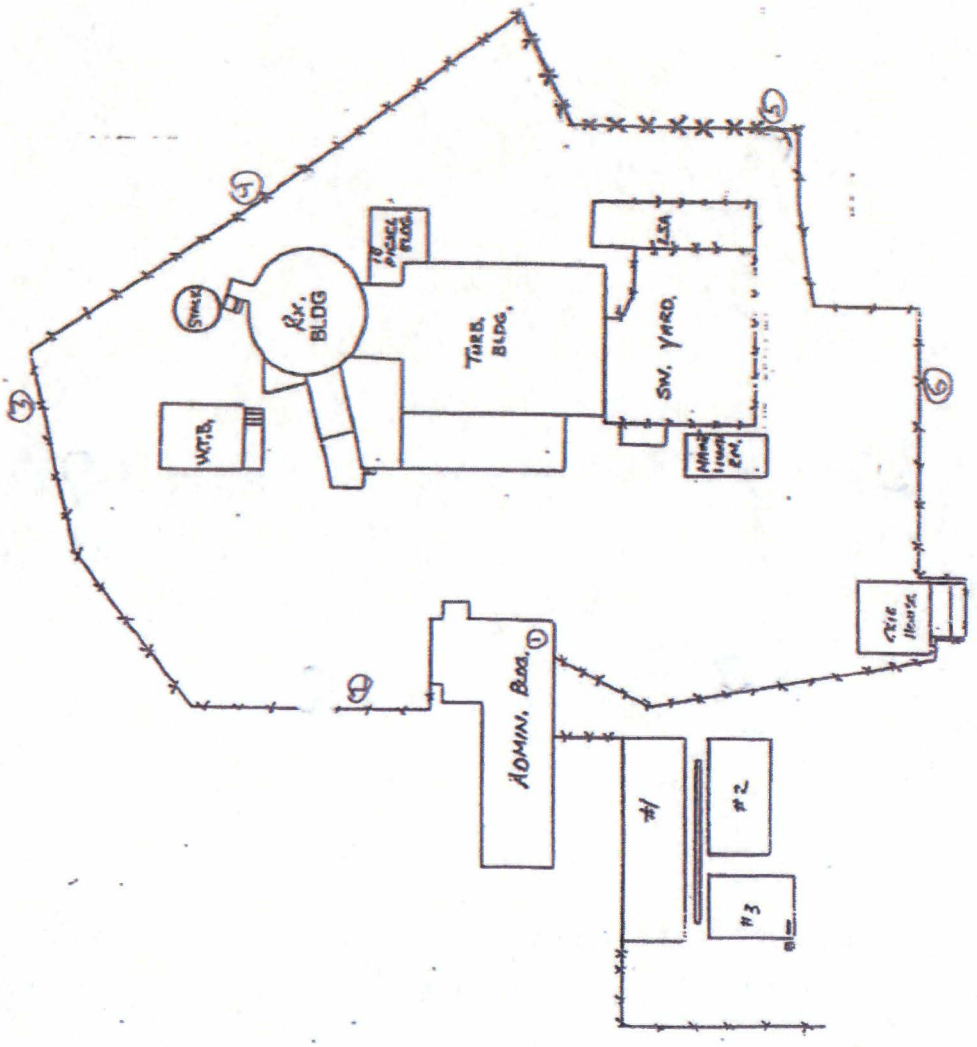


FIGURE 2 - LACBWR RCA FENCELINE ENVIRONMENTAL TLD LOCATIONS

FIGURE 3 – LACBWR ENVIRONMENTAL AIR SAMPLER LOCATIONS

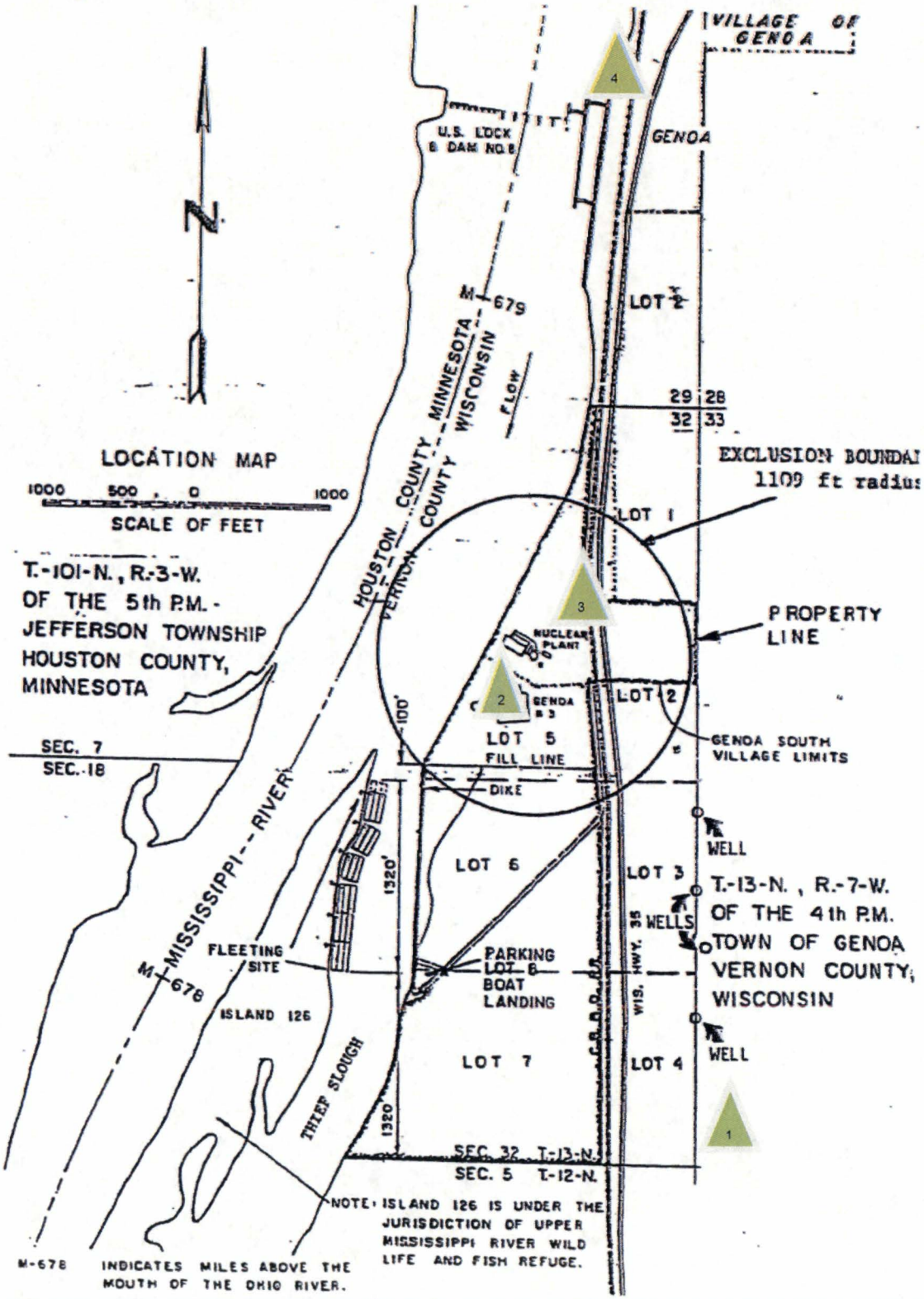


FIGURE 4 - ISFSI ENVIRONMENTAL TLD LOCATIONS

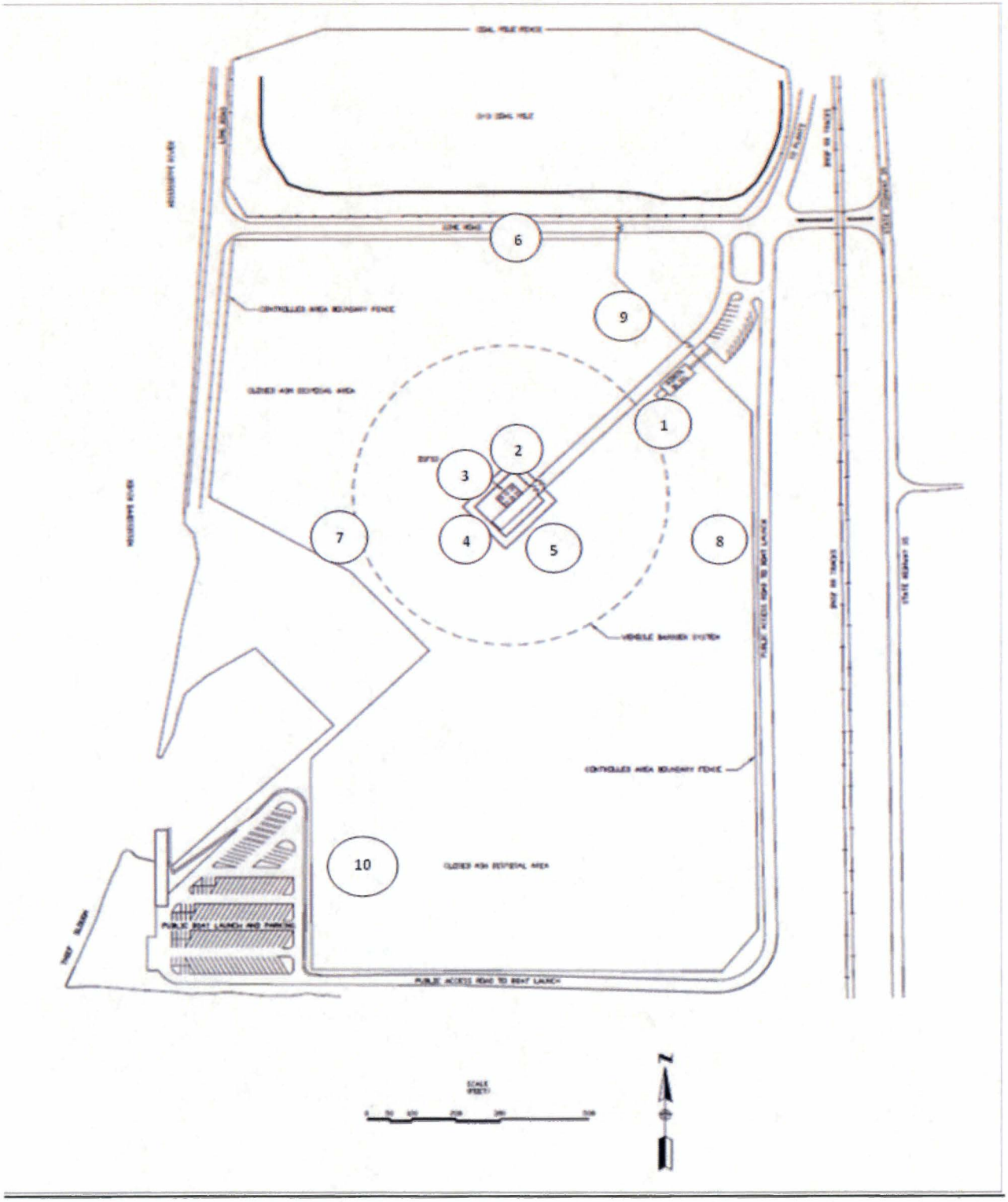


TABLE 4

ISFSI ENVIRONMENTAL TLD LOCATIONS

LOCATION NO.	LOCATION
1	ISFSI ADMINISTRATIVE BUILDING WEST
2	ISFSI PROTECTED AREA NORTH EAST SIDE
3	ISFSI PROTECTED AREA NORTH WEST SIDE
4	ISFSI PROTECTED AREA SOUTH WEST SIDE
5	ISFSI PROTECTED AREA SOUTH EAST SIDE
6	ISFSI OWNER CONTROLLED FENCE NORTH
7	ISFSI OWNER CONTROLLED FENCE WEST
8	ISFSI OWNER CONTROLLED FENCE EAST
9	ISFSI OWNER CONTROLLED FENCE NORTH EAST BY HEAVY HAUL PATH
10	ISFSI OWNER CONTROLLED FENCE WEST BY BOAT LANDING

TABLE 5

SAMPLE FREQUENCY AND ANALYSIS OF RADIOLOGICAL ENVIRONMENTAL SAMPLES

SAMPLE	FREQUENCY	ANALYSIS PERFORMED
Environmental TLDs	Quarterly	Dose in mRem
Particulate Air - Glass Fiber Filters	Bi-Weekly	Gross Beta and Gamma Spectroscopy
River Sediment	Semi-annually	Gamma Spectroscopy
River Water	Semi-annually	Gamma Spectroscopy and Tritium (Liquid Scintillation Analyzer)

NOTE:

All LACBWR site required effluent and environmental monitoring, other than for the LACBWR ISFSI, has been terminated as of October 2019. The termination of environmental monitoring was following completion of both the final status surveys field work and independent verification survey field work by ORAU of the radiological restricted area. The first set of river sediment and river water were collected in late April/early May. The second set of river and water samples were not collected as the LACBWR site exited the environmental program before these samples were due to be taken. The environmental TLD program for the LACBWR site other than the ISFSI environmental TLDs ended following the third quarter collection of environmental TLDs.

The Bi-Weekly collection of air samples ended after pick up of the air samples on October 9, 2019.

TABLE 6

LOW VOLUME ENVIRONMENTAL AIR MONITORING STATION LOCATIONS

(Refer to Figure 3)

LOCATION NO.	LOCATION
1	Trailer Park
2	Coal Plant - North Side
3	North of Main Switch Yard
4	Lock and Dam #8 - North Side

TABLE 7

LACBWR ENVIRONMENTAL TLD LOCATIONS

LOCATION NO.	LOCATION
1	ADMINISTRATION BUILDING VAULT WEST END
2	RCA FENCE LINE NORTH
3	RCA FENCELINE SOUTHEAST
4	RCA FENCELINE SOUTH
5	RCA FENCE LINE SOUTHWEST
6	RCA FENCE LINE WEST
	G-3 Crib House
	Barge Wash Break Shack
	G-3 Control Room
	LACBWR Warehouse
	Modular Meeting Trailer-East of LACBWR Admin Building

TABLE 8

RADIOLOGICAL ENVIRONMENTAL SAMPLES COLLECTED

JANUARY- DECEMBER 2019

TYPE OF SAMPLE	NUMBER OF SAMPLES
Penetrating Radiation(Environmental TLDs)	73
Air Particulate	83
River Water	3
River Sediment	3

TABLE 9

QUARTERLY ENVIRONMENTAL TLD RESULTS IN THE LACBWR VICINITY

JANUARY- DECEMBER 2019

STATION NO.	1st QUARTER mRem	2nd QUARTER mRem	3rd QUARTER mRem
1(*)	</=BKG	</=BKG	</=BKG
2(*)	</=BKG	</=BKG	</=BKG
3(*)	</=BKG	</=BKG	</=BKG
4(*)	</=BKG	</=BKG	</=BKG
5(*)	</=BKG	</=BKG	</=BKG
6(*)	</=BKG	</=BKG	</=BKG
G-3 Crib House	</=BKG	</=BKG	</=BKG
Barge Wash Break Shack	</=BKG	</=BKG	</=BKG
G-3 Control Room	</=BKG	</=BKG	</=BKG
LACBWR Warehouse	</=BKG	</=BKG	</=BKG
Modular Meeting Trailer-East of LACBWR Admin Building	</=BKG	</=BKG	</=BKG

ALL BACKGROUND (BKG) CORRECTED RESULTS AND IF WITH (*) ON RCA FENCELINE HAD OCCUPANCY CORRECTION FACTOR APPLIED IF > BACKGROUND TLD RESULTS

TABLE 10 BI-WEEKLY GROSS BETA ENVIRONMENTAL AIR SAMPLE RESULTS

COLLECTION DATE	COAL PLANT pCi/m^3	TRAILER COURT pCi/m^3	LOCK AND DAM #8 pCi/m^3	NORTH OF MAIN SWITCHYARD pCi/m^3
1-02-2019	.023 ± .002	.020 ± .002	.018 ± .002	.015 ± .002
1-16-2019	.021 ± .002	.019 ± .002	.029 ± .002	.018 ± .002
2-01-2019	.020 ± .001	.017 ± .001	.013 ± .001	.018 ± .001
2-13-2019	.014 ± .001	.014 ± .001	.013 ± .001	.013 ± .001
2-27-2019	.022 ± .001	.021 ± .001	.015 ± .001	.021 ± .001
3-13-2019	.020 ± .001	.020± .001	.015 ± .001	.022 ± .001
3-27-2019	.014 ± .001	.010 ± .001	.013 ± .001	.013 ± .001
4-10-2019	.011 ± .001	.011 ± .001	.012 ± .001	.011 ± .001
4-24-2019	.008 ± .001	.038 ± .003	.010 ± .001	.008 ± .001
5-08-2019	.008 ± .001	.008 ± .001	.012 ± .001	.009 ± .001
5-22-2019	.009 ± .001	.008 ± .001	.010 ± .001	.008 ± .001
6-05-2019	0.016+/-0.001	PUMP OFF*	.008 ± .001	.006 ± .001
6-19-2019	.010 ± .001	.011 ± .001	.014 ± .001	.009 ± .001
7-03-2019	.011 ± .001	.011 ± .001	.013 ± .001	.010 ± .001
7-17-2019	.015 ± .001	.014 ± .001	.013 ± .001	.015 ± .001
8-01-2019	.012 ± .001	.015 ± .001	.013 ± .001	.012 ± .001
8-14-2019	.016 ± .001	.020 ± .001	.019 ± .001	.015 ± .001
8-28-2019	.010 ± .001	.011 ± .001	.014 ± .001	.011 ± .001
9-11-2019	.013 ± .001	.014 ± .001	.017 ± .001	.016 ± .001
9-25-2019	.020 ± .001	.017 ± .001	.013 ± .001	.016 ± .001

TABLE 10 BI-WEEKLY GROSS BETA ENVIRONMENTAL AIR SAMPLE RESULTS

COLLECTION DATE	COAL PLANT pCi/m^3	TRAILER COURT pCi/m^3	LOCK AND DAM #8 pCi/m^3	SW MAIN SWITCHYARD pCi/m^3
10-09-2019	.010±.001	.007 ±.001	.009 ± .001	.007 ± .001

***GFCI kicked out some time after start up. GFCI was replaced. No impact tied to radiological trending given the range of the surrounding data and no events of radiological interest going on at LACBWR in this time period.**

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWITCHYARD pCi/m3
START DATE	12-20-2018	12-20-2018	12-20-2018	12-20-2018
END DATE	1-02-2019	1-02-2019	1-02-2019	1-02-2019
ISOTOPES				
Cs-134	</=4.16 E-03	</=4.00E-03	</= 1.60 E-03	</=3.31E-03
Cs-137	2.55E-03	3.70 E-03	</=1.77E-03	1.89 E-03
Co-60	</=3.78 E-03	</=3.95 E-03	</=1.53 E-03	</=3.25 E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OFMAIN SWITCHYARD pCi/m3
START DATE	1-02-2019	1-02-2019	1-02-2019	1-02-2019
END DATE	1-16-2019	1-16-2019	1-16-2019	1-16-2019
ISOTOPES				
Cs-134	</=4.35 E-03	</=3.93E-03	</=4.23 E-03	</=3.22 E-03
Cs-137	</=4.06 E-03	</=3.93E-03	</=4.12 E-03	</=3.22 E-03
Co-60	</=4.08 E-03	</=3.84 E-03	</=4.16 E-03	</=3.30 E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWITCHYARD pCi/m3
START DATE	1-16-2019	1-16-2019	1-16-2019	1-16-2019
END DATE	2-01-2019	2-01-2019	2-01-2019	2-01-2019
ISOTOPES				
Cs-134	</=3.42E-03	</=3.76E-03	</=1.37E-03	</=2.81E-03
Cs-137	</=3.76E-03	</=3.02E-03	1.32E-03	2.21E-03
Co-60	</=3.49E-03	</=3.04E-03	</=1.35E-03	</=2.76E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	2-01-2019	2-01-2019	2-01-2019	2-01-2019
END DATE	2-13-2019	2-13-2019	2-13-2019	2-13-2019
ISOTOPES				
Cs-134	</=4.60E-03	</=4.23E-03	</=1.73E-03	</=3.92E-03
Cs-137	2.80E-03	2.90E-03	</=1.21E-03	</=2.28E-03
Co-60	</=4.91E-03	</=4.17E-03	</=1.61E-03	</=3.91E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWITCHYARD pCi/m3
START DATE	2-13-2019	2-13-2019	2-13-2019	2-13-2019
END DATE	2-27-2019	2-27-2019	2-27-2019	2-27-2019
ISOTOPES				
Cs-134	</=4.12E-03	</=3.37E-03	</=1.48E-03	</=3.23E-03
Cs-137	</=2.82E-03	</=2.78E-03	</=1.41E-03	2.18E-03
Co-60	</=3.91E-03	</=3.28E-03	</=1.52E-03	</=3.23E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OFMAIN SWITCHYARD pCi/m3
START DATE	2-27-2019	2-27-2019	2-27-2019	2-27-2019
END DATE	3-13-2019	3-13-2019	3-13-2019	3-13-2019
ISOTOPES				
Cs-134	</=4.46E-03	</=3.43E-03	</=1.56E-03	</=3.34E-03
Cs-137	</=4.19E-03	</=3.00E-03	</=1.56E-03	</=3.38E-03
Co-60	</=4.14E-03	</=3.29E-03	</=1.55E-03	</=3.27E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWITCHYARD pCi/m3
START DATE	3-13-2019	3-13-2019	3-13-2019	3-13-2019
END DATE	3-27-2019	3-27-2019	3-27-2019	3-27-2019
ISOTOPES				
Cs-134	</=4.03E-03	</=2.76E-03	</=1.46E-03	</=3.15E-03
Cs-137	</=2.52E-03	1.91E-03	</=8.62E-04	</=2.37E-03
Co-60	</=4.00E-03	</=2.69E-03	</=1.54E-03	</=3.21E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWITCHYARD pCi/m3
START DATE	3-27-2019	3-27-2019	3-27-2019	3-27-2019
END DATE	4-10-2019	4-10-2019	4-10-2019	4-10-2019
ISOTOPES				
Cs-134	</=2.98E-03	</=2.71E-03	</=1.50E-03	</=3.12E-03
Cs-137	</=2.57E-03	</=1.89E-03	</=9.94E-04	</=2.53E-03
Co-60	</=3.21E-03	</=2.68E-03	</=1.51E-03	</=2.97E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWITCHYARD pCi/m3
START DATE	4-10-2019	4-10-2019	4-10-2019	4-10-2019
END DATE	4-24-2019	4-24-2019	4-24-2019	4-24-2019
ISOTOPES				
Cs-134	</=2.91E-03	</=1.43E-03	</=1.50E-03	</=2.98E-03
Cs-137	</=1.95E-03	1.02E-03	</=8.21E-04	</=3.09E-03
Co-60	</=3.17E-03	</=1.52E-03	</=1.59E-03	</=3.17E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	4-24-2019	4-24-2019	4-24-2019	4-24-2019
END DATE	5-08-2019	5-08-2019	5-08-2019	5-08-2019
ISOTOPES				
Cs-134	</=3.00E-03	</=2.72E-03	</=1.43E-03	</=3.05E-03
Cs-137	</=1.74E-03	2.09E-03	</=1.13E-03	2.18E-03
Co-60	</=3.11E-03	</=2.80E-03	</=1.57E-03	</=3.14E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	5-08-2019	5-08-2019	5-08-2019	5-08-2019
END DATE	5-22-2019	5-22-2019	5-22-2019	5-22-2019
ISOTOPES				
Cs-134	</=3.02E-03	</=2.63E-03	</=1.46E-03	</=2.98E-03
Cs-137	</=3.14E-03	</=2.67E-03	</=1.54E-03	</=3.15E-03
Co-60	</=3.14E-03	</=2.78E-03	</=1.52E-03	</=3.08E-03

LOCATION	COAL PLANT	TRAILER COURT	LOCK AND DAM #8	NORTH OF MAIN SWICHYARD
START DATE	5-22-2019	5-22-2019	5-22-2019	5-22-2019
END DATE	6-05-2019	6-05-2019	6-05-2019	6-05-2019
ISOTOPES				
Cs-134	</=3.00E-03	PUMP OFF*	</=1.43E-03	</=2.94E-03
Cs-137	</=1.86E-03	PUMP OFF*	1.11E-03	2.14E-03
Co-60	</=3.11E-03	PUMP OFF*	</=1.57E-03	</=3.08E-03

***GFCI kicked out some time after start up. GFCI was replaced. No impact tied to radiological trending given the range of the surrounding data and no events of radiological interest going on at LACBWR in this time period.**

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS

(Concentrations in pCi/m³)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	6-05-2019	6-05-2019	6-05-2019	6-05-2019
END DATE	6-19-2019	6-19-2019	6-19-2019	6-19-2019
ISOTOPES				
Cs-134	</=3.07E-03	</=2.75E-03	</=1.46E-03	</=3.13E-03
Cs-137	</=2.24E-03	</=1.98E-03	1.07E-03	1.85E-03
Co-60	</=2.90E-03	</=2.73E-03	</=1.49E-03	</=3.21E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	6-19-2019	6-19-2019	6-19-2019	6-19-2019
END DATE	7-03-2019	7-03-2019	7-03-2019	7-03-2019
ISOTOPES				
Cs-134	</=3.21E-03	</=2.76E-03	</=1.51E-03	</=3.18E-03
Cs-137	</=3.30E-03	3.11E-03	</=8.99E-04	</=3.20E-03
Co-60	</=1.55E-03	</=2.67E-03	</=1.57E-03	</=3.27E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS

(Concentrations in pCi/m³)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	7-03-20198	7-03-2019	7-03-2019	7-03-2019
END DATE	7-17-2019	7-17-2019	7-17-2019	7-17-2019
ISOTOPES				
Cs-134	</=3.02E-03	</=3.01E-03	</=1.47E-03	</=3.13E-03
Cs-137	</=3.13E-03	</=3.00E-03	</=1.44E-03	</=2.04E-03
Co-60	</=3.02E-03	</=3.10E-03	</=1.50E-03	</=3.15E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	7-17-2019	7-17-2019	7-17-2019	7-17-2019
END DATE	8-01-2019	8-01-2019	8-01-2019	8-01-2019
ISOTOPES				
Cs-134	</=2.86E-03	</=2.59E-03	</=1.38E-03	</=3.09E-03
Cs-137	</=2.95E-03	</=1.61E-03	</=7.97E-04	</=2.27E-03
Co-60	</=3.04E-03	</=2.46E-03	</=1.42E-03	</=3.08E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS

(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	8-01-2019	8-01-2019	8-01-2019	8-01-2019
END DATE	8-14-2019	8-14-2019	8-14-2019	8-14-2019
ISOTOPES				
Cs-134	</=3.36E-03	</=2.86E-03	</=1.62E-03	</=3.43E-03
Cs-137	</=1.77E-03	</=2.21E-03	</=1.36E-03	</=2.14E-03
Co-60	</=3.42E-03	</=3.02E-03	</=1.62E-03	</=3.20E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	8-14-2019	8-14-2019	8-14-2019	8-14-2019
END DATE	8-28-2019	8-28-2019	8-28-2019	8-28-2019
ISOTOPES				
Cs-134	</=4.26E-03	</=3.88E-03	</=2.11E-03	</=4.33E-03
Cs-137	</=2.45E-03	</=2.29E-03	</=2.19E-03	</=4.32E-03
Co-60	</=4.42E-03	</=4.00E-03	</=2.03E-03	</=4.61E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS

(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	8-28-2019	8-28-2019	8-28-2019	8-28-2019
END DATE	9-11-2019	9-11-2019	9-11-2019	9-11-2019
ISOTOPES				
Cs-134	</=4.34E-03	</=3.79E-03	</=1.99E-03	</=4.30E-03
Cs-137	</=4.14E-03	</=3.94E-03	</=1.13E-03	</=2.39E-03
Co-60	</=4.56E-03	</=3.85E-03	</=2.14E-03	</=4.32E-03

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	9-11-2019	9-11-2019	9-11-2019	9-11-2019
END DATE	9-25-2019	9-25-2019	9-25-2019	9-25-2019
ISOTOPES				
Cs-134	</=4.26E-03	</=3.85E-03	</=2.22E-03	</=4.36E-03
Cs-137	</=2.69E-03	</=3.77E-03	</=1.26E-03	</=2.97E-03
Co-60	</=4.45E-03	</=2.07E-03	</=2.17E-03	</=4.34E-03

TABLE 11- BI-WEEKLY GAMMA SPEC ENV. AIR SAMPLE ANALYSIS RESULTS
(Concentrations in pCi/m^3)

LOCATION	COAL PLANT pCi/m3	TRAILER COURT pCi/m3	LOCK AND DAM #8 pCi/m3	NORTH OF MAIN SWICHYARD pCi/m3
START DATE	9-25-2019	9-25-2019	9-25-2019	9-25-2019
END DATE	10-09-2019	10-09-2019	10-09-2019	10-09-2019
ISOTOPES				
Cs-134	</=3.88E-03	</=4.13E-03	</=2.17E-03	</=3.22E-03
Cs-137	</=7.01E-03	</=3.83E-03	</=2.24E-03	</=3.49E-03
Co-60	</=6.90E-03	</=4.17E-03	</=2.23E-03	</=4.54E-03

TABLE 12
SEMI ANNUAL MISSISSIPPI RIVER WATER ANALYSIS RESULTS
(Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	SAMPLE #1 LOCK and DAM # 8 5/03/2019	SAMPLE #2 LACBWR OUTFALL 5/03/2019	SAMPLE #3 Dairyland Public River Access 5/03/2019
ISOTOPES/RL*			
H-3/20000	</=217	</=217	</=217
Mn-54/1000	</=4.14	</=4.01	</=4.05
Co-60/300	</=4.17	</=4.25	</= 4.31
Zn-65/300	</=9.15	</=8.93	</=8.97
Cs-134/30	</=4.50	</=4.62	</=4.56
Cs-137/50	</=4.42	</=4.60	</=4.69

*RL = REPORTING LEVEL

TABLE 13
SEMI ANNUAL MISSISSIPPI RIVER SEDIMENT ANALYSIS RESULTS
(Concentration in pCi/Kg)

SAMPLE LOCATION COLLECTION DATE	UPSTREAM 04/23/2019	OUTFALL 04/23/2019	DOWNSTREAM 04/23/2019
ISOTOPES			
Cs-134	</=5.51	</=5.38	</=12.60
Cs-137	21.5+/-1.99	13.2 ± 1.60	77.00 ± 6.09
Co-60	</=5.16	</=5.06	</=11.00

TABLE 14
QUARTERLY ENVIRONMENTAL TLD RESULTS FOR ISFSI AREA
JANUARY-DECEMBER 2019

STATION NO.	1st QUARTER mRem	2nd QUARTER mRem	3rd QUARTER mRem	4TH Quarter mRem
1	</=BKG	</=BKG	</=BKG	</=BKG
2	74.5	80.0	82.0	64.0
3	14.0	13.0	8.0	11.0
4	28.0	28.0	17.0	22.0
5	22.0	22.0	19.0	16.0
6 (*)	</=BKG	</=BKG	</=BKG	</=BKG
7(*)	</=BKG	</=BKG	</=BKG	</=BKG
8 (*)	</=BKG	</=BKG	</=BKG	</=BKG
9 (*)	</=BKG	</=BKG	</=BKG	</=BKG
10 (*)	</=BKG	</=BKG	</=BKG	</=BKG

ALL BACKGROUND CORRECTED AND THOSE ON OWNER CONTROLLED AREA FENCE LINE IDENTIFIED WITH (*) HAD OCCUPANCY FACTOR CORRECTION APPLIED IF> BACKGROUND TLD RESULTS

Attachment 2

LACBWR Process Control Program
Revision 1

LACROSSE SOLUTIONS

LACBWR Site Restoration Project
Process Control Program
Procedure No. LC-WM-PG-001
Revision No. 1

Preparer (Print name/Sign) Jason Q Spaide — Date: 06/18/2019

Secondary Reviewer (Print Name/Sign) Greg W Tuttle — Date: 6/18/19

Regulatory Affairs assigned program & regulatory reviews (*new only): Initials/ Date: N/A		
Regulatory Required Reviews (attach completed LC-RA-PR-001 and QTR forms, as applicable)		
Part 50 License: 10 CFR 50.59 and 50.90	☒ YES	☐ NO
Fire Protection: 10 CFR 50.48(f)	☐ YES	☒ NO
Conditions of License: PSP: 10 CFR 50.54(p)	☐ YES	☒ NO
Conditions of License: E-Plan: 10 CFR 50.54(q)	☐ YES	☒ NO
Termination of License: 10 CFR 50.82(a)(6) and 50.82(a)(7)	☐ YES	☒ NO
Part 72 License: 10 CFR 72.48	☐ YES	☒ NO

Program Required Reviews

RP: ☒ YES ☐ NO SIGNATURE Scott Gilbert DATE: 06/18/19

QA: ☐ YES ☒ NO SIGNATURE _____ DATE: _____

QTR: ☒ YES ☐ NO SIGNATURE _____ DATE: 6/18/19

Approval Section

PROJECT MANAGER: SIGNATURE _____ DATE: 06/18/2019

Effective Date: 6/19/19 (assigned by Document Control or Project Manager)

TABLE OF CONTENTS

Summary of Changes:
1. Section 3.9, PCP Dewatering Process Description modified to allow the dewatering of water processing media.

1. PURPOSE AND SCOPE

1.1. Purpose

This Process Control Program (PCP) identifies the administrative and operation controls for waste processing, process parameters, and surveillance requirements, which assure that the final waste product meets the requirements of applicable Federal, State and Disposal Site Waste form requirements.

1.2. Scope

This Program is applicable to low-level radioactive waste, which requires processing to meet Reference 2.1 stability and liquid content requirements.

2. REFERENCES

2.1. NRC, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

2.2. NRC, Title 10, Part 20, "Standards for Protection Against Radiation"

2.3. NRC, Title 10, Part 71, "Packaging and Transportation of Radioactive Material"

2.4. DOT, Title 49, "Transportation", Sub Chapter C – "Hazardous Materials Regulations", Part 173, "Shippers – General Requirements for Shipments."

2.5. NRC, Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants"

2.6. Amendment # 72 to License DPR-45, LaCrosse Permanently Defueled Technical Specifications (PDTS)

2.7. NRC, Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"

2.8. LaCrosse*Solutions*, procedure LC-RP-PR-025, "Generation of the Annual Radioactive Effluent Release Report (ARERR)"

2.9. NRC Branch Technical Position On "Concentration Averaging and Encapsulation", dated January 1995

2.10. NRC Branch Technical Position On "Waste Form", Revision 1, dated January 1991

2.11 NRC Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification-1983

2.12 NEI 07-10A, Generic FSAR Template Guidance for Process Control Program (PCP) March 2009

3. GENERAL

3.1. Responsibilities

3.1.1 Waste Management is responsible for:

- Preparing and maintaining the Process Control Program and implementing procedures.
- Ensuring that waste is processed and packaged in accordance with the applicable procedures and the disposal facility waste acceptance criteria.

3.2. Definitions

3.2.1 Disposal Facility – A state or NRC licensed off-site facility used for the disposal of radioactive waste.

3.2.2 Dewatering – means the process, which removes the loosely bound liquid from a wet radioactive waste such that the accumulation of Free Standing Liquid in a disposal container is unlikely to approach the disposal limit threshold values of the disposal site.

3.2.3 Dry Active Waste (DAW) - Radioactive waste that is typically paper, wood, plastic, trash, air filters, metal, soil, concrete, asphalt, and used plant components, which without processing, contains essentially no free liquid.

3.2.4 Free Standing Liquid – means liquid that is in a disposal container but is not bound by the waste in the container.

3.2.5 Radioactive Waste Package - The packaging, together with its radioactive contents, as presented for transport.

3.2.6 Radioactive Waste Packaging - The assembly of components necessary to ensure compliance with the packaging requirements of 49 CFR and 10 CFR 71. It may consist of one or more containers, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle, the tie-down system, and auxiliary equipment may be designated as part of the packaging.

3.2.7 Radioactive Material - Byproduct material, source material, special nuclear material (SNM), and technologically enhanced naturally occurring radioactive material (TENORM).

3.2.8 Radioactive Material (for shipping purposes only) - Material having a specific and total activity as defined in 49 CFR 173.436. If the material is not radioactive for the purposes of hazardous material Class 7 transport, it is not subject to the requirements of 49 CFR 173. However, the material is not considered to be cleared or authorized for unrestricted (free) release, nor is it considered to be non-radioactive under the provisions of 10 CFR 20.

3.2.9 Stabilized - The use of an approved container or process to provide an acceptable, stable waste form. Some waste forms themselves are inherently stable.

3.2.10 Temporary System - Systems intended for short-term duration and subsequent removal once they have completed their specific task or tasks. This does not include permanent systems, consumables or vehicles and casks used for pick up or delivery service. Mobile radioactive waste processing systems used to support decommissioning activities are examples of temporary systems.

3.2.11 Waste Stream - An individual, specific type or source of radioactive waste and its associated process that exhibit similar radionuclide distributions and similar physical and chemical characteristics.

3.2.12 Wet Waste - Radioactive waste containing freestanding liquids greater than the applicable waste acceptance criteria.

3.3. LACBWR Site Restoration Project Planned Activities

The LACBWR Site Restoration Project does not plan to ship Class B waste, Class C waste, wet waste or mixed waste directly to a disposal facility. These waste types will be shipped to processing facilities prior to disposal. Program elements identified are consistent with the planned activities.

3.4. Process Control Program Administration

Changes to the PCP or implementing procedures will be reviewed to assure that the requirements of applicable Federal, State and disposal site waste acceptance criteria and waste processing facility are met. PCP changes will be sent to the NRC with the Annual Radioactive Effluent Report.

Implementing procedures are developed, approved and maintained for performing activities in support of the PCP. Examples of functions that may be addressed in implementing procedures include:

- Sampling, analysis, scaling of hard to detect radionuclides and waste classification
- Control and acceptance of vendor waste processing equipment and processes for site and offsite processing of radioactive waste

- Verification of compliance with disposal and processor site acceptance criteria.

3.5. Approval Process For QA Approved Suppliers

Purchase orders for Suppliers for PCP related services will be reviewed and approved in accordance with EnergySolutions Purchasing procedures.

3.6. PCP Requirements for Vendor Processes and Services

Vendors providing PCP services offsite will meet the requirements of their PCP process and applicable quality assurance requirements.

3.7. Waste Types Expected

The waste types planned for disposal from the LACBWR site restoration project include Class A Waste, a limited amount of water processing media, oily waste and dry active waste. Waste will be evaluated for Class B and Class C wastes prior to packaging based on the dose rate to curie content classification methodology.

3.8. PCP Solidification Process Description

No solidification of waste is anticipated for the LACBWR site restoration project. If solidification is to be used to process waste to an acceptable form, then the PCP will be revised to reflect the change.

3.9. PCP Dewatering Process Description

The LACBWR Site Restoration Project will dewater water-processing media for final disposition. Water processing media will be dewatered to meet disposal criteria.

Addition of absorbent to waste packages and containers to absorb incidental quantities of liquids and condensation is anticipated and is beyond the scope of this Program.

3.10. Annual Radioactive Effluent Release Report Input

Reference 2.8 provides direction for submission of the Annual Radioactive Effluent Release Report. Waste management will provide the following input.

Include the following information for each type of solid waste shipped offsite during the report period:

A. Dry compressible waste, contaminated equipment etc.

B. Irradiated components.

C. Other (furnish description).

i. Indicate the following information for each type of waste listed above (A – C):

ii. Total Volume in cubic meters.

- Total Radioactivity in Curies (specify whether determined by measurement or estimate)
- Principal radionuclides (specify whether determined by measurement or estimate).
- Type of container (e.g., LSA, Type A).
- Solidification Agent (e.g., cement, urea formaldehyde).
- Dates of shipment and disposition. Identify the number of shipments, the mode of transport, and the destination.
- The disposition of irradiated fuel shipments. Identify the number of shipments, the mode of transport, and the destination.
- Estimates of the total error associated with certain total values.