

**RADIOACTIVE EFFLUENT REPORT
AND
RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT**

**FOR THE
LA CROSSE BOILING WATER REACTOR (LACBWR)**

(January 1 to December 31, 2013)

**DAIRYLAND POWER COOPERATIVE
3200 EAST AVENUE SOUTH
LA CROSSE WI 54602-0817**

TABLE OF CONTENTS

SECTION A: RADIOACTIVE EFFLUENT REPORT

<u>Section</u>	<u>Title</u>	<u>Page</u>
	Introduction.....	1
1.0	Regulatory Limits.....	2
2.0	Effluent Release Concentration Limit	4
3.0	Average Energy.....	4
4.0	Analytical Methods	4
5.0	Batch Releases	5
6.0	Abnormal Releases	6
7.0	Estimated Total Analytical Error	6
8.0	Offsite Dose Calculation Summary and Conclusions	12
9.0	Offsite Dose Calculation Manual (ODCM) Review	13
10.0	Process Control Program (PCP) Review.....	13

SECTION B: RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

<u>Section</u>	<u>Title</u>	<u>Page</u>
	Introduction.....	1
1.0	Sample Collection	2
2.0	Results of the 2012 Radio-Environmental Monitoring Survey	2
3.0	Conclusions.....	4
4.0	Interlaboratory Comparison Program Results	5

TABLE OF CONTENTS

TABLES

SECTION A: RADIOACTIVE EFFLUENT REPORT

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
1A	Effluent and Waste Disposal – Gaseous Effluents Summation of All Releases	7
1B	Effluent and Waste Disposal – Gaseous Effluents Elevated Release	8
2A	Effluent and Waste Disposal – Liquid Effluents Summation of All Releases	9
2B	Effluent and Waste Disposal – Liquid Effluents	10
3	Effluent and Waste Disposal Annual Report – 2013 Solid Waste and Irradiated Fuel Shipments	11

SECTION B: RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
4	ISFSI Environmental Direct Radiation Badge Locations.....	11
5	Sample Frequency and Analysis of Radio Environmental Samples .	12
6	Permanent Environmental Monitoring Station Locations.....	13
7	Environmental TLD Locations	14
8	Radio-Environmental Samples Collected January-December 2013.	15
9	Quarterly Thermoluminescent Dosimeter Dose Measurements in the LACBWR Vicinity.....	16
10	Weekly Gross Beta Air Particulates in the LACBWR Vicinity	17
11	Air Particulate Composite Results.....	20
12	Results of Analysis of Mississippi River Water in the Vicinity of LACBWR.....	26
13	Results of Analysis of Mississippi River Sediment in the Vicinity of LACBWR	32

TABLE OF CONTENTS

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
14	Fish Sample Activity in the Vicinity of LACBWR.....	33
15	2013 Quarterly Thermoluminescent Dosimeter Dose Measurements in the ISFSI Vicinity.....	35
15	2012 Quarterly Thermoluminescent Dosimeter Dose Measurements in the ISFSI Vicinity.....	36

FIGURES

<u>No.</u>	<u>Title</u>	<u>Page</u>
FIGURE 1	LACBWR Property Map	6
FIGURE 2	Permanent Environmental Monitoring Station Location.....	7
FIGURE 3	LACBWR Environmental Dose Assessment Locations	8
FIGURE 4	LACBWR Environmental Dose Assessment Locations	9
FIGURE 5	ISFSI Environmental Direct Radiation Badge Locations.....	10

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 DPC's 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.

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 ISFSI.

In accordance with LACBWR Appendix C Section 2 of the Quality Assurance Program Description (QAPD), this document is the Radioactive Effluent Report for the Period January 1 through December 31, 2013.

EFFLUENT AND WASTE DISPOSAL REPORT

(Supplemental Information)

FACILITY: La Crosse Boiling Water Reactor LICENSEE: Dairyland Power Cooperative

DOCKET NO. 50-409

1.0 REGULATORY LIMITS

a. Gaseous Effluent Release Limits:

LACBWR's stack effluent release limitations for gaseous effluent releases of radioactive material limits the release rate of the sum of the individual radionuclides, so that the dose rates to members of the public beyond the Effluent Release Boundary do not exceed 500 mRem/year to the whole body and 1500 mRem/year to a critical organ from H-3 and particulates with half-lives greater than 8 days as per the requirements of the Offsite Dose Calculation Manual (ODCM).

Also, in accordance with 10 CFR 50, Appendix I, the ODCM limitations for gaseous effluent radioactive material limit the air dose to a member of the public from noble gases in areas beyond the Effluent Release Boundary to less than 5 mRad gamma and 10 mRad beta per calendar quarter, and less than 10 mRad gamma and 20 mRad beta per calendar year. The dose limits from H-3 and particulates with half-lives greater than 8 days are less than 7.5 mRem per calendar quarter, and less than 15 mRem per calendar year to any organ.

Cumulative dose contributions from gaseous effluent releases are determined in accordance with the LACBWR Offsite Dose Calculations Manual.

EFFLUENT AND WASTE DISPOSAL REPORT - (cont'd)

b. Liquid Effluent Release Limits:

LACBWR's liquid effluent release limitations for liquid effluent releases are those concentrations specified in 10 CFR 20 Appendix B, Table 2, Column 2. For alpha emitting radionuclides, the concentration is limited to a total activity concentration of $4.9\text{E-}9$ $\mu\text{Ci/ml}$, based upon an actual alpha emitting radionuclide analysis performed on a representative water sample. The values reported in tables 2A and 2B, Liquid Effluents, are based on dilution with the combination of LACBWR and Genoa Station No. 3 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.

Cumulative quarterly and annual dose contributions from liquid effluent releases are determined for the adult fish ingestion pathway in accordance with the LACBWR Offsite Dose Calculation Manual.

c. Solid Radioactive Waste

All solid radioactive wastes are handled in accordance with a Process Control Program as defined by LACBWR procedures in order to assure that all applicable transportation and burial site disposal requirements are met.

EFFLUENT AND WASTE DISPOSAL REPORT - (cont'd)

2.0 EFFLUENT RELEASE CONCENTRATION LIMIT

The 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

a. Liquid Effluents

Liquid effluent measurements for gross radioactivity are performed by HPGe gamma isotopic analysis of a representative sample from each tank discharged. In addition, each batch discharged tank is analyzed for alpha and tritium activity concentration. A composite sample is created by collecting representative aliquots from each tank batch discharged during a calendar quarter. This composite is analyzed for Iron-55 and Strontium-90 by a contractor on a quarterly basis.

b. Airborne Particulates

Airborne particulate releases are determined by HPGe gamma isotopic analysis. This analysis is performed by analyzing a glass fiber filter paper taken from the stack monitor which continuously isokinetically samples and monitors the stack effluent. This filter is changed and analyzed on an approximate weekly basis and analyzed within 7 days after removal. This filter is also analyzed for alpha activity. A quarterly composite of these filters is sent to a contractor for Sr-90 analysis.

c. Fission and Activation Gases

With the removal of spent fuel from the site no fission gases remain. Commencing in 2013 the monitoring for fission and activation gases was eliminated.

d. Tritium

Tritium releases are determined by taking a grab sample of the stack atmosphere at the effluent of the stack monitor. Tritium, as tritiated water, is removed from the sample stream by condensation, using a cold trap. The condensed water vapor is then distilled and the distillate is analyzed for H-3 concentration ($\mu\text{Ci/cc}$), by internal liquid scintillation spectrophotometry and the results are expressed in terms of tritium release rates. The tritium grab samples are obtained on at least a once/month basis.

5.0 BATCH RELEASES

a. Airborne

All airborne effluent releases at LACBWR are from a single Continuous-Elevated Release Point.

b. Liquid

All liquid effluent releases at LACBWR are batch releases. This is summarized as follows:

(1) Number of Batch Releases:	43
(2) Total Time Period for Batch Releases:	246.7 hours
(3) Maximum Time Period for a Batch Release:	16.3 hours
(4) Average Time Period for a Batch Release:	5.74 hours
(5) Minimum Time Period for a Batch Release:	2.5 hours
(6) Average Stream Flow Rate During Periods of Release of Effluent into a Flowing Stream:	66,231 ft ³ /sec

6.0 ABNORMAL RELEASES

There were no abnormal releases of radioactivity in plant effluents.

7.0 ESTIMATED TOTAL ANALYTICAL ERROR

The reported analytical results contain the following estimated errors:

Counting Error 95% Confidence Level

Sampling Volume Error \pm 5%.

EFFLUENT AND WASTE DISPOSAL REPORT - (cont'd)

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2013

GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES

		UNIT	QTR	QTR	QTR	QTR	TOTAL
A.	FISSION & ACTIVATION GASES						
1.	TOTAL RELEASE	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	AVERAGE RELEASE RATE FOR PERIOD	μCi/ Sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
B.	IODINE I-131 - No longer analyzed for.						
C.	PARTICULATES						
1.	PARTICULATES WITH HALF-LIVES > 8 DAYS	Ci	2.00E-06	1.60E-06	1.09E-06	6.27E-07	5.32E-06
2.	AVERAGE RELEASE RATE FOR PERIOD	μCi/ Sec	2.57E-07	2.04E-07	9.20E-08	7.89E-08	
3.	GROSS ALPHA RADIOACTIVITY	Ci	1.34E-07	6.70E-08	7.70E-08	4.80E-08	3.26E-07
D.	TRITIUM						
1.	TOTAL RELEASE	Ci	6.57E-03	4.39E-03	9.61E-03	2.59E-03	2.32E-02
2.	AVERAGE RELEASE RATE FOR PERIOD	μCi/ Sec	8.45E-04	5.58E-04	1.21E-03	3.26E-04	
E.	PERCENTAGE OF ODCM DOSE LIMITS FOR GASEOUS EFFLUENT RELEASES						
			QTR	QTR	QTR	QTR	YEARLY
1.	NOBLE GAS RELEASE						
	GAMMA	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	BETA	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	H-3 AND ALL RADIONUCLIDES IN PARTICULATE FORM WITH HALF-LIVES GREATER THAN 8 DAYS						
	GAMMA (Highest Organ)	%	2.78E-04	2.14E-04	1.08E-03	3.83E-04	9.76E-04

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2013

GASEOUS EFFLUENTS – ELEVATED RELEASE

		CONTINUOUS MODE					
		UNIT	QTR	QTR	QTR	QTR	TOTAL
NUCLIDES RELEASED							
1.	FISSION GASES						
	KRYPTON-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL FOR PERIOD	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	IODINE I-131 - Analysis no longer required.						
3.	PARTICULATES						
	STRONTIUM-90	Ci	1.95E-07	1.52E-07	9.18E-07	3.17E-07	1.58E-06
	CESIUM-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	CESIUM-137	Ci	6.86E-07	4.32E-07	1.69E-07	3.10E-07	1.66E-06
	COBALT-60	Ci	1.12E-06	1.02E-06	0.00	0.00	2.14E-06
		Ci					
		Ci					
		Ci					
		Ci					
	TOTALS	Ci	2.00E-06	1.60E-06	1.09E-06	6.27E-06	5.32E-06

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2013

LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES

		UNIT	QTR	QTR	QTR	QTR	TOTAL
A. FISSION & ACTIVATION PRODUCTS							
1.	TOTAL RELEASE (NOT INCL. TRITIUM, GASES, ALPHA)	Ci	5.36E-02	1.02E-02	2.96E-03	0.00	6.68E-02
2.	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	1.27E-08	4.35E-09	2.29E-09	0.00	
B. TRITIUM							
1.	TOTAL RELEASE	Ci	5.17E-02	6.07E-03	5.11E-03	0.00	6.29E-02
	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	1.22E-08	2.58E-09	3.95E-09	0.00	
C. DISSOLVED AND ENTRAINED GASES							
1.	TOTAL RELEASE	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.	AVERAGE DILUTED CONCENTRATION DURING PERIOD	µCi/ ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
D. GROSS ALPHA RADIOACTIVITY							
1.	TOTAL RELEASE	Ci	7.46E-04	5.27E-05	2.70E-05	0.00	8.26E-04
E. VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)							
		Liters	1.55E+05	1.40E+05	6.40E+04	0.00	3.59E+05
F. VOLUME OF DILUTION WATER USED DURING PERIOD							
		Liters	4.22E+09	2.35E+09	1.29E+09	0.00	7.86E+09
G. PERCENTAGE OF ODCM LIMITS FOR LIQUID RELEASES							
			QTR	QTR	QTR	QTR	YEARLY
	HIGHEST ORGAN	%	13.86	3.82	0.73	0.00	9.20
	WHOLE BODY	%	28.74	7.84	1.52	0.00	19.05

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2013

LIQUID EFFLUENTS

NUCLIDES RELEASED	UNIT	QTR	QTR	QTR	QTR
MANGANESE-54	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IRON-55	Ci	5.64E-05	0.00	2.52E-06	0.00E+00
COBALT-60	Ci	3.75E-03	6.58E-04	1.63E-04	0.00
STRONTIUM-90	Ci	7.87E-03	1.73E-03	3.72E-04	0.00
CESIUM-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CESIUM-137	Ci	4.19E-02	7.81E-03	2.43E-03	0.00
TOTAL FOR PERIOD (ABOVE)	Ci	5.36E-02	1.02E-02	2.96E-03	0.00
KRYPTON-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT – 2013
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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

1. TYPE OF WASTE	UNIT	6-MONTH PERIOD	6-MONTH PERIOD	TOTAL
a. SPENT RESINS, FILTER SLUDGES, EVAPORATOR BOTTOMS, ETC	m ³	6.32	0	6.32
	Ci	7.03	0	7.03
b. DRY COMPRESSIBLE WASTE, CONTAMINATED EQUIPMENT, ETC	m ³	122.4	336	458.4
	Ci	0.019	0.244	0.263
c. IRRADIATED COMPONENTS, CONTROL RODS, ETC	m ³	0	0	0
	Ci	0	0	0
d. OTHER (DESCRIBE)	m ³	0	0	0
	Ci	0	0	0

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY TYPE OF WASTE)	PERCENT OF TOTAL	6-MONTH PERIOD CURIES	6-MONTH PERIOD CURIES
Co-60	15.76	1.11	0.04
H-3	4.3	0.30	0
Ni-63	76.48	5.38	0.19
Pu-241	1.2	0.08	0

3. SOLID WASTE DISPOSITION

NO. OF SHIPMENTS	MODE OF TRANSPORTATION	DESTINATION
2	Sole use	Clive, UT
23	Sole use	Oak Ridge, TN

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

NO OF SHIPMENTS MODE OF TRANSPORTATION DESTINATION
 NONE

8.0 OFFSITE DOSE CALCULATIONS SUMMARY AND CONCLUSIONS:

a. Gaseous Effluent Releases

The maximum quarterly offsite gamma dose due to noble gases was 0.00 mRad. The cumulative 2013 annual offsite gamma dose due to noble gases was 0.00 mRad.

The maximum quarterly offsite beta dose due to noble gases was 0.00 mRad. The cumulative 2013 annual offsite beta dose due to noble gases was 0.00 mRad.

The maximum quarterly offsite dose to any organ from the release of H-3 and all radionuclides in particulate form with half-lives greater than 8 days was approximately 8.07E-05 mRem. The cumulative 2013 annual maximum organ dose from these radionuclides was also approximately 1.46E-04 mRem.

The highest historical annual average X/Q equal to 1.82 E-6 sec/m³ for the period 1985-1987 for the worst case offsite receptor location, in accordance with the ODCM, was used to calculate these offsite dose values.

b. Liquid Effluent Releases

The maximum quarterly organ dose from liquid releases was approximately 6.93E-01 mRem. The cumulative 2013 annual organ dose was approximately 9.20E-01 mRem. The maximum quarterly total body dose for liquid releases was approximately 4.31E-01 mRem, and the cumulative 2013 annual total body dose was approximately 5.71E-01 mRem.

c. Conclusion

All calculated offsite doses were below ODCM limits.

9.0 OFFSITE DOSE CALCULATION MANUAL (ODCM) REVIEW

Revision 14 to the ODCM was issued in August of 2013. The majority of the changes were editorial and administrative in nature with the exception of the following:

- Paragraph 2.2.1 – provides information that the Dry Cask Storage project has been completed and that Kr-85 is no longer being analyzed for in the effluent.
- Table 3.5 removes reference to the control room annunciation panel as the control room is no longer manned.
- Section 3.5 has been added to include reporting requirements of the Radiological Effluent Control Program reporting as Non-conformance reporting.

10.0 PROCESS CONTROL PROGRAM (PCP) REVIEW

The PCP was not reviewed in 2013.

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 Appendix I. 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 are taken within the surrounding areas of the plant and in selected control or background locations.

The monitoring program at the LACBWR facility includes monitoring of liquid and gaseous releases from the plant, as well as environmental samples of surface air, river water, river sediment, milk, fish, and penetrating radiation.

The REM program theory 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.

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

1.0 SAMPLE COLLECTION

Environmental samples are collected from the area surrounding LACBWR at the frequencies outlined in the ODCM. A series of figures and tables are included in this report to better show LACBWR's environmental program.

FIGURE 1 This map includes the plant boundary, roads, other generation plants, and the relationship of the plant to the nearest local community.

FIGURE 2 This map shows the location of LACBWR's permanent environmental monitoring stations.

FIGURES 3&4 These maps show the location of LACBWR's TLDs.

FIGURE 5 This map shows the location of ISFSI TLD's.

TABLE 4 This table shows the 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 permanent monitoring stations used in LACBWR's environmental program.

TABLE 7 This table shows the TLD locations.

TABLE 8 This table shows the number of various samples collected and analyzed during 2013.

2.0 RESULTS OF THE 2013 RADIO-ENVIRONMENTAL MONITORING SURVEYS

During 2013, activity levels in the local environment were normal, indicating no significant plant attributed radioactivity.

2.1 PENETRATING RADIATION

The environmental penetrating radiation dose is measured by thermo luminescent dosimeters consisting of four lithium fluoride (LiF) chips. These TLD's are changed on a quarterly basis and are sent to an outside contractor for

reading. The TLD results for 2013 are shown on Table 9 for LACBWR and table 15 for the ISFSI. Table 15 from 2012 is also included in this report as it was inadvertently omitted from the last report.

2.2 AIR PARTICULATE

Air samples are collected continuously from various sites (see Table 6) around LACBWR. An air sampler is also located 18 miles north of the plant in La Crosse, Wisconsin, to act as a control station.

Particulate air samples are collected at the rate of approximately 30-60 lpm with a Gelman Air Sampler. The air filter consists of a glass fiber filter with an associated pore size of approximately 0.45 μm . The particulate filters are analyzed weekly for gross beta activity with an internal proportional counter, and the monthly particulate composites are gamma analyzed for individual isotopic concentration.

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

TABLE 11 This table shows the composite air particulate isotopic analysis.

Comparison between the control station at La Crosse and the other stations near LACBWR indicate that there was no significant plant attributable airborne particulate activity.

2.3 RIVER WATER

River water is collected monthly. River water samples above at, and below the plant site are collected and are gamma analyzed for isotopic concentration. 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 were collected twice per year above, at, and below the plant outfall. These samples were 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 radionuclide in this sediment declined significantly after plant shutdown. These amounts have remained relatively constant the last few years.

2.5 FISH

Fish samples were collected quarterly above and below the plant discharge. The results of gamma spectral analysis of edible portions of fish samples appear in Table 14. There has been no significant accumulation of plant-attributed radionuclides in fish in the vicinity of LACBWR.

3.0 CONCLUSIONS

All environmental samples collected and analyzed during 2013 exhibited no significant contribution from LACBWR.

4.0 INTERLABORATORY COMPARISON PROGRAM RESULTS

During 2013, interlaboratory comparison samples were obtained from an outside contractor. The equipment used to analyze the environmental samples was tested against the contractors' results. The following is the result of this comparison.

ANALYSIS	LACBWR RESULTS	CONTRACTOR RESULTS	RATIO
GROSS BETA	141 pCi	132 pCi	1.07
GROSS ALPHA	70 pCi	64.3 pCi	1.09
I-131	98 pCi/l	92.4 pCi/l	1.06
Cr-51	254 pCi/l	240 pCi/l	1.06
Cs-134	107 pCi/l	115 pCi/l	0.93
Cs-137	106 pCi/l	102 pCi/l	1.04
Co-58	96 pCi/l	90.6 pCi/l	1.06
Mn-54	144 pCi/l	136 pCi/l	1.06
Fe-59	99 pCi/l	89.1 pCi/l	1.11
Zn-65	705 pCi/l	600 pCi/l	1.18
Co-60	127 pCi/l	119 pCi/l	1.07
H-3	14,600 pCi/l	14,500 pCi/l	1.01

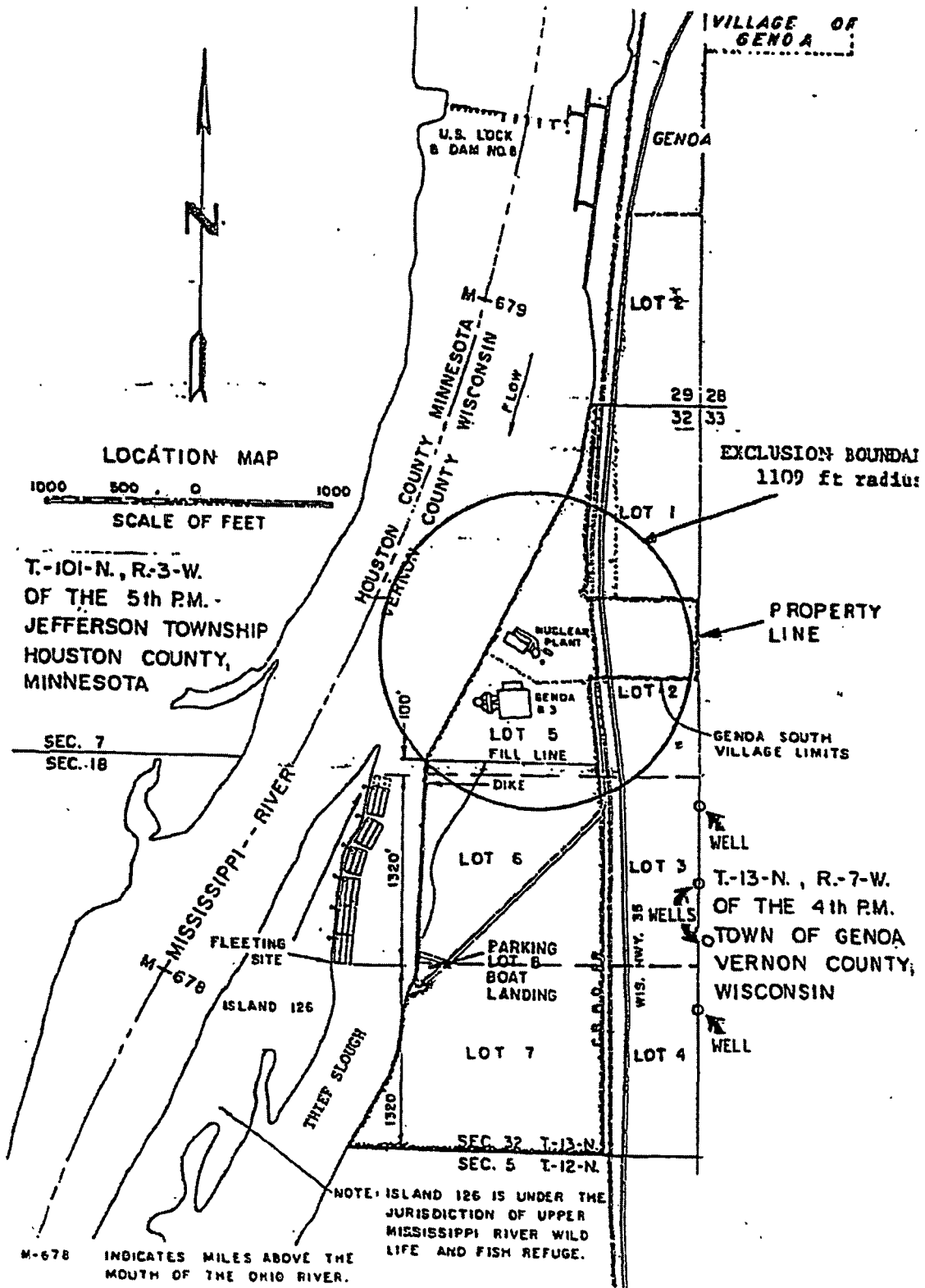


FIGURE 1 - LACBWR PROPERTY MAP

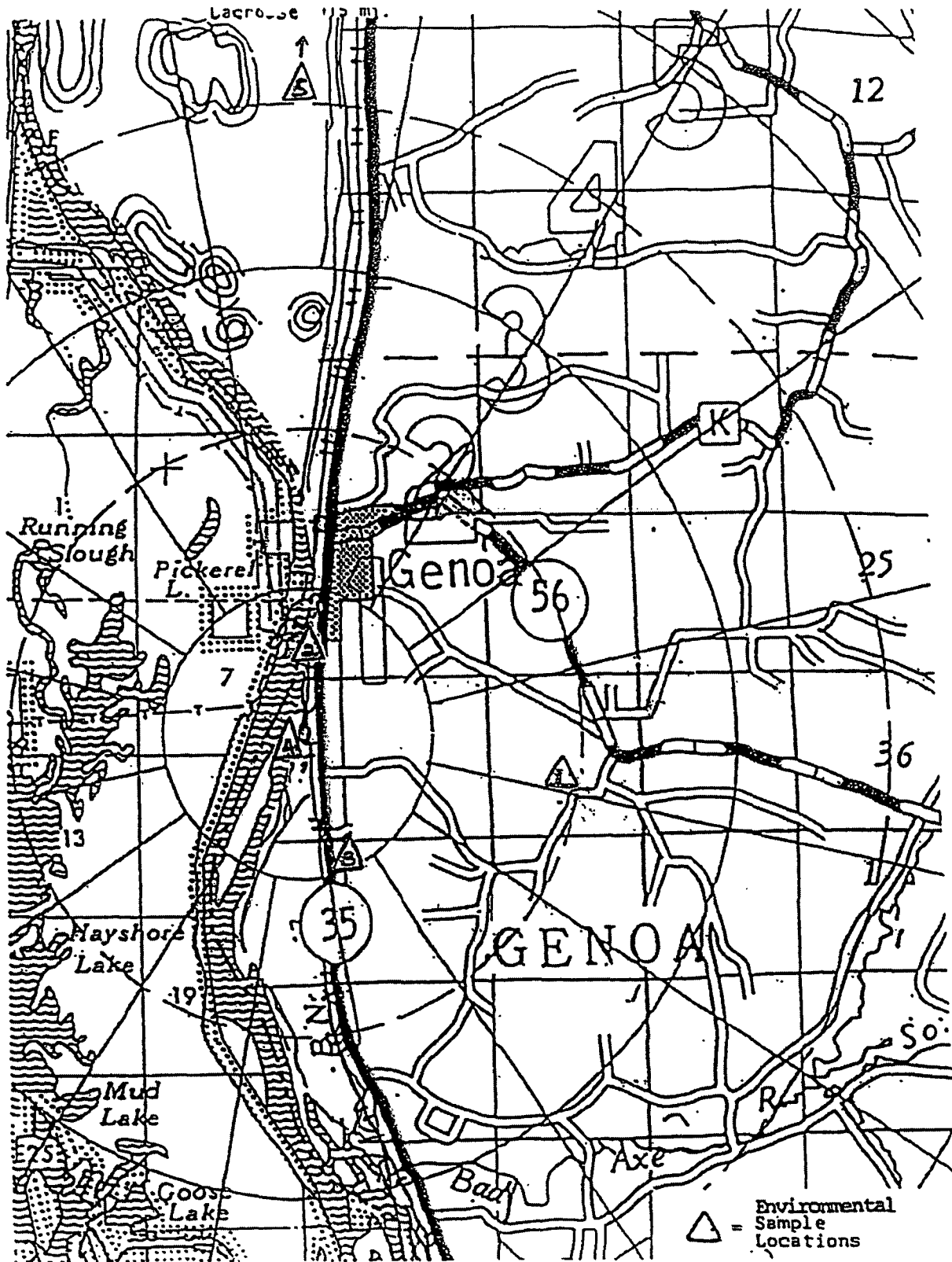


FIGURE 2 - PERMANENT ENVIRONMENTAL MONITORING STATION LOCATIONS
(Refer to Table 6)

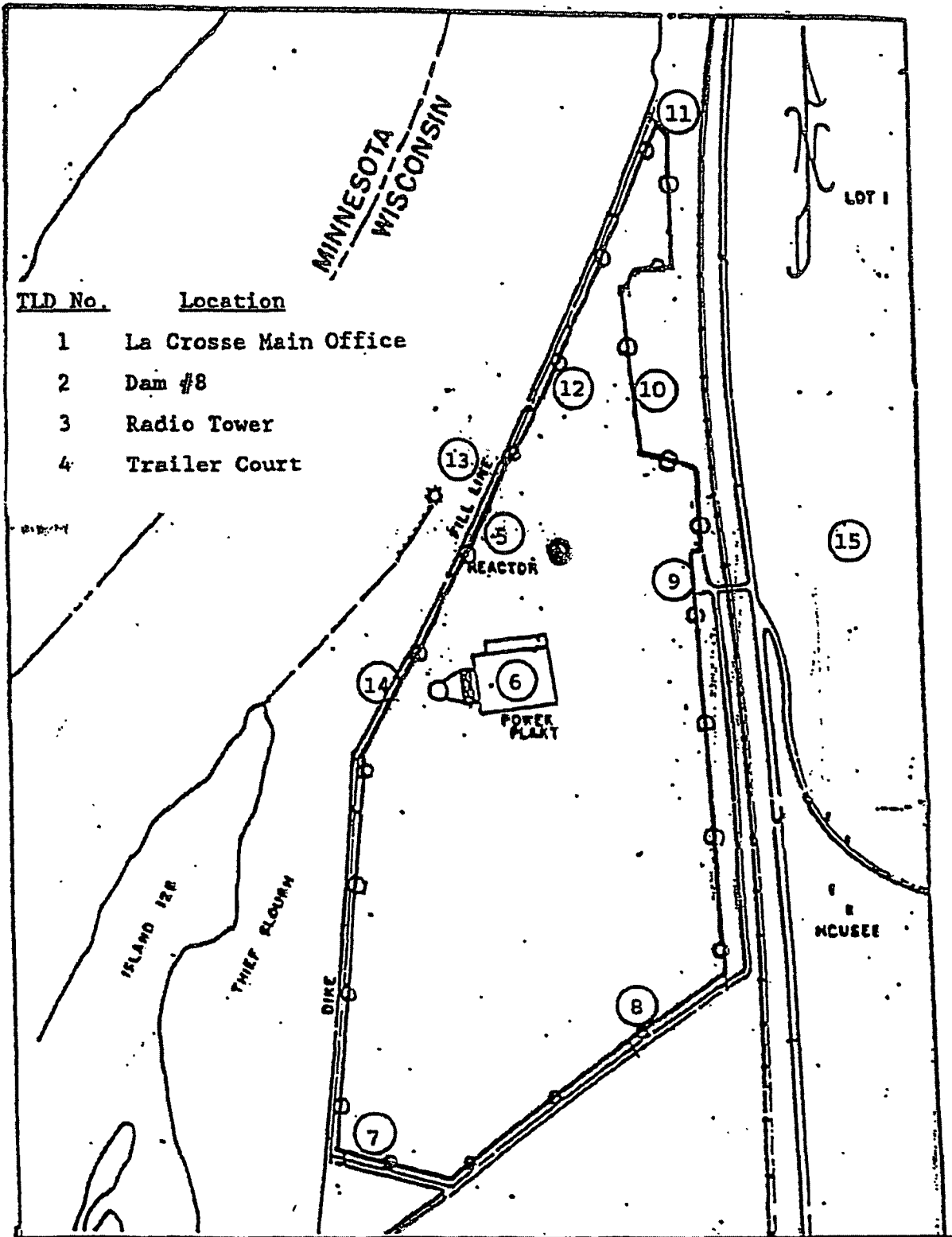


FIGURE 3 - LACBWR ENVIRONMENTAL DOSE ASSESSMENT LOCATIONS

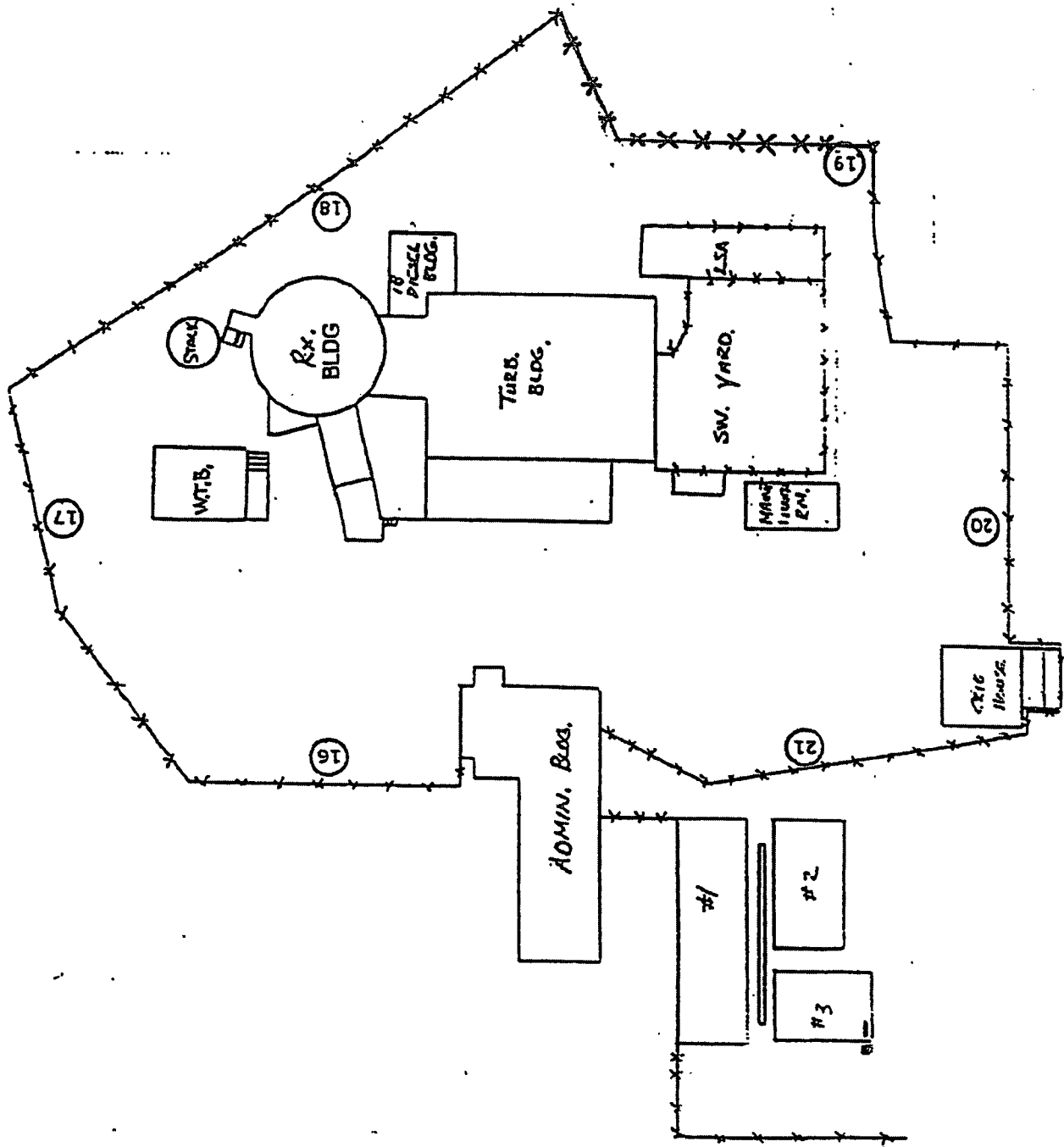
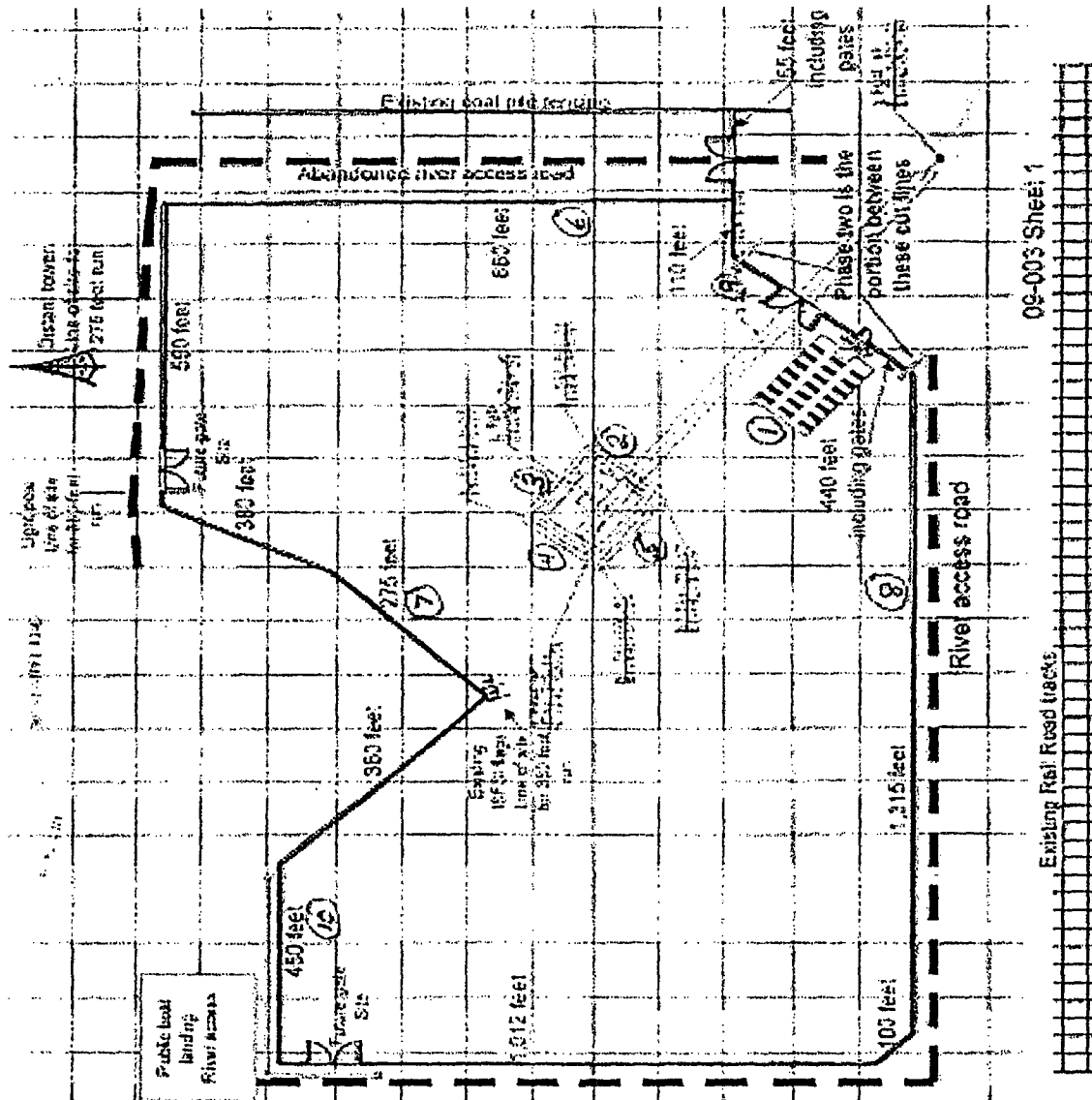


FIGURE 4 - LACBWR ENVIRONMENTAL DOSE ASSESSMENT LOCATIONS

FIGURE 5

ISFSI ENVIRONMENTAL DIRECT RADIATION BADGE LOCATIONS



09-005 Sheet 1

Existing Rail Road tracks

TABLE 4

ISFSI ENVIRONMENTAL DIRECT RADIATION BADGE LOCATIONS

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

TABLE 5

SAMPLE FREQUENCY AND ANALYSIS OF RADIO-ENVIRONMENTAL SAMPLES

<u>SAMPLE</u>	<u>FREQUENCY</u>	<u>ANALYSIS PERFORMED</u>
TLD (LiF) Dosimeters	Quarterly	Dose in mRem
Particulate Air Glass Fiber Filters	Weekly	Gross Beta and Gamma Spectroscopy of Composites Monthly (HPGe-MCA)
Milk	Obtain sample as directed if abnormal stack particulate release occurs.	Gamma Spectroscopy
Sediment	Twice per year	Gamma Spectroscopy
Fish	Quarterly	Gamma Spectroscopy
River	Monthly	Gamma isotopic analysis and tritium (Liquid Scintillation Analyzer)
Vegetation	Obtain sample as directed if abnormal stack particulate release occurs.	Gamma Spectroscopy

TABLE 6

PERMANENT ENVIRONMENTAL MONITORING STATION LOCATIONS

(Refer to Figure 2)

LOCATION NO.	LOCATION	AIR SAMPLE
1	Radio Tower	x
2	Dam No. 8	x
3	Trailer Court	x
4	Crib House	x
5	Main Office	x

TABLE 7
ENVIRONMENTAL TLD LOCATIONS

LOCATION NO.	LOCATION
1	LA CROSSE MAIN OFFICE AIR SAMPLER BOX
2	DAM #8 AIR SAMPLER BOX
3	RADIO TOWER BUILDING AT AIR SAMPLER
4	TRAILER COURT AIR SAMPLER BOX
5	CRIBHOUSE AIR SAMPLER BOX
6	G-3 CONTROL ROOM
7	SW GATEPOST AT END OF G-3 DIKE
8	ON FENCE N. SIDE OF FISHERMAN'S ROAD
9	SITE ENTRANCE GUARD AREA
10	ON FENCE AT NE CORNER OF THE SWITCHYARD
11	ON N. SITE AREA FENCE GATE
12	G-1 CRIBHOUSE
13	ON MOORING WALKWAY WEST OF LACBWR #2 WAREHOUSE
14	G-3 COAL UNLOADING CRANE
15	POWER POLE ON BLUFF SIDE EAST OF PLANT
16	RESTRICTED AREA FENCE N. SIDE
17	RESTRICTED AREA FENCE E. SIDE
18	RESTRICTED AREA FENCE S. SIDE
19	RESTRICTED AREA FENCE SW CORNER
20	RESTRICTED AREA FENCE W. SIDE
21	RESTRICTED AREA FENCE NW CORNER

TABLE 8
RADIO-ENVIRONMENTAL SAMPLES COLLECTED
JANUARY-DECEMBER 2013

TYPE OF SAMPLE	NUMBER OF SAMPLES
Penetrating Radiation (TLD's)	84
Air Particulate	260
River Water	36
Sediment	6
Fish	8

TABLE 9
QUARTERLY THERMOLUMINESCENT DOSIMETER DOSE MEASUREMENTS
IN THE LACBWR VICINITY
JANUARY – DECEMBER 2013
BACKGROUND CORRECTED

STATION NO.	1st QUARTER mRem	2nd QUARTER mRem	3rd QUARTER mRem	4th QUARTER mRem
1	0	0	0	0
2	0	0	0.5	0
3	0	0	0	0
4	0	0	1.8	4.7
5	4	63.6	34.8	3.5
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0.8	4.4	1.5
10	0	0	0	0
11	0	0	0.4	0
12	0	0	0.3	0
13	0	0	0	0
14	0	0	0	0
15	0.6	2.0	5.9	4.9
16	7.9	10.7	8.6	12.7
17	15.1	11.1	6.3	7.6
18	20.9	23.5	22.1	20.5
19	14.5	27.5	23.7	11.5
20	1.7	26.3	24.3	3.7
21	6.8	172.1	176.3	84.9

Station #1 (La Crosse Main Office) located approximately 16 miles north of LACBWR is considered the Control TLD.

TABLE 10
WEEKLY GROSS BETA AIR PARTICULATES IN THE LACBWR VICINITY
 (Reporting Level = 10 times Control Value)

COLLECTION DATE	LACBWR PLANT pCi/m ³	TRAILER COURT pCi/m ³	DAM #8 pCi/m ³	RADIO TOWER pCi/m ³	LA CROSSE CONTROL
1-9-13	.052±.004	.040±.003	.019±.003	.047±.003	.046±.003
1-16-13	.025±.003	.022±.003	.009±.002	.021±.002	.022±.002
1-23-13	.026±.003	.032±.003	.011±.002	.027±.002	.026±.002
1-30-13	.026±.003	.027±.003	.012±.002	.025±.002	.030±.003
2-6-13	.039±.003	.043±.003	.015±.002	.044±.003	.040±.003
2-13-13	.023±.003	.021±.002	.012±.002	.024±.002	.019±.002
2-20-13	.029±.003	.022±.002	.009±.002	.025±.002	.025±.002
2-27-13	.021±.002	.018±.002	.008±.002	.016±.002	.019±.002
3-6-13	.019±.002	.017±.002	.010±.002	.018±.002	.019±.002
3-13-13	.016±.002	.018±.002	.013±.002	.018±.002	.015±.002
3-20-13	.026±.003	.025±.002	.011±.002	.025±.002	.024±.003
3-27-13	.018±.002	.016±.002	.008±.002	.013±.002	.015±.002
4-3-13	.018±.002	.019±.002	.015±.002	.019±.002	.021±.002
4-10-13	.019±.002	.022±.002	.009±.002	.021±.002	.020±.002
4-17-13	.011±.002	.011±.002	.007±.002	.009±.002	.010±.002
4-24-13	.015±.002	.018±.002	.022±.003	.015±.002	.015±.002
5-1-13	.029±.003	.029±.002	.019±.003	.026±.002	.027±.003
5-8-13	.011±.002	.014±.002	.015±.003	.009±.001	.012±.002
5-15-13	.021±.002	.024±.002	.017±.003	.019±.002	.019±.002
5-22-13	.021±.002	.015±.002	.027±.003	.014±.002	.018±.002

TABLE 10
WEEKLY GROSS BETA AIR PARTICULATES IN THE LACBWR VICINITY
(Reporting Level = 10 times Control Value)

COLLECTION DATE	LACBWR PLANT pCi/m ³	TRAILER COURT pCi/m ³	DAM #8 pCi/m ³	RADIO TOWER pCi/m ³	LA CROSSE CONTROL
5-29-13	.014±.002	.013±.002	.014±.002	.013±.002	.015±.002
6-5-13	.021±.002	.014±.002	.026±.002	.015±.002	.017±.002
6-12-13	.018±.002	.018±.002	.024±.003	.023±.002	.021±.002
6-19-13	.017±.002	.017±.002	.018±.003	.019±.002	.017±.002
6-26-13	.017±.002	.018±.002	.019±.003	*No Sample	.017±.002
7-3-13	.009±.002	.015±.002	.015±.003	.020±.002	.016±.002
7-10-13	.026±.003	.027±.002	.028±.003	.029±.002	.027±.002
7-17-13	.024±.003	.022±.002	.022±.003	.024±.002	.021±.002
7-24-13	.018±.002	.022±.002	.021±.003	.020±.002	.018±.002
7-31-13	.011±.002	.012±.002	.015±.003	.014±.022	.013±.002
8-7-13	.024±.003	.021±.003	.024±.003	.021±.002	.020±.002
8-14-13	.018±.002	.019±.002	.021±.003	.019±.002	.019±.002
8-21-13	.029±.003	.029±.002	.033±.003	.033±.002	.030±.003
8-28-13	.031±.003	.033±.002	.026±.003	.034±.002	.031±.003
9-4-13	.016±.002	.019±.002	.016±.003	.022±.002	.018±.002
9-11-13	.030±.003	.038±.003	.029±.003	.040±.003	.036±.003
9-18-13	.017±.002	.018±.002	.026±.003	.018±.002	.017±.002
9-25-13	.017±.002	.024±.002	.026±.002	.018±.002	.022±.002
10-2-13	.025±.002	.026±.002	.033±.004	.028±.002	.027±.003
10-9-13	.019±.002	.019±.002	.020±.003	.024±.002	.019±.003

*Pump found off

TABLE 10
WEEKLY GROSS BETA AIR PARTICULATES IN THE LACBWR VICINITY
 (Reporting Level = 10 times Control Value)

COLLECTION DATE	LACBWR PLANT pCi/m ³	TRAILER COURT pCi/m ³	DAM #8 pCi/m ³	RADIO TOWER pCi/m ³	LA CROSSE CONTROL
10-16-13	.017±.002	.023±.002	.022±.003	.024±.002	.021±.003
10-23-13	.019±.003	.017±.002	.018±.002	.017±.002	.017±.002
10-30-13	.017±.003	.016±.002	.012±.002	.015±.002	.013±.002
11-6-13	.031±.003	.026±.002	.030±.003	.032±.003	.027±.002
11-13-13	.027±.003	.026±.002	.025±.002	.021±.002	.017±.002
11-20-13	.034±.004	.025±.002	.028±.003	.026±.002	.021±.002
11-27-13	.021±.004	.020±.002	.018±.002	.021±.002	.014±.002
12-4-13	.040±.004	.022±.002	.024±.003	.038±.003	.020±.002
12-11-13	.046±.005	.035±.003	.023±.003	.033±.003	.037±.002
12-18-13	.031±.004	.038±.003	.017±.002	.028±.003	.025±.002
12-26-13	.036±.004	.028±.002	.024±.002	.026±.002	.025±.002
1-2-14	.027±.004	.032±.003	.017±.002	.032±.003	.026±.002

TABLE 11
AIR PARTICULATE COMPOSITE RESULTS
 (Concentrations in pCi/m³)

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>01-02-13</u>	<u>01-02-13</u>	<u>01-02-13</u>	<u>01-02-13</u>	<u>01-02-13</u>
END DATE	<u>01-30-13</u>	<u>01-30-13</u>	<u>01-30-13</u>	<u>01-30-13</u>	<u>01-30-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.49E-3	<3.18E-3	<2.91E-3	<3.82E-3	<2.47E-3
Cs-137/20	<2.51E-3	<3.24E-3	<2.94E-3	<3.84E-3	<2.63E-3

*RL = REPORTING LEVEL

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>01-30-13</u>	<u>01-30-13</u>	<u>01-30-13</u>	<u>01-30-13</u>	<u>01-30-13</u>
END DATE	<u>02-27-13</u>	<u>02-27-13</u>	<u>02-27-13</u>	<u>02-27-13</u>	<u>02-27-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.48E-3	<2.90E-3	<2.34E-8	<3.79E-3	<2.56E-3
Cs-137/20	<2.50E-3	<3.09E-3	<2.41E-8	<3.94E-3	<2.62E-3

*RL = REPORTING LEVEL

TABLE 11
AIR PARTICULATE COMPOSITE RESULTS
 (Concentrations in pCi/m³)

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>02-27-13</u>	<u>02-27-13</u>	<u>02-27-13</u>	<u>02-27-13</u>	<u>02-27-13</u>
END DATE	<u>03-27-13</u>	<u>03-27-13</u>	<u>03-27-13</u>	<u>03-27-13</u>	<u>03-27-13</u>
ISOTOPES/RL*					
Cs-134/10	<3.26E-3	<4.33E-3	<3.45E-3	<5.17E-3	<3.85E-3
Cs-137/20	<3.63E-3	<4.61E-3	<3.36E-3	<5.64E-3	<4.01E-3

*RL = REPORTING LEVEL

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>03-27-13</u>	<u>03-27-13</u>	<u>03-27-13</u>	<u>03-27-13</u>	<u>03-27-13</u>
END DATE	<u>05-01-13</u>	<u>05-01-13</u>	<u>05-01-13</u>	<u>05-01-13</u>	<u>05-01-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.48E-3	<3.44E-3	<2.48E-3	<4.22E-3	<2.80E-3
Cs-137/20	<2.70E-3	<2.50E-3	<1.61E-3	<4.49E-3	<2.92E-3

*RL = REPORTING LEVEL

TABLE 11
AIR PARTICULATE COMPOSITE RESULTS
 (Concentrations in pCi/m³)

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>05-01-13</u>	<u>05-01-13</u>	<u>05-01-13</u>	<u>05-01-13</u>	<u>05-01-13</u>
END DATE	<u>05-29-13</u>	<u>05-29-13</u>	<u>05-29-13</u>	<u>05-29-13</u>	<u>05-29-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.62E-3	<4.16E-3	<3.02E-3	<5.27E-3	<3.45E-3
Cs-137/20	<1.49E-3	<2.61E-3	<3.28E-3	<2.89E-3	<1.70E-3

*RL = REPORTING LEVEL

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>05-29-13</u>	<u>05-29-13</u>	<u>05-29-13</u>	<u>05-29-13</u>	<u>05-29-13</u>
END DATE	<u>06-26-13</u>	<u>06-26-13</u>	<u>06-26-13</u>	<u>06-26-13</u>	<u>06-26-13</u>
ISOTOPES/RL*					
Cs-134/10	<3.95E-3	<4.08E-3	<2.78E-3	<5.18E-3	<3.54E-3
Cs-137/20	<4.25E-3	<4.47E-3	<3.01E-3	<5.73E-3	<3.72E-3

*RL = REPORTING LEVEL

TABLE 11
AIR PARTICULATE COMPOSITE RESULTS
 (Concentrations in pCi/m³)

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>06-26-13</u>	<u>06-26-13</u>	<u>06-26-13</u>	<u>06-26-13</u>	<u>06-26-13</u>
END DATE	<u>08-07-13</u>	<u>08-07-13</u>	<u>08-07-13</u>	<u>08-07-13</u>	<u>08-07-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.32E-3	<3.40E-3	<2.15E-3	<4.11E-3	<2.89E-3
Cs-137/20	<2.52E-3	<3.71E-3	<2.32E-3	<4.46E-3	<2.99E-3

*RL = REPORTING LEVEL

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>07-31-13</u>	<u>07-31-13</u>	<u>07-31-13</u>	<u>07-31-13</u>	<u>07-31-13</u>
END DATE	<u>08-28-13</u>	<u>08-28-13</u>	<u>08-28-13</u>	<u>08-28-13</u>	<u>08-28-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.67E-3	<4.42E-3	<2.69E-3	<5.37E-3	<3.57E-3
Cs-137/20	<2.90E-3	<2.80E-3	<2.92E-3	<5.90E-3	<3.86E-3

*RL = REPORTING LEVEL

TABLE 11
AIR PARTICULATE COMPOSITE RESULTS
 (Concentrations in pCi/m³)

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>09-04-13</u>	<u>09-04-13</u>	<u>09-04-13</u>	<u>09-04-13</u>	<u>09-04-13</u>
END DATE	<u>10-02-13</u>	<u>10-02-13</u>	<u>10-02-13</u>	<u>10-02-13</u>	<u>10-02-13</u>
ISOTOPES/RL*					
Cs-134/10	<2.22E-3	<3.34E-3	<2.36E-3	<5.39E-3	<3.31E-3
Cs-137/20	<2.39E-3	<3.58E-3	<2.47E-3	<5.80E-3	<3.45E-3

*RL = REPORTING LEVEL

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>10-02-13</u>	<u>10-02-13</u>	<u>10-02-13</u>	<u>10-02-13</u>	<u>10-02-13</u>
END DATE	<u>10-30-13</u>	<u>10-30-13</u>	<u>10-30-13</u>	<u>10-30-13</u>	<u>10-30-13</u>
ISOTOPES/RL*					
Cs-134/10	<3.34E-3	<5.75E-3	<3.34E-3	<4.97E-3	<3.75E-3
Cs-137/20	<3.35E-3	<6.19E-3	<3.46E-3	<5.46E-3	<4.04E-3

*RL = REPORTING LEVEL

TABLE 11
AIR PARTICULATE COMPOSITE RESULTS
 (Concentrations in pCi/m³)

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>10-30-13</u>	<u>10-30-13</u>	<u>10-30-13</u>	<u>10-30-13</u>	<u>10-30-13</u>
END DATE	<u>11-27-13</u>	<u>11-27-13</u>	<u>11-27-13</u>	<u>11-27-13</u>	<u>11-27-13</u>
ISOTOPES/RL*					
Cs-134/10	<3.63E-3	<6.84E-3	<3.49E-3	<4.14E-3	<2.74E-3
Cs-137/20	<3.81E-3	<7.01E-3	<3.76E-3	<4.22E-3	<2.95E-3

*RL = REPORTING LEVEL

LOCATION	RADIO TOWER	LACBWR	TRAILER COURT	DAM NO. 8	LA CROSSE
START DATE	<u>11-27-13</u>	<u>11-27-13</u>	<u>11-27-13</u>	<u>11-27-13</u>	<u>11-27-13</u>
END DATE	<u>01-02-14</u>	<u>01-02-14</u>	<u>01-02-14</u>	<u>01-02-14</u>	<u>01-02-14</u>
ISOTOPES/RL*					
Cs-134/10	<3.08E-3	<5.49E-3	<3.24E-3	<3.18E-3	<1.85E-3
Cs-137/20	<3.07E-3	<5.70E-3	<1.92E-3	<3.35E-3	<1.86E-3

*RL = REPORTING LEVEL

TABLE 12

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER WATER IN THE VICINITY OF LACBWR
 (Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	1/8/13 DAM 8	1/8/13 OUTFALL	1/8/13 VICTORY	2/11/13 DAM 8	2/11/13 OUTFALL	2/11/13 VICTORY
ISOTOPES/RL *						
H-3	<124	<124	<124	517 ₋ 106	337 ₋ 104	337 ₋ 104
Mn-54/1000	<3.73	<3.81	<3.63	<3.76	<3.76	<3.77
Co-60/300	<4.26	<4.11	<3.96	<3.96	<3.87	<3.94
Zn-65/300	<8.41	<8.99	<8.15	<8.47	<8.12	<8.62
Cs-134/30	<4.36	<4.40	<4.27	<4.09	<4.14	<4.12
Cs-137/50	<4.28	<4.37	<4.23	<4.26	<4.46	<4.29

* RL = REPORTING LEVEL

TABLE 12

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER WATER IN THE VICINITY OF LACBWR

(Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	3/11/13 DAM 8	3/11/13 OUTFALL	3.11/13 VICTORY	4/9/13 DAM 8	4/9/13 OUTFALL	4/9/13 VICTORY
ISOTOPES/RL *						
H-3	362 _± 107	226 _± 105	158 _± 104	524 _± 102	524 _± 102	415 _± 101
Mn-54/1000	<5.58	<5.60	<5.67	<5.74	<5.81	<5.65
Co-60/300	<5.96	<5.78	<5.94	<5.93	<5.89	<6.05
Zn-65/300	<12.5	<12.2	<12.1	<12.6	<12.3	<12.2
Cs-134/30	<6.17	<5.95	<5.90	<6.05	<6.08	<6.36
Cs-137/50	<6.44	<3.05	<6.48	<2.95	<3.17	<6.43

* RL = REPORTING LEVEL

TABLE 12

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER WATER IN THE VICINITY OF LACBWR
 (Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	5/14/13 DAM 8	5/14/13 OUTFALL	5/14/13 VICTORY	6/11/13 DAM 8	6/11/13 OUTFALL	6/11/13 VICTORY
ISOTOPES/RL *						
H-3	329+101	198+99	285+100	594+101	506+100	462+100
Mn-54/1000	<5.61	<5.78	<5.64	<5.54	<5.53	<5.63
Co-60/300	<5.85	<5.91	<5.88	<5.99	<5.65	<5.73
Zn-65/300	<12.2	<12.3	<12.4	<12.1	<11.9	<12.0
Cs-134/30	<6.04	<5.99	<5.97	<6.04	<5.98	<6.03
Cs-137/50	<6.39	<6.12	<6.25	<6.26	<6.26	<6.21

* RL = REPORTING LEVEL

TABLE 12

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER WATER IN THE VICINITY OF LACBWR
(Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	7/9/13 DAM 8	7/9/13 OUTFALL	7/9/13 VICTORY	8/12/13 DAM 8	8/12/13 OUTFALL	8/12/13 VICTORY
ISOTOPES/RL *						
H-3	<124	<124	<124	140+110	210+111	140+110
Mn-54/1000	<5.52	<5.55	<5.63	<5.64	<5.61	<5.71
Co-60/300	<5.97	<5.95	<5.70	<5.55	<5.87	<5.98
Zn-65/300	<11.8	<12.2	<12.0	<11.8	<12.0	<12.3
Cs-134/30	<5.86	<5.92	<6.04	<5.95	<5.92	<6.14
Cs-137/50	3.26+1.15	4.01+1.25	<6.22	<6.51	<6.30	<6.40

* RL = REPORTING LEVEL

TABLE 12

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER WATER IN THE VICINITY OF LACBWR

(Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	9/9/13 DAM 8	9/9/13 OUTFALL	9/9/13 VICTORY	10/15/13 DAM 8	10/15/13 OUTFALL	10/15/13 VICTORY
ISOTOPES/RL *						
H-3	155+104	177+104	155+104	217+103	325+102	217+103
Mn-54/1000	<5.58	<5.73	<5.56	<5.96	<5.61	<5.73
Co-60/300	<5.92	<5.71	<5.89	<6.17	<5.86	<5.72
Zn-65/300	<12.2	<12.7	<12.3	<12.7	<12.2	<12.4
Cs-134/30	<6.02	<6.02	<6.11	<6.33	<6.11	<6.08
Cs-137/50	<3.25	<3.32	<6.32	<6.51	<6.48	<6.35

* RL = REPORTING LEVEL

TABLE 12

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER WATER IN THE VICINITY OF LACBWR
 (Concentrations in pCi/Liter)

COLLECTION DATE: SAMPLE LOCATION:	11/12/13 DAM 8	11/12/13 OUTFALL	11/12/13 VICTORY	12/10/13 DAM 8	12/10/13 OUTFALL	12/10/13 VICTORY
ISOTOPES/RL *						
H-3	304+100	237+100	344+101	299+98	341+99	213+97
Mn-54/1000	<5.63	<5.70	<5.56	<5.60	<5.79	<5.59
Co-60/300	<5.88	<5.77	<5.97	<5.82	<5.72	<6.01
Zn-65/300	<12.4	<12.7	<12.6	<12.8	<12.2	<11.9
<12.8	<6.14	<6.30	<6.05	<6.11	<6.24	<6.03
Cs-137/50	<6.47	<6.55	<6.23	<6.52	<6.51	<3.06

* RL = REPORTING LEVEL

TABLE 13

RESULTS OF ANALYSIS OF MISSISSIPPI RIVER SEDIMENT IN THE VICINITY OF LACBWR
 (Concentration in pCi/Kg)
 (Reporting Level = 10 times Control Value)

SAMPLE LOCATION	UPSTREAM	OUTFALL	DOWNSTREAM	UPSTREAM	OUTFALL	DOWNSTREAM
COLLECTION DATE	<u>5/29/13</u>	<u>5/29/13</u>	<u>5/29/13</u>	<u>8/20/13</u>	<u>8/20/13</u>	<u>8/20/13</u>
<u>ISOTOPES</u>						
Cs-134	<7.85	<8.66	<16.4	<11.9	<12.1	<16.0
Cs-137	<5.06	32.36 ± 2.84	83.13 ± 6.15	13.01± 2.27	282.53 ± 16.6	94.5 ± 6.62

TABLE 14

FISH SAMPLE ACTIVITY IN THE VICINITY OF LACBWR
 (Concentrations in pCi/Kg)

COLLECTION DATE: FISH SPECIES:	10/16/13 NORTHERN PIKE	10/16/13 CARP				
ISOTOPES/RL*						
Mn-54/3E4	<8.54	<11.50				
Co-60/1E4	<9.48	<12.9				
Zn-65/2E4	<22.10	<28.8				
Cs-134/1E3	<8.51	<11.50				
Cs-137/2E3	<4.82	<12.20				

*RL =REPORTING LEVEL

TABLE 14

FISH SAMPLE ACTIVITY IN THE VICINITY OF LACBWR
 (Report Concentrations in pCi/Kg)

COLLECTION DATE: FISH SPECIES:	3/17/13 PIKE & PERCH	3/17/13 CARP	5/29/13 NORTHERN PIKE	5/29/13 CARP	8/20/13 BASS	8/20/13 CARP
ISOTOPES/RL*						
Mn-54/3E4	<10	<8.05	<8.06	<9.76	<9.68	<8.50
Co-60/1E4	<10.7	<8.99	<9.01	<10.5	<11.0	<9.06
Zn-65/2E4	<25.6	<20.4	<20.9	<24.6	<25.4	<21.2
Cs-134/1E3	<9.82	<7.9	<7.88	<9.82	<9.66	<8.39
Cs-137/2E3	<11.0	<8.59	<8.59	<10.4	<10.6	<6.40

*RL =REPORTING LEVEL

TABLE 15

QUARTERLY THERMOLUMINESCENT DOSIMETER DOSE MEASUREMENTS
IN THE ISFSI VICINITY

JANUARY-DECEMBER 2013

<u>STATION NO.</u>	1st QUARTER mRem	2nd QUARTER mRem	3rd QUARTER mRem	4th QUARTER mRem
1	0	0	0	0
2	35.5	42.5	44.5	41.6
3	114	136	125.7	129.1
4	18.2	22.4	21.5	22.1
5	34.4	51.3	38.9	40.4
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0.5
9	0	0	0	0
10	0	0	0	1.1

TABLE 15

QUARTERLY THERMOLUMINESCENT DOSIMETER DOSE MEASUREMENTS
IN THE ISFSI VICINITY

JANUARY-DECEMBER 2012

<u>STATION NO.</u>	1st QUARTER mRem	2nd QUARTER mRem	3rd QUARTER mRem	4th QUARTER mRem
1	0	0	0	0
2	0	0	19.8	40.5
3	0	0	79.5	136.0
4	0	0	10.9	19.8
5	0	0	25.3	41.7
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0.5	0	0	0